1) PROSPECTIVE EVALUATION OF PARENTAL DECISION-MAKING FACTORS FOR MANAGEMENT OF CHILDREN WITH VESICOURETERAL REFLUX.

**Purpose:** Parental decision-making for children with vesicoureteral reflux (VUR) has become more complex with the evolution of social factors such as the Internet, publication of recent VUR clinical trials contradicting older findings, and increasing availability of minimally invasive surgery for VUR. Prior work has prospectively evaluated parental surgical treatment preferences and retrospectively examined parental decision-making factors for management of children with VUR. We sought to prospectively study how parents choose to surgically and medically manage their children's VUR.

**Methods:** A 26 item questionnaire consisting of categorical and Likert scale questions was distributed to parents of children with VUR seen in the Texas Children's Hospital (TCH) urology offices or undergoing anti-reflux surgery at TCH (endoscopic injection of Deflux™ or laparoscopic or open ureteroneocystostomy [UNC]). Patients were otherwise healthy and had no prior anti-reflux surgery. Data was collected on patient age, sex, laterality and grade of VUR. Demographic factors such as income, insurance, education, age, race, and ethnicity were evaluated, as well as factors including duration and severity of VUR, surgery success rates, cessation of antibiotics, postoperative recovery, risks of complications, financial considerations, voiding cystourethrography (VCUG), renal sonography, urologist recommendations, information on the Internet, and recommendations of friends.

**Results:** Data was collected on 14 boys and 40 girls (mean age 3.3 years) with VUR (mean grade 2.8). 33 children had bilateral VUR. The parents of 35, 8, 8, and 3 children chose endoscopic treatment, UNC, antibiotic prophylaxis, or observation sans antibiotic prophylaxis, respectively. The factors which >70% of parents rated as “very important” or “extremely important” included: grade of VUR, stopping antibiotics, stopping VCUG, surgery success rates, and risk of postoperative complications. Furthermore, 92% of parents rated the pediatric urologist's opinion as “very important” or “extremely important”.

**Conclusion:** Our prospective data indicate that the parents of our patients place the most importance on the opinion of their child's urologist when choosing management for their children with VUR. Interestingly, the Internet was not particularly important in parental decision-making. Hence, despite social and medical changes, the physician-parent relationship remains critical in management of children with VUR.

2) FINANCIAL AND RADIATION COSTS OF SCREENING REGIMENS FOR VESICO–URETERAL REFLUX: A DECISION ANALYSIS.

**Purpose:** The current standard for screening regimens following an initial febrile urinary infection is voiding cystourethrography (VCUG) and renal ultrasound (RUS). Recently, a competing protocol (Top-Down method: DMSA followed by VCUG for abnormal scans only) has been gaining increasing attention. The relative cost and radiation exposure of this method as compared to the standard regimen are unclear.
We compared these screening regimens using formal decision analysis techniques, in the context of a child undergoing workup after an initial febrile UTI.

**Methods:** We constructed a decision tree model in order to evaluate two screening regimens: 1) standard (VCUG + RUS) vs. 2) Top-Down (DMSA +/- VCUG). We performed a Monte Carlo microsimulation analysis on a hypothetical cohort of 100,000 children of varying ages (0-10 years). All probability assumptions were based on published data, including: effective radiation dose estimates for continuous-fluoroscopy VCUG (cVCUG), pulsed-fluoroscopy VCUG (pVCUG) and DMSA scans, and radiation-induced solid tumor risk estimates. Cost estimates were modeled based on national billing data. Cost and radiation dosage estimates were based on one-time screening costs only. Sensitivity analyses were conducted around all probability estimates.

**Results:** Screening 100,000 children with the Top-Down regimen resulted in a per-capita 7- to 10-fold increase in effective radiation dose if low-dose pVCUG was used. If high-dose cVCUG was used, the Top-Down approach resulted in a 1.7 to 2.6-fold increase in effective radiation dose. This excess radiation dose would be anticipated to produce an excess 0.2-0.5 radiation-induced solid tumor per 100,000 children screened. Top-Down was more expensive than standard regimen, with an excess cost of $9.3 million ($92.74 per patient). 4,744 patients with VUR would not have been detected using Top-Down, including 2,690 patients with Grade 3-5 VUR. These results proved robust on sensitivity analysis.

**Conclusion:** The Top-Down approach results in an increased per-capita cost and 2-10 fold increased effective radiation dose as compared to VCUG and RUS alone. Roughly 5% of VUR patients will be missed using the Top-Down approach, although the clinical consequences of these missed diagnoses are unclear.

3) **FAILURE OF ANTIBIOTIC PROPHYLAXIS IN VUR MANAGEMENT – IS MEDICATION NONCOMPLIANCE TO BLAME?**

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**Purpose:** Antibiotic prophylaxis (AP) is commonly used for medical management of vesicoureteral reflux (VUR). However, little information exists on AP compliance in children with reflux or factors that may be associated with improved compliance.

**Methods:** We queried the 2002-2007 Innovus i3 pharmacy claims database for all children (age≤18yrs) with the diagnosis of VUR (ICD-9 code 593.7, plus claim for radiographic or nuclear cystogram within 90 days) and analyzed those with at least 1 yr of follow-up data. Criteria for management with AP were ≥ two 30-day supply antibiotic prescriptions or ≥ four 14-day supply prescriptions if the antibiotic was a penicillin or a cephalosporin. AP compliance was determined using an individual medication possession ratio (MPR), an index to estimate the proportion of time that patients have a prescribed drug available for use. Compliance was established as a MPR of greater than 80%, meaning coverage with AP for ≥ 80% of the year period. Multivariate analysis was performed to determine factors associated with compliance.

**Results:** 5,342 out of 9,496 patients with VUR (56.3%) were managed on AP. Eighty-one percent of patients on AP were female. Seventy-nine percent of patients were ≤ 5 years old, eighteen percent were 6-10 years old, and three percent were 11-18 years old. The majority of reflux patients on AP were prescribed trimethoprim/sulfamethoxazole (62%) or nitrofurantoin (24%). Forty percent of patients taking AP were compliant. Compliance was lower for 6-10 yr olds (OR .72, 95CI 0.62-0.83) and 11-18 yr olds (OR 0.57, 95CI 0.41-0.79) compared to younger children (≤5 yrs). During the 1 yr observation period the following factors were associated with increased compliance: A) One or more hospitalizations (OR 1.64, 95CI 1.42-1.90); B) one or more urologist visits; (OR1.37, 95CI 1.22-1.54); and C) two or more changes in AP regimen (OR 1.65, 95CI 1.41-1.93). Increased compliance was not associated with a lack of infections of the urinary tract (OR 1.03, 95CI 0.90-1.18).

**Conclusions:** Forty percent of patients with VUR on AP are compliant, with young age, frequent hospitalization, urologist visits, and medication changes associated with better adherence in the Innovus i3 pharmacy claims database. This knowledge may help to develop effective interventions to improve
adherence to AP. Furthermore, this analysis underscores the importance of reporting compliance with antibiotic regimens in clinical studies evaluating the utility of AP in the management of VUR.

4) PREDICTIVE FACTORS FOR RESOLUTION OF CONGENITAL HIGH-GRADE VESICOURETERAL REFLUX IN INFANTS RESULTS OF UNI AND MULTIVARIATE ANALYSES.

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Eira Stokland, The Queen Silvia Children's Hospital, 416 85 Gothenburg, Sweden
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Purpose: To study variables with impact on cessation of congenital high-grade vesicoureteral reflux in univariate analyses and provide a multivariate model for prediction of reflux resolution.

Methods: 115 infants (80 boys and 35 girls) were included in this prospective observational study at median age 2.7 months. 71% were diagnosed after urinary tract infection and 26% after prenatal ultrasound. Reflux was bilateral in 70% and of maximum grade III in 16%, grade IV in 45% and grade V in 39%. The study protocol included repeated videocystometries, renal scintigrams, chromium edetic acid clearances and free voiding observations. Median follow-up time was 36 months.

Results: The overall spontaneous reflux resolution to grade II or less was 39%. Variables significantly negatively correlated to resolution were breakthrough febrile urinary tract infection, bladder dysfunction, higher grades of reflux at inclusion, renal abnormality, subnormal renal function, increased bladder capacity, residual urine and passive occurrence of reflux. These variables were tested in a multivariate Cox proportional hazard model with stepwise selection and three independent predictors were identified; renal abnormality (hazard ratio 0.47, 95% CI 0.33-0.66, p<0.0001), bladder dysfunction (hazard ratio 0.44, 95% CI 0.29-0.67, p=0.0001) and breakthrough urinary tract infection (hazard ratio 0.42, 95% CI 0.20-0.89, p=0.02). The performance of the model was evaluated by the receiver operating characteristic curve with a calculated area under the curve of 0.83.

Conclusion: The overall resolution rate in congenital high-grade vesicoureteral reflux is high during the first years of life. By multivariate analyses renal abnormality, bladder dysfunction and breakthrough febrile urinary tract infection were identified as strong independent negative predictive factors for reflux resolution.

5) OUTCOME AFTER DISCONTINUATION OF PROPHYLACTIC ANTIBIOTICS IN CHILDREN WITH PERSISTING VESICOURETERAL REFLUX.

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C.D.A. Herndon, MD, Surgery/Section of Pediatric Urology, University of Alabama at Birmingham, Birmingham, AL
David B. Joseph, MD, Surgery/Section of Pediatric Urology, University of Alabama at Birmingham, Birmingham, AL

Purpose: The treatment of vesicoureteral reflux remains controversial. Lacking an evidence based treatment protocol, we elected to offer the option of terminating prophylactic antibiotics in otherwise healthy patients with persisting VUR at ≥ 5 years of age. We report their outcome with respect to the incidence of UTIs and whether they eventually underwent surgical intervention.

Methods: IRB approval was obtained to retrospectively review the records of all children with VUR from Dec. 1999 to Feb. 2009. Within this group, we selected children ≥ 5 years of age that have been taken off of prophylactic antibiotics. Detailed assessment was undertaken in children with primary VUR.

Results: Level 4 evidence is presented. 1006 patients have been reviewed to date with 608 patients with primary VUR identified. 181 children ≥ 5 years of age had persisting VUR. Within this group, antibiotics were discontinued in 160 patients (142 F -89%, 18 M -11%) at an average age of 6.2 years. Patients without problems are followed annually with a UA and renal ultrasound. Average follow up is 2.2 years with follow up to 8 years off of prophylaxis recorded. Grade of VUR at the time of discontinuing antibiotics was 1-5 (average grade 2.3 on both sides). 51 (32%) patients (91% F, 9% M) developed a UTI after discontinuing prophylaxis. After stopping prophylaxis, 43 patients (88% F, 12% M) had a febrile UTI.
at an average of 1.1 years (0.1 – 5.3 years), and 8 patients (100% F) had recurrent cystitis, with first infection occurring on average at 1.8 years (0.1 – 5.2 years). 52 patients have undergone correction (29 open repairs, 23 endoscopic injections). 2 patients underwent intervention at the parents’ request at an average of 0.7 years of uneventful observation and 1 patient is awaiting correction. We did not identify any predictive parameters for patients at risk for a UTI. Demographics of gender, laterality, grade of VUR at diagnosis, and dysfunctional voiding were similar for those who developed UTIs and those who did not. 6 patients had persistent VUR after surgery and all 6 had endoscopic treatment. 2 patients successfully repaired have had recurrent afebrile UTIs. **Conclusion:** 32% of patients ≥ 5 years of age with persisting VUR develop a UTI within 2 years following cessation of prophylaxis, with the majority of these being febrile. Discontinuing antibiotics is reasonable, but a prospective, randomized, long term multi-institutional trial is required to determine if this approach is beneficial.

6) **EXTRAVESICAL URETERAL REIMPLANTATION PERFORMED AT AN OUTPATIENT SURGICAL FACILITY: UNIFORM PATIENT DISCHARGE AND HIGH PARENTAL SATISFACTION.**

Jeffrey S. Palmer, MD, FACS, FAAP, Pediatric and Adolescent Urology, Cleveland Clinic, Cleveland, OH

**Purpose:** Extravesical ureteral reimplantation has been shown to be safely performed in a hospital setting as an outpatient procedure. We evaluated both the ability for this operation to be performed at an outpatient surgical facility with same-day discharge and parental satisfaction to this approach.

**Methods:** We evaluated the level of parental satisfaction after the last 50 consecutive unilateral and bilateral extravesical ureteral reimplantations performed at an outpatient surgical facility. In order to be included in the study, parents were required to have had previous experience at the main hospital for comparison purposes. Parents received extensive preoperative and postoperative education along with a detailed postoperative instruction sheet. Patients were required to fulfill strict criteria prior to discharge home. Postoperatively, parents were asked the following questions: 1) Do you believe that your child benefited by not being hospitalized; 2) Do you believe that your child benefited by having surgery performed in a surgery center; 3) Do you believe that your child would have benefited by a longer stay in the Recovery Room prior to discharge; 4) Did you find the postoperative education sufficient; and, 5) Did you find the outpatient experience favorable.

**Results:** All of the 50 ureteral reimplantations (age range 1.1 to 10.1 years; median 4.5 years) were performed as an outpatient procedure and were discharged within 5 hours after surgery. No patient required a hospitalization prior to the routine 2- to 3-week postoperative office visit and only one patient required an emergency room visit due to an unrelated illness. The parental response to the questionnaire was 100%, 80%, 4%, 94%, and 100%, respectfully.

**Conclusion:** Extravesical ureteral reimplantation can be uniformly performed in children at an outpatient surgical facility with a high level of parental satisfaction.

7) **OPEN URETERAL REIMPLANTATION DOES NOT AFFECT THE QUALITY OF LIFE IN CHILDREN WITH VESICOURETERAL REFUX: ASSESSMENT OF HEALTH-RELATED QUALITY-OF-LIFE USING THE PEDIATRIC QUALITY OF LIFE INVENTORY.**

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**Purpose:** A significant amount of research has been dedicated to the diagnosis and management of vesicoureteral reflux (VUR). However, no study has been published to evaluate the impact of this disease on quality of life. Change in quality of life is an important, yet underreported means to assess the utility of surgery beyond traditional surgical and clinician assessed outcomes. The aims of this study were to prospectively assess the health-related quality of life (HRQoL) of children with VUR who have either been treated medically or with surgery using a validated patient satisfaction survey.

**Methods:** A prospective, longitudinal study was conducted using a web-based validated survey, the Pediatric Quality of Life Inventory to assess four distinct domains: Physical (PF), Emotional (EF), Social (SF), and School Functioning (SF).
One hundred-six patients and 198 parents of patients age 2 to 18 with VUR completed the survey. A historical cohort of 401 healthy patients and 717 healthy parental proxies served as controls. Of the 106 patients who participated, 53 (50%) underwent open ureteral reimplantation (UR) and 53 (50%) were managed medically. Of the 198 parent-proxy survey participants, 78 (39%) had children who had UR and 118 (61%) had been managed medically.

**Results:** There was no difference in HRQoL between patients with VUR and healthy controls. Patients report equivocal HRQoL between UR and medical management (84.66 to 85.09); however parents report lower scores with UR (85.59 to 89.10). Recent febrile UTI was associated with lower HRQoL (82.40 to 90.00). Both patients and parents described lower HRQoL with prophylactic antibiotic use, but results were not statistically significant.

**Conclusion:** Vesicoureteral reflux, although a chronic condition, does not significantly impact HRQoL. From a patient HRQoL perspective, ureteral reimplantation and medical management were equivocal, but parental proxies interpret lower HRQoL with ureteral reimplantation.

Table 1a: Mean values of HRQoL Scores for Patient

<table>
<thead>
<tr>
<th>VUR Patients</th>
<th>Healthy Controls</th>
<th>p</th>
<th>Surgery</th>
<th>No Surgery</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>106</td>
<td>401</td>
<td></td>
<td>53</td>
<td>53</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>84.87</td>
<td>83.00</td>
<td>0.23</td>
<td>84.66</td>
<td>85.09</td>
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<tr>
<td>PF</td>
<td>12.83</td>
<td>14.79</td>
<td>&lt;0.0001</td>
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<td>13.08</td>
</tr>
<tr>
<td>EF</td>
<td>92.11</td>
<td>84.41</td>
<td>0.76</td>
<td>91.41</td>
<td>92.81</td>
</tr>
<tr>
<td>SF</td>
<td>78.31</td>
<td>80.86</td>
<td>0.60</td>
<td>78.87</td>
<td>77.74</td>
</tr>
<tr>
<td>SCF</td>
<td>80.76</td>
<td>78.63</td>
<td>0.33</td>
<td>79.39</td>
<td>82.14</td>
</tr>
</tbody>
</table>

Table 1b: Mean values of HRQoL Scores for Parental Proxy

<table>
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<th>VUR Patients</th>
<th>Healthy Controls</th>
<th>p</th>
<th>Surgery</th>
<th>No Surgery</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>196</td>
<td>717</td>
<td></td>
<td>78</td>
<td>118</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>87.70</td>
<td>87.61</td>
<td>0.95</td>
<td>85.59</td>
<td>89.10</td>
</tr>
<tr>
<td>PF</td>
<td>11.42</td>
<td>12.33</td>
<td>0.02</td>
<td>12.88</td>
<td>10.16</td>
</tr>
<tr>
<td>EF</td>
<td>92.25</td>
<td>89.32</td>
<td>0.08</td>
<td>89.82</td>
<td>93.87</td>
</tr>
<tr>
<td>SF</td>
<td>79.93</td>
<td>82.64</td>
<td>0.05</td>
<td>78.18</td>
<td>81.08</td>
</tr>
<tr>
<td>SCF</td>
<td>16.94</td>
<td>17.54</td>
<td>0.28</td>
<td>17.81</td>
<td>16.32</td>
</tr>
</tbody>
</table>

SEbSON 2: ESPU VISITING FELLOW & CLINICAL RESEARCH PRIZE FINALISTS

8) ESPU Visiting Fellow

THE OUTCOME OF DOUBLE-J STENTS IN THE MANAGEMENT OF PRIMARY OBSTRUCTIVE MEGAURETERS PRESENTING BEFORE ONE YEAR OF AGE.

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**Purpose:** Re-implantation of primary obstructive megaureters before one year of age remains challenging due to the discrepancy between the dilated ureter and small bladder. The insertion of a Double-J stent is an alternative strategy. We present the outcome of 45 infants (54 renal units) with primary megaureter, of whom 17 (19 renal units) were initially stented.

**Methods:** A retrospective case-note and imaging review of all infants with primary megaureter managed between 1992 and 2007 (15 years). Data presented as medians (range).

**Results:** The condition was detected prenatally in 62% (28 patients). Seventeen infants presented between one and 44 (median 16) weeks postnatal age, most commonly with urosepsis. Following postnatal investigation with ultrasound, micturating cystourethrogram and MAG-3 scans, 16 renal units were found to be non-obstructive, non-refluxing megaureters and treated conservatively. Nineteen obstructed renal units were stented at a median age of 24 (1 day to 40) weeks: 15 stents were inserted at open surgery, and four endoscopically. One infant was later found to have a PUJ obstruction and excluded from analysis. A further 19 infants underwent ureteric reimplantation, ureterostomy or nephrectomy. Eleven renal units (61%) had improved drainage on post-operative MAG-3 following removal of stent. Three of them (27%) developed stent-related complications (migration, stone-formation). All infants in this group had an initial differential function above 40%. Failure in seven cases was due to recurrent stent migration (3), UTI’s and/or functional deterioration (4). Of these, three (43%) had an initial differential function below 40%, of whom two (with an initial function of 37% and 18%) eventually required a nephrectomy.

**Conclusion:** Insertion of a Double-J stent in infants with primary obstructing megaureter may be a definitive procedure in cases where the initial differential function is above 40%. In poorly functioning units, stenting is more likely to be a temporising strategy. Vigilance is warranted as stent-related UTI’s could exacerbate renal impairment. Endoscopic stent insertion was only successful in one fifth of infants.

9) **COSTS AND CONSEQUENCES OF SCREENING ASYMPTOMATIC SIBLINGS FOR VESICO-URETERAL REFLUX: A DECISION ANALYSIS.**

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**Purpose:** Sibling screening for vesico-ureteral reflux (VUR) is controversial, as the population-level benefits and harms of screening (in terms of cost, radiation exposure, and febrile UTIs averted) are not well described. Formal decision analysis techniques can be useful to evaluate and inform decisions based on imperfect data.

**Methods:** We constructed a decision tree model in order to evaluate two competing screening regimens: 1) evaluating all asymptomatic siblings vs. 2) screening only symptomatic siblings. We performed a Monte Carlo microsimulation analysis on a hypothetical cohort of 100,000 1-year-old children. Published data were used to inform all model inputs, including: initial UTI rate (6%), UTI rate on prophylaxis (2.6%), sibling VUR rate (30%), radiation dose estimates for continuous-fluoroscopy VCUG (cVCUG), pulsed-fluoroscopy VCUG (pVCUG) and radionuclide cystography (RNC), and radiation-induced solid tumor risk estimates. Cost estimates were modeled based on national billing data. Cost and radiation dose estimates were based on one-time screening costs only. Sensitivity analyses were conducted around all probability estimates.

**Results:** Screening 100,000 asymptomatic siblings resulted in the prevention of initial febrile UTIs in 1,813 children (1.8%) as compared to screening only symptomatic siblings. However, screening asymptomatic siblings with cVCUG, pVCUG, or RNC resulted in an excess per-capita effective radiation dose of 4.95, 0.52, or 0.04 mSv, respectively, leading to 2.8, 0.28, and 0.02 excess radiation-induced solid tumors. In addition, screening all asymptomatic siblings resulted in an excess financial cost of $110 million if using a single VCUG and $87 million if using a single RNC per patient. These results proved robust on sensitivity analysis.

**Conclusion:** Screening a cohort of 100,000 asymptomatic 1-year-old siblings could prevent an initial febrile UTI in 1,800 children. However, screening would also result in a conservatively estimated excess financial cost of $87 million, or $48,000 per averted UTI. Coupled with a small but significant excess risk of radiation-induced solid tumors, the costs of screening asymptomatic siblings would thus appear to outweigh the benefits.
5-YEAR PROSPECTIVE RESULTS OF DMSA IMAGING IN CHILDREN WITH FEBRILE URINARY TRACT INFECTION: PROOF THE TOP-DOWN APPROACH WORKS.
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Purpose: Evaluation of children after febrile UTI involves VCUG because of the traditional association with Vesicoureteral Reflux (VUR) and renal scarring. Emphasis is placed on the presence of VUR and less on true renal risk. We submit that early DMSA renal scan after febrile UTI (Top-down approach) can predict clinically significant (cs) VUR and therefore who should get VCUG. The criticism of the top-down approach is that over time some VUR and preventable renal damage would be missed. This study was designed to validate the top-down approach.

Methods: Over 36 months from 2001 to 2004 a prospective series of children with acute febrile UTI were studied with an initial DMSA renal scan. VCUG was obtained after/during treatment. Children with anatomic or neurological GU abnormality were excluded. UTI was treated following standard AAP guidelines. DMSA scan was repeated at 6 months if initially abnormal. Prophylactic antibiotics were used in all for 6 months (initial study phase), and thereafter only for VUR or recurrent UTI. In toilet trained (tt) children dysfunctional elimination was investigated and treated using standard diagnostic and treatment regimens. Follow-up was every 3 months in first year and every 6 months thereafter. Follow-up for all children was at least 5 years. Results: of VCUG and DMSA scans were recorded and compared according to highest grade of VUR per child.

Results: 121 children fit inclusion criteria and completed the study. Ages were 2 months to 11 years (mean = 3.2 years). Male to female ratio was 2:3. Overall, 88 (73%) of initial DMSA scans were abnormal, and 70 (58%) had VUR. The odds ratio (OR) of VUR predicted by initially abnormal DMSA was 3.03 (95%CI+//-0.8). Abnormal follow-up DMSA scan (cortical scar) was not predictive of VUR with OR of 0.77 (95%CI+//-1.08). Abnormal initial DMSA scan predicted the presence of csVUR with OR of 4.24 (95% CI+//-0.14), and exclude csVUR with 87% NPV. Recurrent (breakthrough) UTI occurred in 19 (16%) and abnormal DMSA scan was present in 18 (95%). No child with a normal initial DMSA scan after febrile UTI had csVUR.

Conclusion: DMSA scan can predict clinically significant VUR and those children at greatest renal risk in the presence or absence of VUR. Initial normal DMSA excludes csVUR. Therefore, DMSA scan should be performed in all children after febrile UTI and VCUG should only be obtained in children with abnormal DMSA scan or in children with recurrent UTI since they are at greatest renal risk.

HIGH GRADE PRIMARY VESICOURETERAL REFLUX IN BOYS: LONG TERM RESULTS OF A PROSPECTIVE COHORT STUDY.
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Purpose: To evaluate the incidence of new scar formation in grade 4 and 5 vesicoureteric reflux in boys. To identify the risk factors for developing new scars. To review the outcome of different management approaches, looking at the rate of urinary tract infections and the incidence of new scars.

Material and Methods: This was a prospective cohort study, with patients recruited from July 1995 until December 2006. The inclusion criteria were male patients with grade 4 or 5 primary vesicoureteric reflux (VUR). The patients were divided into two main groups according to the mode of presentation, Antenatal diagnosis of VUR (Group 1) or VUR found after investigation of a UTI (Group 2). All patients had an initial renal DMSA scan evaluation. Continuous antibiotic prophylaxis was given to all patients until at least 2 years of age. Ureteric reimplantation was performed in 24 patients, and 56 patients were circumcised after presentation. Follow up investigation included a renal DMSA scan with renal ultrasound at 12 months age and then a repeat DMSA scan at 2 years and 4 years of age.
Results: Overall, 148 patients were included in the study; with 202 high grade refluxing renal units. The median age at diagnosis was 2.5 months (1 day to 9.4 years). The median age of first follow up was 14.4 months (3 months to 2.9 years). The median age of the next follow up was 3.7 years (2.6 years to 10.3 years). There were 51 (34%) children in group 1 and 97 (66%) in group 2. Renal scars on the initial DMSA scan were identified in 38/51 (75%) in group 1 and 75/97 (77%) in group 2. New scars were seen in 9/51 (18%) patients in group 1 and 6/97 (6%) patients in group 2. Of these new scars, 8 occurred in already scarred kidneys and 7 occurred in previously normal kidneys (P-value of 0.4). A UTI was documented in 13 patients before developing the new scars. Combining groups 1 and 2, the infection rate after circumcision was 6/64 (9%) and in the uncircumcised group it was 40/84 (47%) (P-value of <0.0001). New scars were seen in 3/64 (4.7%) circumcised boys and in 12/84 (14%) uncircumcised boys during follow up.

Conclusion: Scarring seen on DMSA scanning at presentation is common in this patient cohort 113/148 (76%) and is independent of the mode of presentation. New scarring can occur in both scarred kidneys and in previously normal kidneys. New scarring was associated with UTIs. Being circumcised was associated with fewer UTIs and a slightly lower incidence of observed new scarring (4.7% versus 14%).

12) SHOULD MALE GENDER ASSIGNMENT BE CONSIDERED FOR THE MARKEDLY VIRILIZED 46,XX CONGENITAL ADRENAL HYPERPLASIA PATIENT?

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Background: Two recent consensus conferences have been unable to recommend sex assignment for fully virilized 46,XX patients with congenital adrenal hyperplasia (CAH) because of lack of outcome data.

Purpose: To assess sexual identity among adult males born with Prader 4 or 5 genitalia assigned male at birth before their diagnosis of CAH and karyotype of 46,XX were known.

Methods: Medical records of 12 males, aged 35 to 69 years were reviewed after IRB approval. Six subjects also signed IRB consent and completed questionnaires concerning social and gender issues. Ten of these men had always lived as males, two consider that they were forced into a female reassignment during childhood, had feminizing surgery during childhood but subsequently self reassigned back to male.

Results: All men were initially assigned as male, with the diagnosis of CAH having been made between 3 and 12 years of age. All 12 men indicate a male sexual identity (gender identity and sexual orientation toward females). The 10 men who have always lived as male had total hysterectomies and bilateral salpingoophorectomies. Four has no hypospadias, the others have had hypospadias repair. Six have had placement of testicular prostheses. Nine men have had long-term female partners, 7 having been married for 12 or more years. One with a female partner had his phallus removed but has an ongoing sexual relationship. One man is a priest. The youngest man is not married but socially active with females and one who was reassigned female was married for several years but had not had vaginoplasty sufficient to allow intercourse. She has since divorced and currently considers herself a male. All except this person and the priest indicate a strong libido and indicate that they experience (d) frequent satisfactory sexual activity with orgasms. Body image (for the 10 who have always lived as males), self-esteem, masculinity and work situations are considered to be satisfactory.

Discussion: These outcome data suggest that these 12 46,XX individuals born with essentially fully masculinized genitalia have unequivocal male gender identity. Contributions of delay of diagnosis and therapy and having markedly virilized genitalia toward the development of sex identity cannot be quantitated.

Conclusion: Parents of 46,XX infants born with Prader 4 or 5 genitalia should be given the option of male gender assignment. An accompanying abstract reports the choice of male sex of rearing by parents in the newborn period after having been informed of their child condition.

13) RESIDENCY TRAINING IN ROUTINE NEONATAL CIRCUMCISION – A NEEDS ASSESSMENT AND PILOT STUDY.

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**Purpose:** Obstetricians and pediatricians routinely perform neonatal circumcision, while urologists manage post-procedure complications which may occur. Typically, training for ob-gyn residents in neonatal circumcision does not now involve urological input. Therefore, we performed a prospective needs assessment study to review obstetrics and gynecology resident awareness of safety for neonatal circumcision.

**Methods:** All ob-gyn residents at Prentice Women’s Hospital in Chicago were enrolled in the study, which was conducted between Nov 2008 and Mar 2009. Residents responded to an on-line survey on: 1. demographic information, 2. rating their comfort to do circumcision, and 3. rating their ability to judge safety for circumcision after review of 10 case-videos of uncircumcised newborn penises which are normal or exhibit varying degrees of chordee.

**Results:** A majority of residents 27/36 (75%) responded to the survey. Most respondents (63%) planned to perform neonatal circumcision in postgraduate practice, and procedure training was largely informal (96%). Most respondents (67%) were comfortable in performing neonatal circumcisions (mean rating of 5.9 - range 1 (very uncomfortable) to 7 (very comfortable)). Few (15%) residents were comfortable (mean rating 3.9) evaluating if the penis may undergo circumcision safely. Specifically, no resident correctly identified all cases which could undergo circumcision safely; correct identification of safety for circumcision was done in 38% of cases (SD 15%, range 0-60%); and residents were unable to make safety judgments in 20% of cases.

**Conclusion:** The survey shows that the majority of residents who plan to perform circumcision in practice receive informal procedure training and feel confident to perform the procedure but are not confident to judge the safety for circumcision. We conclude that there is a need to create an urologically based formal curriculum and training in this domain. Such implementation could improve circumcision performance and potentially decrease the incidence of post-procedural complications for newborn boys.

**SESSION 3: ENDOCRINE**

14) **LH AND FSH ARE SIGNIFICANTLY ELEVATED IN YOUNG MEN AFTER TREATMENT WITH IFOSFAMIDE AND CYCLOPHOSPHAMIDE IN RELATION TO THE TOTAL DOSE OF CHEMOTHERAPY.**

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**Purpose:** Cyclophosphamide is an alkylating agent that causes gonadal toxicity when used to treat childhood malignancies. Ifosfamide is a relatively new cyclophosphamide analog for which the gonadal toxicity profile is poorly understood. The purpose of this study is to describe the gonadal dysfunction associated with ifosfamide as demonstrated by elevations in serum gonadotropins in pubertal boys and girls.

**Methods:** We studied young men and women and with a history of childhood cancer treated at Seattle Children’s Hospital and whose treatment regimen included Ifosfamide during the years 1991-2001. Subjects included in the analysis were alive, at least 2 years off therapy and post-pubertal. Patients with recurrent disease, second malignancy, radiation treatment to the pelvis, gonads, or total body, and premorbid conditions associated with infertility were excluded.

**Results:** A total of 27 patients were enrolled (13 female and 14 male). Mean age at cancer diagnosis was 11 years (range 7.15-19 years). Mean age at analysis of gonadal function was 20 years (range 12-29 years). Diagnoses included: sarcoma (23), PNET (2) and neuroblastoma (1). Treatment groups included: ifosfamide only (total 9/27, females 5/9, males 4/9), and ifosfamide plus cyclophosphamide (total 18/27, females 8/18, males 10/18). In females, the median dose of ifosfamide was 59,400 m² (range 24750-7200 m²) and the median dose of cyclophosphamide 6000 m² (range 4800-12,000 m²). In males the median dose...
ifosfamide was 60,750 m² (46,800-72,000 m²) and median dose cyclophosphamide 8400 m² (5400-11,610 m²). Seven of 13 females and nine of fourteen males underwent an endocrine evaluation as part of their post-treatment follow-up care. In the females, the median LH was 3 IU/L (0.3-4.9), FSH 4.2 IU/L (1.8-6), and estradiol 27 pmol/L (12-45). In males, median the LH was 4.3 IU/L (1.9-7.7), FSH 7.9 IU/L (2.1-12.3), and testosterone 439 ng/dl (168-1160). No patients required hormone replacement therapy. Elevations of serum LH were significantly correlated with the total dose of chemotherapy (r=0.93, p=0.003) in males, but not in females (p=0.33). Similarly, there was a trend towards elevations in serum FSH in males in relation to the total dose of chemotherapy administered (r=0.73, p=0.06), but not in females (p=0.4).

**Conclusion:** Post-pubertal males treated with ifosfamide and cyclophosphamide show more evidence of gonadal toxicity as demonstrated by elevated serum gonadotropins than post-pubertal females. This toxicity is significantly associated with the combined dose of ifosfamide and cyclophosphamide more strongly than with the dose of either agent alone. Additional study of the post-treatment gonadal toxicity of these agents, particularly in young men, is warranted.

**15) HORMONAL EFFECTS ON THE MORPHOLOGY OF MOUSE EXTERNAL GENITALIA – A POTENTIAL MODEL FOR STUDYING DISORDERS OF SEX DEVELOPMENT.**

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**Purpose:** The role of androgens and estrogens in normal mammalian sexual differentiation was examined through detailed characterizations of wild-type and mutant mouse external genitalia. The hypothesis tested is that external genital development is dependent on a balance between androgens and estrogen, not just androgens alone.

**Methods:** Paraffin-embedded sections of external genitalia of two wild-type strains of adult mice, CD-1 and C57BL6 (Charles River Laboratories), were studied. Linear measurements of key structures, including urethra, erectile tissue, bone and cartilage were collected for each specimen. In addition, 3-dimensional reconstructions of the histological sections were prepared utilizing OsiriX Imaging Software (Geneva, Switzerland). Similar methodology was used to analyze C57BL6 mutant mice for estrogen receptor α (αERKO) and androgen receptor (testicular feminization-Tfm). Statistical analysis was performed using Student’s t test and a p value of <0.05 was considered significant.

**Results:** The morphology of Tfm male (X\textsuperscript{Tfm}/Y) external genitalia was remarkably similar to wild-type females. Clitoral length did not differ significantly between either wild-type strain (CD-1 and C57BL6) and Tfm mutants (p=0.09 and p=0.12, respectively). In contrast, the αERKO clitoris was 59% longer than the wild-type CD-1 and C57BL6 females and Tfm mutants. The distance from the distal tip of the external genitalia to the beginning of the urethra was variable in all animals. Linear measurements of bone revealed similar lengths in the CD-1, C57BL6 females and Tfm animals. In contrast, bone length in the αERKO females was greater than 10 times that of the other animals. In addition to bone, the αERKO clitoris also contained cartilage, which is typical of wild-type males, but was absent in the wild-type females and Tfm mutants. Interestingly, cartilage length in the wild-type CD-1 male, a strain known to be relatively estrogen insensitive, was significantly longer compared to that of wild-type C57BL6 males (p<0.04).

**Conclusion:** Differences in clitoral sub-structures between wild-type females and Tfm animals indicates a role for estrogens in the development of female external genitalia. Masculinization of αERKO clitoris may be secondary to androgen excess and/or the absence of estrogen action. Estrogen sensitivity may contribute to important morphologic differences. We propose that a disruption of the normal balance between androgens and estrogens, for example via endocrine disruptors, may explain hypospadias and disorders of sex development.

**16) PITUITARY-TESTIS AXIS AND GONADAL GROWTH IN PATIENTS WITH HYPOSPADIAS AT PUBERTY.**

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**Purpose:** Reports of pubertal hormonal and gonadal status of patients with hypospadias are scarce. The aim of this study is to evaluate pituitary-testis axis and gonadal growth in patients with hypospadias at puberty.

**Methods:** Serum level of luteinizing hormone (LH), follicle-stimulating hormone (FSH), testosterone (T) and testicular volume at puberty (15 years or older) were retrospectively reviewed from the medical charts of patients with hypospadias (HS) who were treated since 1986 and followed at our institute.

**Results:** Forty-three patients were enrolled in this study. Mean age at evaluation was 17.6 years (range: 15.1 to 22.8). Of these, 14 patients were treated for mild HS and 29 were for severe HS. Five patients with severe HS underwent bilateral orchiopexy for bilateral undescended testes (BUT). All patients were Turner grade 4 to 5 at evaluation. Among the 14 patients with mild HS, hypergonadotropic hypogonadism, hypogonadotropic hypogonadism, decreased level of LH, and decreased level of T were observed in one each (7% each). In the cases with severe HS and without BUT, hypergonadotropic hypogonadism, hypogonadotropic hypogonadism, decreased level of LH, and decreased level of T were observed in one each (7% each). In the cases with severe HS and without BUT, hypergonadotropic hypogonadism, and partial androgen insensitivity syndrome were identified in 2 (8%), and 1 (4%) of 24, respectively. Of the 5 patients with severe HS and BUT, hypergonadotropic hypogonadism was shown in 1 (20%), and increased level of LH with normal T in 2 (40%). Small testicular volume (less than 10 ml) with elevated FSH level was identified in 6 of 43 patients (1 of 14 (7%) with mild HS, 3 of 24 (13%) with severe HS and without BUT and 3 of 5 (60%) with severe HS and BUT).

**Conclusion:** Our data demonstrated the presence of endocrine dysfunction in patients with both mild and severe hypospadias at puberty. Some of them could have a risk of impaired spermatogenesis.

**SESSION 4: BLADDER**

17) **PREDICTING RENAL OUTCOME IN CHILDREN WITH ANTERIOR URETHRAL VALVES: SYSTEMATIC REVIEW AND META–ANALYSIS.**

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**Purpose:** Prognostic information on children with anterior urethral valves (AUV) is primarily based on case reports and small series. We systematically reviewed the literature and examined our own clinical database in order to determine typical renal outcomes in AUV and to identify clinical features which were predictive of renal outcome. We compared our findings to previous classification systems in terms of prognostic value.

**Methods:** We searched MEDLINE and EMBASE for "anterior urethral valve" and "anterior urethral diverticulum"; 98 studies were reviewed in full. Studies were limited to English language, pediatric patients (<18 years) and patients without syndromes. Studies were abstracted for demographic, clinical, treatment, and outcome data. Multivariate logistic regression models were used to determine which factors predicted patients' progression to renal failure or death.

**Results:** We identified 288 male patients (median age 1.9 years), 260 (90%) of whom had normal renal function following treatment. On univariate analysis, pre-treatment azotemia (odds ratio (OR) 14.7, p=0.0001), vesicoureteral reflux (VUR) (OR 19.7, p=0.0001), urinary tract infection (UTI) (OR 3.9, p=0.004), hydronephrosis (OR 8.7, p=0.0009), and bladder trabeculation (OR 6.2, p=0.02) were associated with renal failure or death; treatment method (open vs. endoscopic, p=0.9), obstruction type (valve vs. diverticulum, p=0.4) and valve location (p=0.3) were not. After adjusting for other factors using multivariate models, only pre-treatment azotemia (p=0.002), VUR (p=0.02), and UTI (p=0.04) remained associated with renal failure/death. If all three factors were present, a child’s odds of renal failure/death increased over 10-fold (p<0.0001). This combination of clinical data was more highly predictive of renal failure/death (c=0.90, 89% accuracy) than either the Mayo (c=0.79) or Firlit (c=0.76) systems.

**Conclusion:** Anterior urethral valves are a rare cause of pediatric urinary morbidity and progress to long-term renal failure in only 10% of patients. The combined presence of pre-treatment azotemia, VUR, and
UTI is highly predictive of renal failure and more accurately predicts renal outcome than previous classification systems.

18) TRANSURETHRAL INCISION FOR URETEROCELE.
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Purpose: The management of ureteroceles remains controversial with many options available. We present our experience with transurethral endoscopic incision (TUI) of ureterocele (UC) and analyze our outcomes to better predict which patients should be considered candidates for this treatment.

Methods: Over the last 15 years at two institutions 47 patients (median age 2 months, range 1 day–23 years) with a total of 50 UC underwent primary TUI. Prenatal ultrasound detected hydronephrosis in 34 cases (68%); in the remaining the diagnosis was made on evaluation for urinary tract infection (UTI). UC was intravesical in 25 units (50%), ectopic in 25 (50%), duplex system (DS) in 34 cases (68%) and single system (SS) in 16 (32%). Pre and post TUI evaluations included US and VCUG or voiding urosonography in all patients; the majority underwent nuclear scan (DMSA, MAG3 or DTPA) and/or intravenous pyelogram pre and/or post TUI. Mean follow-up was 7 yrs (range 6 mos–15 yrs).

Results: In 28 UC units (56%) TUI was the only management, with 2 patients requiring a repeat TUI. The remaining 22 (44%) underwent further procedures for high grade VUR, persistent hydronephrosis, UTIs or nonfunctioning upper pole (UP)/kidney. Overall 30 of 50 UC units (60%) did not require open surgery. TUI alone was effective in 81% of SS and 72% of intravesical UC; in ectopic and DS cases, TUI was successful alone in 42% and 44%, respectively. Prior to TUI, VUR was present in 19 patients (16 with VUR in one ureter; 3 with VUR in more than one ureter), with a total of 23 refluxing units. Resolution of VUR after TUI was seen in 10 of 23 refluxing ureters (44%) and in 4 (17%) VUR was downgraded. 30 of 50 UC units had no VUR before TUI: 20 of these (66%) had TUI only, the remaining 10 (33%) required secondary procedures. Of the 50 punctured UC, in 15 (30%) de novo VUR to the UC moiety occurred. In 8 of these 15 cases (53%) the de novo VUR spontaneously resolved or patients did well with or without antibiotic prophylaxis. 7 UC units with de novo reflux (46%) required surgery, in 2 of these 7 VUR was also present pre-TUI. 11 (22%) ipsilateral UP or kidneys were nonfunctioning; 5 were removed because of high grade hydronephrosis; those left in place did not develop symptoms.

Conclusions: Our results indicate that the success of TUI for initial management of ureteroceles is dependent on several factors: the status of the upper tracts (single vs. duplex), the presence or absence of reflux (contralateral or ipsilateral or both), and the status of the UC (intravesical vs. extravesical). Neither presentation nor age of the patient influenced the result of TUI regarding the need for subsequent surgery. The best outcomes for TUI are in single renal systems and intravesical ureterocele. This information should be used in considering options for initial ureterocele management.

19) THE NATURAL HISTORY OF VALVE BLadders: THE SEATTLE EXPERIENCE.
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Purpose: Long-term outcomes in boys born with posterior urethral valves (PUV) are sparsely described in the literature. We hypothesize that favorable early bladder dynamics after valve ablation can predict future bladder outcome.

Methods: Of 160 consecutive PUV cases treated at our hospital between 1985 and 2005, we identified 118 patients older than 3 years of age at last follow-up. Early bladder outcomes (1-2 years after initial PUV treatment) were judged as favorable or unfavorable on the basis of urodynamic parameters and/or bladder wall appearance on voiding cystourethrogram (VCUG). We used the term maximal typical cystometric
capacity (MTCC) to define the maximal cystometric capacity at Pdet < 40 cm. water and calculated the age adjusted-MTCC as a percent based on the expected for age.

Results: Eighty-one (69%) were < 3 months old at presentation with a median follow-up of 9 years (range 2-21 years). Early favorable bladder outcome was noted in 70% of these patients. Anticholinergic medications were indicated in 48% of patients. At last follow-up; 59% of patients were toilet trained, 5% had daytime urinary control, 8% were incontinent, 8% were on CIC and 20% had undergone bladder augmentation. Predictors for successful daytime urinary control on multivariate analysis were favorable early bladder dynamics (OR 3.97, 95% CI 1.69-9.31, p=0.002) and absence of vesicoureteral reflex at initial VCUG (OR 3.38, 95% CI 1.78-9.77, p=0.024). Predictors for bladder augmentation on multivariate analysis were unfavorable early bladder dynamics (OR 12.08, 95% CI 3.50-41.67, p<0.001), valves-unilateral reflex-renal dysplasia (VURD) syndrome (OR 5.52 95% CI 1.64-18.51, p=0.006), delayed age at diagnosis (OR 1.24 95% CI 1.03-1.49, p=0.025) and initial urinary diversion (OR 3.80 95% CI 1.11-12.99, p=0.033). Toilet training and/or favorable bladder dynamics were noted in 42% of 3-5 years old patients, in 55% of 6-10 years old and in 67% of those older 10 years. The mean (SD) of the age-adjusted MTCC% at the initial urodynamics of 43% (±11%) was a significant predictor of bladder augmentation and of 69% (±22%) was a significant predictor of successful toilet-training at last follow-up (p<0.001).

Conclusion: Early favorable bladder outcome is a strong predictor of eventual bladder function. Early urodynamic studies can identify the group at risk for bladder augmentation. Valve bladders can improve as patients age, however, long-term function into young adulthood remains to be determined in our patient group.

20) VARIATION IN MANAGEMENT OF URETEROCELES: A SURVEY OF PEDIATRIC UROLOGISTS.

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Purpose: Most children born with prenatally diagnosed ureteroceles are asymptomatic but clinical manifestations can include urinary tract infections, renal stones, and renal damage. There is controversy in the management of this condition and the literature lacks clear evaluation and management strategies and guidelines. We conducted a survey of pediatric urologists to answer the following two questions: 1) How do pediatric urologists manage prenatally diagnosed duplex system ureterocele (DSU)? 2) What are their perceptions of non-surgical versus surgical management?

Methods: A focus group of 5 pediatric urologists were interviewed to formulate survey questions. Construct validity was obtained through a pilot test with 25 pediatric urologists participating. The final survey consisted of 4 case scenarios (obstruction of the upper pole with or without reflux to the lower pole, normal ultrasound with intravesical ureterocele and a complication of incision with reflux to the upper pole). The respondents were given multiple surgical options and were asked to classify each option using a scale from Definitely Yes to Definitely No. There were also multiple questions regarding the perception and opinions related to management of this condition. Chi square statistical analysis using was performed to analyze responses to the categorical variables. Cronbach’s alpha and Kappa analysis was performed to evaluate the validity and repeatability of the survey questions.

Results: A total of 269 pediatric urologists responded. 47.5% of respondents see more than 5 cases per year. There was agreement in the use of antibiotics at birth (83.3%) and the diagnostic management (85%). Most would advocate for puncture of the ureterocele at 3 months (76%). There was significant variability in the surgical treatment options at 18 months of age. In the scenario with no hydronephrosis and a ureterocele in the bladder 29% would have advocated for a partial nephrectomy. The number of Definitely Yes responses were significantly lower for all case scenarios and ranged from 1% to 28%. Most agreed that the majority of these patients will require surgery. Preservation of function of the other renal units was a more significant factor in guiding surgical intervention than the upper pole of same kidney (85.2% and 49.5% respectively). Prevention of symptoms was also a guiding factor in 83% of those surveyed. There
was no statistically significant difference in management when stratified to practice location, number of cases performed yearly or years in practice.

**Conclusions:** Management and treatment of prenatally diagnosed duplex system ureteroceles varies significantly among pediatric urologists. Preservation of renal function seems to be the most important factors in determining surgical correction.

21) AMINOCAPROIC ACID FOR THE TREATMENT OF SEVERE REFRACTORY HEMATURIA IN CHILDREN.
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**Purpose:** Gross, intractable hematuria is rare in the pediatric population, but can lead to significant renal and systemic morbidity. Aminocaproic acid (Amicar®) is widely used for its anti-fibrinolytic properties. Its role in the management of severe hematuria is well established in the adult population. However, little data exists in the literature about the safety and efficacy of this agent in the pediatric population for this indication. The purpose of this study is to present our initial experience with aminocaproic acid for the treatment of refractory hematuria where conservative measures have failed.

**Methods:** We reviewed the charts of all patients treated with aminocaproic acid for intractable, severe gross hematuria over the past 24 months at our institution. Before administration of aminocaproic acid, all patients underwent hematologic evaluation and any underlying bleeding dyscrasias were addressed. All patients underwent imaging and full urologic evaluation, including cystourethroscopy, as well as retrograde pyelogram and ureteroscopy if indicated. Demographic information, medical and surgical histories, aminocapropic acid dosing and outcomes were recorded.

**Results:** Between October 1, 2006 and October 1, 2008, five patients (4 male, 1 female, ages 12-18 years) were treated with aminocaproic acid. Three patients had sickle trait, one of whom had Nutcracker phenomenon, one had hemophilia A, and the other had normal hematologic evaluations. Three patients required packed red blood cell transfusions to maintain hematocrit. Interventions such as silver nitrate instillation (n=1) and multiple factor transfusions (n=2) were attempted unsuccessfully. Three renal angiograms were performed, which were both non-diagnostic. Duration of hematuria ranged from 1 to 52 weeks prior to administration of aminocaproic acid. Endoscopic evaluation demonstrated hematuria localized to one ureteral orifice in 4 patients. Ureteroscopy in these patients revealed non-localized, diffuse hemorrhage. In a fifth patient, bleeding was localized to the pendulous urethra. All patients received 100mg/kg of oral aminocaproic acid every 6 hours as outpatients, which effectively led to cessation of hematuria in all five patients. Time from initiation of aminocaproic acid to resolution of hematuria ranged from 2 to 7 days.

**Conclusion:** Aminocaproic acid is useful in the management gross, refractory hematuria when more conservative measures fail. Because of its potential side effects, treatment algorithms should include other systemic and local therapies prior to its use.

22) THE EFFECTS OF CYSTINURIA ON BLADDER CONTRACTILITY AND HISTOLOGY IN THE SLC3A1 KNOCKOUT MOUSE – NEW INSIGHTS FOR THE MANAGEMENT OF PEDIATRIC CYSTINURIA.
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**Purpose:** Cystinuria is the most common cause of urinary tract stones in children. It is unknown what effects cystinuria has on bladder function. We developed a Slc3a1 knockout mouse model for this
condition. These mice form kidney stones and large bladder stones. This study determines the effect that cystinuria has on bladder contractility and histology in the mouse. This question is important clinically as bladder dysfunction might result in inefficient emptying, thus promoting further stone growth.

**Methods:** The study was approved by our Animal Care and Use Committee. Three groups of mice were evaluated: 8 control (4 male, 4 female) and 9 male Slc3a1 and 7 female Slc3a1 mice. In-situ cystometry was performed via a midline incision under anesthesia. The bladder dome was catheterized with PE-50 tubing with a 23-gauge needle. Following cystometry, the mouse was sacrificed and strips of bladder muscle were harvested. The strips were stimulated with field stimulation (2, 8, 32 Hz), carbachol (20 µM), ATP (1 mM), phenylephrine (100 µM), and KCl (120 mM). Additional strips were fixed in buffered formalin and evaluated histologically with hematoxylin and eosin staining.

**Results:** The control mice had no stones. Consistent with prior experiments, male cystinuria mice developed large stones and female cystinuria mice did not. Cystinuria male and female mice showed poor bladder compliance compared to controls, with males being significantly less compliant than females. Compared to controls, male cystinuria mice demonstrated significantly decreased contractility with mean contractile responses to all forms of stimulation between 20 and 30% of the response of controls. The female cystinuria mice showed a non-significant decrease in contractility compared to controls. The contractile response to phenylephrine, an alpha-agonist, was similar between all three groups. Histologically, muscle hypertrophy and basement membrane thickening of varying degrees was demonstrated with crystal deposition under bladder submucosa and hypertrophic and inflammatory changes.

**Conclusion:** Exposure of the bladder to cystinuria crystals and stones results in loss of compliance and contractility that increases with the severity of the disease. These findings suggest that children with cystinuria should be encouraged to empty the bladder frequently to minimize the risk of bladder inflammation, stone growth, and bladder dysfunction. Children who frequently pass large stones or complain of irritative voiding symptoms should be evaluated with a post-void urine determination and urodynamics if indicated. These studies also underline the importance of studying male and female responses individually.

**SESSION 5: LAPAROSCOPY**

23)
**TRANSABDOMINAL LAPAROSCOPIC VS OPEN PYELOPLASTY IN CHILDREN: PRELIMINARY REPORT OF A PROSPECTIVE RANDOMIZED TRIAL.**
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**Purpose:** Pyeloplasty for ureteropelvic junction obstruction (UPJO) in children has traditionally been performed utilizing an open technique. Although laparoscopic pyeloplasty has been shown to be comparable and possibly superior to open pyeloplasty in adult patient studies, such results in the pediatric population are limited. We herein evaluate outcomes between trans-abdominal laparoscopic versus open pyeloplasty in children.

**Methods:** All pediatric patients with UPJO requiring operative repair between the ages of 1 and 18 years were offered enrollment in the study. Patients were prospectively randomized to either laparoscopic (LP) or open pyeloplasty (OP). A total of 20 patients (mean age 7.8 years, range 1-15 years) in the laparoscopic group & 19 children (mean age of 7.2 years, range 1-17 years) in the open group were reviewed (p=0.69). Mean follow-up was similar between both groups (LP = 7.4 vs. OP = 9.1 months, p=0.38)

**Results:** The mean operative time for the laparoscopic group was 151 minutes (range 94-213); for open 130 minutes (range 83-225) p=0.09. Mean hospitalization for laparoscopic was 29.3 hours (range 20.5-48); open was 36.2 hours (range 24-73) p=0.06. Mean analgesic usage was similar between the two groups. There have been no failures in either group to date. Operative, hospital, anesthetic and total charges were similar between groups.

**Conclusion:** Laparoscopic pyeloplasty appears to be a safe and effective alternative to open pyeloplasty in children. Although cost is similar, there is a trend toward longer operative times in the LP group, but a
shorter overall hospitalization. As more patients are enrolled in the study, these differences may prove significant.

24) COMPARATIVE EVALUATION OF THREE-LEVEL FIDELITY KIDNEY MODELS IN THEIR IMPACT ON TEACHING LAPAROSCOPIC PYELOPLASTY BY SIMULATION. Yaser El-Hout, Urology, The Hospital for Sick Children, Toronto, ON, Canada Ryan Brydges, University of Toronto, Toronto, ON, Canada Katherine Moore, Urology, The Hospital for Sick Children, Toronto, ON, Canada Allison Kurahashi, University of Toronto, Toronto, ON, Canada Armando J. Lorenzo, Urology, The Hospital for Sick Children, Toronto, ON, Canada Ethan Grober, Urology, Mount Sinai Hospital, Toronto, ON, Canada Adam Dubrowski, University of Toronto, Toronto, ON, Canada Thomas S. Lendvay, Urology, Seattle Children Hospital, Seattle, WA Walid A. Farhat, Urology, The Hospital for Sick Children, Toronto, ON, Canada

Purpose: With increasing adoption of laparoscopy in pediatric urology and owing to the surgical and medico-legal challenges of early learning on actual patients, acquiring skills using simulation curricula is an emerging solution. Herein, we evaluated three-level fidelity models in their performance prediction and perceived utility as educational tools for simulation training on laparoscopic pyeloplasty.

Methods: We targeted 24 urologists (20 fellows and 4 attendings) participating in a yearly North American laparoscopy course with didactic, dry and wet lab components. Three kidney models were available for practice: 1) a previously described (AUA 2008, abstract 1918) low-fidelity ping-pong ball in two balloons, 2) intermediate-fidelity anatomically correct silicone model with simulated hydronephrosis, 3) high-fidelity live porcine model. All performances were evaluated using a validated Global Rating Scale (GRS), compared between models using Kruskal-Wallis test, and cross-correlated with Fundamentals of Laparoscopy (FLS) scores using Spearman’s correlation coefficient. Low and intermediate fidelity models were submitted to final product inspection and evaluation by two independent evaluators for adequacy of spatulation, suture number and quality. Finally, the participants’ preference of model usefulness was ranked and compared in two separate one-way ANOVA.

Results: Intermediate and high fidelity performances were significantly correlated to each other compared to low fidelity performance on GRS and are better predicted by FLS scores (p <0.05). The high fidelity model was most preferred and perceived to be the most useful (p<0.001). However, the preference of the low vs. intermediate fidelity models was similar. Performance predicted by final product analysis was comparable with satisfactory inter-rater reliability (R=0.65 vs. 0.87 for low vs. intermediate fidelity models respectively).

Conclusion: To our knowledge, this is the first study to compare models of different fidelities. Performance on the high-fidelity model was better predicted by subject performance on intermediate rather than the low fidelity model. Though the animal model remains the gold standard in performance and preference and despite a better prediction of performance by intermediate fidelity model, the low fidelity model may still be useful owing to its comparable preference, availability and affordability. Further refinement of an inexpensive intermediate fidelity model may be needed.

25) OPEN PYELOPLASTY, LAPAROSCOPIC DISMEMBERED PYELOPLASTY, AND LAPAROSCOPIC VASCULAR HITCH PYELOPLASTY: ANALYSIS OF SURGICAL REINTERVENTION. Theodore D. Barber, MD, Urology, University of Texas Southwestern Medical School, Dallas, TX Nicholas G. Cost, MD, Urology, University of Texas Southwestern Medical School, Dallas, TX Clanton B. Harrison, MD, Urology, University of Texas Southwestern Medical School, Dallas, TX Warren T. Snodgrass, MD, Urology, University of Texas Southwestern Medical School, Dallas, TX Duncan T. Wilcox, MD, Pediatric Urology, The Children's Hospital, Aurora, CO Linda A. Baker, MD, Urology, University of Texas Southwestern Medical School, Dallas, TX

Purpose: Despite the widespread use of laparoscopic dismembered pyeloplasty for the management of pediatric ureteropelvic junction (UPJ) obstruction, most reports have not compared outcomes to the gold standard of open pyeloplasty. Published reoperative rates for open pyeloplasty (OP), laparoscopic dismembered pyeloplasty (LDP), and laparoscopic vascular hitch pyeloplasty (LVHP) range from 0-15%,
0–17%, and 0–8% respectively. We compared surgical reintervention rates in consecutive patients over the age of 2y with minimum 12-month follow-up undergoing OP, LDP, and LVHP.

**Methods:** Consecutive patients undergoing primary pyeloplasty between January 2000 and December 2008 with at least 12 months postoperative follow-up were reviewed. Patients >2y were chosen, as laparoscopic approaches have only recently been offered to patients <2y. Surgical procedure was determined by surgeon preference. Surgical reintervention was defined as any second procedure to the UPJ (such as balloon dilatation) or repeat pyeloplasty. Comparisons were calculated using two-tailed, Fisher’s exact test.

**Results:** 116 patients >2y underwent pyeloplasty (42 OP, 55 LP, 19 LVHP) in 8 years. 101 patients had >12m follow-up (38 OP, 47 LDP, 19 LVHP). LDP & LVHP were performed by 2 surgeons (DTW and LAB), while OPs were performed by an additional 2 surgeons. Mean ages in the OP, LDP, and LVHP groups were 7.7, 9.3, and 11.1 years respectively. Rates of surgical reintervention were not significant between groups at 0/42 (0%) OP, 4/47 (8.5%) LDP, and 0/19 (0%) LVHP respectively (LDP vs. OP, p=0.12; LDP vs. LVHP, p=0.31).

**Conclusion:** This is the first and largest comparison of surgical reintervention rates of OP, LDP, and LVHP for UPJ obstruction with all patients having minimum 12m follow-up. Although the complication rate in the LDP group was the highest, the absence of statistical significance when compared to the gold standard, OP, encourages the continued use of laparoscopy in UPJ repair. Furthermore, application of LVHP in properly selected patients with a crossing vessel and healthy UPJ may further decrease minimally invasive complication rates.

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**26) RETROPERITONEOSCOPIC NEPHRECTOMY IN CHILDREN ON PERITONEAL DIALYSIS: THE GOLD STANDARD.**

*Konrad Szymanski, Pediatric Urology, Montreal Children’s Hospital, McGill University Health Center, Montreal, QC, Canada Martin Bitzan, Nephrology, Montreal Children's Hospital, McGill University Health Center, Montreal, QC, Canada John Paul Capolicchio, Pediatric Urology, Montreal Children's Hospital, McGill University Health Center, Montreal, QC, Canada*

**Purpose:** The literature on minimally invasive nephrectomy in patients on peritoneal dialysis (PD) is sparse. Isolated case reports claim that the transperitoneal approach is effective. We present our experience with the retroperitoneal approach (RPN) in children on PD, which to our knowledge is the second reported experience, and the only one documenting dialysis outcomes.

**Methods:** Fourteen kidneys were removed from 10 children (median age of 11.5 years; range 6-17) during 11 consecutive RPNs from 2001 to 2008. Three other successful RPNs were excluded from further analysis because the PD catheter was not utilized. Indications included nephrotic-range proteinuria in 8 patients, hypertension in 6 and polyuria in 5, all in preparation for renal transplantation. A 3-port lateral RPN technique was utilized, with significant trainee participation. Preoperative and postoperative biochemistries within 3 months of surgery were compared with the Wilcoxon signed-rank test.

**Results:** Three bilateral synchronous, 1 bilateral staged and 6 unilateral RPNs were performed. Mean operating times were 174 min (range 115-250) for unilateral and 454 min (range 370-575) for bilateral RPNs, including 1 simultaneous PD insertion and 1 umbilical hernia repair. No open conversions or blood transfusion were needed. PD was initiated after a median of 1 h postoperatively (range 3-56), with a final dialysate titration at a median of 60 h (range 5-312 h). One patient had a peritoneotomy repaired intraoperatively and required hemodialysis until transplant 1.5 months later. Five patients were rendered anuric. Of the remaining 5 patients, 2 maintained nephrotic-range proteinuria and all 3 previously polyuric patients had desired urine output reduction (p=0.04). Serum albumin and protein concentrations improved significantly after surgery for all patients (p = 0.04, p = 0.002, respectively). No postoperative complications were noted except for 1 case of *C. difficile* diarrhea.

**Conclusion:** RPN for end-stage renal disease is a safe and effective operative technique, which preserves peritoneal integrity in children requiring immediate postoperative PD. In the absence of data to the contrary, RPN should be considered the gold standard in patients on PD, as it obviates morbidity related to vascular access for hemodialysis.
Purpose: Laparoendoscopic single-site surgery (LESS) is the next evolution in minimally invasive surgery. Since the advent of laparoscopy, there has been a desire to reduce the number of laparoscopic ports, as each additional port increases the potential morbidity from bleeding, hernia and internal organ damage, while decreasing the cosmetic outcome. While still in its infancy for adults, this technique has become particularly attractive in the pediatric population. At our institution, we performed the first reported single port access nephrectomy for a pediatric patient. Having a single incision is believed to reduce postoperative pain, hasten recovery and improve cosmesis, without sacrificing technique, safety or outcome. We evaluated our initial experience with LESS in pediatric urology.

Methods: From August 2008 to April 2009, seven pediatric patients underwent a LESS procedure at our institution. Their clinicopathological data has been prospectively collected into a multidisciplinary database. One patient underwent LESS simple nephrectomy and six underwent LESS varicocelectomy.

Results: All procedures were performed in entirety through a multichannel single laparoscopic port inserted in the umbilicus, making the abdominal incision, in essence, hidden.

TABLE 1

<table>
<thead>
<tr>
<th>Patient</th>
<th>Age</th>
<th>BMI</th>
<th>Procedure</th>
<th>OR Time (min)</th>
<th>EBL</th>
<th>Transfusions</th>
<th>Incision Length (cm)</th>
<th>Incision Site</th>
<th>Type of Port</th>
<th>Length of Stay</th>
<th>Complications</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12</td>
<td>21.8</td>
<td>Left Nephrectomy</td>
<td>163</td>
<td>20cc</td>
<td>0</td>
<td>2</td>
<td>Umbilicus</td>
<td>Triport</td>
<td>1 day</td>
<td>None</td>
</tr>
<tr>
<td>2</td>
<td>19</td>
<td>25</td>
<td>Left Varicocelectomy</td>
<td>73 Min</td>
<td>0</td>
<td>2.5</td>
<td>Umbilicus</td>
<td>Triport</td>
<td>0</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>18</td>
<td>18.5</td>
<td>Left Varicocelectomy</td>
<td>91 Min</td>
<td>0</td>
<td>2</td>
<td>Umbilicus</td>
<td>Gelpor</td>
<td>0</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>17</td>
<td>19.4</td>
<td>Right Varicocelectomy</td>
<td>82 Min</td>
<td>0</td>
<td>3</td>
<td>Umbilicus</td>
<td>Triport</td>
<td>0</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>15</td>
<td>16.4</td>
<td>Left Varicocelectomy</td>
<td>48 Min</td>
<td>0</td>
<td>2</td>
<td>Umbilicus</td>
<td>Triport</td>
<td>0</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>11</td>
<td>18.5</td>
<td>Left Varicocelectomy</td>
<td>70 Min</td>
<td>0</td>
<td>2</td>
<td>Umbilicus</td>
<td>Triport</td>
<td>0</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>15</td>
<td>18.5</td>
<td>Left Varicocelectomy</td>
<td>60 Min</td>
<td>0</td>
<td>2</td>
<td>Umbilicus</td>
<td>Triport</td>
<td>0</td>
<td>None</td>
<td></td>
</tr>
</tbody>
</table>

Conclusion: Despite the widespread acceptance of standard multiple port laparoscopic surgery, there have been efforts to further reduce the invasiveness of this procedure in children. Compared with traditional open and laparoscopic surgery, single port access surgery affords multiple benefits, including improved cosmesis, reduction in iatrogenic bowel, visceral and vascular injuries from port placement, wound infections, incisional hernias and possibly reduced cost from fewer ports. Since the sole port is placed in the umbilicus, which is an embryonic natural orifice, intraabdominal access is obtained through this virtually scarless technique. While further research is necessary to determine if single port surgery improves outcomes, it is clear that this technique has its role in urology and is both safe and feasible in the pediatric population.
Purpose: Although retroperitoneal nephrectomy in children has gained popularity among paediatric urologists only few large series are available in the literature. Hereby we sought to review the first 100 cases at our institution.

Methods: Medical records of all children who underwent retroperitoneal nephrectomy from 2000 to 2008 regardless of the indication for surgery were reviewed. Age, underlying diagnosis, operative time, complications, blood transfusion and hospital stay were recorded. The procedures were performed in flank position, the retroperitoneal space was developed with blunt dissection using the camera and 3 trocar approach was used in all cases.

Results: A total of 101 retroperitoneal laparoscopic nephrectomies in 92 children were identified. Average patient age at surgery was 7.3 years (10m-17y). The main indications were: multicystic dysplastic kidneys (29), reflux nephropathy (20), non functioning kidneys secondary to obstruction (21) and pre transplant nephrectomy (16). The mean operative time for unilateral cases was 165 minutes and bilateral 335. The mean hospital stay for unilateral cases was 2.15 days and for bilateral 12.5 days. No major operative complications were reported; one patient with nephrotic syndrome developed a retroperitoneal hematoma postoperatively after a bilateral nephrectomy that was clinically managed. Conversion to open surgery was performed in 5(5%) cases: 3 due to adhesions in patients with VUR nephropathy and recurrent UTI,1 due to inability to identify a small pelvic kidney and 1 due pyonephrosis. Two patients underwent intraoperative blood transfusion while undergoing other concomitant major procedures (kidney transplantation and bladder augmentation). A peritoneal leak of gas was observed in 12 cases in 6 of those an angiocath was placed in the peritoneum to allow an improvement in the working area, none of them needed to be converted. 11 patients were younger than 2 years at the time of the procedure, in this age group only one conversion was identified due inability to identify the small pelvic kidney.

Conclusion: Retroperitoneal laparoscopic nephrectomy is safe and feasible in all age groups.

Purpose: Spina Bifida patients are affected by many different problems, the severity of which vary greatly. Urinary incontinence and fecal impaction are among the most important symptoms from which these patients suffer. We report our preliminary results with a minimally invasive approach to both of these problems: the same-setting antegrade bladder neck injection (ABNI) and laparoscopic antegrade continence enema (LACE) and procedures.

Methods: The charts of all patients undergoing same-setting LACE and ABN between January 1, 2006 and August 1, 2008 were reviewed. Demographic data, surgical indications, operative details and results were recorded. Surgical steps were uniform for all cases: diagnostic laparoscopy was performed to ensure the presence of an appendix à if present, two additional 5 mm trochars were placed à the appendix was mobilized to reach skin in the right lower quadrant (RLQ) à appendiceal catheterizable channel was matured. A small percutaneous cystotomy was then made, and dextranomer/hyaluronic acid was injected in antegrade fashion into the bladder neck.

Results: We performed a total of 10 same-setting ABNI and LACE during the stated time period. There were 5 males and 5 females, mean age 9 years (range: 6-12). All were spina bifida patients with smooth-walled bladders on VCUG and good capacity, good compliance, and low leak point pressure on urodynamic study. All suffered severe constipation, refractory to dietary modification and pharmacologic interventions. There were no intra-operative complications and all patients were discharged within the first post-operative day. At an average of 15 months of follow-up (range 10-27 months), 7/10 (70%) patients are
continent of urine, reporting that they no longer wear diapers. Six of these 7 continue to use intermittent catheterization. All 10 patients are continent of stool, reporting marked improvement in their constipation. Even without imbricating or tunneling the appendix, no patient has experienced leakage of stool or gas per ACE.

**Conclusion:** Same-setting ABNI and LACE is a safe and reasonably simple minimally invasive approach to the spina bifida patient with urinary incontinence and severe constipation. In carefully selected patients, this combined procedure is highly efficacious.

**30)**

**A PROSPECTIVE RANDOMIZED CONTROLLED TRIAL ASSESSING THE USE OF AEROSOLIZED INTRAPERITONEAL BUPIVACAINE IN REDUCING POSTOPERATIVE PAIN IN CHILDREN UNDERGOING LAPAROSCOPIC SURGERY: PRELIMINARY RESULTS.**

**Frank J. Penna, MD, Children's Hospital Boston; Brian Minnillo, Children's Hospital Boston; Constance S. Houck, MD, Children's Hospital Boston; Petra M. Meier, MD, Children's Hospital Boston; Andres D. Silva, MD, Children's Hospital Boston; Drew A. Freilich, MD, Children's Hospital Boston; Hiep T. Nguyen, MD, Children's Hospital Boston**

**Purpose:** Laparoscopic surgery has decreased the severity of postoperative pain in children. However, children often experience abdominal and shoulder pain requiring significant amounts of opioids, potentially prolonging their hospitalization. The goal of this study was to assess in a randomized fashion the effectiveness of aerosolized intraperitoneal bupivacaine in reducing postoperative pain in children.

**Methods:** Twenty-five patients undergoing robot-assisted laparoscopic surgery at our institution were randomized to either receive aerosolized intraperitoneal bupivacaine (1.25 mg/kg) or an equivalent volume of saline after establishment of pneumoperitoneum. Postoperative pain scores and opioid utilization were compared between the two groups. All patients received a standardized anesthetic and opioid analgesic regimen. Blood samples were obtained after aerosolization at 5, 15, 30, 60 min [1]. Review was undertaken at midpoint of study per IRB standards.

**Results:**

<table>
<thead>
<tr>
<th>Metric</th>
<th>Bupivacaine arm (12)</th>
<th>Saline arm (13)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight (kg)</td>
<td>49.7 ± 24.3</td>
<td>45.0 ± 11.9</td>
</tr>
<tr>
<td>Age (yr)</td>
<td>12.1 ± 4.8</td>
<td>11.9 ± 5.0</td>
</tr>
<tr>
<td>LOS (days)</td>
<td>1.2 ± 0.6</td>
<td>1.4 ± 0.8</td>
</tr>
<tr>
<td>Operative time (min)</td>
<td>173 ± 40</td>
<td>169 ± 66</td>
</tr>
<tr>
<td>Insufflation time (min)</td>
<td>156 ± 39</td>
<td>151 ± 62</td>
</tr>
<tr>
<td>Postop opioid (mg/kg)</td>
<td>0.23 ± 0.14</td>
<td>0.34 ± 0.23</td>
</tr>
<tr>
<td><strong>Peak VAS[2]</strong> Pain Score (0-10, 0 = no pain)</td>
<td>7</td>
<td>10</td>
</tr>
</tbody>
</table>

**Conclusion:** Preliminary data suggest that the use of aerosolized intraperitoneal bupivacaine lowers mean and peak postoperative pain scores and opioid utilization after laparoscopic surgery. Patient enrollment is expected to be completed in 6 mos.

[1] Results of bupicavaine plasma levels will be available at the time of presentation.
[2] Visual Analogue Scale

**SESSION 6: BLADDER EXSTROPHY**

**31)**
MALES WITH CLOACAL EXSTROPHY REARED FEMALE: 5 YEARS LATER.
William G. Reiner, MD, Urology, Univ. of Oklahoma Health Sciences Center, Oklahoma City, OK

Purpose: Assess 5-year clinical follow-up of genetic males converted to female at birth.

Methods: 36 genetic male subjects with cloacal exstrophy, all reared female, were identified with chart review and had phone consultation with parents if the subject was a minor or with the subject. Age range was 7-27 years (mean 15.6). Twenty-three subjects had transitioned to male; they were 8-27 years old (mean 15.3 years) and transitioned to male 1-15 years earlier (mean 6.7 years). The 13 who remained female were 7-27 years old (mean 17.4).

Results: Of 13 subjects remaining female, 2 were found dead at age 16-years, presumably of medical causes. Overall developmental psychosocial status (quality of life) was rated as fair in two and good in 9 of the 11 living subjects remaining female: 7 adolescents began estrogen at ages 12-13 13 years, one at age 16; 4 had major depressive episodes but information on suicidal ideation was unavailable because all 4 sets of parents refused access to the subject. None of the 13 subjects has dated, although 6 were 20 years or older. Of the 23 subjects who had transitioned to male, all parents allowed access to the subject. Psychosocial status was rated as fair in 2 adolescents, good in 21 although one was in maximum security prison. 9 subjects have dated (beginning at ages 13-19 years-old), 2 were married; one was engaged. Three had sexual intercourse but with difficulty. Of these 23 subjects, 3 have had major depressive episodes after transition to male, 2 with suicidal ideation (no attempts). Renal failure and transplantation occurred in one female and one male subject.

Conclusion: Of 36 identified genetic male subjects reared female, 2 died, 2 experienced renal failure, but most had fair to good health and psychosocial status. Those remaining female can experience good psychosocial status, although none has dated so far. Those transitioning to male can experience good psychosocial status. Dating, sexual intercourse, and marriage appears more likely after transitioning to male, although intercourse has been difficult to achieve. Cloacal exstrophy appears to be a risk factor for comorbid major depression.

32)
LONG-TERM BLADDER FUNCTION AND URINARY CONTINENCE IN STAGED REPAIR OF BLADDER EXSTROPHY.
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Purpose: The optimal strategy for surgical repair of bladder exstrophy (BE) is a subject of heated debate. Fueling this controversy is an inability to directly compare surgical management and outcome within even the same era of past or contemporary reconstruction techniques. We reviewed bladder function and urinary continence outcomes of patients that underwent staged repair for BE at our institution.

Methods: The paper and electronic medical records of all patients at our institution with BE that underwent staged repair were reviewed. Patient age at the time of surgery for each stage of the repair (bladder closure, epispadias repair, bladder neck reconstruction (BNR)) was analyzed. Ancillary procedures were also reviewed. Urodynamic study (UDS) reports were reviewed with regard to timing, result and utility. Urinary continence status at last follow-up was recorded where possible and defined as a dry interval of ≥ 3hrs. Number and specific types of surgeries, medications, and the need for clean intermittent catheterization (CIC) were also recorded.

Results: Between 1956 and 2006, 165 patients with BE were treated at our institution with a staged approach. Of these, 80 (34 females, 46 males) had complete records including at least one UDS. The 80 patients underwent a total of 167 UDS. Mean age at initial bladder closure was 4.97 mo. (SD ± 11.3). Mean age at epispadias repair was 4.5 yrs (SD ± 1.7) and mean age at BNR was 5.24 yrs (SD ± 2.1). The mean bladder capacity (BC) at BNR was 82.1 ml. Thirty five patients (43 %) underwent bladder augmentation at a mean age of 9.2 yrs. At last follow-up 24 of 42 males (57%) and 19 of 28 females (68%) were continent, of which 37 (53%) require CIC. Patients that are continent required a statistically significant higher number of surgical procedures than those that are incontinent. There was a statistically significant higher rate of urinary incontinence and (eventual) bladder augmentation in patients with re-do exstrophy closure, bladder capacity < 85 cc before BNR, or initial closure before 1980. Patients with
uninhibited bladder contractions (without bladder augmentation) at UDS also showed a statistically higher incontinence rate.

**Conclusion:** Following staged repair of BE, patients who attain urinary continence are likely to have > 10 operations or multiple procedures, some to the extent of bladder augmentation and/or diversion. In our cohort, a large number of surgical procedures did not always result in urinary continence. UDS is valuable in the longitudinal care of BE patients and aids in the prognosis and management of bladder function and urinary continence.

33)

**THE NEURO–ORTHOPEDIC MANIFESTATIONS OF THE OMPhALOCELE EXSTROPHY IMPERFORATE ANUS SPINAL DEFECTS (OEIS) COMPLEX.**

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**Thomas E. Novak**, Division of Pediatric Urology, Johns Hopkins University School of Medicine, Baltimore, MD

**Jane Benson**, Radiology, Johns Hopkins University School of Medicine, Baltimore, MD

**Paul Sponseller**, Orthopedics, Johns Hopkins University School of Medicine, Baltimore, MD

**John P. Gearhart**, Division of Pediatric Urology, Johns Hopkins University School of Medicine, Baltimore, MD

**Purpose:** OEIS complex is a severe multi-system congenital defect. As the pediatric urologist assumes a primary role in the comprehensive management of these patients, it is important to appreciate the impact of neurologic and orthopedic manifestations on the overall health of the child.

**Methods:** We retrospectively reviewed the medical records of 73 children with OEIS treated at our institution. We identified neurologic and orthopedic anomalies and correlated them with the ambulatory ability and urologic status of the child.

**Results:** No neurologic data was available in 5 patients. Of the remaining 68 patients, 9 had no spinal anomalies, 57 had spina bifida (SB), one had hemivertebrae, and one had coccygeal hypoplasia. Forty-seven of the SB patients were additionally classified: 6 as SB occulta, 12 as meningocele/lipomeningocele, 24 as myelomeningocele/lipomyelomeningocele, and 6 as sacral agenesis. More than half of the patients with SB (35) had a tethered cord. The most common identified orthopedic anomalies requiring follow-up or surgery included vertebral malformation (59), scoliosis (25), club foot (14), and limb length discrepancy (8). The ambulatory status for 56 patients of walking age revealed 37 to ambulate fully, 15 to ambulate with assistive devices, 2 to ambulate minimally with assistive devices, and 8 to be wheelchair bound.

**Conclusion:** Early evaluation of neurosurgical and orthopedic anomalies is vital in caring for children with OEIS. Despite a high incidence of spinal pathology, most patients are able to ambulate without assistance. Very few children with OEIS achieve continence per urethra with volitional voiding. Vigilant follow up of spinal pathology in these children will help promptly identify correctable problems such as cord tethering which can significantly impact quality of life.

34)

**PARENT–REPORTED HEALTH RELATED QUALITY OF LIFE AMONG ADOLESCENTS WITH BLADDER EXSTROPHY AS MEASURED BY THE CHQ–PF50.**

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**Susan L. Furth, MD, Ph.D.**, Pediatric Nephrology, Johns Hopkins Medical Institutions, Baltimore, MD

**Gayane Yenokyan, M.P.H.**, Epidemiology, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD

**Kaitlyn Alcorn, B.M.**, Urology, Johns Hopkins Medical Institutions, Baltimore, MD

**Marie Diener-West, Ph.D.**, Biostatistics, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD

**Albert Wu, MD**, Medicine, Johns Hopkins University School of Medicine, Baltimore, MD

**Kaitlyn Alcorn, B.M.**, Urology, Johns Hopkins University School of Medicine, Baltimore, MD

**Kaitlyn Alcorn, B.M.**, Urology, Johns Hopkins University School of Medicine, Baltimore, MD

**John P. Gearhart, MD**, Urology, Johns Hopkins University School of Medicine, Baltimore, MD

**Purpose:** A valid and reliable method is needed to assess the impact of bladder extrophy on health related quality of life (HRQOL) from both the parent and child perspective. In this study, we collected HRQOL data using the parent-completed Child Health Questionnaire-Parent Form 50.
Methods: Participants aged 11-17 with bladder extrophy or epispadias and their parents were recruited to participate in a study of HRQOL. One parent self-administered a well-validated generic HRQOL instrument, the CHQ-PF50, as a proxy for their child. Urinary incontinence, catheterization status, medical and surgical history data were also collected. Mean scores of the CHQ-PF50 were compared to population-based norms. Mean scores for incontinent participants were compared to those who were continent.

Results: The mean age of the 45 adolescent participants was 14.4 years, 67% were male, and 82% Caucasian. Diagnoses included Bladder Exstrophy (n=40), Epispadias (n=4), and Bladder Exstrophy Variant (n=1). 27 participants reported current urinary incontinence. The median number of lifetime surgeries was 9. Although the Physical and the Psychosocial Summary Scores were comparable to norms, the mean General Health Perceptions Score was significantly worse than the available population-based sample (65.7 (95%CI: 60.8-70.6) vs. 73 (95% CI: 71.3-74.7), p=0.007). In addition, the mean Family Activities Score and the Parent Emotional Impact Score were also significantly worse than the available population-based sample (83.8 (95%CI: 78.8-88.8) vs. 89.7 (95% CI: 87.9-91.5), p=0.04 and 68.3 (95% CI: 61.9-74.7) vs. 80.3, (95% CI: 78.4-82.2), p=0.0001 respectively). There were no significant differences in HRQOL scores of incontinent compared to continent children in the study population.

Conclusion: In this study of HRQOL among adolescents with bladder extrophy, parents reported that their children had significant impairments in general health, experienced limitations in family activities, and a negative parental emotional impact. However, the overall Physical and Psychosocial Summary Scores of the CHQPF50 were comparable to an available population-based sample. This suggests that the CHQ-PF50 may be a useful generic instrument in the bladder exstrophy population, but that further research is needed to better understand the effects of urological symptoms such as incontinence on HRQOL from both the child and parent perspective.

SESSION 7: VOIDING DYSFUNCTION

35) PROSPECTIVE OPEN-LABEL STUDY OF SOLIFENACIN FOR OVERACTIVE BLADDER IN CHILDREN.
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Purpose: Pediatric urologists frequently encounter children presenting symptoms of bladder over activity. Optimal anticholinergic pediatric dosage is not well known. Historically, oxybutinin has been effective in treating overactive bladder but is poorly tolerated. Tolterodin has been shown to be as effective as oxybutinin with fewer side effects (S/E). Newer agents, such as solifenacin, could be an alternative but their use in children as never been reported. Therefore, we aimed at optimising medical therapy in a select group of children which failed to improve under oxybutinin or tolterodin by using solifenacin and evaluating its efficacy, tolerability and safety.

Methods: Pediatric patients presenting refractory overactive bladders with incontinence were offered to enter a prospective open-label protocol using adjusted-dose regimens (solifenacin 1.25 to 10 mg). Inclusion criteria were: absence of correctable neurological anomalies (MRI), failure of symptoms improvement under intensive behavioural and medical (oxybutinin or tolterodin) therapies and/or significant S/E with other agents. The follow-up consisted of voiding diaries, post-void residuals and urine cultures every 3 months and ultrasound and UDS every 6 months. Families were regularly questioned for continence, S/E, compliance, change in behaviour and quality of life. Blood samples and EKG were obtained to detect potential toxicity. The primary end-point was efficacy toward continence; the secondary end-points were tolerability and safety.

Results: A total of 66 patients (37 girls, 29 boys) were enrolled. Twenty-six patients with neurogenic bladder (10 CIC) and 40 with overactive bladder completed a minimum of 3-months follow-up. Mean age at initiation was 8.8 years. They were on solifenacin for a mean of 12 months. Urodynamic capacity improved from 151±66ml to 325±135ml and uninhibited contractions decreased from 71±29 to 22±18cmH2O. Continence improved in all (24 dry, 36 significantly and 6 moderately improved). Forty-eight patients reported no S/E, 14 mild, 2 moderate and 2 withdrew from the protocol due to S/E. Four patients developed significant post-void residuals (>20%). Blood tests and EKG remained normal.
Conclusion: In the presence of overactive bladder refractory to oxybutinin or tolterodin, solifenacin was proven to be an alternative to improve symptoms in the pediatric population. Tolerability was acceptable and the adjusted-dose regimen appeared safe.

36) NIRS BASED NON-INVASIVE URODYNAMIC TEST: A BETTER WAY TO ASSESS CHILDREN WITH VOIDING DYSFUNCTION.
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Purpose: Near infrared spectroscopy (NIRS) is a non-invasive technology (Urodynamix Technologies, Canada), which uses energy from light in the near infrared spectrum to monitor changes in local blood flow and hemodynamics and detect differences in tissue oxygen delivery, consumption and utilization. NIRS technology was used to evaluate children undergoing uroflowmetry and perineal electromyography during routine evaluation for voiding problems. We report the preliminary data that has been garnered to date utilizing this new technology.

Methods: A prospective study was conducted under an IRB approved protocol to evaluate the NIRS technology. All patients that were scheduled for uroflow/EMG were asked to participate in the study. Consent was obtained from all participants. A NIRS patch was placed suprapubically along with perineal EMG patch electrodes prior to the patient voiding. The patient was given permission to void and the data recording was commenced. The Uroflow data was all collected in the same Laborie urodynamic machine (Laborie Medical, Canada). Data analysis was performed by the author utilizing Excel (Microsoft Corp. WA) statistical data package.

Results: We have enrolled 58 patients out of an expected 100 in the study, 54 had NIRS curves that were adequate for analysis. The patients were divided into 3 groups: OAB, Internal sphincter dyssynergia (IDSD) and external sphincter dyssynergia (EDSD). It was found that there was no difference between age-adjusted bladder volumes between the groups, acceleration, Q max, Q avg. When Q max and Q avg were vol adjusted there were statistically significant differences between the groups (EDSD vs. OAB and IDSD vs. OAB). Lag times as defined by the NIRS curves revealed a statistically significant difference between IDSD and the other two groups (p<0.01). Evaluation of the NIRS patterns revealed that in IDSD that a positive deflection occurred in 8/11 patients with no negative deflections in all three hemoglobin curves.

Conclusion: From the interim data that has been gathered to date it is clear that a diagnosis of IDSD can be made utilizing the NIRS device in conjunction with an uroflowmetry and pelvic floor electromyography. Absence of some of these parameters also helps make the definitive diagnosis of EDSD easier. In some cases patients with mixed IDSD and EDSD were identified thereby facilitating management.

37) CORRELATION BETWEEN DETRUSOR OVERACTIVITY ON URODYNAMICS AND SHORTEÑED EMG LAG TIME ON UROFLOWMETRY/ELECTROMYOGRAPHY.
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Purpose: When employing the term overactive bladder (OAB), the symptom of urgency must be present and the presence of detrusor overactivity (DO) is only implied. While DO can be proven with urodynamics (UDS), this invasive procedure is often unnecessary in the highly suspicious patient. Uroflowmetry with electromyography (EMG) provides an alternative and non-invasive approach to making the diagnosis of DO objectively. EMG lag time (the time from the start of pelvic floor relaxation and the start of urine flow) is normally 2-6 seconds (sec). In children with DO and a quiet pelvic floor during voiding, EMG lag time is shortened and often negative. Previous analysis has shown that 100% of patients with a shortened lag time (≤0 sec) also have evidence of DO on UDS. Despite this excellent positive predictive value (PPV)
and specificity, it is still unknown how many patients with DO will actually have a shortened EMG lag time on uroflow/EMG. We sought to determine the sensitivity of EMG lag time in the diagnosis of DO.

**Methods:** We reviewed the charts of 50 consecutive patients (median age 8.4 years, 25th-75th percentiles = 6.0 – 9.4 years) who had DO on UDS and a quiet EMG during voiding from 2006 to 2009 and who also underwent uroflow/EMG study within a 3 month period before or after their UDS. No patient received anticholinergics for at least 3 months prior to each study. EMG lag times for each patient were reviewed and the correlation between UDS proven OAB and shortened lag time was determined with three cutoffs for shortened lag time: 1) <2 sec, 2) ≤ 1 sec, and 3) ≤ 0 sec.

**Results:** Of the 50 children (14 male; 36 female), average EMG lag time was 0.1 sec (SD 1.7). 44 of the 50 patients (88%) qualified as having shortened EMG lag time with the first cutoff (<2 sec). With the second cutoff (≤ 1 sec), 42 patients (84%) had a shortened EMG lag time. Finally with the third and most stringent cutoff (≤ 0 sec) 35 patients (70%) had a shortened EMG lag time.

**Conclusion:** Previously we demonstrated that children with an EMG lag time of ≤ 0 sec in association with a quiet pelvic floor during voiding on screening uroflow/EMG was associated with DO on UDS in 50 out of 50 patients, i.e. 100% specificity and 100% PPV. We now have documented the reverse – the existence of a shortened lag time on uroflow/EMG in patients with documented DO on UDS. DO can be predicted with an 88% degree of sensitivity in patients when EMG lag time is <2 sec. Therefore, the presence or absence of DO in most patients can be identified on a noninvasive uroflow/EMG study and convert a presumed diagnosis into a confirmed one.

**38) MANAGEMENT OF LOWER URINARY TRACT (LUT) DYSFUNCTION: A STEPWISE APPROACH.**

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**Purpose:** To evaluate management patterns of LUT dysfunction and establish a treatment algorithm to guide pediatric healthcare providers.

**Methods:** 390 children with nonneurogenic LUT dysfunction were treated and followed over 7 months. 115 patients were excluded due to incomplete data or no follow up. Children were categorized based on presenting complaints and pelvic ultrasound into 3 groups: diurnal enuresis (DE) without incomplete emptying (IE), DE with IE, or IE without DE. Every child underwent behavioral modification (BM) including timed voiding, double voiding, deep breathing, and treatment of constipation if present. BM failures received secondary therapy including medications (alpha blockers, anticholinergics), physical therapy (PT), and/or botulinum-A toxin (BTX) injection of the external sphincter at a dose of 100 units. Outcomes were based on parent questioning and voiding diaries.

**Results:** BM improved symptoms in 152 (55%), including 68% (46% dry), 49% (27% dry), and 59% (29% dry) from the 3 groups respectively. Of the 45% whom demonstrated no change in symptoms, 98 (80%) improved with addition of medication, majority (89) after starting alpha-blocker therapy. Children with IE responded better to alpha-blockers, 83 (67%) compared to 38% without IE, where as those without IE demonstrated more symptom resolution with anticholinergics, 6 (38%) compared to 3% of those with IE. Incorporation of pelvic floor PT with medication improved overall group success rate by 16%. Only 6 (2%) patients were refractory to non-operative treatment with all showing improvement after injection of BTX, 4 (67%) of which became completely dry.

**Conclusion:** Diagnosis of DE and/or IE with stratification of children into particular symptom groups appears beneficial in guiding the practitioner to appropriate therapy. Behavioral modification improves >50% of children and should be the first step in management. Identifying IE will direct medical therapy to either alpha-blocker or anticholinergic therapy. PT is a useful adjuvant in improving treatment response and finally, BTX injection into the external sphincter proved a reliable treatment modality in children who failed all therapies.
Purpose: Uroflowmetry (UFM) is the most common diagnostic urodynamic procedure for evaluating children with lower urinary tract problem. However, interpretation of UFM curves is incompletely standardized. An objective patterning is proposed.

Methods: UFM curves were obtained from 100 children presenting with daytime incontinence or enuresis at their first office visit. Each curve was compared with a standard curve generated from a published nomogram, and deviation from it was considered as abnormal pattern. As a result, a new patterning method was formulated. First, Staccato and Interrupted patterns were defined by ICCS criteria. Next, rest of the curves were classified by deviation of maximal flow rate (MFR) from median value of the nomogram as Tower (>140%), 'Not abnormal'(70-140%), and Plateau (<70%) pattern. The correlation of the patterns and other UFM parameters with the presenting symptom was evaluated. Further, six pediatric urologists patterned the same curves subjectively.

Results: All the curves could be classified to one of the patterns by the method. Distribution of the patterns reasonably reflected the spectrum of presenting symptom (Figure 1, p<0.05 between Group 1 and 3). Age adjusted voided volume was smaller in children with daytime incontinence than those without. Post-void residual, MFR and average flow rate did not correlate with presenting symptom. Subjective patterning showed marked inter-observer difference. When the patterning by the present method was set as a reference standard, the positive prediction rate of the observers for abnormal patterns inversely correlated with their negative prediction rate (Figure 2).

Conclusion: Subjective UFM patterning is liable to personal bias. The proposed methodology enables an objective patterning, complying the ICCS standardization and clinical presentation.
40) THE EFFECT OF RECTAL BALLOON INFLATION AND DEFLATION ON BLADDER FUNCTION IN CHILDREN WITH LOWER URINARY TRACT SYMPTOMS (LUTS) AND/OR CONSTIPATION.

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Purpose: To study the effect of rectal balloon inflation and deflation on bladder sensory-motor functions in children.

Methods: We prospectively studied 26 neurologically normal children 10M/16F aged 6 to 11 years with symptoms of urinary incontinence or infrequent voiding +/- constipation with GI-GU studies including: elimination questionnaires and diaries, personality assessments, colonic transit time, anorectal manometry, and simultaneous urodynamic-rectal balloon pressure studies attempted 3X with balloon empty, inflated, and deflated.

Results: Anorectal manometry was normal in all. Colonic transit was prolonged in 39%. Constipation was diagnosed by Rome III criteria in 16. Constipation did not correlate with urinary infrequency or incontinence, presence of uninhibited contractions (UNC) or UTI history. UNC were seen in 16 of 22 with OAB symptoms. 3 bladder response patterns to rectal balloon inflation were observed: Stimulatory: bladder capacity decreased in 40%, bladder sensation increased in 40% and bladder instability increased or was unmasked in 66%. Inhibitory: bladder capacity increased in 25%, bladder sensation decreased in 40%, and bladder instability decreased or disappeared in 34%. No effect: in 7.

Conclusion: Rectal balloon inflation induced bladder sensory-motor dysfunctions which may persist after balloon deflation. There were no significant correlations between response patterns and either GI or GU symptoms but the preexisting state of the bladder and rectum appeared to influence the behavior of the bladder: stimulatory responses were seen in children with small bladders or large rectal vaults with inhibitory responses noted in those with large bladders. These preliminary observations suggested that there are both mechanical and neurological causes for the sensory-motor interrelationships between rectum and bladder that markedly impacted LUT function in neurologically normal children. They provide insights into
the actual mechanisms of what have formerly been apparent associations between GU symptoms, LUT dysfunction and fecal retention and afford potential opportunities for treatment of bladder hyperactivity and hypoactivity in childhood.

41) SEX DIFFERENCES IN BLADDER SMOOTH MUSCLE AND UROTHELIAL MUSCARINIC SENSITIVITY.
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Purpose: The female predominance in bladder disorders begins during childhood and continues into adulthood. Using in-vitro spontaneous bladder contractions as a preparation for overactive bladder, we had previously noted an endogenous enhancement of bladder contractions by muscarinic and purinergic mechanisms. We wished to determine if there was a sex difference in sensitivity to these mechanisms that would explain the difference in bladder disorders.

Methods: Whole bladders from neonatal Sprague-Dawley rats were harvested at 1,2,3, and 6 weeks of life and placed in an organ chamber with Krebs' solution at 37°C and 95% O\textsubscript{2}/5% CO\textsubscript{2}. Bladders were filled to optimal volume and baseline amplitude (% of K\textsuperscript{+} evoked contractions) and frequency (number of contractions/5 minutes) of spontaneous bladder contractions were measured. Muscarinic agonists (oxotremorine-M, 40 µM) and antagonists (atropine-methyl-nitrate, 5 µM) and purinergic agonists (α,β-Me-ATP, 1 mM) and antagonists (PPADS, 1 mM) with poor lipophilic properties were added to the serosal (smooth muscle) and mucosal (urothelial) sides of the bladder preparations to determine the differential regulation of spontaneous bladder contractions.

Results: Female bladders had higher amplitude (13% vs 5%, p<0.05) and frequency (22 vs 12, p<0.05) spontaneous contractions than male bladders at 2 weeks of life. Serosal administration of oxo-M enhanced the amplitude of contractions only in male bladders, whereas AMN inhibited contractions in both male and female bladders. Mucosal administration of oxo-M only enhanced the amplitude in male bladders, and AMN only inhibited the amplitude in female bladders. Purinergic agonists and antagonists did not affect amplitude or frequency via either serosal or mucosal administration.

Conclusion: Spontaneous contractions in female neonatal rat bladders exhibit higher amplitude and frequency compared to male bladders. Serosal muscarinic agonists increase amplitude only in male bladders, and mucosal muscarinic antagonists decrease amplitude only in female bladders. This suggests that female bladder smooth muscle and urothelium are more sensitive to endogenous levels of acetylcholine than male bladders, which may be a factor in the female predominance of bladder disorders.

SESSION 8: DIAGNOSTIC IMAGING

42) CATHETERLESS MRI CYSTOGRAM USING ULTRASOUND ACTIVATED GADOLINIUM-CONTAINING LIPOSOMES – A PILOT STUDY.
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Purpose: We hypothesize that non-enhancing gadolinium-containing liposomes can be delivered to the bladder and ruptured with ultrasonic energy to locally release gadolinium, allowing for the performance of a cystourethrogram without catheterization or exposure to ionizing radiation. We performed a pilot study using an in vitro and in vivo model to test the feasibility of this concept.

Methods: Omniscan liposomes were prepared and placed into 15ml falcon tubes and a T1 MRI scan of the tubes was obtained. Ultrasonic energy (1 MHz) was then delivered to the tube for 5 minutes to rupture the micelles and the scans were repeated. We then catheterized female Sprague-Dawley rats and filled their bladders with gadolinium-containing liposomes and performed T1 MRI scans of the rat bladders.
Ultrasonic energy (1 MHz) was also administered to the bladders for 5 minutes and the scans were repeated.

**Results:** The T1 MRI images of the falcon tubes with gadolinium-containing micelles demonstrated no enhancement, while repeat scan following activation with ultrasonic energy demonstrated obvious enhancement. The T1 MRI images of the rat bladders following filling with gadolinium-containing liposomes also demonstrated no enhancement, but repeat scans following activation showed clear cystogram images, the bladders filled with gadolinium.

**Conclusions:** The ultrasonic activation of gadolinium-containing liposomes allows for the localization of gadolinium enhancement specifically to the bladder, excluding of the upper urinary tract, for use in MRI cystography. This technology may be combined with orally consumed or intravenously delivered gadolinium-containing liposomes to perform voiding cystourethrograms in children without catheterization or ionizing radiation.

**43) IS HAVING A VCUG THAT HORRIBLE: AN ASSESSMENT OF PARENTAL SATISFACTION WITH VOIDING CYSTOURETHROGRAPHY IN CHILDREN.**

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**Purpose:** Voiding cystourethrography (VCUG) is the gold standard in the diagnosis of vesicoureteral reflux and a number of other bladder conditions. An estimated 50,000 children undergo this procedure every year. There is a recent trend toward the use of sedation or even delaying or forgoing VCUG due to the anticipated distress of the exam. We hypothesized that VCUG is not as distressing as commonly thought and can be performed without the need for sedation with adequate preparation and the use of proper techniques to minimize anxiety.

**Methods:** A prospective evaluation of parental satisfaction of children undergoing VCUG was conducted using the 33-question VCUG Satisfaction Survey. Sixty-one parents of patients of all ages (53% male) completed the survey in urology clinic after undergoing a VCUG earlier that day. The questions assessed level of preparation, parental satisfaction, sources of discomfort, and the value of a child life specialist (CLS).

**Results:** Fifty-two percent of the children were under one year of age. Most parents reported being prepared for the procedure, while only 6% reported not being very prepared. Most parents found discussions with the radiologist and primary care physician prior to the exam to be useful. The more prepared the parents were the greater percentage reported being very satisfied with the procedure. About one-third of patients had a prior VCUG, with more than two-thirds of these having their prior VCUG at our institution, with one quarter reporting a much better experience and all reporting that that the recent VCUG was either the same or better than the prior VCUG. More than half reported that VCUG was the same or better than a physical exam, immunization, ultrasound, and prior catheterization. Most patients were uncomfortable during the catheter placement and bladder-filling phase but reported feeling comfortable after the procedure. Two thirds of patients reported the presence of a CLS; however, 15% were unsure if a CLS was present. Most parents reported that the CLS was either extremely or very helpful for the child, the parent, and the physician present. Parents had varied perceptions of their own ability in comforting their child, whereas parents with a CLS present reported it to be much easier to comfort their child, with more than 70 percent reporting it to be somewhat or very easy. A greater percentage of parents with a CLS present than those without a CLS present reported being very satisfied. Most parents were very satisfied with the overall experience and their child’s ability to tolerate the procedure. Most parents reported that the VCUG experience was much better or better than expected, with only 5% reporting that the experience was worse than expected.

**Conclusion:** The VCUG, with adequate preparation and the support of a CLS, is a very tolerable procedure that exceeds expectations.

**44)
UTILIZATION OF SONOURETHROGRAM IN THE MANAGEMENT OF ADOLESCENT ANTERIOR URETHRAL STRICTURES.

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Purpose: Accurate measurement of anterior urethral stricture length is critical to determine the appropriate surgical approach. Longer urethral strictures may be best treated by open urethroplasty. Retrograde urethrogram (RUG) is often utilized to determine stricture location and length. However, the adult literature has demonstrated that RUG may underestimate stricture length in comparison with sonourethrogram. We investigate the role of SUG in pre-operative evaluation of adolescent urethral stricture disease.

Methods: Between June 2008 and February 2009 we prospectively evaluated 12 pediatric patients with urethral stricture disease by RUG and SUG. Stricture length on RUG was categorized by two uro-radiologists as: I, <1 cm; II, 1 to 3 cm; III, >3 cm. All SUG were performed in the operative suite with cystoscopy. SUG stricture length was measured as the longest extent of urethral abnormality. Comparative analysis between the two methods was performed.

Results: Mean patient age at the time of SUG was 16.9 (range 9.5 to 20.8). RUG identified 7 patients with category I strictures (<1 cm); 4 patients with category II strictures (1-3 cm). No patients had category III strictures (>3 cm); and one patient suspected of having stricture disease had a negative RUG. All 7 category I patients had strictures >1 cm on SUG with mean stricture length of 2.4 ± 1.2 cm. Of the 4 category II patients two were found to have strictures longer than 3 cm. One category II patient was not found to have a stricture on SUG with verification by cystoscopy. SUG identified a 2.6 cm stricture in the patient with a negative RUG, further confirmed by cystoscopy and open surgery. Overall, SUG upgraded stricture length in 9 of 12 patients, and altered surgical approach in 7 of 12 patients. SUG outperformed RUG in 10 of 12 cases.

Conclusion: SUG is a simple and effective technique for evaluating adolescent urethral stricture disease. SUG may provide a more accurate measurement of stricture length and improve preoperative planning.

45) MAGNETIC RESONANCE VOIDING CYSTOURETHROGRAPHY FOR VESICOURETERAL REFLUX CAN BE IN PLACE OF STANDARD VCUG EXCEPT TODDLERHOOD.

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Purpose: Not only urologists but also radiologists are searching for a noninvasive technique of testing for reflux. To assess the feasibility of magnetic resonance (MR) voiding cystourethrography using MR fluoroscopy for evaluation of vesicoureteral reflux and the possibility of it being a noninvasive alternative to the standard voiding cystourethrography (VCUG).

Methods: A total of 104 MR studies: plain (55), enhanced (49) with vesicoureteral reflux diagnosed by VCUG were evaluated. When enhanced studies were done, contrast medium for magnetic resonance imaging was instilled into the bladder via the catheter. Before and during voiding MR fluoroscopy was executed with the fast multiplanar spoiled gradient-echo sequence. The MR findings were correlated with those obtained by the gold standard VCUG. We investigated the feasibility of MRVCUG performed with sedation (51) and without sedation (53).

Results: MRVCUG enhanced was showed to be 95% sensitive with a specificity of 96.2% for detecting VUR. One false negative unit was found in grade I reflux case. MRVCUG could detect 4 higher grade reflux cases which proved to be no or lower reflux on VCUG. There were no false positive cases on MRVCUG. Thirty one of 51 patients (infant and toddler) could undergo MRVCUG with sedation. On the other hand, 51 of 53 patients (child and adult) could undergo MRVCUG without sedation. MRVCUG could be more feasible on older patients than younger patients (p<0.001).

Conclusion: MRVCUG can demonstrate most of reflux without ionizing radiation, and can be in place of standard VCUG except toddlerhood.
ASSESSING THE VALIDITY OF SUBDIVIDING A STANDARD ULTRASOUND GRADING SYSTEM FOR HYDRONEPHROSIS.

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Purpose: Hydronephrosis (HN) diagnosed via ultrasound is often reported according to the Society of Fetal Urology (SFU) subjective 4-point grading system. How ever, a study we published in 2008 demonstrated modest inter-rater reliability, with interpreters inconsistently ranking SFU Grades 3 and 4. We assessed whether clarifying the SFU grading system using a previously reported system (Sibai, H, Pippi Salle J L et al) using a subdivision of Grade 4 that takes into account the extent of the segmental parenchymal thinning would increase inter-rater reliability.

Methods: Retrospective study utilizing 50 sets of pediatric ultrasounds that were assessed by 4 staff and 4 trainees using a modified SFU grading system with a subdivision of Grade 4 into 4a (segmental parenchymal thinning) and 4b (diffuse parenchymal thinning). Each assessor repeated their ranking for a second time after 2 weeks. Inter-rater and intra-rater reliabilities were determined using the non-weighted Cohen κ statistic and agreement level was considered as follows: 0.81 to 0.99 as almost perfect, 0.61 to 0.80 as substantial, 0.41 to 0.60 as moderate, 0.21 to 0.40 as fair and 0.01 to 0.20 as slight.

Results: Overall inter-rater agreement among the eight raters was found to be “moderate” for Grade 0, “slight to fair” for Grades 1 to 4a, almost “substantial to perfect” for Grade 4b, and “substantial” for a combined Grade 4 (Grades 4a and 4b). Intra-rater agreement was found in general to be “moderate to substantial” for both staff (κ 0.41 to 0.85) and trainees (κ 0.55 to 0.86).

Conclusion: Similar to our previous report, this study suggests that the SFU grading system has good intra-rater reliability. Clarifying the system with a subdivision of Grade 4 allowed raters to almost perfectly distinguish Grade 4b from Grades 4a and 3. It also increased the inter-rater agreement of Grade 4 from moderate to substantial. In conclusion, this modification may improve the low inter-rater agreement previously observed for Grades 3 and 4; however studies using a larger population should be conducted.
47) IS VARICOCELECTOMY SAFE FOR PATIENTS WITH A HISTORY OF PREVIOUS INGUINAL SURGERY?

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**Purpose:** Varicocelectomy with a history of previous inguinal surgery poses a potential risk of testicular volume loss. In addition, it is thought that artery sparing technique might be associated with decreased risk of testicular atrophy, especially in the face of previous inguinal surgery. To assess the extent to which varicocelectomy can be performed on these patients without resultant atrophy of the ipsilateral testis, we present outcomes for 26 pediatric patients with history of prior inguinal surgery who subsequently underwent ipsilateral varicocelectomy.

**Methods:** Patients’ charts from a single urologist’s practice were retrospectively reviewed. Any patient who underwent left varicocelectomy and who had a history of prior ipsilateral groin surgery was considered.

Patients having had a previous failed varicocelectomy were excluded. Pre- and postoperative testicular volumes were recorded preferentially by ultrasound (23 patients), or by ring orchidometry if two consecutive ultrasounds were unavailable (3 patients). Symmetry was defined as less than 10% asymmetry, and catch-up growth was defined as resolution of asymmetry.
Results: We identified 26 patients, median age 15.4 years (range 10-18) at time of varicocelectomy that fit the above criteria. Initial groin surgeries were inguinal hernia/hydrocele repair (21 patients), orchidopexy (5 patients) with or without hernia/hydrocele repair. Varicocelectomy was performed laparoscopically in 19 patients (6 artery and lymphatic sparing, 9 lymphatic sparing, 4 nonlymphatic sparing) and via open technique in 7 patients (2 artery and lymphatic sparing, 1 lymphatic sparing, 4 Palomo). Median follow-up was 22.1 months (range 2.1-70.4). Testicular asymmetry decreased by more than 10% in 16 (62%) of patients and changed by less than 10% in 8 (31%) patients. Although 2 patients (8%) experienced worsening of asymmetry, all patients experienced increase in left testicular volume, with a median increase of 83% over preoperative measurement. Twenty patients had >10% preoperative asymmetry. Of these, 16 (80%) experienced decrease in asymmetry by more than 10% (12 of which experienced postoperative catch-up growth), while 4 (20%) experienced less than 10% change in asymmetry.

Conclusion: Varicocelectomy with a history of previous inguinal surgery is safe, as there was no incident of decrease in testicular volume following surgery. In addition, the incidence of catch-up growth was similar to series without previous groin surgery. There was no significant difference in outcome when comparing those who had artery sparing versus nonartery sparing or open versus laparoscopic varicocelectomy.

<table>
<thead>
<tr>
<th>No. of Patients</th>
<th>Incidence of Preop Asymmetry (&gt;10%)</th>
<th>Median Decrease in Asymmetry</th>
<th>Median Left Testicular Volumes Change</th>
<th>Incidence of Catch-Up Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open (7 pts)</td>
<td>Artery &amp; Lymphatic Sparing</td>
<td>2</td>
<td>7%</td>
<td>+69%</td>
</tr>
<tr>
<td></td>
<td>Lymphatic Sparing</td>
<td>1</td>
<td>59%</td>
<td>-172%</td>
</tr>
<tr>
<td></td>
<td>Palomo</td>
<td>4</td>
<td>26%</td>
<td>-106%</td>
</tr>
<tr>
<td>Laparoscopic (19 pts)</td>
<td>Artery &amp; Lymphatic Sparing</td>
<td>6</td>
<td>23%</td>
<td>+95%</td>
</tr>
<tr>
<td></td>
<td>Lymphatic Sparing</td>
<td>9</td>
<td>20%</td>
<td>+57%</td>
</tr>
<tr>
<td></td>
<td>Lymphatic Sacrificing</td>
<td>4</td>
<td>16%</td>
<td>+54%</td>
</tr>
</tbody>
</table>

*of those with preoperative asymmetry >10%
consider this to be partial. Further histopathological studies should be necessary to demonstrate the relationship between testicular hypoplasia, irreversible damage and future fertility problems, so deciding which adolescents should be treated.

49) ADOLESCENT VARICOCELES: DOES THE POTENTIAL FOR CATCH-UP GROWTH WITHOUT SURGERY VARY WITH TANNER STAGE?

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Purpose: Testicular asymmetry in adolescents can worsen, remain unchanged, or lessen on follow up. We sought to determine the incidence of testicular asymmetry at presentation by Tanner stage and determine the correlation, if any, between Tanner stage and subsequent changes in percent asymmetry (i.e. ability for catch-up growth or progressive asymmetry).

Methods: We studied 101 boys (mean age 14.1 years, range 9.2 to 22.3) with left varicoceles who had testicular volume measurements (using either ring orchidometer or ultrasound) on at least two visits a minimum of 6 months apart. Only one type of volume determination was used in any particular patient, using ultrasound when both were recorded. Patients were divided into two groups: <15% asymmetry and ≥15% asymmetry. Catch up growth was defined as <10% asymmetry on any subsequent visit.

Results: At presentation, 45%, 63%, 61%, 25%, and 56% of Tanner 1, 2, 3, 4, and 5 patients had ≥15% testicular asymmetry, respectively (see figure). In 92%, volume measurements were obtained by ultrasound. Mean follow up was 13.7 months (range 6-57). Tanner 4 patients were less likely to have ≥15% asymmetry at presentation than Tanner 2 and 3 patients (p<0.04), although no other Tanner stage differences were significant. Although not statistically significant, there was a trend towards more catch up growth at higher Tanner stages. Interestingly, Tanner 1 patients with ≥15% asymmetry at presentation were more likely to have a worsening of their asymmetry (>25%) than any other Tanner stage (p<0.01). Furthermore, although not statistically significant, the percentage of patients who had ≥15% asymmetry at the end of follow up regardless of initial testicular group (<15 or ≥15% asymmetry) was higher for Tanner 1 patients than the other Tanner stages: 91% vs. 60%, 58%, 58%, and 59% for Tanner 2, 3, 4, and 5, respectively (p=0.26).

Conclusion: Adolescents with ≥15% testicular asymmetry exhibit a higher incidence of catch up growth at higher Tanner stages. In addition, Tanner 1 patients were more likely to have a worsening of their asymmetry and even if they present with symmetrical testicular sizes they had a high percentage of future asymmetry. Children who present with a varicocele prior to the onset of puberty (i.e. Tanner 1) have a greater likelihood of having asymmetry at presentation, worsening of asymmetry with time, and future asymmetry when presenting with symmetry.
# Outcomes of 101 Adolescent Boys with <15% and ≥15% Asymmetry (Asym)

<table>
<thead>
<tr>
<th>Tanner Stage</th>
<th>No. of Patients</th>
<th>&lt;15% Asym at 1st Visit # (%)</th>
<th>≥15% Asym at 1st Visit # (%)</th>
<th>At Follow Up # (%)</th>
<th>At Follow Up # (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>11</td>
<td>6 (55)</td>
<td>1 (17)</td>
<td>5 (45)</td>
<td>0 (0)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8 (73)</td>
<td>2 (40)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 (27)</td>
<td>3 (60)</td>
</tr>
<tr>
<td>2</td>
<td>30</td>
<td>11 (37)</td>
<td>5 (17)</td>
<td>19 (63)</td>
<td>23 (73)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3 (27)</td>
<td>14 (74)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6 (20)</td>
<td>5 (16)</td>
</tr>
<tr>
<td>3</td>
<td>20</td>
<td>10 (50)</td>
<td>6 (30)</td>
<td>12 (40)</td>
<td>2 (60)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4 (20)</td>
<td>11 (55)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 (10)</td>
<td>D (0)</td>
</tr>
<tr>
<td>4</td>
<td>12</td>
<td>9 (75)</td>
<td>4 (33)</td>
<td>3 (25)</td>
<td>2 (67)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5 (42)</td>
<td>D (0)</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>6 (50)</td>
<td>D (0)</td>
</tr>
<tr>
<td>5</td>
<td>22</td>
<td>13 (44)</td>
<td>6 (27)</td>
<td>9 (56)</td>
<td>3 (33)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7 (32)</td>
<td>B (67)</td>
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</table>

50)
**A CONSERVATIVE APPROACH TO TESTICULAR RUPTURE.**

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Jordan Gitlin, Pediatric Urology, Schneider Children's Hospital, Lake Success, NY
Steven Friedman, MD, Urology, Maimonides Medical Center, Brooklyn, NY
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**Purpose:** The management of blunt trauma with breach of the renal capsule or the bladder (extraperitoneal) has largely become non-surgical as a conservative approach proved to be effective and safe. Currently, the recommendation for managing testicular rupture is surgical exploration and debridement or orchiectomy. We report an outcome series of boys diagnosed with testicular rupture who were managed without surgical intervention.

**Methods:** Over the past year, we have managed 6 boys with a delayed presentation of testicular rupture following blunt scrotal trauma. Patients were managed with scrotal support, antibiotics (to prevent abscess), rest, analgesics, and serial ultrasounds. We report their clinical information and outcome.

**Results:** The 6 boys were ages 3-18 years old and presented to the ED 1-5 days after the injuries. Trauma was to the left testis in 4 cases and the right in 2 cases. The patients all presented with mild-moderate pain and similar scrotal swelling. The ultrasound findings consistently demonstrated hematocele and increased echogenicity. Blood flow was present in injured portion of the testes in 5 cases. Other findings included scrotal edema and prominent rete testis. The period of follow-up was greater than 6 months in all cases. In all cases, there was resolution of the hematoceles, stabilization of the testicular sizes without atrophy and normalization of the echogenicity. One patient required surgical repair of a hydrocele 4 months after the trauma. No patient developed an abscess or infection.

**Conclusion:** A conservative approach to a select group of adolescent boys with testicular rupture can result in resolution of the fracture and maintenance of testicular architectural integrity. The risk of subfertility will need to be assessed at a later date.
51) EPIDIDYMAL CYSTS AND TESTICULAR SIZE: A SONOGRAPHIC SURVEY OF 1765 PATIENTS.
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Purpose: Epididymal cysts are easily visualized with scrotal sonography. Epididymal cysts can result from maternal exposure to estrogen mimetic endocrine disrupting molecules during male fetal development. We reviewed more than 2000 pediatric scrotal ultrasounds in an effort to gain insight into the frequency and age distribution of epididymal cysts and discern any relationship with testicular size.

Methods: A review of all pediatric scrotal ultrasounds performed at our institution between 2001 and 2008 was carried out tabulating primary sonographic diagnosis, incidental findings, and testicular size. Patient age was divided into 5 year intervals. Testicular size was compared between patients with epididymal cysts and those with normal anatomy (based on sonographic interpretation of the study) using an analysis of covariance approach, adjusting for age.

Results: 2031 scrotal ultrasounds were reviewed in 1765 patients. Epididymal cysts were found in 254 patients (14.4%). As patient age increased so too did the proportion of epididymal cysts, from ~9% in the youngest cohort to >50% in the 15+ age group. Analysis of covariance results show that testicular sizes (both length and volume) are larger in those patients with epididymal cysts, compared with patients with normal anatomy. Approximately 80% of cysts were incidental findings, while the other 20% were found on evaluation of a scrotal mass consistent on physical examination with epididymal cyst. We identified bilateral cysts in 16.1% of patients with cysts.

Conclusion: Epididymal cysts are felt to be harmless whether discovered on physical examination or with scrotal ultrasonography. No previous tabulation of pediatric scrotal sonography has demonstrated an increase in the occurrence of epididymal cysts by age for populations studied. The association of epididymal cysts with testes of increased size is novel, but unexplained.

52) THE ESTROGEN RECEPTOR BETA (ERß) GENE IS ASSOCIATED WITH CRYPTORCHIDISM IN RAT AND MAN.
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Purpose: Cryptorchidism is a complex disease defined by multilocus genetic susceptibility. We studied the cryptorchid Long Evans (LE) orl rat to identify candidate genes for study in human males.

Method: To define genomic loci associated with cryptorchidism in orl rats, we used WKY rats in an intercross-backcross breeding protocol to generate affected F2 males (n=58) that were genotyped using genome-wide single nucleotide polymorphism (SNP) and microsatellite markers. Genotypes were analyzed using the transmission disequilibrium test (TDT) with multiple testing correction. The sequence of exon, intron-exon junction and promoter regions of candidate genes was determined and regions of interest analyzed in multiple rat strains. Real time RT-PCR analysis of gestational day (GD) 17 fetal orl and wt LE gubernaculum was performed using TaqMan chemistry and results expressed relative to Tpp2. Genotyping of the intron 6 CA dinucleotide repeat polymorphism in the ESR2 gene was performed by PCR amplification of genomic DNA from cryptorchid cases (n=116) and circumcision controls (n=108) using a
6-FAM labelled primer followed by fragment analysis using capillary electrophoresis. Short (S) and long (L) alleles were defined as <(CA)_{22} and ≥(CA)_{22}, respectively.

**Results:** Several genomic loci showed significant (p<0.01) linkage with one or both marker sets. We searched for candidate genes at these loci and identified Esr2, encoding estrogen receptor β (ERβ), at the chromosome 6 peak. Sequencing of orl Esr2 revealed a strain-specific homozygous promoter haplotype associated with a 50% reduction in Esr2 mRNA in orl gubernaculum. Longer alleles of a human ESR2 intronic CA repeat polymorphism have been associated with hypospadias ced testosterone levels. Analysis of our case-control cohort also showed a positive association of cryptorchidism with the L allele and LL genotype with odds ratios of 1.52 (CI 1.05-2.21) and 2.36 (C.I. 1.09-5.08), respectively; p=0.027.

**Conclusion:** (1) Risk alleles in the promoter of Esr2 are associated with orl cryptorchidism and with decreased expression of Esr2 mRNA in orl fetal gubernaculum and (2) Long CA repeat risk alleles in ESR2 are associated with the clinical disease. These data suggest a common mammalian genetic risk factor for non-syndromic cryptorchidism.

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53) **HORMONAL REGULATION OF GENE EXPRESSION IN THE FETAL RAT GUBERNACULUM.**

*Julia S. Barthold, MD, FAAP*, Surgery/Urology and Research, A.I. duPont Hospital for Children/Nemours Biomedical Research, Wilmington, DE *Job Chacko, MD*, Surgery/Urology and Research, A.I. duPont Hospital for Children/Nemours Biomedical Research, Wilmington, DE *Alan Robbins, MSc*, Surgery/Urology and Research, A.I. duPont Hospital for Children/Nemours Biomedical Research, Wilmington, DE *Yaning Wang, PhD*, Surgery/Urology and Research, A.I. duPont Hospital for Children/Nemours Biomedical Research, Wilmington, DE *Suzanne McCahan, PhD*, Surgery/Urology and Research, A.I. duPont Hospital for Children/Nemours Biomedical Research, Wilmington, DE *Kamin Johnson, PhD*, Surgery/Urology and Research, A.I. duPont Hospital for Children/Nemours Biomedical Research, Wilmington, DE

**Purpose:** The Leydig cell hormones insulin-like 3 (INSL3) and testosterone/dihydrotestosterone (DHT) are key factors required for gubernaculum development. Our previous data suggest altered expression of genes related to cytoskeleton, energy pathways and muscle development in the fetal gubernaculum of the cryptorchid Long Evans (LE) orl rat. We used genome-wide analysis to validate strain-specific and examine hormone-responsive gene expression in gubernaculum.

**Methods:** Untreated gubernacula from GD17 and 19 fetuses were pooled by litter after fixation in RNALater®. For organ culture, GD17 wt gubernacula were pooled by litter on Millicell culture plate inserts in DME with 10% FCS. After 24h, media was added containing no hormone (control), INSL3 (1 or 10 nM) or DHT (0.1 or 1 nM) for an additional 24h. RNA was extracted from all pools of treated and untreated gubernacula (n=5-7 litters/group), amplified, labelled and hybridized to Affymetrix 230 2.0 rat expression arrays. Raw data were normalized and groups compared using the LIMMA linear model approach with a false discovery rate (FDR) of 5%. Differentially expressed genes were analyzed for overrepresented functional categories using DAVID and transcription factor (TF) binding sites using PAINT.

**Result:** Comparison of GD17 and GD19 orl and wt samples revealed most strain-specific differences (n=3042 differentially expressed probesets) at GD17. Although expression patterns of specific genes were not always comparable to our previous data due to different collection methods, analysis of these 3042 probesets using DAVID and PAINT produced similar results to our previous series, with overrepresentation of energy pathway, muscle, cytoskeleton and proteosome signaling genes (Bonferroni p values <0.03) and Elk1, Cret-BP/c-jun, CREB, e-Ets1 and NRF2 as the most overrepresented TF binding sites (p<0.0001). Significant expression differences were seen at one or both doses of hormone for more genes after INSL3 (n=2680) than DHT (n=1198) exposure. INSL3 altered expression of genes related to Wnt signaling, cytoskeleton organization and biogenesis, muscle development and neurogenesis, while DHT affected expression of primarily cell cycle- and morphogenesis-associated genes. Interesting INSL3-regulated genes include Wnt5a and Sfrp1, both recently associated with abnormal gubernacular development in transgenic mice, and multiple cAMP response element-associated genes including Crem and Crebbp.
Conclusion: Our expanded analysis of gene expression in fetal rat gubernaculum confirms altered muscle, cytoskeletal and energy pathway signaling in the cryptorchid orl strain and provides initial support for regulation of Wnt signaling, muscle development and neurogenesis by INSL3.

54)
ACUTE TESTICULAR TORSION: EFFECT OF HOSPITAL TRANSFER AND SOCIOECONOMIC FACTORS ON PATIENT SURGICAL OUTCOMES.
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Purpose: Testicular torsion is a true pediatric emergency. Testicular salvage depends primarily on the time from the torsion occurrence to the time to treatment. We sought to determine if delay from a hospital transfer or variable socioeconomic factors could impact the orchiectomy rate for children with this condition.

Methods: We retrospectively evaluated the records of children seen in a single institution emergency room who proceeded to surgery for a diagnosis of acute testicular torsion from 2003 to 2008. Charts were reviewed for transfer status, race, presence or absence of insurance, and distance from the hospital. Orchiectomy specimens were evaluated for histological confirmation of non-viability.

Results: 101 children underwent scrotal exploration for acute testicular torsion and 99 records had complete data to review. The orchiectomy rate for those transferred versus presented primarily to the ER was 55.6% vs 64.2% (p>0.05). Orchiectomy rates for patients with private insurance vs medicaid or no insurance were 62.3% vs 64.6% (p>0.05). Average distance from the hospital in the orchiectomy group was 26.3 miles vs 19.4 in the non-orchiectomy group (p<0.05) (see figure). Orchiectomy rates were highest in the African American population (70.3%) and lowest in the latino population (61.1%) (p>0.05). Surgical diagnosis of non-viability agreed with pathologic diagnosis of complete non-viability in 89% with the remaining testicles showing only microscopic focus of viable tissue in the setting of extensive necrosis.

Conclusion: While testicular torsion is a disease entity that depends on rapid diagnosis and treatment, hospital transfer does not seem to lead to greater orchiectomy rates. Outcomes are not influenced by distance from the hospital or by type of insurance. Surgical assessment of non-viability correlates closely with pathological findings.
SESSION 10: PENIS

55) GLANS DEHISCENCE AFTER HYPOSPADIAS REPAIR.
Nicol Corbin Bush, MD, Pediatric Urology, Children's Medical Center Dallas, Dallas, TX; Nicholas Cost, Pediatric Urology, Children's Medical Center Dallas, Dallas, TX; Warren T. Snodgrass, Pediatric Urology, Children's Medical Center Dallas, Dallas, TX

Purpose: Few reports concern rates of glans dehiscence (GD) after hypospadias repair, defined here as neourethral opening to the corona or more proximally. We compare incidence after primary tubularized incised plate (TIP) repair of distal/midshaft versus proximal hypospadias, after TIP reoperations, and following staged repair using oral mucosa.

Methods: Prospectively maintained databases of WS were reviewed to identify patients with GD. All boys were prepubertal. Preoperative testosterone use, meatus location, and glansplasty suture material were recorded. 6-0 sutures were used in all cases.

Results: GD occurred in 10/477 (2%) of distal/midshaft repairs, which was significantly less than for proximal primary TIP [9/67 (13%), p=0.0001], reoperations [6/62 (10%), p=0.005], or staged oral mucosa [6/28 (21%), p=0.0001]. Analyzing all distal/midshaft operations and reoperations compared to proximal hypospadias surgeries, GD occurred in 13/523 (2%) versus 18/111 (16%), p=0.0001. Preoperative testosterone was given to only 7 (1%) patients with distal/midshaft, versus 27 (24%) with proximal hypospadias. Preoperative use of testosterone in patients with proximal hypospadias did not affect rates of GD, which occurred in 6/27 (22%) with preoperative testosterone versus 10/84 (12%) without, p=0.2. GD was not associated with type of suture [7/119 (6%) chromic vs. 24/515 (5%) vicryl, p=0.6]. Among patients with oral mucosa grafts, GD occurred in 6/13 (46%) using cheek vs 0/14 using lip, p=0.005.

Conclusion: Rates of GD are 5- to 10-fold higher in patients with proximal hypospadias, reoperations, and staged operations with oral mucosa compared to distal/midshaft hypospadias. This may indicate the impact of smaller glans size in proximal compared to distal cases. Although preoperative testosterone is known to increase glans size, it did not reduce GD, but our non-randomized use prevents definitive conclusions regarding its role. Suture material did not correlate with GD. In the patients with proximal hypospadias that had oral mucosa grafts, thinner lip grafts had no GD in contrast to nearly 50% with cheek grafts. Objective measurements of glans diameter are needed to determine if size predicts rates of GD.

56) STAGED BUCCAL MUCOSA GRAFT FOR SALVAGE URETHROPLASTY IN CHILDREN: LESSONS LEARNED.

Purpose: Although staged buccal mucosa graft is a well accepted technique for salvage urethroplasty, there are few reports describing pitfalls and outcomes of this technique for redo hypospadias repair in children.

Methods: The charts of patients who underwent substitution buccal mucosa graft urethroplasty performed for urethral plates not amenable to repeat single stage reconstruction were reviewed. During the first stage
the diseased urethra was removed and a quilted de-fattened buccal graft placed over a well vascularised bed. The second stage graft tubularization was performed approximately 6 months later. A second covering layer was used in all cases. Age, quality of the graft immediately before tubularization, meatal position, presence of Balanitis Xerotica Obliterans (BXO) and complications were recorded.

**Results:** 30 patients underwent 32 repairs over a 5-year period. Mean of age at the first stage was 7 years (range 1-17) and mean interval between stages was 9.3 (range 5-13) months. Mean follow up after the second stage was 19.5 months (range 4-44). Meatal position before first stage was proximal in 44%, midshaft in 39% and distal in 16%. The buccal graft was harvested from the cheek in 25, the lower lip in 2 and from both sites in 4 cases. Nine patients had proven BXO. There were no donor site complications. In 16 cases the graft developed variable degrees of fibrosis/retraction and/or induration. In 4 of these the fibrosis was severe enough to warrant re-grafting. Complications after the second stage procedure occurred 11/32 repairs (34%): Urethral stenosis, glandular dehiscence and urethro-cutaneous fistula occurred in 5, 3 and 3 repairs, respectively. Complications occurred in 9(81%) of the 11 patients with some degree of graft fibrosis or induration at second stage whereas only 4(19%) complications occurred in 21 patients without this unfavourable graft finding (p<0.001). Age, presence of BXO and meatal position were not significant factors associated with adverse outcomes.

**Conclusion:** Staged buccal mucosa urethroplasty is a suitable technique for salvage urethroplasty. Donor site complications are rare. Complications were seen in approximately one third of the patients, occurring mainly in fibrotic and indurated grafts which, in retrospect, should not have been tubularized.

57)

**SUTURELESS, SCALPEL-LESS CIRCUMCISION: FASTER, CHEAPER AND BETTER.**

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**Purpose:** We previously reported our success with sutureless circumcision using 2-octyl cyanoacrylate (2-OCA; Dermabond®) in 267 patients. At that time, it was unclear whether our use of 2-OCA offered real financial or time savings over the traditional sutured technique. However, we have since modified our technique further by making all skin incisions with electrocaudery on cutting current. We report our results in the present study, which we believe to be the first such series in the literature.

**Methods:** We reviewed the charts of all patients ages 6 months-12 years undergoing primary circumcision (PC) and circumcision revision (CR) by three surgeons over a 27-month period. Exclusion criteria included complexity beyond phimosis (i.e. chordee, penile torsion, hypospadias, phalloplasty) and use of the Gomco clamp. The surgical technique was the same for all patients: circumferential inner incision using electrocaudery on cutting current à circumferential outer incision using electrocaudery à removal of foreskin à hemostasis with electrocaudery à approximation of skin edges with 2-OCA or 6-0 suture à application of antibiotic ointment. Compiled data included: PC vs. CR, suture vs. 2-OCA for skin approximation and the reason for this decision, operative times, complications, and parental and surgeon satisfaction.

**Results:** Between July 1, 2006 and October 1, 2008, we performed 348 PC using 2-OCA, 171 CR using 2-OCA, 94 PC using 6-0 sutures, and 60 CR using 6-0 sutures. In the vast majority of cases in which sutured PC and CR were performed, this decision was based upon resident request for suturing experience. Mean operative time for PC and CR using 2-OCA was 11 minutes (range: 6-22), and that for sutured PC and CR was 33 minutes (range 18-48) (p<0.05). Operative times for both techniques depended somewhat upon the degree of resident involvement in the case. At mean follow-up of 12 months (range 1-27 months) a total of 4 patients (one from each group) were re-admitted for bleeding, and one sutured CR was brought back electively at parents’ request for correction of unsatisfactory cosmesis. While parental satisfaction was equally high in both groups, the absence of suture tracks and suture sinuses in the 2-OCA groups gave this group higher surgeon satisfaction.

**Conclusion:** The combined use of electrocaudery and 2-OCA for circumcisions is a safe, efficient, financially beneficial and cosmetically appealing alternative to traditional circumcision performed with scalpel and sutures.
LONGTERM OUTCOMES AND COMPLICATIONS OF HYPOSPADIAS REPAIRS – MULTI-INSTITUTIONAL REVIEW.

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Purpose: Hypospadias is known to occur with an incidence of 4 per 1000 live male births, per the Birth Defects Monitoring Program in the US. Reports of single institution and single surgeon outcomes have been published but generalized outcomes from multiple institutions are lacking.

Methods: A retrospective review utilizing the Pediatric Health Information System (PHIS) database, a database of patients from 40 pediatric hospitals in the US, was performed. Patients were extracted by ICD-9 codes for hypospadias repairs and subsequent operations and diagnoses consistent with complications postoperatively. All boys 6 months or younger at the time of diagnosis of hypospadias were included, between the years 2003-2005. All patients had at least 3 years of followup, through September 2008. Older patients were excluded to avoid patients referred for redo hypospadias repairs.

Results: A total of 1511 patients met the inclusion criteria. The average age of patients was 5 months (0-6 months). The overall complication rate for all patients was 9.8% (148 patients). The breakdown of procedures performed for complications is as follows: 41.3% redo hypospadias repairs, 13.9% repair of urethral fistulae, 12.6% treatment of urethral stricture, 5.2% excision of penile adhesions/skin lesions, 3.2% repeat circumcisions, 3.2% release of chordee. On average, the time interval from initial hypospadias repair to complication was 17 months, with a median time of 13 months (range 1-69 months). When patients were analyzed by age at time of initial hypospadias repair, there was no significant difference in complication rate between the age groups (range 7.7% to 11.8%). The 4 month age group had the highest percentage of patients with complications after repair (11.8%).

Conclusion: The overall complication rate for hypospadias repairs was 9.8%, which is a higher rate than is frequently published in the literature, and likely is a better reflection of actual practice. There does not appear to be a difference in complication rates when patients are broken down by the age at initial hypospadias repair. The time to complication is most commonly 13 months, but can occur as late as 69 months, suggesting longterm followup is necessary to accurately define complication rates.

ANDROGEN STIMULATION PRIOR TO HYPOSPADIAS SURGERY INCREASES THE RATE OF HEALING COMPLICATIONS.

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Purpose: Preoperative androgen stimulation for severe hypospadias (i.e. with a proximal division of the corpus spongiosum) has long been used to enlarge the penis and to improve the outcome. We compared the outcome of Onlay island flap urethroplasty in 2 groups: with and without preoperative androgen stimulation.

Methods: Between 1997 and 2007, 126 onlay urethroplasties were performed by the same surgeon (PM). Thirty patients received preoperative androgen treatment (Human Chorionic Gonadotrophins and/or Systemic Testosterone) and 96 patients didn’t receive any steroid stimulation. The timing of these androgens treatments varied between 1 and 24 months prior to surgery.

Results: Thirty five patients presented with a complication (27.7%) among which 26 (20.6%) had either a fistula or a dehiscence (complications related to a healing failure). Patients who received androgen stimulation presented with an overall rate of fistula / dehiscence of 30% whereas those who did not receive any hormonal treatment had a rate of 17.7%. If the androgenic treatment was given more than 3 months prior to surgery, the fistula / dehiscence rate was 21.7% whereas if this treatment was given less than 3 months prior to surgery, the rate reached 57%.

Conclusion: A literature review of preoperative stimulation in hypospadias surgery showed the paucity of data concerning hormonal stimulation. However dermatologists reported some scientific evidence indicating that androgens reduce the healing process of the skin, compared to estrogens which have a stimulating effect on it. Although androgens might be useful to increase the size of the penis prior to
hypospadias surgery, they should be given more than 3-6 months before the procedure in order to avoid their negative effects on the healing process. Topical estrogen prior to surgery is currently on trial to boost the healing process in hypospadias.

60) DOES SKIN PHOTOTYPE AND LOCAL TRAUMA PLAY A ROLE IN THE ONSET OF BXO IN CIRCUMCISED PATIENTS?

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Purpose: The association between Balanitis Xerotica Obliterans (BXO) and skin disorders is well established: however the role skin type and local trauma in the onset of such disease has never been investigated in details.

Methods: Chart of all caucasian children circumcised over a 3 year period were reviewed. Excised skin underwent histological examination for BXO. Children with signs of BXO were classified as Group A; children without signs of BXO were classified as Group B. Fitzpatrick phototype (FT) was obtained in all children with personal or family interview of sunburn and suntan experience. FT was divided into two Groups: FT 1-2 and FT 3-4: patients with FT 1-2 have less ability to tan because of reduced melanin content. Attention was also directed to manoeuvres of mechanical reduction of foreskin (MRF) performed at least 5 to 10 times a month in the last year prior to surgery. Association was sought between BXO and the following parameters: FT 1-2 and MRF. Patients with immunological or endocrine disorders were excluded as were those with a family history of skin disease. Statistical evaluation was performed with the Odds Ratio.

Results: 297 patients met the aforementioned criteria: Group A consisted of 78 patients whereas Group B comprised 219 subjects. Patients undergoing MRF (n = 131) had a statistically significant greater risk of developing BXO (OR = 5.319, CI 2.91 – 9.44 p < .05); risk of BXO was also significantly greater in FT 1-2 patients (n = 76) (OR = 4.52, CI 2.57 – 7.94, p< .05).

Conclusion: Though foreskin is not directly exposed to sunlight, this study emphasizes the role of different skin type role in the onset of BXO in circumcised subjects; moreover, advantages of repeated foreskin reduction must be weighed against greater risk of developing BXO which may enhance complication rate of circumcision surgery.

61) SINGLE STAGE URETHROPLASTY FOR SEVERE POSTERIOR HYPOSPADIAS: THE “TWO STAGES IN ONE TIME” PROCEDURE.

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Purpose: To present the results of scrotal-perineal hypospadias repair with a procedure that combines advantages of single-stage with the safety of two-stage procedures.

Methods: Operation stems from Koyanagi-Nonomura technique, its modifications, and “Yoke”repair. Procedure starts with degloving and straightening of the penis; a buttonhole is created in dorsal penis-skin, glans is passed through the hole, transferring foreskin ventrally. Glanular-wings are created. Prepuce is split in the midline and minimally unfurled, creating two long skin flaps in continuity proximally with
parameatal skin and laterally with penile skin. The two flaps are joined in the midline, reconstructing a new urethral plate that is stabilized securing it to the corpora. A “U”-shaped incision including the original meatus is carried out, the skin strip is minimally detached from lateral skin, keeping its blood-supply intact. The urethral plate is rolled into a tube. The glans is re-approximated in the midline, creating a generous external meatus and the two lateral skin flaps are joined in midline covering the new urethra.

**Results:** Fifty-two consecutive boys (average 22 month old) affected by scrotal/perineal hypospadias were treated from 1998 till December 2007. Patients were controlled from 6 to 12 months after surgery. Outcome was satisfactory in 32 patients (57.7%); 7 (13.4%) presented a retrusive meatus, but good urinary flow and were not re-operated. Fifteen needed revision (28.8%): 10 meatal or distal urethral stenosis (together with: fistulas in 3, urethral ballooning in 3, urethral diverticulum in 1), 3 had isolated urethral fistulas, 1 long urethral stenosis, and 1 total dehiscence.

**Conclusion:** Our procedure gives satisfactory results in 70% of cases, with a reasonable rate and severity of complications, it allows the treatment of chordee and penoscrotal-transposition and is not adversely conditioned by a small prepuce. The most challenging part is creation of glanular urethra and external meatus wide enough, not obstructing the relatively weak urinary stream, consequence of the long-tube urethral replacement. This procedure may popularize the use of one-stage-repair for the most severe form of hypospadias, being a good alternative to the 2-stage-repair in primary cases.

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**SESSION 11: BASIC SCIENCE PRIZE FINALISTS**

62)

**EVALUATION OF CYSTONE IN THE TREATMENT OF CYSTINE UROLITHIASIS IN SLC3A1 KNOCKOUT MICE.**

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**Purpose:** Hyperhydration and urine alkalinization have been advocated as preventive measures in children with cystinuria without consistent success, prompting the search for more reliable alternatives. Recently, there has been interest in Cystone, an herbal preparation used in the treatment of urolithiasis. The mechanism is unclear, but Cystone has been speculated to prevent the supersaturation of lithogenic substances. Although clinical trials are currently underway, *SLC3A1* knockout mice provide an opportunity to assess the potential therapeutic effects of Cystone in cystinuria. *SLC3A1* encodes a subunit of the transporter system for cystine.

**Methods:** Four-month-old male mice were used. Cystone (Himalaya Herbal, Houston, TX) dose of 20 mg/mouse was administered to both treated and control mice (n=6) every weekday for 4 weeks. For the bladder and calculi analysis, 12 knockout mice were randomly assigned to 2 groups: no treatment group (n=6) and Cystone treatment group (n=6); two heterozygous males were used as controls. Urine samples from the treated and control groups were collected at 0, 1, 2, 3, 4 weeks. Samples were analyzed for amino acids by HPLC (Children's Hospital, Washington, DC). At the completion of the treatment, mice were sacrificed. Micro CT (SkyScan, Belgium) analysis of bladders was performed to appraise the bladder and calculi mass. Bladders and calculi were also weighed.

**Results:** The knockout mice showed significant urinary hyperexcretion of cystine and dibasic amino acids compared to controls (p<0.01). The treatment duration had no effect on cystine excretion (Figure).
Micro CT analysis revealed that Cystone had no effect on percent calculi or bladder volumes of treated and untreated knockout mice (19±4% vs. 16±8%, p=0.54; 397±225mm$^3$ vs. 252±185mm$^3$, p=0.81). The comparison between calculi and bladder weights also showed no significant differences (150±68mg vs. 80±66mg, p=0.79; 136±90mg vs. 87±75mg, p=0.94). Mean bladder weight of the control group was 7±3mg.

**Conclusion:** Cystone treatment had no effect in reducing the cystine stone burden. These findings suggest that Cystone prevents neither supersaturation nor crystallization of cystine in SLC3A1 knockout mice. Although clinical trials may still be necessary, this emphasizes the need to continue to look for alternative medical therapies for the treatment of cystinuria.

63) **THE BMP–7–SMAD1/5/8 PATHWAY SUPPRESSES TGF–β–DEPENDENT PRO–FIBROTIC PATHWAYS DURING RENAL RECOVERY FOLLOWING OBSTRUCTION–INDUCED INJURY.**

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**Purpose:** Obstructive uropathies are a leading cause of pediatric renal failure and require intervention to prevent the development of irreversible renal fibrosis and injury. The TGFβ pathway plays a central role in the pathogenesis of fibrosis and is countered by the BMP7 pathway. Here, we examine the mechanisms in the TGFβ and BMP7 pathways that promote renal recovery from obstruction-induced injury following the correction of obstruction.

**Methods:** Obstruction-induced renal fibrosis was studied using reversible unilateral ureteral obstruction (UUO) in control and BMP7-treated mice. Fibrosis was assessed with trichrome staining, hydroxyproline measurement, and interstitial volume quantification. TGFβ and BMP7 signaling were assessed using TGFβ and BMP7 ELISA, RT-PCR, Smad immunoblotting and co-immunoprecipitation.

**Results:** We found that BMP7 promotes renal recovery by stimulating the regression of fibrotic lesions (166.2±9.8% reduction in renal collagen relative to control) and the restoration of renal architecture (193.7±15.8% reduction in interstitial volume relative to control; 184.0±12.5% increase in tubular volume relative to control). In examining the regulation of the BMP7 pathway, we found that, following obstruction, there is a 67.1±13.0% decrease in BMP7 protein levels and a decrease in the activation of its target proteins Smad1, Smad5, and Smad8. After the correction of obstruction, there is a 235±22.6% increase in BMP7 protein levels and, subsequently, the reactivation of the BMP7-Smad1/5/8 pathway is sufficient to inhibit the formation of TGFβ-dependent Smad2/3-Smad4 transcription factor complexes and the transcription of TGFβ-dependent pro-fibrotic genes despite the continued presence of elevated levels of TGFβ.

**Conclusion:** These findings demonstrate that the BMP7-Smad1/5/8 pathway plays a role in the suppression of TGFβ-dependent pro-fibrotic pathway that occurs during the recovery of the kidney from obstruction-induced renal injuries. Together, these findings suggest that the BMP7 pathway plays a functional role in the innate ability of the kidney to repair obstruction-induced injuries and, furthermore,
that the BMP-7 pathway represents an important therapeutic target to activate these innate repair mechanisms during the treatment of renal injuries from obstruction.

64) MESENCHYMAL STEM CELL RECRUITMENT AND IMPROVED BLADDER FUNCTION FOLLOWING BLADDER OUTLET OBSTRUCTION.

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Mark C. Adams, MD, Pediatric Urology, Monroe Carell Children's Hospital, Vanderbilt University, Nashville, TN
Stacy T. Tanaka, MD, Pediatric Urology, Monroe Carell Children's Hospital, Vanderbilt University, Nashville, TN
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Neil A. Bhowmick, PhD, Pediatric Urology, Vanderbilt Medical Center, Nashville, TN

Purpose: Mesenchymal stem cells (MSCs) have been reported to have a variety of therapeutic benefits in various models of organ injury. Bladder outlet obstruction (BOO) is known to result in fibrosis and decreased compliance. To investigate the role of MSCs in the setting of BOO, we used a mouse model of BOO to determine whether tissue-specific recruitment of injected MSCs was observed after obstruction. We also evaluated whether the presence of these recruited cells resulted in any appreciable change in bladder histology and function. Finally, we sought to identify potential chemokines in the obstructed bladder involved in MSC recruitment.

Methods: Twenty C57BL/6 female mice underwent partial-BOO. Under anesthesia, a urethral catheter was inserted. Through a suprapubic incision, the bladder neck was dissected and tied with a 4-0 silk. After abdominal closure, the catheter was withdrawn. 3 days following BOO, 2 million green fluorescent protein (GFP) labeled MSCs were administered to each mouse via tail vein injection. After 4 weeks, the mice underwent urodynamic measurements for bladder compliance and were sacrificed for histologic evaluation of the bladder. Compliance values were taken at 50% of the bladder capacity. Tissues were analyzed immunohistochemically for the presence of GFP-positive MSCs, histopathologically for changes associated with partial-BOO, and with qRT-PCR to determine relative expression of the chemokines CCL2, CCL20, CCL25, CXCL9, and CXCL16 associated with MSC recruitment. Age-matched controls were utilized for chemokine expression quantitation.

Results: 15/20 mice survived to urodynamic evaluation at 4 weeks post-BOO. Immunohistochemical exam of the bladder revealed the presence of GFP-positive cells in the detrusor compartment in 10/15 animals. Furthermore, histopathologic review revealed decreased detrusor hypertrophy and markedly decreased bladder fibrosis. When correlated with urodynamic findings, 9/10 mice who had successful recruitment of MSCs demonstrated improved compliance compared to those that did not (9.6±5.1 vs. 3.9±2.6 µL/cm H2O, p=0.012). Chemokine analysis by qRT-PCR demonstrated a 2-fold increase in CCL2 expression in the 4-week obstructed bladders, however no significant changes in CCL20, CCL25, CXCL9, or CXCL16 expression were observed.

Conclusions: Based upon our preliminary findings, successful MSC recruitment to the bladder following BOO appears to improve histopathologic findings and functional parameters. MSC recruitment appears to be related to CCL2 overexpression in the obstructed bladder. Additional studies with larger sample sizes will be required, however we feel our initial results suggest a potential mechanism of action and may provide insight into potential MSC-based therapies for BOO-related bladder fibrosis.

65) INCREASED DNMT1 EXPRESSION AND ACTIVITY IN UROEPITHELIAL CELLS CORRELATES WITH DECREASE IN P16 MRNA EXPRESSION FOLLOWING UROPATHOGENIC E.COLI INFECTION.

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Cornelia Tolg, Developmental and Stem Cell Biology, The Hospital for Sick Children, Toronto, ON, Canada
Trupti Panchal, Developmental and Stem Cell Biology, The Hospital for Sick Children, Toronto, ON, Canada

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Conclusions: Based upon our preliminary findings, successful MSC recruitment to the bladder following BOO appears to improve histopathologic findings and functional parameters. MSC recruitment appears to be related to CCL2 overexpression in the obstructed bladder. Additional studies with larger sample sizes will be required, however we feel our initial results suggest a potential mechanism of action and may provide insight into potential MSC-based therapies for BOO-related bladder fibrosis.
Purpose: Urinary tract infection (UTI) is one of the most common bacterial infections, affecting tens of millions of children and adults worldwide, with E.coli the most common pathogen. In some instances, UPEC form internal quiescent reservoirs (IQR) inside the UEC. Reactivation of dormant UPEC may lead to recurrence of UTI. We propose that IQR of UPEC incite epigenetic changes, specifically DNA methylation, in the UEC genome, which may alter infection pathogenesis and predispose to recurrent UTI. Methylation of DNA occurs in the promoter region, which is associated with gene silencing and loss of gene expression. DNA methyl transferase 1 (DNMT1) is responsible for hemi-methylation of DNA in somatic cells. Many genes commonly known to be inactivated by promoter hypermethylation such as p16, a cell cycle arrest gene, and O6-MGMT, a DNA mismatch repair gene.

Methods: In this study, we investigated whether infection at low multiplicities of infection (MOI) with Fim [+]/E.coli (UT-189) vs. Fim [-]/E.coli (SLC-35) can induce methylation changes by DNMT1 enzyme activation. We optimized the ratio of infection of 1 to 5 (i.e., number of cells: number of E.coli), and infection time for 2 hours only, followed by post-infection incubation from 1 to 6 days in Gentamycin containing-medium.

Results: At 24 hours of post-infection incubation, 70% of cells were infected, with 3 particles of UT189 E.coli internalized per cell. Next, we investigated mRNA expression of DNMT1 in UT-189 infected UEC compared to non-infected UEC. Real-Time PCR revealed a 150-fold increase in DNMT-1 mRNA expression compared to non-infected UEC. This increase in the mRNA level correlated with a 170-fold increase in DNMT activity (EpiQuik DNA Methyltransferase Activity Kit) in infected vs. non-infected UEC. Real-time PCR for p16 and O6-MGMT, showed a 3, and 9-fold decrease in the mRNA level in infected UEC compared to non-infected cells, respectively.

Conclusion: The above data suggest that internalization of Fim [+]/E.coli at low MOI can induce the DNA methylation machinery, possibly downregulating genes by methylation of CpG islands in the UEC DNA. Ongoing experiments are focusing on assessing the methylation status of p16, O6-MGMT and other candidate genes that may be downregulated through E.coli infection in UEC. Identification of epigenetic alteration in UEC exposed to E.coli may provide a new paradigm for UTI pathogenesis and preemptive diagnosis.

NEONATAL BLADDER REDUCTION SURGERY ALTERS BRAIN REGULATION OF VOIDING.

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Purpose: Patients with nocturnal enuresis may have a small functional bladder capacity, or altered sensation of bladder fullness. We wished to determine if reducing bladder volume would affect the central inhibition of voiding, which is normally present between birth and 2 weeks of life in neonatal rats.

Methods: 1 and 3 week old Sprague-Dawley rats underwent 50% reduction of bladder volume by suture closure of the bladder dome or sham surgery. T8-T10 spinal cord injury was performed in select animals. The latency of the perigenital-bladder reflex, onset of spontaneous voiding, and body weight were measured. Cystometry under urethane anesthesia and measurements of in-vitro spontaneous and KCl-evoked contractions were performed.

Results: Bladder reduction surgery led to the immediate appearance of spontaneous voiding in 1 week old rats. Cystometry at 2 weeks showed voiding contractions in rats that had undergone bladder reduction, which could be abolished by acute T8-T10 spinalization. Voiding contractions were not seen on cystometry in animals that underwent sham surgery or concurrent T8-T10 spinalization and bladder reduction. The perigenital-bladder reflex, somatic growth, in-vitro spontaneous bladder contractions, and bladder contractility were not affected by bladder reduction. Bladder capacity at 9 weeks was larger (540 vs 256 µl, p=0.04) and peak voiding pressure was lower (32 vs 51 cm H2O, p=0.04) in animals undergoing bladder reduction at 1 week compared to sham animals, but not in animals undergoing bladder reduction at 3 weeks.
Conclusion: Bladder reduction removes the central inhibition of spontaneous voiding in the neonatal rat. This suggests that a reduction in bladder capacity during a critical developmental period can alter how the brain regulates the bladder.

67) RAPAMYCIN INHIBITS PROLIFERATIVE SIGNALS FROM THREE COORDINATE STIMULI.
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Introduction: Obstructive conditions of the urinary bladder induce smooth muscle overgrowth and de-differentiation. Pathway analysis of genes induced by strain injury in bladder smooth muscle cells (BSMC) identified rapamycin (specific inhibitor of mTOR) as a pharmacologic inhibitor of a highly associated gene network. While anti-proliferative effects of rapamycin in vascular smooth muscle cells (SMC) are known, its pleiotropic effects on BSMC were previously unknown.

Purpose: To study the role for mTOR in the BSMC response to three stimuli associated with bladder outlet obstruction: mechanical strain/distension, hypoxia, and denatured collagen matrix.

Methods: Ex vivo bladders from Sprague-Dawley (SD) rats were distended to 40 cm H2O pressure, harvested in OCT, cryosectioned and stained via double-immunofluorescence and deconvolution microscopy. BSMC were isolated from neonatal SD rats and utilized at early passages (p1-2), and serum-starved before treatments: hypoxia at 1 or 5% O2, 5% strain, heat-denatured collagen. Thymidine incorporation into DNA and cell counting was used to assess proliferation. Western blotting for mTOR and other pathways was performed on protein isolated in RIPA buffer, and detected with antibodies from Cell Signal (NEB). Overexpression of an HA-tagged plasmid in BSMC was detected by immunofluorescence using anti-HA antibodies. Real-time PCR and immunofluorescence was used to detect SMA expression.

Results: Strain-induced mTOR-specific S6K activation segregated differently from ERK1/2 activation in the whole intact bladder ex vivo. Rapamycin significantly inhibited proliferation of BSMC in response to mechanical strain, hypoxia, and denatured collagen. Rapamycin inhibited S6K at mTOR-sensitive phosphorylation sites in response to strain and hypoxia. Rapamycin maintained smooth muscle actin (SMA) expression at normal or higher than normal levels in response to de-differentiation induced by strain or hypoxia. Importantly, strain plus hypoxia synergistically augmented S6K activation, and was inhibited by rapamycin. STAT3 activation was increased by strain. While S6K and S6 activation was significantly increased by strain alone at 10 and 20 minutes, respectively, eIF4E and 4EBP were not significantly altered by rapamycin. Forced expression of wild type and constitutively active S6K mutants resulted in loss of SMA expression.

Conclusion: Together, these results suggest that S6K in the mTOR pathway is a potential new target for myopathic bladder disease.

SESSION 12: STONES

68) PEDIATRIC UROLITHIASIS: MEDICAL TREATMENT AND OUTCOMES.
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Purpose: Pediatric urolithiasis is characterized by a significant risk of recurrence and thus warrants a full metabolic evaluation. Non-pharmacologic management, i.e., forced diuresis alone, is rarely successful and frequently is insufficient to prevent recurrence. One of the mainstays of treatment is potassium citrate, which increases both the pH of tubular cells and the excretion of citrate thereby inhibiting crystal formation by reducing the supersaturation of calcium oxalate and calcium phosphate in urine. Thiazides directly stimulate calcium reabsorption in the distal nephron. Our retrospective study was designed to evaluate if
these standard therapies are effective in reducing the excretion rates of lithogenic solutes and increasing supersaturation ratios among patients who received potassium citrate, thiazide or combination therapy.

**Methods:** Between 2002 and 2008, 62 urolithiasis patients from a pediatric urology and nephrology practice had multiple 24-hour urine tests performed. Patients were grouped into controls who only increased hydration, and those who received potassium citrate, thiazide, or a combination of both therapies. All patients were investigated for supersaturation levels of calcium oxalate (SS CaOx), calcium phosphate (SS CaP), and uric acid (SS UA), hypercalciuria, hyperoxaluria, hypocitraturia, and hyperuricosuria.

**Results:** The mean age was 11 years and mean follow-up was 2 years. There were 23 untreated controls, 24 treated with potassium citrate, 12 with thiazide and 3 with both. On comparing the levels before and after treatment using the paired t-test in the potassium citrate group, significant improvement was seen in SS UA (P=0.008) and hypocitraturia (P<0.02). In the thiazide group, significant improvement was seen in SS CaOx (P=0.012) and SS CaP (P=0.013). In the combined treatment group, significant improvement was seen in hypercalciuria (P=0.041).

**Conclusion:** Recurrence is quite likely in pediatric patients unless an etiologic diagnosis is made and treatment is directed at risk factors. Our study revealed statistically significant changes in multiple risk factors as demonstrated by improvement based on 24-hour urine tests. Furthermore, we observed many clinically significant trends in SS CaOx, SS CaP, hypercalciuria and hypocitraturia across all treatment groups that match those noted in adults. Our study, although retrospective, demonstrated statistically and clinically significant changes in metabolic stone risk factors with the use of pharmacologic interventions.

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**69) SCREENING PEDIATRIC STONE FORMERS FOR HYPERPARATHYROIDISM AND ITS RELATIONSHIP TO PSYCHOLOGICAL FUNCTION.**

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**Purpose:** Hyperparathyroidism (hPTH) is an uncommon cause of pediatric nephrolithiasis but demands screening and prompt intervention as the sequela of delayed diagnosis can be severe. The published incidence of hPTH in adult stone formers is 1-2%. However, there is no published incidence of hPTH in pediatric stone formers. Being perceived as a rare entity, many physicians only screen children with hypercalcemia or hypophosphatemia. Additionally, due to a recent publication discussing the impact of PTH and 25-hydroxyvitamin D (25-OH vit D) on pediatric neuropsychological function we were interested in this relationship in our population.

**Methods:** We reviewed 472 children with nephrolithiasis visiting the pediatric urology clinic at Children’s Medical Center from 1999-2008. We identified 90 children screened for hPTH with a serum intact parathyroid hormone (iPTH). Additionally, many had serum Calcium (Ca), Phosphorus (Phos) and 25-OH vit D levels drawn as part of the screening panel. The patient’s charts were analyzed for diagnoses of any psychiatric or behavioral disorders. All data was analyzed using SPSS version 17.0 (Chicago, IL).

**Results:** Of the 90 children screened for hPTH, 9 (10%) were found to have elevated iPTH. Of these, 2 had borderline high iPTH levels and on confirmatory testing were found to be normal. 1 patient is currently undergoing further investigation because ultrasound and nuclear medicine exams were normal. 1 child was determined to have secondary hPTH. Of the 5 patients with primary hPTH, 1 is undergoing medical management and 4 were found to have parathyroid adenomas after parathyroidectomy. Only 3 of 7 patients with persistently elevated iPTH had hypercalcemia or hypophosphatemia. 4 of 7 (57.1%) children with repeatedly elevated iPTH also had a psychiatric or behavioral disorder vs. 10 of 83 (12.0%) of the patients without elevated iPTH, p=0.05. Of the 14 patients with psychiatric or behavioral disorders, 5 (35.7%) had either elevated iPTH or low 25-OH vit D versus 12 of 77 (15.6%) children without psychiatric or behavioral disorders.
Conclusion: The incidence of hPTH in a screened population of pediatric stone formers is 7.8% (7/90), with a 5.5% incidence of primary hPTH (5/90). Despite the common practice of only screening pediatric stone formers for hPTH if they have hypercalcemia or hypophosphatemia, a significant portion of patients with hPTH would be missed. Additionally, our data correlates with the previously published report that alterations in PTH and 25-OH vit D may impact neuropsychological function.

70) PEDIATRIC URINARY CALCULI: ARE STONE PROTOCOL CT SCANS NEEDED IN ALL CASES?
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Purpose: Non-contrast computed tomography (NCCT) has become routine in the evaluation of adult patients with suspected urolithiasis. However, there is concern about adopting this practice universally in the pediatric population given the potentially unnecessary radiation dose. Our study examines the necessity and clinical utility of NCCT scans in pediatric stone patients who progress to surgical intervention.

Methods: We conducted a retrospective chart review of all pediatric stone patients who progressed to surgical treatment between 2003 and 2008 at our institution. Clinical characteristics evaluated included imaging modalities required, type of surgical management, stone composition, 24-hour urine analyses, and relevant predisposing conditions/comorbidities.

Results: A total of 45 pediatric patients (26 males, 19 females) underwent surgical management of urolithiasis during the 6 year study time period. Average age was 11.6 (± 5.3) years. Of the 79 procedures performed (average procedures per patient 1.8 ± 0.9), the most common treatment modalities were ESWL (28%) and ureteroscopy (22%). Neurogenic bladder was the most common predisposing condition (22%), whereas 15 patients (33%) had no discernible risk or cause for their urolithiasis. Stone analysis was available for 28 patients, of whom 22 had calcium oxalate as the primary stone component. There was only 1 pure cystine and 1 pure uric acid stone. Radio-opaque stones not recoverable for analysis were found in 17 patients. 24-hour urine analysis was available in 23 patients; 22 (96%) had low total urine volume. Review of imaging studies found 37 had stones which were visible on ultrasound (USN) and/or abdominal plain film, which was often a component of an intravenous pyelogram (IVP) or voiding cystourethrogram. Only 5 patients required a NCCT for diagnosis or management of their stone: 1 patient had a stone visible only on NCCT, 1 required NCCT for aid in procedural planning, and 3 USN was normal but NCCT showed small distal ureteral stone. In all, 88% of patients underwent evaluation and surgical treatment without NCCT.

Conclusions: Nearly 90% of pediatric patients treated surgically for symptomatic urolithiasis completed evaluation and management without requiring NCCT. For children who present with signs and symptoms suggesting urinary calculi, initial evaluation and imaging with USN and abdominal plain film may be sufficient, thus avoiding the excess radiation of NCCT.

71) PREOPERATIVE STONE ATTENUATION PREDICTS SUCCESS AFTER SHOCK WAVE LITHOTRIPSY (SWL) IN CHILDREN.
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Purpose: Previous studies have demonstrated that stone attenuation values (Hounsfield units) predict stone fragmentation success after shock wave lithotripsy (SWL) in adult patients with nephrolithiasis. No previous studies have examined this correlation in the pediatric population.
Methods: Twenty-four pediatric patients (age 6-18) undergoing SWL for renal calculi at two institutions were reviewed for whom attenuation values were available. Stone size and attenuation value were determined by bone windows on noncontrast CT scan. The outcome after SWL was categorized as stone free, complete or incomplete fragmentation, or unchanged at follow up. Success was defined as stone free after a single session of SWL.

Results: After SWL, 18 patients (75%) were either stone free or had complete fragmentation, and 6 (25%) of 24 patients had incomplete fragmentation. The stone attenuation of the successfully treated patients was $788 \pm 328$ Hounsfield units (HU) vs $1249 \pm 362$ HU for those with incomplete fragmentation ($P < 0.03$). The stone size of the stone free patients was $9.9 \pm 4.2$ mm vs $15.5 \pm 5.6$ mm for those with treatment failure ($P= 0.06$). When patients were stratified into two groups, 1000 HU and > 1000 HU, SWL success rate was 93% and 50%, respectively.

Conclusion: We found that attenuation value of 1000 HU is a significant predictor for ESWL success in children and may be utilized in preoperative counseling. This finding suggests that attenuation values have a similar predictive value in the pediatric population as previously reported in the adult population.

72) PEDIATRIC UROLITHIASIS: DOES BODY MASS INDEX INFLUENCE STONE PRESENTATION AND TREATMENT?

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Purpose: Pediatric obesity is a major public health concern in the United States. Obesity has been correlated with an increased incidence of many medical conditions as well as negative outcomes following certain surgical procedures. We investigated whether body mass index (BMI) was associated with differential outcomes in children with upper tract urolithiasis.

Methods: We identified all patients who presented to our institution with a radiographically confirmed renal or ureteral stone between January 2003 and June 2008. Data were collected on demographics, patient BMI, stone characteristics, medical and surgical therapies, and metabolic evaluation. For patients with recurrent stones, only the first stone episode was included in our analysis. Patients were stratified into three BMI categories: underweight (BMI <18.5 kg/m$^2$), normal weight (18.5-23.5 kg/m$^2$), and overweight (>23.5 kg/m$^2$).

Results: 133 patients met the study criteria. 75 (56.4%) were male and 58 (43.6%) were female. Mean age at diagnosis was 11.7 ± 4.0 years. BMI was available in 114 patients: 46 (40.3%) were underweight, 37 (32.5%) were normal weight, and 31 (27.2%) were overweight. Mean stone diameter was 5.1 ± 3.8 mm. 34.2% of stones were in the kidney and 65.8% were in the ureter at initial presentation. 108 (81.2%) patients underwent surgery to treat the stone: 73.1% of patients required a single procedure and 26.9% required 2 procedures for stone clearance. Mean age at presentation was significantly earlier (p<0.0001) for underweight patients (8.6 years) than for normal weight (13.6 years) or overweight patients (13.8 years). Neither stone size (p=0.47) nor the number of procedures required to clear the stone (p=0.85) differed significantly by BMI. Stone recurrence rates were similar across all BMI groups (p=0.64).

Conclusion: In our series, obesity was not associated with an increased risk of early stone development, larger stones, or need for multiple surgical procedures for stone clearance. Underweight patients developed symptomatic renal and ureteral stones at a significantly younger age than normal- or overweight patients. However, stone size and the number of procedures needed to treat the stone were similar regardless of BMI. Further research is needed to identify risk factors which may predispose underweight children to early stone development, and to further characterize the role of BMI in pediatric urolithiasis.
INCREDIBLE INTERVENTION FOR PEDIATRIC UROLITHIASIS OVER THE PAST DECADE.
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Dionne A. Graham, Ph.D., Clinical Research Program, Children's Hospital Boston, Boston, MA
Caleb P. Nelson, MD, M.P.H., Department of Urology, Children's Hospital Boston, Boston, MA

Purpose: Little is known of current practice trends for pediatric urolithiasis in terms of imaging and treatment. The goal of this study is to examine recent trends in the diagnosis and management of pediatric urolithiasis.

Methods: The Pediatric Health Information System (PHIS) database is a national database collected by U.S. children’s hospitals. We searched PHIS from 1998 to 2007 to identify children (age <18 years) diagnosed with urolithiasis. Inpatient admissions, emergency department visits, and outpatient surgery were included. We examined trends in diagnosis and management, specifically surgery and imaging use, over the study period.

Results: We identified 8,340 children diagnosed with urolithiasis during the study period, 437 of whom underwent surgery within 6 months of their initial visit. The number and proportion of patients undergoing surgery increased over the study period, from 3 of 363 (0.8%) in 1998 to 127 of 1229 (9.4%) in 2007, an average annual increase of 33% (p<.0001 for trend). Rates of ureteroscopy (0.3-5.2%), ureteral stenting (0.7-6%), and shock-wave lithotripsy (0.3-3.4%) increased (all p<.0001); percutaneous intervention rates remained stable (0.6-0.2%, p=.36). Similarly, the use of CT scans increased (21-45%), while KUB (65-36%) and ultrasound (37-24%) use declined over the study period (all p<.0001). MRI use remained stable (1.9-1.6%, p=0.86). White children were more likely to undergo surgical intervention than were blacks or Latinos (both relative risk (RR) 2.1, p<.0001). Surgery rates also varied by census region (8% Northeast, 5% elsewhere, p=0.02).

Conclusion: The proportion of children with urolithiasis who are treated surgically, as well as the proportion imaged with CT scans, has increased dramatically over the last decade at PHIS children’s hospitals. Intervention rates vary by race and region.

SESSION 13: ONCOLOGY

ENTERIC AUGMENTATION CYSTOPLASTY DOES NOT APPEAR TO INCREASE THE RISK OF DEVELOPING BLADDER CANCER IN INHERENT CONGENITAL BLADDER ANOMALIES.
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Purpose: Enteric augmentation cystoplasty for inherent congenital bladder abnormalities has been reported to be a risk factor for developing bladder cancer later in life. However, the data supporting this statement is limited and to date there have been no studies comparing the risk of developing bladder cancer in congenital bladder anomalies managed with or without augmentation cystoplasty. We compared the risk of developing a bladder cancer in patients with inherent congenital bladder abnormalities managed with and without augmentation cystoplasty.

Methods: We retrospectively reviewed a patient registry of children with inherent congenital bladder anomalies due to neurologic anomaly, exstrophy/epispadias, and posterior urethral valves. Individuals managed with enteric augmentation cystoplasty were matched (1:1) to control group managed by intermittent catheterization by the etiology of bladder dysfunction, sex, and age (+/- 2 years). The two study populations were compared for the development of bladder cancer, and the age and stage of cancer at the time of diagnosis.

Results: 153 patients underwent enteric augmentation cystoplasty and were matched with appropriate controls. Median follow-up interval after augmentation was 27 years (range 10-23) and median current age is 41 years (range 17-65). A total of 4.5% (7/153) of the patients undergoing augmentation cystoplasty developed bladder cancer compared to 2.6% (4/153) in the non-augmented patients (p>0.5). The mean age (48.6 vs. 46.5 years, p>0.7) and stage (3.4 vs. 3.8, p>0.5) at the time of bladder cancer diagnosis was not different between the augmented and non-augmented bladder, respectively.
Conclusions: In patients with inherent congenital bladder anomalies, enteric augmentation cystoplasty does not appear to substantially increase the risk of bladder cancer over the inherent cancer risk associated with the underlying congenital abnormality.

75) WILMS’ TUMOR: RISK FACTORS FOR INTRAOPERATIVE TUMOR SPILL.
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Purpose: Intraoperative Wilms’ tumor spill is a dreaded surgical complication associated with tumor recurrence and necessitating local radiotherapy, thus increasing treatment morbidity. As little data exist assessing tumor spill risk factors based upon preoperative imaging, we attempted to identify radiological parameters associated with intraoperative tumor spill.
Methods: Utilizing our institutional Wilms’ tumor database, a retrospective review of all patients diagnosed from January 2000 - August 2008 was performed. Inclusion criteria included available abdominal CT scan and pathologic stage I-IV disease. Patient characteristics and neoadjuvant chemotherapy use were noted. After blinding, a radiologist reviewed preoperative CT images assessing tumor size and characteristics (capsule thickness, tumor and normal kidney volumes, and metastatic spread) and assigned a preoperative radiological stage.
Results: Of 67 patients diagnosed with Wilms’ tumor, 41 (22M:19F) met inclusion criteria. Comparing patients +/- tumor spill, there were no significant differences in age (3.8 vs. 3.6y), sex (3M/3F vs. 19M/16F), weight, or tumor capsule thickness. Preoperative radiologic staging was unable to predict pathologic stage I – III disease. 6 intraoperative tumor spills (15%) were identified (4L/2R), 3 pathologic stage III and 3 stage IV. Tumors >900cc were associated with a 67% (2/3) risk of spill vs. 11% (4/38), p=0.05. Among 9 patients with stage IV disease, 0/4 (0%) patients receiving neoadjuvant chemotherapy experienced tumor spill, while lack of neoadjuvant therapy was associated with a 60% (3/5, 1M/2F) risk of stage IV spill, p=0.17.
Conclusions: At all stages, tumor volume >900cc was associated with significant risk of tumor spill, but did not predict all tumor spills, as spill occurred at volumes <400cc. Although not statistically significant, neoadjuvant chemotherapy for stage IV disease trended toward diminishing spill risk. We speculate that patients with large tumors or stage IV disease would benefit from neoadjuvant chemotherapy. Multi-center studies are needed to further identify risk factors for intraoperative tumor spill, so as to minimize surgically induced treatment morbidity.

<table>
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<th>Stage</th>
<th>No. Patients</th>
<th>Neoadj. Chemo</th>
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<tbody>
<tr>
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<td>9</td>
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<td>294 (93-692)</td>
</tr>
<tr>
<td>II</td>
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<tr>
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<td>2 (50%)</td>
<td>484 (81-741) Prechemo/380 (370-390) Post</td>
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<tr>
<td>IV</td>
<td>9</td>
<td>4</td>
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<tr>
<td>Rupture</td>
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<tr>
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<td>0 (0%)</td>
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<td>35 (85%)</td>
<td>6 (17%)</td>
<td>467 Pre/417 Post</td>
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</tbody>
</table>

76)
CAN WE PRESERVE THE ADRENAL GLAND AT THE TIME OF RADICAL NEPHRECTOMY IN CHILDREN WITH WILMS TUMOR?

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Purpose: The risk factors for adrenal involvement and indications for adrenalectomy with renal cell carcinoma have been well studied. However, for Wilms tumor, the indications and need for adrenalectomy are not well defined. Thus, current protocols lack specific guidelines and ultimately leave the option to the surgeon. Following the rationale for preserving the adrenal gland during radical resection of other renal malignancies, we sought to determine predictors for adrenal involvement and the impact of adrenalectomy on retroperitoneal recurrence.

Methods: We retrospectively reviewed all the charts of the patients who underwent surgical resection for Wilm's tumor between 1990 and 2008 in two large Canadian paediatric referral centers. Children who underwent preoperative chemotherapy or partial nephrectomy were excluded. Patients' characteristics were reviewed, including findings on preoperative diagnostic imaging and pathology reports to determine their potential link with adrenal involvement. Recurrence was evaluated as a time-dependent variable based on follow-up duration.

Results: One hundred and eighty patients were diagnosed with Wilms tumor during the study period. Of those, 91 underwent initial radical nephrectomy as primary treatment. The mean age at diagnosis was 46.7 +/- 38 months and follow-up 108.3 +/- 219.9 months. The disease was stage 1 in 28 patients, 2 in 31, 3 in 24 and 4 in 8. Adrenalectomy was performed, according to surgeon's judgement, in 57 patients (62%) at the time of the nephrectomy. Only one adrenal gland was reported positive for Wilms tumor invasion, while periadrenal fat involvement was described in 3 patients (overall incidence 4.1%). None of the studied tumor characteristics (stage, size, location) were predictive of a higher risk of involvement. No statistically significant difference was found between the groups for which the adrenal gland was removed or not, on a time-to-event analysis looking at the possible relation between adrenalectomy and retroperitoneal recurrence. (Mantel Cox p=0.997, figure 1).

Conclusion: Adrenal involvement in patients with Wilms tumor appears rare and difficult to predict. In this study preserving the adrenal gland was not associated with an increased risk of local recurrence. Thus, it seems prudent to preserve the adrenal at the time of radical nephrectomy if technically feasible, attempting to otherwise remove all peri-adrenal fat with the specimen.
SPHINGOSINE-1-PHOSPHATE RECEPTOR 2 IS RESPONSIBLE FOR SPHINGOSINE-1-PHOSPHATE INDUCED VASCULAR ENDOTHELIAL GROWTH FACTOR EXPRESSION AND TUMOR GROWTH IN NEUROBLASTOMA.

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Tim Hla, Ph.D., Vascular biology, University of Connecticut/Connecticut Childrens Medical Center, Hartford, CT
Fernando A. Ferrer Jr., MD, Urology, Connecticut Childrens Medical Center/University of Connecticut, Hartford, CT

Purpose: Neuroblastoma (NB) is highly angiogenic, in large part this is due to activation of the hypoxia inducible factor (HIF) - vascular endothelial growth factor (VEGF) pathway. Failure of anti-VEGF monotherapy has spurred investigation for additional points of regulation/intervention in the angiogenic cascade. The bioactive lipid sphingosine-1-phosphate (S1P) and its five receptors (S1P1-5) have been implicated as regulators of tumor growth and angiogenesis. We report the novel observation that S1P-S1P2 interactions regulate VEGF expression in NB, independent of HIF. Preclinical studies conducted in a murine model suggest efficacy of anti-S1P2 therapy in NB.

Methods: Quantitative real-time PCR and VEGF ELISA analysis detected mRNA level and protein secretion of VEGF in NB cell lines. VEGF mRNA stability assay, transient transfection and luciferase assay were performed to determine if S1P-induced VEGF mRNA expression occurred on the transcriptional level or post-transcriptional level. Sequential deletion analysis was used to determine involvement of the HIF promoter. Gain and loss of functions studies were performed by adenoviral
transduction/ plasmid transfection and using specific antagonists/ pharmacological inhibitors. In vivo studies were conducted in a subcutaneous nude mouse human tumor model with the S1P2 antagonist JTE-013 treatment.

**Results:** S1P induced VEGF mRNA expression at the transcriptional level, and protein secretion in NB cells. S1P stimulation increased VEGF mRNA and protein levels above and beyond levels seen under hypoxic conditions. Sequential deletion analysis confirmed that this phenomenon occurs independent of the HIF promoter. Blockade of S1P2 with the S1P2 antagonist JTE-013 inhibited S1P-induced VEGF mRNA expression and protein secretion while the S1P1 antagonist VPC44116 did not. In addition, overexpression of S1P2 in SK-N-AS cells by adenoviral transduction further increased S1P-induced VEGF secretion. By using various pharmacological inhibitors, we found that RhoA inhibitor C3 transferase, ROCK inhibitor Y27632 and ERK inhibitor U0126 potently inhibited S1P-induced VEGF mRNA expression and protein secretion, suggesting that S1P-induced VEGF expression might be mediated by RhoA/ROCK and ERK pathways. The critical role of RhoA in this pathway was further confirmed by transfection of constitutively active RhoA plasmid into SK-N-AS cells. Finally and more importantly, S1P2 antagonist JTE-013 significantly inhibited tumor growth in a subcutaneous nude mice model.

**Conclusion:** S1P induces VEGF expression in NB cells via the S1P2 receptor, independent of the HIF pathway. Blocking this pathway inhibited tumor growth in vivo. Taken together these findings suggest that VEGF induced by S1P/S1P2 pathway may play a critical role in NB growth and angiogenesis.

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**SESSION 14: MISCELLANEOUS**

78)

**SURGICAL ANTIBIOTIC PRACTICES AMONG PEDIATRIC UROLOGISTS IN THE UNITED STATES.**

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**Purpose:** Perioperative and postoperative antibiotics may prevent postoperative infectious complications, but the increasing prevalence of antibiotic resistance and potential for adverse drug reactions are causes for concern. However, there is little data on how pediatric urologists use surgical antibiotics. We hypothesized that there are practice variations in the use of surgical antibiotics by pediatric urologists in the United States.

**Materials and Methods:** An IRB approved, 31-question online survey was distributed to members of the Society of Pediatric Urology. The questionnaire examined physician preferences for surgical antibiotic use, including indications, antibiotic selection, timing of administration, and duration.

**Results:** 189 pediatric urologists, encompassing 40 states, responded to the survey. More than 85% of responders give perioperative antibiotics before open pyeloplasty, postoperative antibiotics after hypospadias repair (when a urethral catheter is left in place), or perioperative or postoperative antibiotics for open ureteral reimplantation or bladder reconstructive surgery. More than 90% of responders do not give postoperative antibiotics to children who have undergone circumcisions, simple chordee repairs, herniorrhaphies, or hydrocelectomies. For all other open, laparoscopic, and endoscopic operations, use of perioperative and postoperative antibiotics varied significantly. Pediatric urologists expressed diverse opinions regarding surgical antibiotic use, including the importance of antibiotic costs, potential adverse reactions, reduction in infection risk, and antibiotic resistance. Survey results also revealed major differences in gentamicin dosing and timing of administration of perioperative antibiotics.

**Conclusion:** Perioperative and postoperative antibiotics are widely and commonly used by pediatric urologists. However, there is significant practice variation in surgical antibiotic administration with regards to most areas of pediatric urology, in particular laparoscopic, endoscopic and hypospadias surgery. Prospective studies are needed to clarify when and which pediatric urologic patients require antibiotics.

79)

**VARIATION ACROSS TWO CONTINENTS IN ANTIBIOTIC PROPHYLAXIS AND EVALUATION OF PRENATALLY DETECTED HYDRONEPHROSIS: A SURVEY OF AMERICAN AND EUROPEAN PEDIATRIC UROLOGISTS.**
Purpose: No clear practice guidelines exist either in the evaluation of prenatally diagnosed hydronephrosis or in the use of antibiotic prophylaxis. We hypothesize that among pediatric urologists there is significant variability in the evaluation and management of antenatal hydronephrosis.

Methods: A survey questionnaire was created to answer the following questions: 1) How do pediatric urologists manage prenatally diagnosed hydronephrosis? 2) What are their recommendations for antibiotic prophylaxis? The survey questions were configured and validated using a focus group of 10 pediatric urologists. Questions included practice patterns and influences concerning use of radiographic tests and antibiotics. A web-based survey link was sent to members of the Urology Section of the American Academy of Pediatrics and the European Society of Pediatric Urology. A total of 156 responses were received. We limited the analysis to practices based in Europe (62 respondents) and the United States (78 respondents). Statistical analysis of categorical data was performed using the chi-squared test. Validity of survey responses was analyzed using Cronbach’s alpha and Kappa analyses.

Results: Both European and American respondent were equally distributed in regards to years in practice and number of patients seen per month. Europeans relied more on prenatal parameters to determine postnatal evaluation (p<0.05). Europeans were more likely to evaluate hydronephrosis if the AP diameter is greater than 7mm versus 4mm in the US (p<0.05). A significantly larger number of US urologists would routinely place infants on prophylactic antibiotics even if the postnatal ultrasound is normal. If Vesicoureteral reflux is present Europeans will prescribe antibiotics for grades III and above versus II and above in the US. There was variability in the postnatal radiographic evaluation with more variability in the evaluation of SFU grades I and II and less so for grades III and IV. Europeans were also more likely to obtain renal scans for SFU grades I and II compared to their US counterparts (p<0.05). Validity of the survey was confirmed with a Cronbach’s alpha of 0.776 when correlating similar questions.

Conclusions: There is considerable variation in resource utilization and use of prophylactic antibiotics, in the evaluation and treatment of antenatal hydronephrosis with significant differences between pediatric urologists in Europe and the US. Prospective and controlled trials are required in order to create clear guidelines in the evaluation of this common condition.

80) TOPICAL SKIN REFRIGERANT ANALGESIC SPRAY FOR OFFICE PROCEDURES: EFFICIENT AND HIGHLY COST EFFECTIVE.

Purpose: Three common office procedures are lysis of glanular adhesions, lysis of labial adhesions, and excision of glanular skin bridges. These procedures require the application of topical analgesic agents such as EMLA® Cream (lidocaine 2.5% and prilocaine 2.5%), which delays the procedure several minutes while the medication is being absorbed. Pain Ease® (1,1,1,3,3-Pentafluoropropane, 1,1,1,2-Tetrafluoroethane), a topical skin refrigerant (vapocoolant) analgesic spray, has an immediate onset of action since it does not require time for absorption. We evaluated the feasibility of using Pain Ease® as an analgesic spray prior to these three common office procedures in the pediatric population.

Methods: We evaluated the first 60 children undergoing attempted lysis of glanular and labial adhesions, and excision of glanular skin bridges performed in the office with Pain Ease® pretreatment. The aerosol can was held approximately 3 to 7 inches away from the treatment site prior to the skin turning white. The adhesions were then lysed. Patients were monitored for complications including alteration of skin pigmentation and frostbite. A cost analysis of Pain Ease compared to EMLA Cream was also performed.

Results: Thirty-four and 10 circumcised boys underwent lysis of glanular adhesions (range: 0.3 to 3.9 years; median 0.9 years) and excision of glanular skin bridges (range: 0.9 to 4.2 years; median 2.6 years), respectively. Sixteen girls (range: 0.4 to 5.0 years; median 2.0 years) underwent lysis of labial adhesions. All patients tolerated the procedure. No complications occurred and no patient required additional analgesics (oral or topical). Pain Ease had a 636% cost savings per application compared to EMLA Cream ($0.58 vs. $4.27, respectively). Pain Ease was also a significant time saver compared to EMLA Cream since the former has an immediate time of onset unlike the latter agent.
Conclusion: This initial study demonstrates that Pain Ease is a safe, fast, easy to apply, and effective spray analgesic in children undergoing three common office procedures. Its use is cost effective and time efficient compared to EMLA Cream.

SESSION 15: RECONSTRUCTION

81) IMPROVED CONTINENCE IN PATIENTS WITH NEUROGENIC SPHINCTERIC INCOMPETENCE WITH COMBINATION TUBULARIZED POSTERIOR URETHROPLASTY AND FASCIAL WRAP: THE LENT PROCEDURE.

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Purpose: The present surgical alternatives for the correction of pediatric intractable neurogenic sphincteric urinary incontinence (including the Kroppe, Pippi Sale, and artificial sphincter procedures) have significant inherent deficiencies. We describe a new, improved operation, called the LeNT procedure, which involves a lengthening, narrowing, and tightening (with a circumferential fascial wrap) posterior urethroplasty. This procedure overcomes a number of these difficulties.

Methods: We reviewed the preoperative urodynamic and radiographic data, as well as the long-term clinical, imaging, and serum creatinine information of all 19 patients who underwent the LeNT procedure between April 1996 and November 2002. The surgical technique involved retroperitoneal exposure of the bladder neck with a tubularized posterior urethroplasty over a urethral catheter. The reconstructed urethra was then circumferentially wrapped with a fitted piece of cadaveric fascia.

Results: Fifteen of 19 patients (78.9%) remain completely continent with mean follow-up of 60.1 ± 36.8 months. None of these patients required subsequent anatomical or mechanical revision (a very common problem with artificial sphincters), and none had difficulty with intermittent catheterization per urethra postoperatively (a common problem with the Kroppe and Pippi Sale techniques). In the four patients who did not achieve urinary continence, the LeNT procedure did not interfere with subsequent successful reconstruction utilizing bladder neck closure (in 3 patients), Mitrofanoff (in 3 patients) and augmentation (in 1 patient).

Conclusion: The LeNT procedure is an improved technique for the management of neurogenic sphincteric incontinence. Continence rates achieved are comparable with other reconstructive procedures, but the need for subsequent revision or difficulties with catheterization are superior to most published reports.

82) THE AMS INVANCE SLING FOR THE TREATMENT OF NEUROGENIC SPHINCTERIC INCONTINENCE IN PRE-PUBERTAL AND ADOLESCENT BOYS.

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Purpose: The treatment of boys with sphincteric incompetence secondary to a neurogenic etiology presents a challenge. We have employed a polypropylene male perineal sling in the treatment of boys with neurogenic sphincteric incontinence. We have expanded our indications to include pre-pubertal boys and present our recent multicenter experience.

Methods: 11 patients ranging in age from 7 to 21 years (mean of 13.7 years) underwent outpatient placement of a polypropylene male perineal sling with follow-up ranging from 3 to 48 months (mean of 13.6 months). 4 of 11 patients were pre pubertal. 5/11 were ambulatory (some with crutches) and the remaining 6/11 were wheel chair bound. 3/11 had mitrofanoffs and 2/11 had bladder augments. All patients had a history of neurogenic sphincteric incompetence and had undergone urodynamic evaluation demonstrating normal compliance, adequate capacity, and sphincteric incompetence. Placement of a suburethral sling was performed on an outpatient basis through a small perineal incision. Sling tension was
adjusted for maximal urethral compression while still permitting uncomplicated passage of a urethral catheter.

**Results:** 7 of 11 patients reported immediate complete continence following sling placement. 3/11 were substantially dry with occasional pad use between catheterization and 1/11 was unchanged. 4/11 patients underwent re-operation. Three slings were removed following the development of a local infection. All of these patients were post-pubertal and wheelchair bound. The fourth patient required replacement because of incomplete bone anchoring. No patients have experienced urethral erosion. Of the 8 patients with slings currently in place, 5 are completely continent on q 3 hour intermittent catheterization. 2 of 8 are drier with occasional pad use and 1 of 8 is completely wet. In the pre-pubertal patients, 1 of 4 patients is completely dry, 2 are drier and 1 is wet.

**Conclusion:** Our multi-center experience further explores the potential role of this simple outpatient technique and demonstrates that it can be effective in some pre and post pubertal boys. While the results are encouraging with improved or complete continence achieved in 88% of those with intact slings, the infection rate of 27% remains a concern. Further development of this approach with vascularized flap coverage, particularly in wheelchair bound patients may be required to decrease this potential complication.

### 83) COMPARISON OF BLADDER NECK REPAIR TECHNIQUES WITHOUT AUGMENTATION IN CHILDREN WITH NEUROGENIC INCONTINENCE.

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**Purpose:** Our initial experience using bladder neck sling (S) without augmentation for neurogenic incontinence was previously reported. Subsequently, we added Leadbetter/Mitchell bladder neck repair to sling (LM/S) in consecutive patients to improve continence and now present comparative results.

**Materials and Methods:** LM/S consisted of 50% reduction in diameter of the proximal urethra and bladder neck followed by tight 360° fascial sling, versus tight 360°fascial sling alone in S repairs. A prospective protocol was followed in all patients, including determination of continence and periodic renal sonography and cystography. We defined continence as dry (no pads), improved (≤2 pads/24hrs) or wet (>2 pads/24hrs).

**Results:** From 2001 - 2006, 37 consecutive patients with neurogenic incompetent outlet underwent S, with follow-up before any additional outlet procedures a mean of 27 months. Subsequently, 14 consecutive patients underwent LM/S, with follow-up a mean of 6 months. Mean patient age in both groups was 8yrs, with no significant differences in sex (S: 22m / 15f; LM/S: 9m / 5f) or ambulatory status (S: 22 ambulatory/ 13 wheelchair; LM/S: 8a / 6wc). Since mean follow-up time was different between the 2 groups, continence comparisons were done at 6 months. There were 18/37 (49%) dry S versus 13/14 (93%) dry LM/S, p<0.01. No patient in either group had postoperative hydroureter and bladder neck repair with tight 360° fascial sling alone in S repairs. A prospective protocol was followed in all patients, including determination of continence and periodic renal sonography and cystography. We defined continence as dry (no pads), improved (≤2 pads/24hrs) or wet (>2 pads/24hrs).

**Conclusion:** We previously concluded “improved” and “wet” patients had insufficient tissue coaptation from S. Reduction in urethral / bladder neck diameter likely improves ability of the sling to provide coaptation. LM/S patients had significantly improved continence over S alone. Outlet procedures for neurogenic incontinence can achieve dryness without augmentation.

### 84) ORAL VITAMIN B12 FOR TREATMENT OF VITAMIN B12 DEFICIENCY IN PATIENTS WITH PRIOR ILEOCYSTOPLASTY: IS IT EFFECTIVE?

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Purpose: We previously identified vitamin B12 deficiency as a potential long term consequence in pediatric patients with prior history of ileocystoplasty despite adequate preservation of terminal ileum. Vitamin B12 deficiency can result in hematologic & neurologic deficits; some of which are irreversible. Deficiency discovered following ileocystoplasty has been purported due to B12 malabsorption as the principal site for absorption is ileum. B12 deficiency due to malabsorption is typically treated with intramuscular injections to ensure absorption. We sought to determine if oral vitamin B12 supplementation could raise vitamin B12 serum levels in patients that have undergone ileocystoplasty.

Methods: During follow-up after ileocystoplasty, we identified patients with vitamin B12 levels that were low (≤ 200 mg/dL) or low normal (200- 300 mg/dL). Oral vitamin B12 was begun at 250mcg daily. Serum B12 was checked at one, two months and three month intervals after beginning therapy.

Results: A total of 128 patients with a mean follow-up of 83 months following ileocystoplasty had Vitamin B12 levels for review. Of these patients, 36 patients (28%) had levels ≤300 mg/dL with 16 patients (13%) having levels ≤200 mg/dL. Following treatment with oral Vitamin B12, mean levels increased from 237 to 518 mg/dL (138%) upon initial measurement (p=0.01). Second measurements continued to increase 13% from first post-treatment levels (p=0.05). No adverse effects were noted during mean follow-up of 4 months.

Conclusion: To our knowledge this is the first report demonstrating that oral Vitamin B12 is effective in raising serum levels in pediatric patients with prior history of ileocystoplasty.

DOES PREOPERATIVE GENITOGRAPHY IN CONGENITAL ADRENAL HYPERPLASIA AFFECT SURGICAL APPROACH TO FEMINIZING GENITOPLASTY?

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Purpose: Genitography has been thought to be an imperative part of radiographic evaluation of females born with congenital adrenal hyperplasia (CAH) prior to surgical reconstruction. We evaluate the role of the preoperative genitogram in planning surgical reconstruction and how it correlates with intraoperative findings.

Methods: Retrospective review of CAH patients that underwent feminizing genitoplasty at our institution between 2003-2008 was performed. Preoperative genitogram findings were recorded and correlated with operative findings by review of dictated operative notes.

Results: Forty-two preoperative genitograms were available for review in 40 patients CAH pts that had undergone feminizing genitoplasty at our institution. Genitography revealed complete anatomy of the urogenital sinus in 30 (72%) while bladder filling alone was present in 9 (21%) and vaginal filling in two patients (5%). The urogenital sinus was unable to be catheterized in 1 patient (2%). Vesicoureteral reflux was identified in 6 patients (12%) with mean grade of 2. Utilizing urogenital mobilization, feminizing genitoplasty technique was accomplished with flap vaginoplasty in over 90% of cases (37 patients) while the remaining three pts underwent pull through vaginoplasty. In no circumstance did the genitogram demonstrate anatomy that was not visible via endoscopy or during reconstruction. Vaginoplasty technique was determined on basis of endoscopic and intraoperative findings and not on the genitogram.

Conclusions: Genitography during preoperative evaluation of CAH females undergoing feminizing genitoplasty may not demonstrate complete urogenital sinus anatomy in 25% of patients. Furthermore, the preoperative genitogram did not influence surgical approach in our series and its value as a preoperative imaging study in CAH patients is limited.
SEXUALITY AND QUALITY OF LIFE IN YOUNG GIRLS FOLLOWING COLOVAGINOPLASTY.

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Purpose: The aim of this study was to assess the effect of colovaginoplasty on psychosocial functioning and sexuality in young women.

Methods: From 1995 to 2008, 43 patients 10 to 29 years old (average age 18.4 years) with Mayer Rokitansky-Kuster-Hauser syndrome underwent total vaginal replacement with sigmoid colon. 6 patients were Italian and 37 Bangladeshi. All patients were operated by the same surgical team. Outcomes were evaluated by retrospective chart review and the FSDQ, a validated questionnaire used to evaluate postoperative sexual function. Psychosocial functioning was measured by a 36-item survey that includes the Rosenberg Self-Esteem Scale (RSES: 14 items, possible score, 14-56), Beck Depression Index (BDI: 9 items; score, 9-45) and Cohen's Test for Life Management ability (CTML: 13 items; score, 13-65) and compared to 30 healthy control subjects.

Results: Among the 43 patients, postoperative sexual function was evaluated in 40 because 3 were considered too young for evaluation. All 40 patients responded to the FSDQ: 14 patients were married, 5 couples had already adopted one or more children and 16 were sexually active (11 Bangladesh and 5 Italian). 92.5% reported sexual desire, 87.5% sexual arousal, 90% sexual confidence and 93.7% sexual satisfaction. 87.5% patients reported frequent orgasms and 12.5% occasional orgasms. All patients reported adequate lubrication and none reported dyspareunia. Calibration and irrigation were temporary, no woman required pads for mucous production. Partner satisfaction was considered adequate by 93.7% of women. The mean scores (SD) of the tests of psychosocial functioning were as follows: in BDI, 31.8 (4.7) in our patients vs 31.9 (4.1) in control subjects; in RSES, 45.2 (7.4) vs 45.6 (9.0); and in CTML, 53.9 (10.6) vs 54.6 (8.0). The mean scores of test of psychosocial functioning did not differ statistically significantly between patients and control subjects. No difference was noticed between the 2 populations (those from Bangladesh and those from Parma).

Conclusions: Sigmoid vaginoplasty seems to be an excellent choice for management of vaginal agenesis not only in a developing country but also in Italy based on outcomes scoring systems. This procedure seems to ensure a good quality of general and sexual life.

SESSION 16: KIDNEY

87)

PRENATALLY DETECTED PRIMARY URETEROVESICAL JUNCTION OBSTRUCTION (UVJO): IS ANTIBIOTIC PROPHYLAXIS NEEDED?

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Purpose: A minority of children discovered prenatally to have primary UVJO require surgery. Controversy exists regarding the need for prophylactic antibiotics (PA) immediately after birth and during a period of observation until the hydronephrosis completely resolves, improves or until surgery is performed. These infants are infrequently placed on PA at our institution and their records were retrospectively reviewed.

Methods: Data regarding the radiographic evaluation and clinical course of infants who presented with prenatally detected UVJO were retrospectively reviewed and tabulated.

Results: 30 (25 M, 5 F) children were identified with an average follow up of 45 mos. (range: 9 to 144 mos). 23 of 25 males were circumcised. All were evaluated with renal sonograms, voiding cystourethrogram and diuretic renal scans. None had vesicoureteral reflux. 3 were placed on PA. Only 1 boy, who was not on PA, developed a UTI and his hydronephrosis resolved. Twenty-two had non-obstructed scans at first: 1 circumcised boy developed a UTI off of PA, 1 was placed on PA and 2 came to surgery. Five had unilaterally obstructed scans at first: 1 was placed on PA, none developed UTI, 3 came to
surgery. Three had bilaterally obstructed scans at first: 1 was placed on PA, none developed UTI, 2 came to surgery. Surgery was performed at an average age of 10 mo. in 7 (23%-4F, 3M) for high-grade obstruction and/or diminution of function. Initial SFU grades were available in 25 kidneys and they were: grade I-0, grade II-8, grade III-8, grade IV-9. Of 7 patients who came to surgery, initial SFU grades known in 6 were: IV-4, III-2. Initial SFU grade was not available for the 1 who developed a UTI off PA.

**Conclusion:** UTI rarely occurs in children prenatally diagnosed with primary UVJO, even if obstruction is seen on initial scan or SFU grade is high. Routine prophylaxis is, therefore, unnecessary. The majority of our patients were boys in whom circumcision may have had a protective effect against UTI in early infancy.

88) USEFULNESS OF PIC CYSTOGRAM FOR PREVENTION OF CONTRALATERAL REFLUX AFTER ANTIREFLUX SURGERY IN CHILDREN WITH UNILATERAL VESICOURETERAL REFLUX.

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**Purpose:** Contralateral vesicoureteral reflux (VUR) may develop in 1-18% of patients who had unilateral ureteral reimplantation for primary VUR. Although it resolves spontaneously in most patients, it may cause recurrent urinary tract infection (UTI). To avoid new onset of contralateral reflux, we perform positioned instillation of contrast material (PIC) cystogram in patients with unilateral VUR prior to ureteral reimplantation. Our aim of this study was to evaluate the usefulness of PIC cystogram for the surgical management of unilateral VUR.

**Methods:** Between January 2007 and October 2008, 28 children (17 boys and 11 girls) had ureteral reimplantation for primary VUR. Unilateral VUR was diagnosed by conventional X-ray voiding cystourethrogram (VCUG) in all patients. Before surgery cystography by positioning the instillation of contrast material at the ureteral orifice was performed under the same anesthesia. Patients with positive PIC cystogram on the contralateral side underwent bilateral ureteral reimplantation. VCUG was repeated postoperatively.

**Results:** Thirteen of 28 patients (46%) showed VUR on the contralateral side on PIC cystography and had bilateral reimplantation. The rest of 15 patients underwent unilateral reimplantation. No VUR was detected by postoperative VCUG in all patients. None of them had recurrent UTI and surgical complications.

**Conclusions:** PIC cystogram is useful for the detection of contralateral occult VUR in patients with unilateral VUR on conventional VCUG. It should be performed prior to surgical correction to avoid new onset of contralateral VUR.

89) ANALYSIS OF RENAL PELVIC DIAMETER IN NORMAL HUMAN FETUSES: ANATOMICAL REFERENCE FOR ANTENATAL HYDRONEPHROSIS.

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**Purpose:** Numerous renal pelvis measurements and various gestational age cutoff points have been recommended in the assessment of fetal hydronephrosis. Renal pelvic measurements are not well standardized, which may result in conflicting prenatal ultrasound diagnoses and unclear post-natal follow-up. The anterior-posterior diameter of renal pelvis (APPD) is a reproducible measurement in prenatal ultrasound. The objective of this work is to assess the measures of the transverse and longitudinal diameters of the renal pelvis in human fetuses.

**Methods:** We analyzed 68 human fetuses (37 males and 31 females) totaling 136 renal units. The fetuses were macroscopically well preserved and no external evidence of congenital malformations was detected. The fetuses were evaluated with regard to the foot length, crown-rump length and body weight. After the measurements, the abdomen was opened to identify and expose the urogenital organs. The fetuses were dissected with the aid of a stereoscopic lens with 16/25X magnification. The renal pelvis was dissected
carefully and the measures were made using a precision digital paquimeter. Renal length, width and thickness also were obtained. The data were analyzed in the software Graphpad Instat. To compare the quantitative data in both sexes the Students t-test was used (p<0.05). A simple linear correlation between fetal age and transverse and longitudinal diameters in both kidneys was made.

**Results:** Gestational age ranged from 12 to 25 weeks post conception (WPC) and was determined according to the foot length criterion. The transverse diameter mean in male fetuses was 3.61mm in the right side and 3.54mm in the left side. No statistics difference was observed between the two sides (p<0.81). In female fetuses was 3.54mm in the right pelvis and 3.40mm in the left pelvis. No statistics difference was observed between the two sides (p<0.33). The transverse diameter mean between sexes was not significant (p<0.9). The longitudinal diameter mean in male fetuses was 4.26mm in the right side and 4.23mm in the left side. No statistics difference was observed between the two sides (p<0.82). In female fetuses was 4.16mm in the right pelvis and 4.32mm in the left pelvis. No statistics difference was observed between the two sides (p<0.33). The longitudinal diameter mean between sexes was not significant (p<0.9). The linear correlation between gestational age and transverse and longitudinal diameters in both sexes were positive (respectively r²=0.21 and r²=0.26).

**Conclusions:** Our results suggest that transverse and longitudinal diameter in the fetuses between 12 and 25 (WPC) can be used as parameters for assessment of the renal pelvis development and hydronephrosis for image methods in the second gestational trimester.

**90)**
**MINIMALLY INVASIVE INGUINAL APPROACH FOR THE SEPARATION OF URETERAL DISTAL PART IN DUPLEX SYSTEMS AND EXTRAVESICAL URETEROCYSTONEOSTOMY ONLY OF THE PATHOLOGICALLY INVOLVED URETER.**
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**Purpose:** In duplex systems usually one of the ureters is refluxive or obstructive, while the other remains uninvolved. We report outcomes of minimally invasive inguinal approach for the separation of ureteral distal part in duplex systems and extravesical ureterocystoneostomy only of the pathologically involved ureter.

**Methods:** From January 2002 to December 2006, we performed a reimplantation only of one ureter in 10 duplex systems; 5 with reflux and 5 with obstruction of the ureterovesical junction (UVJ). The patients were aged between 18-59 months (mean 35 months). Using the inguinal approach, we separated the ureters in the most distal part, which enabled extravesical detrusor tunneling ureterocystoneostomy only of that which was reflexive or obstructive. The ureter and UVJ of the ureter of normal diameter were left intact (non-reimplanted).

**Results:** Follow-up was between 12 and 39 months (mean 25 months). There were no operative or postoperative complications. Postoperatively children were evaluated by US, VCUG and IVP, and there were no signs of reflux or obstruction in any of reimplanted or intact (non-reimplanted) ureters.

**Conclusion:** Our results offer and encourage a minimally invasive inguinal approach for the separation of ureters in duplex systems and ureterocystoneostomy of only pathologically involved ureter.

**91)**
**INCIDENCE OF FEBRILE URINARY TRACT INFECTIONS IN CHILDREN AFTER SUCCESSFUL ENDOSCOPIC TREATMENT OF VESICOURETERAL REFLUX: A LONG TERM FOLLOW UP.**
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**Purpose:** Endoscopic treatment is widely accepted as a first line of treatment in the management of intermediate and high grade primary vesicoureteral reflux (VUR). Although VUR resolution rates after endoscopic treatment appear promising there are conflicting reports regarding the incidence of urinary tract infections in children.
infection (UTI) after successful endoscopic correction of VUR. The aim of our study was to evaluate the incidence of febrile UTI after successful endoscopic correction of high grade VUR.

**Methods:** We retrospectively reviewed the medical records of 1271 children (males 408, females 863) who underwent successful endoscopic correction of VUR between 1998 and 2007. The following parameters were examined: age, gender, grade of reflux, renal scarring on DMSA scan, number of endoscopic treatments needed for resolution of VUR, history of febrile UTI, results of urine culture and voiding history. Febrile urinary tract infection was diagnosed when a urine culture showed a bacterial count of more than $10^5$ and grew a single organism accompanied by high fever, dysuria and/or frequency.

**Results:** Of the 1271 children, 73 (5.7%) developed febrile UTI after successful endoscopic correction of high grade primary VUR. There were 9 boys and 64 girls. The age at diagnosis of VUR ranged from 3 months to 9.1 years (median 3 years). Thirty nine children had a single episode of UTI and 34 children had two or more episodes of urinary tract infections. Febrile UTIs developed at 1 month to 5.9 years (median 1 year) after endoscopic correction of VUR. In the children who developed febrile UTI, reflux was unilateral in 33 and bilateral in 40. The grade of VUR at diagnosis was grade II in 4, grade III in 66, grade IV in 40 and grade V in 3 ureters. 27 (37%) patients showed presence of renal scarring on DMSA scans with 12 having moderate to severe scarring. The VUR was resolved in 98, 13, and 2 after one, two and three endoscopic injections respectively. Twenty three (31.5%) girls had a positive history of voiding dysfunction such as voiding frequency and incontinence diagnosed at a median age of 6.5 years (range 4.2 – 10.2 years). No correlation was found between febrile UTI, grade of VUR, renal scarring or number of endoscopic injections for the resolution of VUR.

**Conclusions:** This long term follow up shows that the incidence of febrile UTIs after successful correction of high grade VUR is low. Our data supports the importance of assessing voiding habits in older children presenting with febrile UTIs after endoscopic correction of VUR.

92) WHICH APPROACH IS PREFERRED IN TREATING UPPER POLE PATHOLOGY IN DUPLEX SYSTEMS: EXTIRPATIVE OR RECONSTRUCTIVE?

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**Purpose:** Complex complete ureteral duplication anomalies include an upper pole moiety with an ectopic ureter or ureterocele. Prenatal ultrasound has allowed for earlier detection of these duplication anomalies that may have preservable upper pole function. Many treatment options have been described once intervention becomes necessary including reconstructive or extirpative procedures. The purpose of this study was to describe a series of children with upper pole pathology that underwent surgical correction by one of two approaches: extirpative or reconstructive. We compared outcomes to identify if one technique was superior.

**Methods:** A retrospective review of patients with upper pole ureteral pathology in duplex system undergoing partial nephrectomy (PN) or ureteropyelostomy (UP) / proximal ureteroureterostomy (UU) was performed. UP & UU was performed in patients with preservable function based on preoperative imaging. Data was collected regarding mode of presentation, etiology of duplication anomaly, preoperative and postoperative function of affected kidney based on nuclear renography, surgical complications, and length of hospital stay.

**Results:** A total of 196 children were identified with 152 undergoing PN and 44 undergoing reconstruction in the form of either UP (n=11) or proximal UU (n=33). Ectopic ureters were encountered in 119 patients & ureteroceles in 75 patients. Two-thirds of patients were referred for antenatal hydronephrosis. Mean follow-up after surgery was 72 months with reconstruction and 40 months in PN group. Mean preoperative function of affected kidney in PN and reconstructed patients were 44% and 51%, respectively. Mean postoperative function of affected kidney in PN and reconstructed patients were 39% and 52%,
respectively. Two patients that underwent reconstruction had urinomas requiring drainage. One patient that underwent PN had loss of lower pole renal unit on follow-up imaging that ultimately underwent completion nephrectomy. Mean hospital length of stay in PN and reconstructed patients were 3.3 and 3.2 days, respectively.

**Conclusions:** In our large series with long term follow-up, both PN and UP or UU were safe and effective treatments of upper pole ureteral pathology. Outcomes after upper pole reconstructive surgery demonstrate that there is preservable function in a select group of patients.

**Session 17: Bladder II**

93)

IN VIVO BLADDER TISSUE REGENERATION UTILIZING BONE MARROW MESENCHYMAL STEM CELLS AND A NOVEL POLYMER SCAFFOLD.

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**Purpose:** Advancements in scaffold design and use of alternative cell sources will enhance our ability to promote functional bladder regeneration. This study evaluated the use of highly specific bone marrow human mesenchymal stem cells (MSCs) seeded on a novel, synthetic elastomeric thin film, poly(1,8-octanediol-co-citrate) (POC) that exhibits controllable biodegradation and mechanical properties.

**Methods:** 15K human MSCs or cherry labeled bladder smooth muscle cells (cBSMCs) were seeded onto one side of separate POC films and allowed to grow until confluency. The opposing side of each POC film was concurrently seeded with Urotsa cells [an immortalized urothelial cell (UC) line] to create a biocomposite bilayer (MSC/UC or cBSMC/UC). Unseeded POC films were used as controls. The seeded scaffolds were augmented into nude rats that had undergone a 40% partial cystectomy. Animals were sacrificed at 4 and 10 week time points (n=5 for each condition and time point). Harvested bladders were subjected to histological evaluation using Masson’s Trichrome and immunofluorescent staining utilizing antibodies against Ki-67, calponin, caldesmon, elastin, and smooth muscle γ-actin. All antibody stained samples were dual stained with DAPI and human-specific γ-tubulin to identify cells of human origin.

**Results:** At 4 weeks, histological evaluation was notable for a trilayered appearance consisting of urothelium, submucosa and muscle in both the MSC and SMC groups that developed along the back surface of the POC film. Discrete muscle fasicles stained + for human specific γ-tubulin, calponin and caldesmon. The smooth muscle to collagen ratio was greatest for the cBSMC group (45% +/- 11) vs. (34% +/- 8) and (12 % +/- 8) in the MSC and POC alone groups, respectively. At 10 weeks, there was an increase in smooth muscle noted in the MSC group with an almost equal ratio of muscle to collagen (58% +/- 11) while there was a diminished ratio in the cBSMC groups (27% +/- 11). This corresponded to the appearance of a more robust trilayered architecture in the MSC group at 10 weeks. Once again, the regenerated tissue stained positive for γ-tubulin indicating that the seeded MSCs are retained in the regenerative process. The POC alone group demonstrated fibrosis and the absence of substantial muscle.

**Conclusion:** Bone marrow derived MSCs facilitate better smooth muscle formation in regenerated bladder tissue than cSMC. In addition, the seeding of MSCs onto a reproducible elastomeric POC film appears to enhance the bladder regenerative process.

94)

CLASSIFICATION OF BLADDER DEFORMITY IN INFANT WITH SPINA BIFIDA: COULD IT BE USEFUL TO PREDICT RENAL DAMAGE IN LATER CHILDHOOD?

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Purpose: We previously reported that vesicoureteral reflux (VUR) is one of the strongest risk factors of abnormal 99mTc dimercaptosuccinic acid (DMSA) renal scan in patients with spina bifida during long-term follow-up (J Urol 2009; 181: 2262-66). The aim of this study is to assess classification of bladder deformity in infant with spina bifida can be useful to predict renal damage in later childhood.

Methods: We retrospectively reviewed 42 patients with spina bifida more than 10 years old (mean age 16.0 years [range 10-21]) followed in our center. Between 1985 and 1998, all patients underwent the initial voiding cystourethrography (VCUG) and intravenous pyelography (IVP) at less than two years old (mean age 10.7 months [range 1–22]). The patients with renal damage or small kidney detected by initial IVP were excluded from this study. Bladder deformity was evaluated with a full-bladder image and was classified in three groups (Grade 0 (G0): no deformity, Grade 1 (G1): longitudinal deformity without definite trabeculation, Grade 2 (G2): deformity with trabeculation). We performed DMSA renal scan for all these children from 2005 to 2007. DMSA scans were considered abnormal with differential function of <40% or focal defects. Patients were grouped based on bladder deformity grade at initial VCUG. The association between bladder deformity grade and DMSA renal scan findings was examined. Chi^2 test was used for statistical evaluation.

Results: Fifteen (36%) patients had no bladder deformity (G0) at the initial VCUG. Thirteen patients (31%) and 14 patients (33%) were classified in G1 and G2 bladder deformity, respectively. In G0 group, one of 15 patients had an abnormal renal scan in later childhood. Two of the 13 patients in G1 group had abnormal DMSA findings. Of the 14 patients in G2 group, 6 (43%) had abnormal DMSA findings (table). There is a significant difference between G0 group and G2 group (p=0.03).

Conclusion: The severity of bladder deformity in infants with spina bifida was associated with abnormal DMSA findings in later childhood. We conclude that classification of bladder deformity in infants is useful to predict long-term results of renal function in patients with spina bifida.

<table>
<thead>
<tr>
<th>Bladder deformity grade</th>
<th>G0</th>
<th>G1</th>
<th>G2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abnormal DMSA</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Normal DMSA</td>
<td>14</td>
<td>11</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>13</td>
<td>14</td>
</tr>
</tbody>
</table>
Conclusion: These studies indicate that, while nerve transplantation allows regeneration of the neuromuscular junction, the function of the denervated muscle remains in the subnormal range even at 12 weeks. These results suggest that nerve transplantation should be combined with other supportive treatment to allow for a more complete recovery of muscle function.

96) ASSESSMENT OF DETRUSOR LEAK POINT PRESSURE IN PATIENTS WITH SPINA BIFIDA USING THE REINSERTION TECHNIQUE MODIFICATION: ARE ALL PATIENTS WITH HIGH DETRUSOR LEAK POINT PRESSURES EQUALLY AT RISK FOR UPPER TRACT INJURY?

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Purpose: We previously reported (JU 156, 757-760; 1996) a modification of the original technique described by McGuire to measure detrusor leak point pressure (DLPP) in patients with myelodysplasia. The technique involves DLPP measurement by standard methodology and when after leakage stops, the urethral catheter is removed and additional leakage observed for. Upon cessation of renewed leakage, the catheter is reinserted and detrusor pressure noted. It is important to note that renewed leakage does not always occur and there is not always a change or decline in detrusor pressure upon catheter reinsertion. This cycle is repeated several times for consistency. We routinely incorporate that modification into our urodynamic assessment and now report our experience during the intervening 12 years.

Methods: We identified 62 spina bifida patients with a DLPP of ≥ 40cmH2O measured by standard methodology during videourodynamics who also had re-insertion pressures measured. Patients were divided into 2 groups based on whether re-insertion pressures remained above or dropped below 40cmH2O the accepted dividing line predicting upper tract injury.

Results: Group 1 consisted of 36 patients (26F,10M) (mean age 8.5 yrs.) whose DLPP was consistently ≥ 40cmH2O on both standard (mean 53.9cmH2O, range 40-75) and re-insertion (mean 48cmH2O, range 40-68) measurements. Upper tract injury, evidenced by hydronephrosis, VUR or both, was noted in 16 (44.4%) and renal insufficiency was present in 4 (11%). Group 2 consisted of 26 patients (13F, 13M) (mean age 6.3yrs) whose DLPP was ≥ 40cmH2O (mean 51.9cmH2O, range 40-91) on standard measurement but <40 (mean 26.4cmH2O, range 15-38) on re-insertion. Upper tract changes were noted in only 4 (15.4%) and all 4 had concomitant hyperreflexia and sphincter dyssynergia. None had renal insufficiency.

Conclusion: Patients with a high DLPP that falls below 40cmH2O when measured by the re-insertion pressure technique have a significantly reduced incidence of upper tract injury compared to those whose pressures don’t, even though their similar traditionally measured DLPP values would have predicted similar rates of renal insult. We believe the reinsertion pressure technique may more accurately assess the patient’s detrusor leak point pressure, better identify those at increased risk for renal deterioration, improve pre-op assessment of outlet resistance and should be incorporated into the standard urodynamic evaluation of these children.

97) THE PROGRESSION OF RENAL INSUFFICIENCY IN CHILDREN WITH NEUROGENIC BLADDER IS NOT ACCELERATED BY CONTINENT LOWER URINARY TRACT RECONSTRUCTION.

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W. Robert DeFoor Jr., MD, MPH, FAAP, Pediatric Urology, Cincinnati Children's Hospital Medical Center, Cincinnati, OH
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Eugene Minevich, MD, FAAP, Pediatric Urology, Cincinnati Children's Hospital Medical Center, Cincinnati, OH
Pramod Reddy, MD, FAAP, Pediatric Urology, Cincinnati Children's Hospital Medical Center, Cincinnati, OH

Conclusion: The progression of renal insufficiency in children with neurogenic bladder is not accelerated by continent lower urinary tract reconstruction.
**Purpose:** Children with neurogenic bladder (NGB) and chronic renal insufficiency (CRI) may require continent urinary reconstruction due to hostile bladder dynamics not responsive to medical management. Our strategy has been to create a low pressure reservoir to stabilize the native kidneys and allow for subsequent renal transplantation. The purpose of this study is to evaluate the stability of renal function in these complex patients after reconstruction.

**Methods:** A retrospective cohort study was performed of all children presenting with CRI and NGB who underwent bladder augmentation at a single institution from 1990 to 2009. CRI was defined as Chronic Kidney Disease Stage II or higher. Patients with end stage renal disease (ESRD) who had staged reconstructions prior to planned renal transplantation were excluded. Patient demographics, etiology of bladder dysfunction, surgical details, and renal outcomes were abstracted from the medical record. As a surrogate for renal function, the inverse creatinine (1/Cr) was plotted versus time to determine the rate of progression of renal insufficiency.

**Results:** A total of 15 patients (6 male and 9 female) were identified. Etiology of neurogenic bladder included cloacal malformation (7), VATER syndrome (4), anorectal malformation (2), and posterior urethral valves (2). All but one patient had a baseline GFR less than 60. Enterocystoplasty was performed in 7 patients and gastrocystoplasty or gastric-composite neobladder in 8. Urinary undiversion at reconstruction was performed in 3 patients. The mean age at reconstruction was 9.2 years. The patients were followed for a mean duration of 4.2 years prior to surgery with a mean post-reconstruction follow-up of 5.1 years. All patients are on a strict clean intermittent catheterization schedule. Of the 15 patients, 9 exhibited stable renal function post-operatively (five patients had a mean increase of 0.4 mg/dL in serum creatinine while 4 patients had a decrease in creatinine). Five patients had gradual progression of renal failure that ultimately required renal replacement therapy at a mean of 7.3 years postoperatively. Another patient has had a stable rate of renal deterioration but has not yet reached ESRD 3 years postoperatively.

**Conclusions:** In our series, complex patients with the most severe bladder abnormalities who underwent continent urinary reconstruction did not have an acceleration in their progression of renal insufficiency. Careful, long-term follow-up is critical in these high risk patients.
Post injection H-Grade = 0 was more sensitive for success. The combined findings of an effaced orifice with H-Grade=0 was highly predictive of success. Patients with Higher grades of reflux and Higher pre-treatment H-grades tended to fail more often. Increased amount of DHA used and increased number of “sticks” was inversely proportional to success. Case complexity and presence of voiding dysfunction had no bearing on success. Visual mound shape/position and coaptation of the ureteral orifice had no obvious bearing on success.

<table>
<thead>
<tr>
<th>H Grade=0</th>
<th>Effaced UO</th>
<th>H Grade=0 &amp; Effaced UO</th>
</tr>
</thead>
<tbody>
<tr>
<td>sens 100</td>
<td>68</td>
<td>67</td>
</tr>
<tr>
<td>spec 14</td>
<td>90</td>
<td>90</td>
</tr>
<tr>
<td>PPV 78</td>
<td>94</td>
<td>96</td>
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<tr>
<td>NPV 100</td>
<td>41</td>
<td>43</td>
</tr>
</tbody>
</table>

**Conclusions:** Post-Injection effacement of the orifice with or without post-injection H-grade = 0 predicts success of DHA injection, whereas post-operative H-grade > 0 predicts failure. Higher pre-operative H-grade, reflux grade, number of “sticks,” and amount of DHA used were associated with DHA failure. Visible mound shape/position does not significantly affect post-op outcome.

**POSTERS**

**Poster 1)**
**EXTRAVESICAL URETERAL REIMPLANTATION PERFORMED AT AN OUTPATIENT SURGICAL FACILITY: UNIFORM PATIENT DISCHARGE AND HIGH PARENTAL SATISFACTION.**

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**Purpose:** Extravesical ureteral reimplantation has been shown to be safely performed in a hospital setting as an outpatient procedure. We evaluated both the ability for this operation to be performed at an outpatient surgical facility with same-day discharge and parental satisfaction to this approach.

**Methods:** We evaluated the level of parental satisfaction after the last 50 consecutive unilateral and bilateral extravesical ureteral reimplantations performed at an outpatient surgical facility. In order to be included in the study, parents were required to have had previous experience at the main hospital for comparison purposes. Parents received extensive preoperative and postoperative education along with a detailed postoperative instruction sheet. Patients were required to fulfill strict criteria prior to discharge home. Postoperatively, parents were asked the following questions: 1) Do you believe that your child benefited by not being hospitalized; 2) Do you believe that your child benefited by having surgery performed in a surgery center; 3) Do you believe that your child would have benefited by a longer stay in the Recovery Room prior to discharge; 4) Did you find the postoperative education sufficient; and, 5) Did you find the outpatient experience favorable.

**Results:** All of the 50 ureteral reimplantations (age range 1.1 to 10.1 years; median 4.5 years) were performed as an outpatient procedure and were discharged within 5 hours after surgery. No patient required a hospitalization prior to the routine 2- to 3-week postoperative office visit and only one patient required an emergency room visit due to an unrelated illness. The parental response to the questionnaire was 100%, 80%, 4%, 94%, and 100%, respectfully.

**Conclusion:** Extravesical ureteral reimplantation can be uniformly performed in children at an outpatient surgical facility with a high level of parental satisfaction.

**Poster 2)**
**UROTHELIAL DIFFERENTIATION OF MOUSE EMBRYONIC STEM CELLS IS MEDIATED BY RETINOIC ACID AND DEPENDENT ON GATA–4 AND GATA–6 SIGNALING.**

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*Aruna Ramachandran, PhD, Urology, Children's Hospital Boston & Harvard Medical School, Boston, MA*
*Richard N. Yu, MD, PhD, Urology, Children's Hospital Boston & Harvard Medical School, Boston, MA*
*Rosalyn M. Adam, PhD, Urology, Children's Hospital Boston & Harvard Medical School, Boston, MA*
*Joshua R. Mauney, PhD, Urology, Children's Hospital Boston & Harvard Medical School, Boston, MA*
Purpose: We aimed to derive urothelial cells (UC) from murine embryonic stem cells (ESCs) and interrogate the underlying mechanisms of differentiation.

Methods: ESCs (C57BL/6) seeded on type I collagen films were cultured for 9 days in DMEM/15% fetal calf serum +/- retinoic acid (RA, 0.01-10 mM). UC differentiation was determined by quantitative PCR (qPCR) and immunocytochemistry (ICC) for expression of uroplakin (UP) 1a, 1b, 2, 3a, and 3b mRNA and protein. Pluripotency was determined by qPCR for expression of Oct4. Definitive endoderm (DE) lineage specification during the differentiation period was determined by qPCR and ICC analyses for expression of CXCRI1, Mixi1, Sox17, Hoxa13, and p63. Differentiated ESCs (day 9) were then nucleofected with promoter-reporter constructs for UP1b (pGZ-SR500-urP1b-copGFP), and UPII (pGZ-SR500-urP1I-copGFP) and expression of UP1b and 2 determined by fluorescence imaging. The role of the transcription factors GATA4 and GATA6 in UC differentiation was determined by subjecting GATA4 and 6 deficient ESCs to RA treatment. To further interrogate how GATA factors influence UC differentiation, we analyzed 2kb UP1b and 2 promoter fragments and identified one potential GATA binding site within each of the promoter regions. Electromobility shift assays (EMSA) (competition and supershift) were performed to elucidate transcriptional complex formation at the putative GATA binding sites.

Results: qPCR and ICC analyses demonstrated that RA (10 mM) treatment resulted in significant upregulation of uroplakin (UP) 1a, 1b, 2, 3a, and 3b and loss of Oct4 expression. In addition, expression patterns of CXCRI1, Mixi1, Sox17, Hoxa13, and p63 confirmed DE lineage specification with kinetics that proceeded UP expression. Fluorescence analysis of transfected ESCs confirmed expression of UP1b and 2 following differentiation. In response to RA treatment, GATA6 -/- ESCs failed to express any UP and GATA4 -/- ESCs displayed significantly attenuated UP expression. EMSA revealed specific transcriptional complex formation at each GATA binding site within the UP1b and 2 promoters.

Conclusions: We describe for the first time the in vitro derivation of urothelial cells from ESCs utilizing a novel RA treatment strategy. Further, we demonstrate that GATA4 and 6 are critical for UP expression, and show that GATA4 and 6 are direct regulators of UP promoter activity. The derivation of urothelial cells from pluripotent stem cell sources may be beneficial for future tissue engineering applications.

Poster 3)
LONG TERM INCIDENCE OF URINARY TRACT INFECTION AFTER URETERAL REIMPLANTATION FOR PRIMARY VESICOURETERAL REFUX.
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Purpose: Recent publications have suggested that the incidence of UTI after endoscopic therapy for vesicoureteral reflux (VUR) is lower that after open ureteral reimplantation (UR). However, the long-term incidence of UTI after UR is not well-defined. We sought to determine the incidence of UTI during prolonged follow-up in a large cohort of patients after open reimplantation for primary VUR.

Methods: We performed a retrospective review of UR procedures performed at our hospital between 1/90 and 12/02. Electronic records and departmental and hospital paper charts were reviewed. Patients were excluded if the UR was for secondary VUR (neurogenic bladder, ureterocele or other ureteral obstruction, renal transplant, bladder exstrophy, posterior urethral valves, etc). “Any UTI” was defined as UTI based on clinical diagnosis, confirmed by culture. “Pyelonephritis” was defined as UTI associated with fever, symptoms such as flank pain, or imaging confirmation. Time of follow-up was defined as the time from UR until the last clinical contact. Associations of pre-operative and operative factors with post-operative UTI were analyzed.

Results: Of 1455 UR’s overall, 1075 were for primary VUR. 73% were female. Median of age was 4.7 years. Median follow up was 2.9 years; 30% had follow-up > 5 years. 37% were grade 1-2, 18% were grade 3, 43% were grade 4-5. 80% presented with UTI. Extravesical UR was performed in 18%, intravesical UR in 82%. Ureteral tapering was required in 99. Technical success rate (resolution of VUR on post-op imaging, n=745) for non-tapered UR was 97.1%. Overall, the incidence of any postoperative UTI was 23.6%; however, the incidence of post-operative pyelonephritis (POP) was only 4.7%. The median time
from UR to initial POP episode was 20 months. The risk of POP was twice as high among UR failures as that among UR successes. Factors associated with POP on multivariate analysis were female gender (OR 4.3, 95% CI 1.4-13.2), presenting febrile UTI (3.6, 1.5-8.7), breakthrough UTI (2.1, 1.1-3.8), surgical failure (2.9, 1.1-7.5), and renal scarring on pre-operative imaging (1.9, 1.0-3.4). Preoperative VUR grade, intravesical vs. extravesical UR, duplication, and ureteral tapering were not associated with risk of POP.

**Conclusion:** Although some children experience UTI after UR, the incidence of post-operative clinical pyelonephritis is very low, even on very long-term follow-up. Given that most of these patients present with pyelonephritis, these findings suggest that UR is highly effective in reducing pyelonephritis in this population.

**Poster 4)**

**ENHANCING PATIENT SAFETY AND QUALITY OF CARE THROUGH A WEEKLY REVIEW OF SURGICAL CASES IN A PEDIATRIC UROLOGY DEPARTMENT.**

Caleb P. Nelson , Department of Urology, Children's Hospital Boston, Boston, MA Naomi Oyemwense , Program for Patient Safety and Quality, Children's Hospital Boston, Boston, MA Richard Yu , Department of Urology, Children's Hospital Boston, Boston, MA Patricio Gargollo , Department of Urology, Children's Hospital Boston, Boston, MA Katherine Jenkins , Program for Patient Safety and Quality, Children's Hospital Boston, Boston, MA Alan Retik , Department of Urology, Children's Hospital Boston, Boston, MA Bartley Cilento , Department of Urology, Children's Hospital Boston, Boston, MA

**Purpose:** To investigate whether a weekly clinical indications conference has a beneficial effect on patient safety and quality of care, through group review of scheduled surgical cases.

**Methods:** Our department (11 surgeons) holds a weekly clinical indications conference, where surgical cases scheduled for the following week are reviewed and discussed. In July 2007, in conjunction with our hospital’s Program for Patient Safety and Quality (PPSQ), we began tracking each week’s conference findings, focusing on factors associated with patient safety and quality of care. During review of each surgical case, the fellow records any significant discrepancy in the perioperative plan. Discrepancies were categorized as follows: 1) wrong site/procedure, 2) missing records/data, 3) clinical concerns leading to recommendation of change in management plan, by consensus of attendings present, and 4) other discrepancies. All cases each week are reviewed, except for circumcisions and circumcision revisions, and recorded in the PPSQ database. Discrepancies are communicated to the attending, for further action and correction prior to surgery.

**Results:** Data were available for 38 weekly conferences (7/07-9/08). A total of 1903 cases were reviewed (mean: 50.1 cases/week); 6% (n=107) had at least one discrepancy (mean: 2.9 per week). Discrepancy breakdown was: 14% wrong site/procedure, 7% missing data, 66% clinical concerns, and 13% other. Most “other” discrepancies were due to incorrect posting (e.g. failure to reserve laparoscopic equipment for exploration for nonpalpable testis). For clinical concern discrepancies, the most common recommendation was additional imaging or functional studies (36%), followed by alternative or additional procedures (26%). Due to the indications conference, the perioperative care plan was changed in 2.5% of the reviewed procedures (48 patients, 45% of cases with discrepancies). Changes were made in 100% of wrong site discrepancies, 71% of “other” discrepancies, and 33% of clinical concern discrepancies. Rates of management change differed significantly by surgical attending (p=0.044).

**Conclusion:** A weekly surgical case review conference has a significant impact on perioperative care, resulting in changes to perioperative management in 2.5% of cases. These included prevention of potential sentinel events e.g. wrong-site surgery. This conference has had a significant beneficial effect on patient safety and quality of urological care at our institution.

**Poster 5)**

**IMPROVING THE ACCURACY OF DIAGNOSING URETEROPELVIC JUNCTION OBSTRUCTION USING FLUORESCENT MOLECULAR IMAGING: A COMPARATIVE STUDY OF IMAGING MODALITIES IN ASSESSING RENAL FUNCTION AND DEGREE OF OBSTRUCTION IN A MOUSE MODEL.**

Frank J. Penna, MD, Children's Hospital Boston; Brian J. Minnillo, Children's Hospital Boston; Jeanne S. Chow, MD, Children's Hospital Boston; Carol E. Barnewolt, MD, Children's Hospital Boston; S. Ted Treves, MD, Children's Hospital Boston; Frederic H. Fahey, D.Sc., Children's Hospital Boston; Patricia S.
Purpose: Prompt diagnosis and surgical intervention relieving ureteropelvic junction obstruction (UPJO) may preserve renal function. Diuretic renogram, the most frequently used test to diagnose urinary tract obstruction allows for quantification of renal function and obstruction, but is significantly affected by the patient's hydration, positioning, diuretic dosage, and washout calculation methodology. Other radiologic imaging modalities are the mainstay of diagnosing urologic disease; however, they are not without limitation. Ultrasonography (US) is non-invasive and without radiation exposure, but cannot quantify renal function or obstruction, and visualization of the urinary tract is limited. Magnetic resonance imaging (MRI) provides excellent anatomic details, assesses renal function and drainage, but requires a long acquisition time. We hypothesize that the use of a biomolecular fluorescent probe to accurately assess the urinary tract in cases of UPJO would enable more accurate diagnostic and prognostic determination than currently available imaging modalities.

Methods: Twenty mice underwent left-sided ureteral ligation: 10 complete and 10 partial ligations. Both groups were survived for either 1-5 days (short-term) or 8-14 days (long-term) before concurrent imaging with four radiologic imaging modalities. Five additional mice were imaged as a normal control. Each mouse underwent US, diuretic renogram, MRI, and molecular imaging (Figure 1) with Genhance 680 (VisEn Medical, Inc., Woburn, MA). The mice were then euthanized and their kidneys were extracted for histopathological analysis.

Results: Real-time renal perfusion and rate of urine flow obtained by molecular imaging was dependent on degree of obstruction and time frame after obstruction. Mice with complete UPJO had markedly diminished renal perfusion and absence of urine flow on the obstructed side, as compared to mice with partial obstruction and normal controls. Molecular imaging was more sensitive in diagnosing partial UPJO as compared to diuretic renography with live visualization of delayed urine flow. US findings confirmed the presence of varying degrees of hydronephrosis, which were closely correlated with degree of obstruction. MRI confirmed varying levels of diminished renal perfusion and time course through the collecting system, which correlated positively with degree of obstruction.

Conclusion: Unlike other imaging modalities, molecular imaging provides real-time renal perfusion and urine flow visualization, parameters that are invaluable in the diagnosis of UPJO.
Poster 6)  
IS HAVING A VCUG THAT HORRIBLE: AN ASSESSMENT OF PARENTAL SATISFACTION WITH VOIDING CYSTOURETROGRAPHY IN CHILDREN.  
Frank J. Penna, MD, Children's Hospital Boston; Jeanne S. Chow, MD, Children's Hospital Boston; Brian J. Minnillo, Children's Hospital Boston; Angela Franceschi, MEd, CCLS, Children's Hospital Boston; Sonja Ziniel, PhD, Children's Hospital Boston; Natascha Sandy, BS, Children's Hospital Boston; Hiep T. Nguyen, MD, FAAP, Children's Hospital Boston  

Purpose: Voiding cystourethrography (VCUG) is the gold standard in the diagnosis of vesicoureteral reflux and a number of other bladder conditions. An estimated 50,000 children undergo this procedure every year. There is a recent trend toward the use of sedation or even delaying or forgoing VCUG due to the anticipated distress of the exam. We hypothesized that VCUG is not as distressing as commonly thought and can be performed without the need for sedation with adequate preparation and the use of proper techniques to minimize anxiety.  

Methods: A prospective evaluation of parental satisfaction of children undergoing VCUG was conducted using the 33-question VCUG Satisfaction Survey. Sixty-one parents of patients of all ages (53% male) completed the survey in urology clinic after undergoing a VCUG earlier that day. The questions assessed level of preparation, parental satisfaction, sources of discomfort, and the value of a child life specialist (CLS).  

Results: Fifty-two percent of the children were under one year of age. Most parents reported being prepared for the procedure, while only 6% reported not being very prepared. Most parents found discussions with the radiologist and primary care physician prior to the exam to be useful. The more prepared the parents were the greater percentage reported being very satisfied with the procedure. About one-third of patients had a prior VCUG, with more than two-thirds of these having their prior VCUG at our institution, with one quarter reporting a much better experience and all reporting that that the recent VCUG was either the same or better than the prior VCUG. More than half reported that VCUG was the same or better than a physical exam, immunization, ultrasound, and prior catheterization. Most patients were uncomfortable during the catheter placement and bladder-filling phase but reported feeling comfortable after the procedure. Two thirds of patients reported the presence of a CLS; however, 15% were unsure if a CLS was present. Most patients reported that the CLS was either extremely or very helpful for the child, the parent, and the physician present. Parents had varied perceptions of their own ability in comforting their child, whereas parents with a CLS present reported it to be much easier to comfort their child, with more than 70 percent reporting it to be somewhat or very easy. A greater percentage of parents with a CLS present than those without a CLS present reported being very satisfied. Most parents were very satisfied with the overall experience and their child's ability to tolerate the procedure. Most parents reported that the VCUG experience was much better or better than expected, with only 5% reporting that the experience was worse than expected.  

Conclusion: The VCUG, with adequate preparation and the support of a CLS, is a very tolerable procedure that exceeds expectations.  

Poster 7)  
KETOROLAC IS UNDERUTILIZED AFTER URETERAL REIMPLANTATION DESPITE BEING ASSOCIATED WITH REDUCED LENGTH OF STAY AND COST.  
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Purpose: Although ureteral reimplantation (UR) reliably corrects vesicoureteral reflux (VUR), many patients have postoperative pain and bladder spasm. Multiple studies show that ketorolac markedly reduces postoperative pain after UR, but it is not known whether ketorolac is routinely used. We sought to examine ketorolac use after UR and association of ketorolac used with outcomes.  

Methods: The Pediatric Health Information System (PHIS) is a national database collected by 41 free-standing children's hospitals. Using ICD-9 codes, we searched PHIS to identify patients (age <18 years) with primary VUR who underwent UR between 1/03 and 3/08. Billing data were reviewed to identify patients who received ketorolac during hospitalization. We determined rates of ketorolac use among UR patients, association of ketorolac use with patient and provider factors, and association of ketorolac use with postoperative outcomes including complication rates, length of stay, and hospital charges.
Results: We identified 12,239 children who underwent UR and for whom complete medication data was available. Of these, 6,362 (52%) received ketorolac. Preoperative factors associated with ketorolac use include older age (5.2 vs. 4.7 years), female gender (53 v 47%), hospital teaching status (52 v 48%), and decreased disease severity (all p<.0001). No differences in ketorolac use were noted by insurance status (p=.63). Usage rates remained stable over time (p=.07 for trend). Ketorolac use was associated with reduced length of stay (2.2 v 2.7 days, p<.0001) and decreased hospital charges ($14,000 v $16,000, p<.0001). Complication rates were slightly higher in patients not receiving ketorolac (4 v 3%, p<.0001). After adjusting for other factors, including disease severity, in a multivariate model, ketorolac use remained highly significantly associated with decreased length of stay and decreased charges (p<.0001).

Conclusion: Despite high-level data showing improved outcomes with ketorolac after UR, only half of children undergoing UR received this medication. Ketorolac use is independently associated with reduced procedure charges and reduced length of stay after UR, without increased complications. This suggests underutilization of ketorolac after UR in children.

Poster 8)
URODYNAMIC INVESTIGATION OF 347 CHILDREN WITH VESICOURETERAL REFLEX IDENTIFIES OVERACTIVE BLADDER AND POOR COMPLIANCE IN THOSE WITH VOIDING DYSFUNCTION.

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Purpose: Up to 50% of children with vesicoureteral reflux (VUR) may have associated voiding dysfunction. It is thought to be an important determinant of the severity and resolution of VUR; however, to date there has been no objective measurement defining the impact of voiding dysfunction in children with VUR. The purpose of this study is to compare the urodynamic parameters of children with VUR who have and do not have symptomatic voiding dysfunction.

Methods: We performed a retrospective study of 347 children with a diagnosis of primary VUR who underwent urodynamic investigation. Information regarding patient demographics, grade and laterality of VUR and clinical history of bladder dysfunction were assessed. Urodynamic parameters recorded included bladder overactivity, early and late compliance, voiding pressure, post void residual volume and bladder capacity. Statistical analysis was performed using t-Student analysis, Pearson's Chi-Square test or Fischer exact test, with a p<0.05 as being significant.

Results: The mean age of the patients at the time of urodynamic evaluation was 5.5 years (SD 4.2 (4.2 yr). 30% had symptomatic voiding dysfunction based on clinical history. Children without a history of voiding dysfunction had higher grades of VUR compared to those with it (p=0.002). Of all the urodynamic parameters evaluated, the incidence of bladder overactivity and poor late bladder compliance was higher in children with bladder dysfunction than those without it (p< 0.01).

<table>
<thead>
<tr>
<th>History of Voiding Dysfunction</th>
<th>Poor Late Compliance</th>
<th>Overactivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>no</td>
<td>17.5%</td>
<td>7.3%</td>
</tr>
<tr>
<td>yes</td>
<td>30.9%</td>
<td>22.0%</td>
</tr>
<tr>
<td>p=0.006</td>
<td>p&lt;0.001</td>
<td></td>
</tr>
</tbody>
</table>
Conclusion: Our findings suggest that voiding dysfunction does have objective and quantifiable effects on bladder dynamics. Urodynamic evaluation may play a role in the management of children with VUR by identifying those with bladder dysfunction secondary to abnormal voiding habits.

Poster 9
OPEN URETERAL REIMPLANTATION DOES NOT AFFECT THE QUALITY OF LIFE IN CHILDREN WITH VESICOURETERAL REFLUX: ASSESSMENT OF HEALTH-RELATED QUALITY-OF-LIFE USING THE PEDIATRIC QUALITY OF LIFE INVENTORY.
David F. Yao, MD, Children's Hospital Boston; Frank J. Penna, MD, Children's Hospital Boston; Brian Minnillo, Children's Hospital Boston; Aaron C. Weinberg, BS, Children's Hospital Boston; Hiep T. Nguyen, MD, FAAP, Children's Hospital Boston
Purpose: A significant amount of research has been dedicated to the diagnosis and management of vesicoureteral reflux (VUR). However, no study has been published to evaluate the impact of this disease on quality of life. Change in quality of life is an important, yet underreported means to assess the utility of surgery beyond traditional surgical and clinician assessed outcomes. The aims of this study were to prospectively assess the health-related quality of life (HRQoL) of children with VUR who have either been treated medically or with surgery using a validated patient satisfaction survey.

Methods: A prospective, longitudinal study was conducted using a web-based validated survey, the Pediatric Quality of Life Inventory to assess four distinct domains: Physical (PF), Emotional (EF), Social (SF), and School Functioning (SCF). One hundred-six patients and 198 parents of patients age 2 to 18 with VUR completed the survey. A historical cohort of 401 healthy patients and 717 healthy parental proxies served as controls. Of the 106 patients who participated, 53 (50%) underwent open ureteral reimplantation (UR) and 53 (50%) were managed medically. Of the 198 parent-proxy survey participants, 78 (39%) had children who had UR and 118 (61%) had been managed medically.

Results: There was no difference in HRQoL between patients with VUR and healthy controls. Patients report equivocal HRQoL between UR and medical management (84.66 to 85.09); however parents report lower scores with UR (85.59 to 89.10). Recent febrile UTI was associated with lower HRQoL (82.40 to 90.00). Both patients and parents described lower HRQoL with prophylactic antibiotic use, but results were not statistically significant.

Conclusion: Vesicoureteral reflux, although a chronic condition, does not significantly impact HRQoL. From a patient HRQoL perspective, ureteral reimplantation and medical management were equivocal, but parental proxies interpret lower HRQoL with ureteral reimplantation.

Table 1a: Mean values of HRQoL Scores for Patient VUR Patients vs. Healthy Controls

<table>
<thead>
<tr>
<th>VUR patients</th>
<th>Healthy Controls</th>
<th>p VUR Patients vs. Healthy Controls</th>
<th>Surgery</th>
<th>No Surgery</th>
<th>p Surgery vs. No Surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td>106</td>
<td>401</td>
<td>p</td>
<td>53</td>
<td>53</td>
<td>p</td>
</tr>
</tbody>
</table>
Table 1b: Mean values of HRQoL Scores for Parental Proxy

<table>
<thead>
<tr>
<th></th>
<th>VUR Patients</th>
<th>Healthy Controls</th>
<th>p VUR Patients</th>
<th>Surgery vs. Healthy Controls</th>
<th>No Surgery</th>
<th>p Surgery vs. No Surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>87.70</td>
<td>87.61</td>
<td>0.95</td>
<td>85.59</td>
<td>89.10</td>
<td>0.035</td>
</tr>
<tr>
<td>PF</td>
<td>92.25</td>
<td>89.32</td>
<td>0.02</td>
<td>89.82</td>
<td>93.87</td>
<td>0.028</td>
</tr>
<tr>
<td>EF</td>
<td>79.93</td>
<td>82.64</td>
<td>0.02</td>
<td>78.18</td>
<td>81.08</td>
<td>0.244</td>
</tr>
<tr>
<td>SF</td>
<td>92.76</td>
<td>91.56</td>
<td>0.28</td>
<td>90.95</td>
<td>93.96</td>
<td>0.083</td>
</tr>
<tr>
<td>SCF</td>
<td>85.26</td>
<td>85.47</td>
<td>0.88</td>
<td>82.18</td>
<td>87.38</td>
<td>0.027</td>
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</tbody>
</table>

Poster 10)
CORRELATION BETWEEN DETRUSOR OVERACTIVITY ON URODYNAMICS AND SHORTENED EMG LAG TIME ON UROFLOWMETRY/ELECTROMYOGRAPHY.

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Purpose: When employing the term overactive bladder (OAB), the symptom of urgency must be present and the presence of detrusor overactivity (DO) is only implied. While DO can be proven with urodynamics (UDS), this invasive procedure is often unnecessary in the highly suspicious patient. Uroflowmetry with electromyography (EMG) provides an alternative and non-invasive approach to making the diagnosis of DO objectively. EMG lag time (the time from the start of pelvic floor relaxation and the start of urine flow) is normally 2-6 seconds (sec). In children with DO and a quiet pelvic floor during voiding, EMG lag time is shortened and often negative. Previous analysis has shown that 100% of patients with a shortened lag time (≤0 sec) also have evidence of DO on UDS. Despite this excellent positive predictive value (PPV) and specificity, it is still unknown how many patients with DO will actually have a shortened EMG lag time on uroflow/EMG. We sought to determine the sensitivity of EMG lag time in the diagnosis of DO.

Methods: We reviewed the charts of 50 consecutive patients (median age 8.4 years, 25th-75th percentiles = 6.0 – 9.4 years) who had DO on UDS and a quiet EMG during voiding from 2006 to 2009 and who also underwent uroflow/EMG study within a 3 month period before or after their UDS. No patient received anticholinergics for at least 3 months prior to each study. EMG lag times for each patient were reviewed and the correlation between UDS proven OAB and shortened lag time was determined with three cutoffs for shortened lag time: 1) <2 sec, 2) ≤ 1 sec, and 3) ≤ 0 sec.

Results: Of the 50 children (14 male; 36 female), average EMG lag time was 0.1 sec (SD 1.7). 44 of the 50 patients (88%) qualified as having shortened EMG lag time with the first cutoff (<2 sec).
second cutoff (≤ 1 sec), 42 patients (84%) had a shortened EMG lag time. Finally with the third and most stringent cutoff (≤ 0 sec) 35 patients (70%) had a shortened EMG lag time.

**Conclusion:** Previously we demonstrated that children with an EMG lag time of ≤ 0 sec in association with a quiet pelvic floor during voiding on screening uroflow/EMG was associated with DO on UDS in 50 out of 50 patients, i.e. 100% specificity and 100% PPV. We now have documented the reverse – the existence of a shortened lag time on uroflow/EMG in patients with documented DO on UDS. DO can be predicted with an 88% degree of sensitivity in patients when EMG lag time is <2 sec. Therefore, the presence or absence of DO in most patients can be identified on a noninvasive uroflow/EMG study and convert a presumed diagnosis into a confirmed one.

**Poster 11)**

**AN OBJECTIVE PATTERNING OF UROFLOWMETRY CURVES.**

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**Purpose:** Uroflowmetry (UFM) is the most common diagnostic urodynamic procedure for evaluating children with lower urinary tract problem. However, interpretation of UFM curves is incompletely standardized. An objective patterning is proposed.

**Methods:** UFM curves were obtained from 100 children presenting with daytime incontinence or enuresis at their first office visit. Each curve was compared with a standard curve generated from a published nomogram, and deviation from it was considered as abnormal pattern. As a result, a new patterning method was formulated. First, Staccato and Interrupted pattern were defined by ICCS criteria. Next, rest of the curves were classified by deviation of maximal flow rate (MFR) from median value of the nomogram as Tower (>140%), 'Not abnormal'(70-140%), and Plateau (<70%) pattern. The correlation of the patterns and other UFM parameters with the presenting symptom was evaluated. Further, six pediatric urologists patterned the same curves subjectively.

**Results:** All the curves could be classified to one of the patterns by the method. Distribution of the patterns reasonably reflected the spectrum of presenting symptom (Figure 1, p<0.05 between Group 1 and 3). Age adjusted voided volume was smaller in children with daytime incontinence than those without. Post-void residual, MFR and average flow rate did not correlate with presenting symptom. Subjective patterning showed marked inter-observer difference. When the patterning by the present method was set as a reference standard, the positive prediction rate of the observers for abnormal patterns inversely correlated with their negative prediction rate (Figure 2).

**Conclusion:** Subjective UFM patterning is liable to personal bias. The proposed methodology enables an objective patterning, complying the ICCS standardization and clinical presentation.
THE EFFECT OF RECTAL BALLOON INFLATION AND DEFLATION ON BLADDER FUNCTION IN CHILDREN WITH LOWER URINARY TRACT SYMPTOMS (LUTS) AND/OR CONSTIPATION.

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Rosa Burgers, MD, Section of Pediatric Gastroenterology, Nationwide Children's Hospital, Columbus, OH
Stephen A. Koff, MD, FAAP, Section of Pediatric Urology, Nationwide Children’s Hospital, Columbus, OH
Stephen Canon, MD, Urology, Dell Children's Medical Center of Central Texas, Austin, TX
Kristina Booth, RN, Section of Pediatric Urology, Nationwide Children's Hospital, Columbus, OH
Cheryl Baxter, RN, Section of Pediatric Urology, Nationwide Children's Hospital, Columbus, OH
Hayat Mousa, MD, Section of Pediatric Gastroenterology, Nationwide Children's Hospital, Columbus, OH
Carlo DiLorenzo, MD, Section of Pediatric Gastroenterology, Nationwide Children's Hospital, Columbus, OH
**Purpose:** To study the effect of rectal balloon inflation and deflation on bladder sensory motor functions in children.

**Methods:** We prospectively studied 26 neurologically normal children 10M/16F aged 6 to 11 years with symptoms of urinary incontinence or infrequent voiding +/- constipation with GI-GU studies including: elimination questionnaires and diaries, personality assessments, colonic transit time, anorectal manometry, and simultaneous urodynamic-rectal balloon pressure studies attempted 3X with balloon empty, inflated and deflated.

**Results:** Anorectal manometry was normal in all. Colonic transit was prolonged in 39%. Constipation was diagnosed by Rome III criteria in 16. Constipation did not correlate with urinary infrequency or incontinence, presence of uninhibited contractions (UNC) or UTI history. UNC were seen in 16 of 22 with OAB symptoms. 3 bladder response patterns to rectal balloon inflation were observed: Stimulatory: bladder capacity decreased in 40%, bladder sensation increased in 40% and bladder instability increased or was unmasked in 66%. Inhibitory: bladder capacity increased in 25%, bladder sensation decreased in 40%, and bladder instability decreased or disappeared in 34%. No effect: in 7.

**Conclusion:** Rectal balloon inflation induced bladder sensory-motor dysfunctions which may persist after balloon deflation. There were no significant correlations between response patterns and either GI or GU symptoms but the preexisting state of the bladder and rectum appeared to influence the behavior of the bladder: stimulatory responses were seen in children with small bladders or large rectal vaults with inhibitory responses noted in those with large bladders. These preliminary observations suggested that there are both mechanical and neurological causes for the sensory-motor interrelationships between rectum and bladder that markedly impacted LUT function in neurologically normal children. They provide insights into the actual mechanisms of what have formerly been apparent associations between GU symptoms, LUT dysfunction and fecal retention and afford potential opportunities for treatment of bladder hyperactivity and hypoactivity in childhood.

**Poster 13)**

**SEX DIFFERENCES IN BLADDER SMOOTH MUSCLE AND UROTHELIAL MUSCARINIC SENSITIVITY.**

*Hsi-Yang Wu, MD, Urology, Stanford University, Stanford, CA Stephanie Daugherty, Pharmacology, University of Pittsburgh, Pittsburgh, PA William C. de Groat, PhD, Pharmacology, University of Pittsburgh, Pittsburgh, PA*

**Purpose:** The female predominance in bladder disorders begins during childhood and continues into adulthood. Using in-vitro spontaneous bladder contractions as a preparation for overactive bladder, we had previously noted an endogenous enhancement of bladder contractions by muscarinic and purinergic mechanisms. We wished to determine if there was a sex difference in sensitivity to these mechanisms that would explain the difference in bladder disorders.

**Methods:** Whole bladders from neonatal Sprague-Dawley rats were harvested at 1,2,3, and 6 weeks of life and placed in an organ chamber with Krebs’ solution at 37°C and 95% O_2/5% CO_2_. Bladders were filled to optimal volume and baseline amplitude (% of K^+ evoked contractions) and frequency (number of contractions/5 minutes) of spontaneous bladder contractions were measured. Muscarinic agonists (oxotremorine-M, 40 µM) and antagonists (atropine-methyl-nitrate, 5 µM) and purinergic agonists (α,β-Me-ATP, 1 mM) and antagonists (PPADS, 1 mM) with poor lipophilic properties were added to the serosal (smooth muscle) and mucosal (urothelial) sides of the bladder preparations to determine the differential regulation of spontaneous bladder contractions.

**Results:** Female bladders had higher amplitude (13% vs 5%, p<0.05) and frequency (22 vs 12, p<0.05) spontaneous contractions than male bladders at 2 weeks of life. Serosal administration of oxo-M enhanced the amplitude of contractions only in male bladders, whereas AMN inhibited contractions in both male and female bladders. Mucosal administration of oxo-M only enhanced the amplitude in male bladders, and AMN only inhibited the amplitude in female bladders. Purinergic agonists and antagonists did not affect amplitude or frequency via either serosal or mucosal administration.

**Conclusion:** Spontaneous contractions in female neonatal rat bladders exhibit higher amplitude and frequency compared to male bladders. Serosal muscarinic agonists increase amplitude only in male bladders, and mucosal muscarinic antagonists decrease amplitude only in female bladders. This suggests that female bladder smooth muscle and urothelium are more sensitive to endogenous levels of acetylcholine than male bladders, which may be a factor in the female predominance of bladder disorders.
**Poster 14)**  
**MAGNETIC RESONANCE VOIDING CYSToureTHROGRAPHY FOR VESICOURETERAL REFLUX CAN BE IN PLACE OF STANDARD VCUG EXCEPT TODDLERHOOD.**  
Kazuyoshi Johnin, Urology, Shiga University of Medical Science, Otsu, Japan  
Yusaku Okada, Urology, Shiga University of Medical Science, Otsu, Japan  
Ryutaro Takakura, Radiology, Shiga University of Medical Science, Otsu, Japan  
Kiyoshi Murata, Radiology, Shiga University of Medical Science, Otsu, Japan  

**Purpose:** Not only urologists but also radiologists are searching for a noninvasive technique of testing for reflux. To assess the feasibility of magnetic resonance (MR) voiding cystourethrography using MR fluoroscopy for evaluation of vesicoureteral reflux and the possibility of it being a noninvasive alternative to the standard voiding cystourethrography (VCUG).  

**Methods:** A total of 104 MR studies: plain (55), enhanced (49) with vesicoureteral reflux diagnosed by VCUG were evaluated. When enhanced studies were done, contrast medium for magnetic resonance imaging was instilled into the bladder via the catheter. Before and during voiding MR fluoroscopy was executed with the fast multiplanar spoiled gradient-echo sequence. The MR findings were correlated with those obtained by the gold standard VCUG. We investigated the feasibility of MRVCUG performed with sedation (51) and without sedation (53).  

**Results:** MRVCUG enhanced was showed to be 95% sensitive with a specificity of 96.2% for detecting VUR. One false negative unit was found in grade I reflux case. MRVCUG could detect 4 higher grade reflux cases which proved to be no or lower reflux on VCUG. There were no false positive cases on MRVCUG. Thirty one of 51 patients (infant and toddler) could undergo MRVCUG with sedation. On the other hand, 51 of 53 patients (child and adult) could undergo MRVCUG without sedation. MRVCUG could be more feasible on older patients than younger patients (p<0.001).  

**Conclusion:** MRVCUG can demonstrate most of reflux without ionizing radiation, and can be in place of standard VCUG except toddlerhood.

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**Poster 15)**  
**ASSESSING THE VALIDITY OF SUBDIVIDING A STANDARD ULTRASOUND GRADING SYSTEM FOR HYDRONEPHROSIS.**  
A. Kapoor, University of Ottawa, Ottawa, ON, Canada  
Michael P. Leonard, MD, FRCSC, FAAP, Department of Surgery and Pediatrics, Children’s Hospital of Eastern Ontario, University of Ottawa, Ottawa, ON, Canada  
Janusz Feber, MD, FRCP, Pediatric Nephrology, Children’s Hospital of Eastern Ontario, University of Ottawa, Ottawa, ON, Canada  
A. Lalla, University of Ottawa  
M. Matzinger, MD, FRCPC, Pediatric Radiology, Children’s Hospital of Eastern Ontario, University of Ottawa Claudio De Carli, MD, Children’s Hospital of Eastern Ontario M.A. Keays, MD, University of Toronto, Division of Urology  
Gaayana Raju, MD, University of Ottawa, Division of Urology Andy Ni, MSc, CRU – Clinical Research Unit, CHEO Research Institute Luis Guerra, MD, MSc, Departments of Surgery and Epidemiology and Community Medicine, Children’s Hospital of Eastern Ontario, University of Ottawa, Ottawa, ON, Canada  

**Purpose:** Hydronephrosis (HN) diagnosed via ultrasound is often reported according to the Society of Fetal Urology (SFU) subjective 4-point grading system. However, a study we published in 2008 demonstrated modest inter-rater reliability, with interpreters inconsistently ranking SFU Grades 3 and 4. We assessed whether clarifying the SFU grading system using a previously reported system (Sibai, H, Pippi Salle J L et al) using a subdivision of Grade 4 that takes into account the extent of the segmental parenchymal thinning would increase inter-rater reliability.  

**Methods:** Retrospective study utilizing 50 sets of pediatric ultrasounds that were assessed by 4 staff and 4 trainees using a modified SFU grading system with a subdivision of Grade 4 into 4a (segmental parenchymal thinning) and 4b (diffuse parenchymal thinning). Each assessor repeated their ranking for a second time after 2 weeks. Inter-rater and intra-rater reliabilities were determined using the non-weighted Cohen’s κ statistic and agreement level was considered as follows: 0.81 to 0.99 as almost perfect, 0.61 to 0.80 as substantial, 0.41 to 0.60 as moderate, 0.21 to 0.40 as fair and 0.01 to 0.20 as slight.  

**Results:** Overall inter-rater agreement among the eight raters was found to be “moderate” for Grade 0, “slight to fair” for Grades 1 to 4a, almost “substantial to perfect” for Grade 4b, and “substantial” for a combined Grade 4 (Grades 4a and 4b). Intra-rater agreement was found in general to be “moderate to substantial” for both staff (κ 0.41 to 0.85) and trainees (κ 0.55 to 0.86).
Conclusion: Similar to our previous report, this study suggests that the SFU grading system has good intrarater reliability. Clarifying the system with a subdivision of Grade 4 allowed raters to almost perfectly distinguish Grade 4b from Grades 4a and 3. It also increased the inter-rater agreement of Grade 4 from moderate to substantial. In conclusion, this modification may improve the low inter-rater agreement previously observed for Grades 3 and 4; however studies using a larger population should be conducted.

<table>
<thead>
<tr>
<th>SFU Grade</th>
<th>Staff</th>
<th>Trajano</th>
<th>Combined</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.41</td>
<td>0.68</td>
<td>0.63</td>
</tr>
<tr>
<td>1</td>
<td>0.12</td>
<td>0.22</td>
<td>0.25</td>
</tr>
<tr>
<td>2</td>
<td>0.19</td>
<td>0.26</td>
<td>0.23</td>
</tr>
<tr>
<td>3</td>
<td>0.42</td>
<td>0.37</td>
<td>0.29</td>
</tr>
<tr>
<td>4a</td>
<td>0.19</td>
<td>0.45</td>
<td>0.22</td>
</tr>
<tr>
<td>4b</td>
<td>0.50</td>
<td>0.62</td>
<td>0.68</td>
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<tr>
<td>4 (4a+4b)</td>
<td>0.87</td>
<td>0.79</td>
<td>0.75</td>
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</tbody>
</table>

Poster 16)
CLINICAL VALUE OF UROFLOWMETRY FOR LONG-TERM FOLLOW-UP OF HYPOSPADIAS REPAIR.

Luis Guerra, MD, MSc , Departments of Surgery and Epidemiology and Community Medicine, Children's Hospital of Eastern Ontario, University of Ottawa, Ottawa, ON, Canada
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Michael P. Leonard, MD, FRCSC, FAAP, Department of Surgery, Paediatric Urology, Children's Hospital of Eastern Ontario, University of Ottawa, 40, Ottawa, ON, Canada

Purpose: Uroflowmetry is used as a non-invasive test in the follow-up of patients who undergo hypospadias repair in our institution. We evaluate if uroflowmetry predicts the need for re-operation due to urethral obstruction in children with previous hypospadias repair.

Methods: Research Ethics Board approved retrospective chart review of hypospadias repairs at our institution from 1992 to 2006. Uroflowmetry at least 6 months after the last repair was recorded. Maximum flow ($Q_{\text{MAX}}$), average flow ($Q_{\text{AVE}}$), voided volume ($V_{\text{COMP}}$) and residual volumes were analyzed. They were considered normal flow rate with $Q_{\text{MAX}}$ between 5th and 90th percentiles or poor flow rate below 5th percentile. Post-void residual was considered high if it was more than 10% of $V_{\text{COMP}}$.

Results: 124 patients had uroflowmetry follow-up. Median age at primary hypospadias repair was 17 months (Quartile 1st: 2.4; 3rd: 39.9). Median follow-up: 7.8 years (Quartile 1st: 5.8; 3rd: 9.18). Technique: transurethral incised plate (TIP) 33% (41/124), tubularized island flap (TIF) 28% (35/124), Mathieu 19% (23/124), meatal advancement 6.5% (8/124), Onlay island flap (OIF) 6.5% (8/124), others 7% (9/124). Postoperatively 65% (81/124) had normal flow (5th - 90th percentiles) and 35% (43/124) had poor flow rates.
Surgery for urethral obstruction was performed in 35% (15/43) and 23% (19/81) of patients with abnormal and normal postoperative uroflowmetry respectively (p=0.17). PVR was high in 28.4% (23/81) and 23.2% (10/43) of patients with normal and poor flow respectively (p=0.54).

**Conclusion:** Routine uroflowmetry post-hypospadias repair in asymptomatic children was not useful in predicting the need for re-operation due to urethral obstruction. High post void residual was not associated with abnormal uroflowmetry. A more useful test for identification of patients who will need re-operation for urethral obstruction post hypospadias repair is needed.

**Poster 17)**

**Epididymal Cysts and Testicular Size: A Sonographic Survey of 1765 Patients.**

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**Purpose:** Epididymal cysts are easily visualized with scrotal sonography. Epididymal cysts can result from maternal exposure to estrogen mimetic endocrine disrupting molecules during male fetal development. We reviewed more than 2000 pediatric scrotal ultrasounds in an effort to gain insight into the frequency and age distribution of epididymal cysts and discern any relationship with testicular size.

**Methods:** A review of all pediatric scrotal ultrasounds performed at our institution between 2001 and 2008 was carried out tabulating primary sonographic diagnosis, incidental findings, and testicular size. Patient age was divided into 5 year intervals. Testicular size was compared between patients with epididymal cysts and those with normal anatomy (based on sonographic interpretation of the study) using an analysis of covariance approach, adjusting for age.

**Results:** 2031 scrotal ultrasounds were reviewed in 1765 patients. Epididymal cysts were found in 254 patients (14.4%). As patient age increased so too did the proportion of epididymal cysts, from ~9% in the youngest cohort to >50% in the 15+ age group. Analysis of covariance results show that testicular sizes (both length and volume) are larger in those patients with epididymal cysts, compared with patients with normal anatomy. Approximately 80% of cysts were incidental findings, while the other 20% were found on evaluation of a scrotal mass consistent on physical examination with epididymal cyst. We identified bilateral cysts in 16.1% of patients with cysts.

**Conclusion:** Epididymal cysts are felt to be harmless whether discovered on physical examination or with scrotal ultrasonography. No previous tabulation of pediatric scrotal sonography has demonstrated an increase in the occurrence of epididymal cysts by age for populations studied. The association of epididymal cysts with testes of increased size is novel, but unexplained.

**Poster 18)**

**The Estrogen Receptor Beta (ERß) Gene is Associated with Cryptorchidism in Rat and Man.**

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**Purpose:** Cryptorchidism is a complex disease defined by multilocus genetic susceptibility. We studied the cryptorchid Long Evans (LE) orl rat to identify candidate genes for study in human males.

**Method:** To define genomic loci associated with cryptorchidism in orl rats, we used WKY rats in an intercross-backcross breeding protocol to generate affected F2 males (n=58) that were genotyped using
Results: Several genomic loci showed significant (p<0.01) linkage with one or both marker sets. We searched for candidate genes at these loci and identified Esr2, encoding estrogen receptor β (ERβ), at the chromosome 6 peak. Sequencing of orl Esr2 revealed a strain-specific homozygous promoter haplotype associated with a 50% reduction in Esr2 mRNA in orl gubernaculum. Longer alleles of a human ESR2 intronic CA repeat polymorphism have been associated with hypospadias and testosterone levels. Analysis of our case-control cohort also showed a positive association of cryptorchidism with the L allele and LL genotype with odds ratios of 1.52 (CI 1.05-2.21) and 2.36 (CI 1.09-5.08), respectively; p=0.027.

Conclusion: (1) Risk alleles in the promoter of Esr2 are associated with orl cryptorchidism and with decreased expression of Esr2 mRNA in orl fetal gubernaculum and (2) Long CA repeat risk alleles in ESR2 are associated with the clinical disease. These data suggest a common mammalian genetic risk factor for non-syndromic cryptorchidism.

Poster 19) HORMONAL REGULATION OF GENE EXPRESSION IN THE FETAL RAT GUBERNACULUM.

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Purpose: The Leydig cell hormones insulin-like 3 (INSL3) and testosterone/dihydrotestosterone (DHT) are key factors required for gubernaculum development. Our previous data suggest altered expression of genes related to cytoskeleton, energy pathways and muscle development in the fetal gubernaculum of the cryptorchid Long Evans (LE) orl rat. We used genome-wide analysis to validate strain-specific and examine hormone-responsive gene expression in gubernaculum.

Methods: Untreated gubernacula from GD17 and 19 fetuses were pooled by litter after fixation in RNALater®. For organ culture, GD17 wt gubernacula were pooled by litter on Millicell culture plate inserts in DME with 10% FCS. After 24h, media was added containing no hormone (control), INSL3 (1 or 10 nM) or DHT (0.1 or 1 nM) for an additional 24h. RNA was extracted from all pools of treated and untreated gubernacula (n=5-7 litters/group), amplified, labelled and hybridized to Affymetrix 230 2.0 rat expression arrays. Raw data were normalized and groups compared using the LIMMA linear model approach with a false discovery rate (FDR) of 5%. Differentially expressed genes were analyzed for overrepresented functional categories using DAVID and transcription factor (TF) binding sites using PAINT.

Result: Comparison of GD17 and GD19 orl and wt samples revealed most strain-specific differences (n=3042 differentially expressed probesets) at GD17. Although expression patterns of specific genes were not always comparable to our previous data due to different collection methods, analysis of these 3042 probesets using DAVID and PAINT produced similar results to our previous series, with overrepresentation of energy pathway, muscle, cytoskeleton and proteosome signaling genes (Bonferroni p values <0.03) and Elk1, Creb-BP/c-jun, CREB, c-Ets1 and NRF2 as the most overrepresented TF binding sites (p<0.00001). Significant expression differences were seen at one or both doses of hormone for more genes after INSL3 (n=2680) than DHT (n=1198) exposure. INSL3 altered expression of genes related to
Wnt signaling, cytoskeleton organization and biogenesis, muscle development and neurogenesis, while DHT affected expression of primarily cell cycle- and morphogenesis-associated genes. Interesting INSL3-regulated genes include *Wnt5a* and *Sfrp1*, both recently associated with abnormal gubernacular development in transgenic mice, and multiple cAMP response element-associated genes including *Creml* and *Crebbp*.

**Conclusion:** Our expanded analysis of gene expression in fetal rat gubernaculum confirms altered muscle, cytoskeletal and energy pathway signaling in the cryptorchid orl strain and provides initial support for regulation of Wnt signaling, muscle development and neurogenesis by INSL3.

**Poster 20)**

**ACUTE TESTICULAR TORSION: EFFECT OF HOSPITAL TRANSFER AND SOCIOECONOMIC FACTORS ON PATIENT SURGICAL OUTCOMES.**

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**Purpose:** Testicular torsion is a true pediatric emergency. Testicular salvage depends primarily on the time from the torsion occurrence to the time to treatment. We sought to determine if delay from a hospital transfer or variable socioeconomic factors could impact the orchiectomy rate for children with this condition.

**Methods:** We retrospectively evaluated the records of children seen in a single institution emergency room who proceeded to surgery for a diagnosis of acute testicular torsion from 2003 to 2008. Charts were reviewed for transfer status, race, presence or absence of insurance, and distance from the hospital. Orchiectomy specimens were evaluated for histological confirmation of non-viability.

**Results:** 101 children underwent scrotal exploration for acute testicular torsion and 99 records had complete data to review. The orchiectomy rate for those transferred versus presented primarily to the ER was 55.6% vs 64.2% (p>0.05). Orchiectomy rates for patients with private insurance vs medicaid or no insurance were 62.3% vs 64.6% (p>0.05). Average distance from the hospital in the orchiectomy group was 26.3 miles vs 19.4 in the non-orchiectomy group (p>0.05) (see figure). Orchiectomy rates were highest in the African American population (70.3%) and lowest in the Latino population (61.1%) (p>0.05). Surgical diagnosis of non-viability agreed with pathologic diagnosis of complete non-viability in 89% with the remaining testicles showing only microscopic focus of viable tissue in the setting of extensive necrosis.

**Conclusion:** While testicular torsion is a disease entity that depends on rapid diagnosis and treatment, hospital transfer does not seem to lead to greater orchiectomy rates. Outcomes are not influenced by distance from the hospital or by type of insurance. Surgical assessment of non-viability correlates closely with pathological findings.
Poster 21) SUTURELESS, SCALPEL-LESS CIRCUMCISION: FASTER, CHEAPER AND BETTER.
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Purpose: We previously reported our success with sutureless circumcision using 2-octyl cyanoacrylate (2-OCA; Dermabond®) in 267 patients. At that time, it was unclear whether our use of 2-OCA offered real financial or time savings over the traditional sutured technique. However, we have since modified our technique further by making all skin incisions with electrocaudery on cutting current. We report our results in the present study, which we believe to be the first such series in the literature.

Methods: We reviewed the charts of all patients ages 6 months-12 years undergoing primary circumcision (PC) and circumcision revision (CR) by three surgeons over a 27-month period. Exclusion criteria included complexity beyond phimosis (i.e. chordee, penile torsion, hypospadias, phalloplasty) and use of the Gomco clamp. The surgical technique was the same for all patients: circumferential inner incision using electrocaudery on cutting current à circumferential outer incision using electrocaudery à removal of foreskin à hemostasis with electrocaudery à approximation of skin edges with 2-OCA or 6-0 suture à application of antibiotic ointment. Compiled data included: PC vs. CR, suture vs. 2-OCA for skin approximation and the reason for this decision, operative times, complications, and parental and surgeon satisfaction.

Results: Between July 1, 2006 and October 1, 2008, we performed 348 PC using 2-OCA, 171 CR using 2-OCA, 94 PC using 6-0 sutures, and 60 CR using 6-0 sutures. In the vast majority of cases in which sutured PC and CR were performed, this decision was based upon resident request for suturing experience. Mean operative time for PC and CR using 2-OCA was 11 minutes (range: 6-22), and that for sutured PC and CR was 33 minutes (range 18-48) (p<0.05). Operative times for both techniques depended somewhat upon the degree of resident involvement in the case. At mean follow-up of 12 months (range 1-27 months) a total of
4 patients (one from each group) were re-admitted for bleeding, and one sutured CR was brought back
electively at parents’ request for correction of unsatisfactory cosmesis. While parental satisfaction was
equally high in both groups, the absence of suture tracks and suture sinuses in the 2-OCA groups gave this
group higher surgeon satisfaction.

**Conclusion:** The combined use of electrocaudery and 2-OCA for circumcisions is a safe, efficient,
financially beneficial and cosmetically appealing alternative to traditional circumcision performed with
scalpel and sutures.

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**Poster 22)**

**SEXUALITY AND QUALITY OF LIFE IN YOUNG GIRLS FOLLOWING COLOVAGINoplasty.**

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**Purpose:** The aim of this study was to assess the effect of colovaginoplasty on psychosocial functioning
and sexuality in young women.

**Methods:** From 1995 to 2008, 43 patients 10 to 29 years old (average age 18.4 years) with Mayer
Rokitansky–Kuster–Hauser syndrome underwent total vaginal replacement with sigmoid colon. 6 patients
were Italian and 37 Bangladeshi. All patients were operated by the same surgical team. Outcomes were
evaluated by retrospective chart review and the FSDQ, a validated questionnaire used to evaluate
postoperative sexual function. Psychosocial functioning was measured by a 36-item survey that includes
the Rosenberg Self-Esteem Scale (RSES:14 items, possible score, 14-56), Beck Depression Index (BDI: 9
items; score, 9-45) and Cohen's Test for Life Management ability (CTML: 13 items; score, 13-65) and
compared to 30 healthy control subjects.

**Results:** Among the 43 patients, postoperative sexual function was evaluated in 40 because 3 were
considered too young for evaluation. All 40 patients responded to the FSDQ: 14 patients were married, 5
couples had already adopted one or more children and 16 were sexually active (11 Bangladeshi and 5
Italian). 92.5% reported sexual desire, 87.5% sexual arousal, 90% sexual confidence and 93.7% sexual
satisfaction. 87.5% patients reported frequent orgasms and 12.5% occasional orgasms. All patients reported
adequate lubrication and none reported dyspareunia. Calibration and irrigation were temporary, no woman
required pads for mucous production. Partner satisfaction was considered adequate by 93.7% of women.
The mean scores (SD) of the tests of psychosocial functioning were as follows: in BDI, 31.8 (4.7) in our
patients vs 31.9 (4.1) in control subjects; in RSES, 45.2(7.4) vs 45.6(9.0); and in CTML, 53.9(10.6) vs
54.6(8.0). The mean scores of test of psychosocial functioning did not differ statistically significantly
between patients and control subjects. No difference was noticed between the 2 populations (those from
Bangladesh and those from Parma).

**Conclusions:** Sigmoid vaginoplasty seems to be an excellent choice for management of vaginal agenesis
not only in a developing country but also in Italy based on outcomes scoring systems. This procedure
seems to ensure a good quality of general and sexual life.

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**Poster 23)**

**THE PROGRESSION OF RENAL INSUFFICIENCY IN CHILDREN WITH NEUROGENIC
BLADDER IS NOT ACCELERATED BY CONTINENT LOWER URINARY TRACT
RECONSTRUCTION.**

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Cincinnati, OH
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**Purpose:** Children with neurogenic bladder (NGB) and chronic renal insufficiency (CRI) may require continent urinary reconstruction due to hostile bladder dynamics not responsive to medical management. Our strategy has been to create a low pressure reservoir to stabilize the native kidneys and allow for subsequent renal transplantation. The purpose of this study is to evaluate the stability of renal function in these complex patients after reconstruction.

**Methods:** A retrospective cohort study was performed of all children presenting with CRI and NGB who underwent bladder augmentation at a single institution from 1990 to 2009. CRI was defined as Chronic Kidney Disease Stage II or higher. Patients with end stage renal disease (ESRD) who had staged reconstructions prior to planned renal transplantation were excluded. Patient demographics, etiology of bladder dysfunction, surgical details, and renal outcomes were abstracted from the medical record. As a surrogate for renal function, the inverse creatinine ($1/Cr$) was plotted versus time to determine the rate of progression of renal insufficiency.

**Results:** A total of 15 patients (6 male and 9 female) were identified. Etiology of neurogenic bladder included cloacal malformation (7), VATER syndrome (4), anorectal malformation (2), and posterior urethral valves (2). All but one patient had a baseline GFR less than 60. Enterocystoplasty was performed in 7 patients and gastrocystoplasty or gastric-composite neobladder in 8. Urinary undiversion at reconstruction was performed in 3 patients. The mean age at reconstruction was 9.2 years. The patients were followed for a mean duration of 4.2 years prior to surgery with a mean post-reconstruction follow-up of 5.1 years. All patients are on a strict clean intermittent catheterization schedule. Of the 15 patients, 9 exhibited stable renal function post-operatively (five patients had a mean increase of 0.4 mg/dL in serum creatinine while 4 patients had a decrease in creatinine). Five patients had gradual progression of renal failure that ultimately required renal replacement therapy at a mean of 7.3 years postoperatively. Another patient has had a stable rate of renal deterioration but has not yet reached ESRD 3 years postoperatively.

**Conclusions:** In our series, complex patients with the most severe bladder abnormalities who underwent continent urinary reconstruction did not have an acceleration in their progression of renal insufficiency. Careful, long-term follow-up is critical in these high risk patients.

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**Poster 24**

**INCIDENCE OF URINARY TRACT INFECTIONS FOLLOWING RENAL TRANSPLANTATION IN CHILDREN WITH BLADDER AUGMENTATION.**

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**Purpose:** In children with end stage renal disease and severe bladder dysfunction, augmentation cystoplasty prior to transplantation may be necessary. Recent reports suggest unacceptable febrile UTI rates in these immunosuppressed patients. We reviewed our experience in this complex population.

**Methods:** A retrospective cohort study was performed of all patients treated by a single surgeon with augmentation cystoplasty and subsequent renal transplantation from 1989 to 2007. This cohort was compared with a control group dependent on clean intermittent catheterization (CIC) who have undergone transplantation, but not augmentation. Patient demographics, renal failure etiology, surgical details, surgical/allograft outcomes, and UTI occurrence were abstracted from the medical record.

**Results:** Our augment group consisted of 17 patients (9 male, 8 female). Etiologies of renal failure were anorectal malformation (11), posterior urethral valves (4), and vesicoureteral reflux (2). Median age at reconstruction was 6.4 years. Fifteen patients had gastric augmentation or gastric composite neobladders while 2 had colocystoplasty. All perform CIC. Median time between reconstruction and transplantation was 1.3 years. Allograft source was living-related donor (LRD) in 12, deceased donor (DD) in 5. Median follow-up after transplantation was 7.7 years. The control group consisted of 17 patients (14 male, 3 female), who underwent transplantation at a median age of 10.9 years. Allograft source was LRD in 16,
DD in 1. Median follow-up after transplantation was 5.8 years. All transplant ureteral reimplantations were done in an anti-refluxing fashion. Almost all patients have been on antibiotic prophylaxis, including long-term gentamicin bladder irrigations (5 in the augment, 6 in the control). In the augment group, 5 patients (29%) had febrile UTI. A total of 35 UTI episodes (afebrile and febrile) have occurred. The number of documented UTI per patient-year of follow-up is 0.23. In the control group, 5 patients (29%) had febrile UTI. A total of 32 UTI episodes (afebrile and febrile) have occurred. The number of documented UTI per patient-year of follow-up is 0.28. No allograft has been lost due to infectious complications.

Conclusion: In our series, there is a relatively low rate of UTI in children with renal transplantation following augmentation cystoplasty. The use of gastric component augmentation, anti-refluxing reimplantation, and gentamicin bladder irrigation may account for this.

Poster 25
A PROSPECTIVE CLINICAL TRIAL CORRELATING APPEARANCE OF REFLUXING URETERAL ORIFICES BEFORE AND AFTER INJECTION THERAPY WITH RESOLUTION OF REFLUX.

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Purpose: Vesicoureteral reflux (VUR) is a common disorder in the pediatric population. Surgical treatment includes both open and endoscopic techniques. Open surgery has success rates near 95%, while single dextranomer-hyaluronic acid injection (DHA) success rates have varied from 65 to 90%. Prior studies have evaluated the general appearance of the subureteric mound and its correlation with post-op outcomes. Our objective is to evaluate the appearance of the ureteral orifices after DHA with visible findings and correlate these findings with post-operative outcomes. Our hypothesis is that visually assessable cues during surgery may predict success or failure of DHA injections.

Methods: A prospective, non-blinded, single center study was performed with IRB approval. Patients under 18 years of age that meet the criteria for surgical intervention for their VUR were considered for enrollment. Data collection included patient age, sex, confounding urologic diagnoses, voiding dysfunction, previous GU surgery, and grade of reflux as determined by most recent voiding cystogram. Outcome variables included pre-injection and post-injection “H grade” of each Ureteral Orifice, appearance of ureteral orifice after injection including mound position, coaptation and effacement of orifice, volume of DHA used, number of “sticks,” and results at follow-up cystogram.

Results: 34 patients agreed to participate in the study beginning January 2006. Of the 34 patients 57 ureters were treated at initial presentation. Post-operative VCUG showed 40 ureters without reflux, 17 ureters with continued reflux. Effacement of the orifice after injection was specific for success whereas post injection H-Grade = 0 was more sensitive for success. The combined findings of an effaced orifice with H-Grade=0 was highly predictive of success. Patients with Higher grades of reflux and Higher pre-treatment H-grades tended to fail more often. Increased amount of DHA used and increased number of “sticks” was inversely predictive to success. Case complexity and presence of voiding dysfunction had no bearing on success. Visual mound shape/position and coaptation of the ureteral orifice had no obvious bearing on success.

<table>
<thead>
<tr>
<th>H Grade=0</th>
<th>Effaced UO</th>
<th>H Grade=0 &amp; Effaced UO</th>
</tr>
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<tbody>
<tr>
<td>sens 100</td>
<td>68</td>
<td>67</td>
</tr>
<tr>
<td>spec 14</td>
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<td>90</td>
</tr>
<tr>
<td>PPV 78</td>
<td>94</td>
<td>96</td>
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<tr>
<td>NPV 100</td>
<td>41</td>
<td>43</td>
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</table>

Conclusions: Post-Injection effacement of the orifice with or without post-injection H-grade = 0 predicts success of DHA injection, whereas post-operative H-grade > 0 predicts failure. Higher pre-operative H-grade, reflux grade, number of “sticks,” and amount of DHA used were associated with DHA failure. Visible mound shape/position does not significantly affect post-op outcome.

Poster 26)
RELIABILITY AND VALIDITY OF ICIQ-CLUTS: THE FIRST SCREENING QUESTIONNAIRE FOR PEDIATRIC LOWER URINARY TRACT SYMPTOMS.

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Purpose: No validated instruments are to date available to screen lower urinary tract symptoms (LUTS) in children. We developed and tested for validity a screener tool (ICIQ-CLUTS) to detect LUTS in children.

Methods: A 12-items questionnaire had been designed in a children’s (ICIQ-CLUTS-C) and parents’ (ICIQ-CLUTS-P) version, and submitted to a standard cross-cultural adaptation process, simultaneously in English (UK), Italian and German languages. While items 1 and 2 asked for age and gender, specific items investigated: 3.urinary tract infection; 4.nocturnal incontinence; 5.daytime incontinence; 6.daytime frequency; 7.urgency; 8.voiding postponement; 9.straining; 10.urge incontinence; 11.incomplete emptying; 12.bowel movements. Questionnaires were administered, anonymously and blended, to children aged 5-18 yrs and their parents presenting for LUTS (case) or attending pediatric/urologic clinics for reasons different that LUTS (controls). A Case-Report Form comprehended history, urinalysis, bladder diary, flowmetry/PVR and a final clinician’s judgement. Acceptability (percentage of missing items), reliability (internal consistency: Cronbach Alpha Index ≥0.7) and correlations between children’s and parents answers (Spearman’s Rho) were evaluated. ICIQ-CLUTS-C and -P scores were matched to final clinician’s judgement (taken as gold standard) in order to produce sensitivity and specificity (CI: 5-10%; level of confidence 95%). ICIQ-CLUTS was also tested in 3 age groups: 5-9, 10-13, 14-18 yrs.

Results: A total of 345 questionnaires were completed. Final clinician’s judgement identified 147 children as LUTS+ and the remaining 198 as LUTS-. Percentage of missing items was low in ICIQ-CLUTS-C (average: 1.67%) and in ICIQ-CLUTS-P (average: 2.10%). Cronbach alpha was acceptable in all age group, except in the 5-9 yrs one (alpha<0.7). Degree of correlation between children’s and parents’ answers was high (>50%) for items investigating incontinence. Sensitivity and specificity were, respectively, 89% and 76% for ICIQ-CLUTS-C and 91% and 73.5% for ICIQ-CLUTS-P.

Conclusion: Data confirm ICIQ-CLUTS-C and -P as valid tools to screen LUTS in children. Problems related to literacy were found in younger children. Therefore, ICIQ-CLUTS-C is recommended only in children older than 9 years of age. ICIQ-CLUTS might be used to reconfigure prevalence of LUTS in children, which was previously evaluated without validated instruments.

Poster 27)
DELAYED COMPLETE REPAIR OF EXSTROPHY WITH TESTOSTERONE TREATMENT: A SAFE ALTERNATIVE TO AVOID GLANS COMPLICATIONS?

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Purpose: Complete primary repair of exstrophy (CPRE) represents a significant advancement in the surgical treatment of this condition. However, because of serious glans complications, it has not gained wide acceptance so far.

Methods: In the period ranging from June 2006 to December 2009 five male patients underwent CPRE for bladder exstrophy (BE) at our Institution. The first two patients were treated soon after stabilization while in the remaining three elective delayed CPRE (DCPRE) (two months of age) was undertaken. Patients undergoing DCPRE were discharged home after initial work up: bladder plate was taken care of at home by the family with daily applications of hydrophilic gel; testosterone course (four doses 100 mg per square meter body surface) was also given prior to scheduled surgery to enhance penile size and blood supply.
**Results:** No significant changes in bladder plate appearance were noted at the time of DCPRE. Biopsy confirmed absence of inflammatory changes. Penile size was significantly enhanced in all treated patients. Bodyweight at surgery ranged from 3900 to 4200 gr. All patients underwent bilateral anterior osteotomy with 1 month postoperatively spica cast constraint. Paralyzation was maintained 7 to 10 days postoperatively. Primary bladder closure with corporeal bodies extrinsecation was achieved in all patients; additional bladder neck surgery was performed in two patients. No complications related to glans blood supply were observed. Two patients at toilet training age exhibit dry intervals of 75 min or more. In the third one (9 month old), 4-hour observation demonstrates dry intervals with micturition episodes. Voiding cystourethrogram shows a bladder of adequate capacity for age.

**Conclusion:** CPRE is a complex procedure which requires a multidisciplinary approach; however, current management options of bladder plate enable to defer repair by the period of time necessary to enhance penile size and blood supply without damaging bladder plate; initial long term results seem encouraging in terms of continence even though a longer follow up is required.

**Poster 28)**

**THE DOUBLE HIT METHOD FOR THE ENDOSCOPIC CORRECTION OF VESICOURETERAL REFLUX: UPDATED RESULTS.**

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**Purpose:** Since 2001 the use of dextranomer/hyaluronic acid (Dx/HA) for the cystoscopic correction of VUR has gained popularity in the United States. In 2003 we reported our initial success rate (72%) with Dx/HA using the classic STING technique. This technique was later modified (referred to as the Hydrodistention Implantation Technique-HIT) which resulted in significantly higher success rates (89%). Herein we report the results of the last 345 patients, treated by 3 different surgeons using a further modification of this technique – the Double HIT method.

**Methods:** The charts of the last 345 consecutive patients who underwent Double HIT for the treatment of primary grade I to V VUR were reviewed. Patients with ureteral duplication, paraureteral diverticula, voiding dysfunction, or neurogenic bladder were excluded from this analysis. Voiding cystourethograms (VCUG) obtained 1-21 months (mean 3 mo) following treatment were used to determine success rates. Cure was defined as the radiographic absence of VUR (grade 0) after a single treatment. Postoperative renal and bladder sonograms were obtained at the time of the VCUG.

**Results:** The study group was comprised of 304 girls and 41 boys, mean age 4.2 years (range 1-17 years). 136 patients had unilateral VUR and 209 patients had bilateral VUR (554 ureters). 41 were grade I, 191 grade II, 218 grade III, 71 grade IV, and 8 grade V. Indications for surgery were persistent VUR (≥2 VCUGs) in 249 (72%) patients and primary treatment (1 VCUG) in 96 (38%) patients. Patient success was 89% but increased to 92% if grade I is defined as a cure. Ureteral success was 91% overall: 98% (40/41) with grade I, 92% (175/191) grade II, 90% (196/218) grade III, 94% (67/71) grade IV, and 63% (5/8) with grade V were cured by a single implantation. There was no significant difference in cure rate up to grade V. The average volume of Dx/HA injected was 1.3 ml, with higher grades of reflux and hydrodistention requiring higher volumes of injection (p<0.05). There was no difference in success between surgeons. However, for each individual surgeon there was a strong correlation between number of cases performed and success with Dx/HA (p<0.05). One bilateral obstruction and one pseudomonas febrile UTI occurred.

**Conclusion:** The Double HIT method, using two tandem intrareteral submucosal injections, results in better coaptation and elevation of the ureteral orifice and tunnel leading to reproducibly superior cure rates. This method has proved to be reliable and continues to be our technique of choice for the endoscopic management of VUR.

**Poster 29)**

**THE ROLE OF AMNIOTIC FLUID STEM CELLS IN ACUTE TUBULAR NECROSIS.**
**Purpose:** Acute Tubular Necrosis (ATN) causes severe damage to the epithelial tubular cells of kidney that can lead to End Stage Renal Disease. Stem cell based applications may provide alternative approaches to therapeutic options to ameliorate Acute Renal Failure. In this study, we show the successful therapeutic application of amniotic fluid stem cells (AFSC) in an *in vivo* mouse model with glycerol induced ATN.

**Methods:** AFSC were labeled with luciferase protein and cell surface marker (CM-Dil) prior to injection. ATN in mice was induced by intramuscular injection of 50% glycerol. Then, AFSC were directly injected into both kidneys of a mouse under isofluorane anesthesia. Post injection, cells were tracked by bioluminescence imaging. In addition, blood creatinine levels were monitored before and after the procedure. Animals were sacrificed at different time points and kidneys were processed for immunohistologic, PCR and cytokine analysis.

**Results:** Under bioluminescent detection the positive signal for AFSC in the area of the kidney was seen immediately after injection. The kidney signal was strongest at 48 hours and then gradually faded away over the next several days. However, 21 days after injection, the signal was evident, again in the area of the kidney. At the same time point, detection of kidney specific markers such as Nephrin, Aquaporin 1, Pax-2, and Tamm-Horsfall Protein were confirmed by PCR. Additionally, injected AFSC stained positive for kidney specific markers including Aquaporin2, Peanut Agglutinin and Dolichus Biflorus Agglutinin in some rare instances also GDNF. Animals subjected to damage induced with glycerol and simultaneously injected with AFSC, demonstrated no increase in levels of creatinine during the expected severe acute phase, as compared to controls. Furthermore, injected kidneys demonstrated elevated expression of anti-inflammatory cytokines, whereas the expression of pro-inflammatory cytokines was suppressed as compared to controls.

**Conclusion:** In conclusion, we have demonstrated for the first time that AFSC can integrate and differentiate *in vivo* into a kidney that underwent ATN. In addition, we have shown that early direct injection of AFSC into the kidney can ameliorate ATN injury as reflected by decreased creatinine levels. This may lead eventually to the possible application of AFSC for therapeutic purposes in kidney diseases.

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**Poster 30)**

**ARE ABDOMINAL RADIOGRAPHS A RELIABLE WAY TO ASSESS FOR CONSTIPATION?**

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**Purpose:** There is currently no validated, reliable tool available for the evaluation of constipation in children. Abdominal radiographs (AR) are often obtained in clinical practice to evaluate these patients. Although three previously published rating tools exist for scoring constipation based on AR, there is little information on the merit of any of them. We sought to assess these three tools for reliability between multiple practitioners.

**Method:** We retrospectively analyzed abdominal x-rays on a cohort of patients (*n*=40) between the ages of 4-12 years seen in the urology department at our institution in the last 5 years with a diagnosis of lower urinary tract dysfunction and a group of controls (*n*=40). Radiographs were independently assessed by each author (2 attending pediatric urologists, 1 pediatric radiologist, and 3 pediatric urology nurse practitioners) using 3 different previously published scoring tools (Barr, Leech and Blethyn). Scores were then analyzed for reliability using standard statistical methods.

**Results:** Weighted Kappa score and Interclass Correlation (ICC), both measures of reliability, were poor (< 0.4) for all 3 scoring tools for nearly all comparisons between raters. There was a trend toward better inter-rater reliability between the more experienced urology practitioners, and the only “good” scores (0.4 – 0.75) achieved were with the Barr and Blethyn tools. No tool had “Excellent” reliability (>0.75).
Conclusions: Currently available scoring tools for evaluating constipation by AR do not demonstrate good reliability among multiple examiners. Further research is needed to investigate whether focused mentoring by experienced practitioners or development of an alternate tool would increase the reliability of AR to assess constipation between multiple practitioners.

Poster 31)
DOES ABDOMINAL RADIOGRAPHY RELIABLY IDENTIFY CONSTIPATION IN PATIENTS WITH URINARY TRACT SYMPTOMS?
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Purpose: The association between lower urinary tract dysfunction and constipation is well known. History and exam may be inaccurate, however, and there is no accepted clinical tool to assess constipation. Abdominal radiographs (AR) are often obtained in clinical practice to evaluate these patients, but there is little information on the objective findings in relation to urinary tract symptoms. We sought to determine whether constipation based on available AR scoring tools differs significantly in children with and without urological symptoms.

Method: We retrospectively analyzed abdominal x-rays obtained on patients age 4-12 years with lower urinary tract dysfunction (n=40) and controls (AR for ingestion of a foreign object) (n=40). Patients with neurogenic bladder or recent abdominal surgery were excluded. Radiographs were assessed by multiple raters (2 attending pediatric urologists, 1 pediatric radiologist, and 3 pediatric urology nurse practitioners) using 3 different previously published scoring tools (Barr, Leech and Blethyn). Scores were then evaluated by standard statistical methods.

Results: A statistically significant difference was found by 67% of raters using the Barr score, 83% using the Leech score, and 50% using the Blethyn score. Two raters found a statistically significant difference using all three scores. Evidence of constipation by AR was present significantly more often in patients with lower urinary tract dysfunction than in controls.

Conclusions: Our data indicate an objective relationship between constipation/stool retention determined by AR and presence of lower urinary tract symptoms. Further research is needed to establish the most predictive and reliable tool, to isolate which factors on abdominal x-rays correlate most highly with lower urinary tract dysfunction, and to assess outcomes of treatment based on AR findings.

Poster 32)
COMPUTER ENHANCED VISUAL LEARNING (CEVL) METHOD TO TRAIN UROLOGY RESIDENTS IN PEDIATRIC ORCHIOPEXY PROVIDES CONSISTENT LEARNING EXPERIENCE IN A MULTI-INSTITUTIONAL CLINICAL TRIAL.
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Purpose: Computer enhanced visual learning (CEVL) is a new method to train residents to do surgery by giving them access to a personalized surgical feedback archive using internet. At the parent institution (Chicago) we have already shown CEVL is effective to train orchiopexy. In an effort to assess if this new idea is generalizable to other residency programs we performed a prospective multi-institutional clinical trial.

Methods: We prospectively compared ratings of resident skills to do pediatric orchiopexy using CEVL at four new institutions (study group) vs. those at the parent institution (control group). Specifically, all Urology residents and attendings accessed the CEVL curriculum which is comprised of customized computer visuals that detail 11 surgical steps and skills. After each case is done, the attending rates resident
performance of each skill (Likert scale as 1-5) and provides feedback which the resident will remediate at the next case. The CEVL score is calculated for each case done as sum of the ratings * case difficulty (assessed as 1-5). The CEVL scores for 1st and last case done were compared between study vs. control group by resident and institution.

**Results:** The study group included: 6 attendings, 29 residents, 63 orchiopexies, and the control group included: 8 attendings, 16 residents, 81 orchiopexies. Between the study vs. control groups there were no significant differences between: average postgraduate resident year (3 vs. 3), number of cases/resident (5.1 vs. 2.2), mean rating of case difficulty (3.2 vs. 3.0), frequency residents viewed CEVL preop (57% vs. 75%), or attending provision of feedback (95% vs. 99%)( p NS for all). Similarly, of the residents who did more than one case, there was no significant difference in the percentage of residents who showed an improved CEVL score between the study vs. control groups (86% vs. 79%) or in the magnitude of average improvement residents showed (10.3 vs. 5.6) (p NS for all).

**Conclusions:** As this clinical trial shows that the institution groups did not differ in training resident skills using CEVL for pediatric orchiopexy, we conclude CEVL use provides a consistent learning experience and so is generalizable across institutions. We believe this tool will change the practice of how training programs educate residents by enhancing learning through use of a checklist approach and a computer platform to archive feedback and remediation skills.

**Poster 33)**

**IS THE CECAL/COLONIC FLAP INFERIOR TO THE APPENDIX OR THE MONTI RECONFIGURED ILEUM FOR THE CONSTRUCTION OF MACE CONDUIT?**

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**Purpose:** Cecal/colic flap (CCF) has been suggested as an alternative to the appendix or Monti reconfigured ileum (MRI) for the Malone antegrade continence enema (MACE) procedure in children. The literature regarding its efficiency is scant. Therefore, we analyzed our results comparing these 3 alternative techniques, regarding complications such as stomal incontinence, and stenosis/obstruction.

**Methods:** Medical charts were reviewed retrospectively. All patients who underwent MACE procedures at our institution were included in this study. The study was approved by the hospital internal review board.

**Results:** Eighteen children and adolescents with fecal incontinence (12 males, 6 females, mean age 12.8 years) underwent the MACE procedure between 1999 and 2007. Diagnoses included myelodysplasia (9 patients), anorectal malformations (6), sacral agenesis (2), and pelvic trauma (1). The MACE conduits were constructed using the appendix in 6 patients, MRI in 8, and CCF in 4. Indications for CCF were appendicovesicostomy and prior appendectomy (2 patients each). We used the technique published by Hanna for CCF construction. Of the patients, 17 underwent concomitant lower urinary tract reconstruction including Mitrofanoff urinary diversion in 16. One patient with an appendix-MACE underwent dilation of a stenosed stoma. In two of the patients with MRI revision was necessary for obstruction/stenosis. All the other patients who underwent the MACE procedure using these 2 techniques were fecal continent. No appendix or MRI conduits have leaked. All 4 patients with CCF conduits had stomal fecal incontinence 6 to 24 months following surgery. The umbilical stoma - CCF also required dilation for stenosis. Attempts to cure incontinence by submucosal injection of dextronomer/hyaluronic acid at the conduit-colon junction failed in 2 patients. Two CCF conduits were successfully replaced by MRI, 1 was replaced by a button cecostomy, and 1 is awaiting reconstruction.

**Conclusion:** Initial results reveal that in our hands, CCF has failed as an efficient conduit for the MACE procedure because of a 100% rate of stomal incontinence. Though, not statistically significant, we believe that it is inferior to the appendix or the MRI as a means for MACE conduit construction. We, therefore,
abandoned this procedure, and currently recommend on the use of either the appendix or MRI for the MACE procedure.

Poster 34)  
BUCCAL MUCOSA ONLAY GRAFT IN HYPOSPADIAS REPAIR – LONG-TERM RESULTS.  
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Purpose: Buccal mucosa onlay grafts are widely used in complex hypospadias surgery. In a retrospective study we evaluated the long-term complication rates, cosmetic and functional results in patients with a minimum follow-up of 5 years.  

Methods: All patients in whom a buccal mucosa graft had been used in our institution for hypospadias repair received a questionnaire and were invited for a follow-up visit at our department. The questionnaire included two visual analogue scales (VAS) (0-100) concerning the functional and cosmetic result (0 = very dissatisfied; 50 = satisfied; 100 = very satisfied).  

Results: A total of 85 patients with a median age at the operation of 7.4 years (1 – 60 years) could be followed for a median of 8 years (5-16 years). In 36/85 the buccal mucosa had been used in a redo-operation. For functional results, the median VAS score was 86 and for the cosmetic results, the median VAS score was 69.5. The median IPSS (international prostate symptom score) was 2; seven patients reported moderate symptoms and one had a IPSS of 25. 22 patients (26%) developed 24 complications: fistula (5), meatal stenosis (7), wound dehiscence (6), urethral stricture (3) (two strictures after 8 and 9 years were treated by optical urethrotomy) and one granuloma. 19 patients required re-operation, 3 patients were treated conservatively (2 with fistula and one with wound dehiscence).  

Conclusion: After a median follow-up of 8 years, the overall complication rate is acceptable and confirms the durability of buccal mucosa in the long run. A proximal urethral stricture was the most common late complication. To improve our cosmetic results, we perform reconstruction of the glans with positioning of the meatus into the ventral glans since the last 5 years.

Poster 35)  
MEDELA QUICK CLEAN MICRO-STEAM BAGS: A NOVEL METHOD FOR MICROWAVE SANITIZATION OF URINARY CATHETERS FOR REUSE.  
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Purpose: Clean intermittent catheterization for neurogenic bladder typically utilizes individually packaged sterile polyvinylchloride catheters which may be used and reused. Many methods of sanitizing catheters have been tried without consensus or efficacy study. Antibacterial soap alone or in combination with microwave heating has been advocated to reduce pathogens and bacterial residue. Storage conditions both during and after use of the microwave may impact sanitization. A recently commercially available product for sanitizing breast/bottle feeding equipment may be useful. This study assesses the efficacy of the Medela Quick Clean Micro-Steam Bags (MSB) for catheter sanitizing and storage for reuse.  

Materials and Methods: 27 Catheters were inoculated with a 24-hour broth culture of E.coli and placed directly into MSB; 27 were washed with antibacterial soap and placed into MSB. Negative controls included 27 catheters removed from sterile packaging and directly placed into storage containers, 27 sanitized in the MSB, and 27 washed then sanitized in MSB. All were then stored for one or three days in sealable plastic containers, plastic bags or paper towels. Each condition was assessed in triplicate via culturing of the entire catheter contents in tryptic soy broth.  

Results: On day 1, negative controls had growth in 37% (10/27) cultures (Staph). Unwashed inoculated catheters treated with MSB sanitization failed to sanitize 66% (6/9) catheters on day 1 [3/9 positive for E.coli, 3/9 positive for Staph], and 44% (4/9) stored for 3 days [2/9 positive for E.coli, 2/9 positive for Staph]. For combined antibacterial wash with MSB, 44% (4/9) on Day 1 [2/9 positive for E.coli; 2/9 positive for Staph], and 22% (2/9) on Day 3 [1/9 positive for E.coli, 1/9 positive for Staph], showed growth. Positive (untreated) controls evidenced viable organisms throughout the test period.
Conclusions: Overall, 18.5% (5/27) catheters inoculated with *E. coli*, then sanitized in MSB grew *E. coli* as opposed to 11% (3/27) for combined antibacterial soap-MSB treatment. We conclude that MSB can be a good sanitization method for clean catheters.

Poster 36)
EXPERIENCE WITH POST-OPERATIVE TELEPHONE FOLLOW UP IN PEDIATRIC UROLOGIC SURGERY.
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Purpose: To evaluate the feasibility and safety of a telephone call follow up protocol as an alternative to the conventional post operative visit for select outpatient pediatric urologic procedures.

Methods: Procedures qualifying for telephone follow up include routine hernia/hydrocoele repair, orchidopexies, circumcisions and metatotomy. At the time of scheduling, the parents are given the option of a post operative clinic visit or telephone call follow up. An experienced pediatric urologic nurse specialist (CLK) calls the parent and fills a post operative follow up form (see below) which becomes a permanent part of the patient's medical record.

Results: A total of 57 patients voluntarily entered this pilot study. There were 40 circumcisions, 5 groin procedures and the remainder miscellaneous minor procedures. 3 patients returned for a post operative clinic visit for concerns raised as a result of the telephone follow up call. There were a total of 7 unscheduled ED evaluations, all occurring during the first 3 days post operatively. 50 patients were successfully contacted and 7 were lost to follow up and did not return calls or respond to a letter. None of the parents have expressed dissatisfaction with this approach.

Conclusion: Post operative telephone follow-up using a structured protocol is safe and may be a preferred alternative to families. This experience has prompted us to embark on a prospective randomized clinical study to more formally evaluate protocol based telephone call follow up for select pediatric urologic procedures.

ABBREVIATED POST-OPERATIVE TELEPHONE FOLLOW UP FORM
Surgical Procedure:
Name of Contact/relatiton/Tel ______________________ _
1st Call________________ 2nd Call_______________ Lette________________
How is patient doing (overall)? □ Great (back to normal) □ Good □ Fair □ Poor
Diet: □ Normal □ Abnormal
Bowel/Bladder: □ Normal □ Abnormal
Incision: □ yes □ no □ Normal □ Abnormal
Swelling? □ yes □ no □ Normal □ Abnormal
Pain Meds? □ None □ Acetaminophen □ Ibuprofen □ Other
Activity? □ Normal □ Sluggish □ Problems:
Follow-up? □ Everything is fine – no further follow-up needed
□ Everything is fine but would like to schedule appointment
□ Has questions/concerns – would like to schedule appointment

Poster 37)
PERIOPERATIVE TESTOSTERONE THERAPY FOR FOWLER-STEPHENS ORCHIDOPEXY.
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**Purpose:** Treatment of the intra-abdominal testis may require a Fowler-Stephens orchidopexy (FSO). Survival of the testis after FSO relies on collateral blood supply from the vasal artery, however testicular atrophy after FSO has been reported in up to 20% of cases. Testosterone is known to increase vascularity in androgen-responsive tissues. We sought to determine whether administration of exogenous testosterone before and/or after testicular artery ligation would improve testis survival and whether testosterone had any deleterious effects on the testis.

**Methods:** Male Sprague Dawley rats (age 20 days) were randomized to 4 treatment groups of 3 animals each: Group 1 did not receive testosterone; Group 2 received testosterone 20 days prior to testicular artery ligation; Group 3 received testosterone immediately after artery ligation; and Group 4 received testosterone both 20 days prior to- and immediately after ligation. A 5th group of 3 animals served as age-matched controls. In treated animals, 2 mg/kg intraperitoneal dose of testosterone enanthate was administered. All animals underwent unilateral ligation of the testicular artery under anesthesia, followed by sacrifice and procurement of both testes 20 days later. Testicular tissue was processed for immuno- and histopathologic analysis.

**Results:** In the absence of testosterone administration, ligated testes appeared grossly atrophic and uniformly underwent infarction with resultant necrosis and calcification. In contrast, 6/9 (67%) ligated testes in animals receiving exogenous testosterone, at any time point, appeared grossly normal in size and demonstrated preserved testicular viability and architecture. Compared to controls, testosterone administration appeared to increase levels of cellular proliferation and number of primary spermatogonia. Furthermore, the vasal artery in the testosterone treated groups was visibly dilated on gross examination. While a marked difference was noted between animals who received testosterone and those that did not, no discernible difference between each of the testosterone treatment groups was appreciated. Exam of the contra-lateral, unligated testis in each of the treated animals revealed normal-appearing testes grossly and microscopically.

**Conclusion:** Based on the results of these preliminary studies, we are encouraged by the fact that administration of exogenous testosterone appears to have a positive impact on testicular survival following FSO. Currently, we are expanding our treatment groups to attain statistical power and confirm our preliminary results.

**Poster 38)**

**RISK FACTORS ASSOCIATED WITH RENAL FAILURE IN POSTERIOR URETHRAL VALVE PATIENTS WITH PRESENTATIONS OTHER THAN ANTENATAL HYDRONEPHROSIS.**

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**Purpose:** Obstructive uropathy remains a common etiology of chronic kidney disease in the pediatric population. Posterior urethral valves (PUV) represent a spectrum of infravesical obstruction and can have varied presentations. Conflicting studies have reported late presentation as either favorable or ominous in regards to long term renal outcome. The purpose of our study was to identify risk factors associated with chronic renal failure in patients who did not present with antenatal hydronephrosis.

**Methods:** We performed a retrospective review of all children with PUV at our institution from 1977 to 2007 and selected those patients with posterior urethral valves confirmed on endoscopy. Patients with mini posterior urethral valves were excluded. We recorded age at time of initial procedure (valve ablation or vesicostomy), presenting symptoms, presence of preoperative hydronephrosis and presence of preoperative vesicoureteral reflux for all patients who did not present with antenatal hydronephrosis. We used Cox proportional hazards analysis to identify risk factors associated with poor renal outcome defined as GFR < 60 mL/ min/1.73m², need for dialysis or need for renal transplant.

**Results:** Of the 184 patients with posterior urethral valves confirmed at endoscopy, 141 patients had presentations other than antenatal hydronephrosis and /or oligohydramnios. Average age at presentation was 55 months (range: 0.3 to 174 months). Presenting symptoms were urinary tract infection in 62 (44%), voiding dysfunction in 48 (34%), hematuria in 10 (7%), renal failure in 10 (7%), and other / unknown in 11
Preoperative hydronephrosis was seen in 79 (56%) and reflux in 36 (26%). Twelve patients (9%) developed chronic kidney disease. Average follow-up was 2.3 years (range: 0 to 24 years). By Cox regression analysis we found that urinary tract infection as a presenting symptom was associated with a lower likelihood of chronic kidney disease (HR: 0.17±0.13; p=0.03) and that preoperative reflux was associated with a greater likelihood of chronic kidney disease (HR: 4.2 ± 3.0; p=0.04). Other variables were not significant protective or deleterious predictors.

**Conclusion:** In PUV patients who present with symptoms other than antenatal hydronephrosis, presenting symptom and reflux may be more prognostic for renal outcome than strictly age alone.

**Poster 39)**

**PRIMARY VALVE ABLATION VS. CUTANEOUS VESICOSTOMY IN PRETERM INFANTS WITH POSTERIOR URETHRAL VALVES.**

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_John C. Thomas, MD, Pediatric Urology, Monroe Carell Children's Hospital, Vanderbilt University, Nashville, TN_  
_John C. Pope IV, MD, Pediatric Urology, Monroe Carell Children's Hospital, Vanderbilt University, Nashville, TN_  
_Mark C. Adams, MD, Pediatric Urology, Monroe Carell Children's Hospital, Vanderbilt University, Nashville, TN_  
_John W. Brock III, MD, Pediatric Urology, Monroe Carell Children's Hospital, Vanderbilt University, Nashville, TN_  

**Purpose:** In the preterm infant with posterior urethral valves (PUV), the urethra is often too small to allow primary valve ablation. Because the preterm infant often requires extended hospitalization, primary valve ablation can often be deferred until the infant is larger and ready for discharge. The purpose of our study was to compare primary valve ablation to cutaneous vesicostomy in preterm infants and its effect on need for additional procedures and eventual bladder function.

**Methods:** We performed a retrospective review of infants born at <37 weeks gestation who underwent primary valve ablation or cutaneous vesicostomy for PUV at our institution from 1990 to 2008 prior to discharge home post partum. We recorded birth date, gestational age at birth, birth weight, age at time of initial procedure (primary valve ablation or vesicostomy), additional urinary tract procedures performed during follow up and most recent continence status.

**Results:** Of the 20 preterm infants diagnosed with PUV, 7 underwent cutaneous vesicostomy and 13 underwent primary valve ablation. Characteristics for each group are summarized in the table below. Additional procedures of interest included need for vesicostomy after primary valve ablation and need for repeat valve ablation. Bladder dysfunction was defined as present in patients who had daytime urinary incontinence if >3 years old at last follow-up or had undergone bladder augmentation. P values are given for Wilcoxon-Mann-Whitney test for continuous variables and Fisher's exact test for categorical variables.

<table>
<thead>
<tr>
<th></th>
<th>Primary valve ablation</th>
<th>Cutaneous vesicostomy</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median gestational age at birth (weeks)</td>
<td>34.0 [range: 29.9-36.9]</td>
<td>32.0 [range: 26.0-36.0]</td>
<td>0.23</td>
</tr>
<tr>
<td>Median birth weight (g)</td>
<td>2483 [range:1800-4170]</td>
<td>1958 [range: 990-2187]</td>
<td>0.16</td>
</tr>
<tr>
<td>Median age at procedure (days)</td>
<td>7 [range: 2-63]</td>
<td>2 [range: 1-29]</td>
<td>0.13</td>
</tr>
<tr>
<td>Additional procedures</td>
<td>Vescistomy: 1/13</td>
<td>Delayed valve ablation:7/7</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Repeat valve ablation</td>
<td>3/13</td>
<td>0/7</td>
<td>0.52</td>
</tr>
<tr>
<td>Bladder dysfunction</td>
<td>3/6</td>
<td>2/6</td>
<td>0.41</td>
</tr>
</tbody>
</table>

**Conclusion:** Preterm infants with PUV can often undergo primary valve ablation instead of cutaneous vesicostomy prior to discharge especially in infants requiring prolonged post partum hospitalizations. Although vesicostomy did not increase the risk of eventual bladder dysfunction, primary valve ablation does avoid a mandatory return visit to the operating room for delayed ablation and vesicostomy closure without a significant increase in need for repeat valve ablation.

**Poster 40)**

**ROLE OF EGR-1 INFLAMMATION-INDUCED BLADDER FIBROSIS FOLLOWING OBSTRUCTION.**
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**Purpose:** Inflammation has been implicated in every major disease of the bladder including interstitial cystitis, infection and fibrosis. Several lines of evidence indicate that EGR-1 (Early growth response factor-1) is an important regulator of inflammation. EGR-1 response elements are present in the promoters of several proinflammatory genes. In this study, we test the hypothesis that EGR-1 is involved in the inflammatory response induced by obstruction, ultimately leading to bladder fibrosis.

**Methods:** To determine the role of EGR-1 in inflammation, we have treated wild-type (WT) and EGR-1 knockout (KO) mice with cyclophosphamide (200 mg/Kg body weight), a known inducer of bladder inflammation. Bladder tissue was harvested after cyclophosphamide treatment, and analyzed immunohistopathologically to confirm presence of inflammatory cells. To investigate the functional role of EGR-1 in bladder inflammation induced by partial bladder outlet obstruction (pBOO), we surgically induced pBOO in 5 week old WT and EGR-1 KO mice. After 4 weeks, bladder tissue was harvested and immunohistochemical localization of α-SMA, vimentin, trichrome and F/480 were performed.

**Results:** In comparison to WT mice, EGR-1 KO mice demonstrated significantly reduced numbers of infiltrating inflammatory cells in response to cyclophosphamide treatment. After pBOO, EGR-1 KO mice showed decreased collagen deposition and smooth muscle hypertrophy compared to obstructed WT mice. Furthermore, EGR-1 KO mice demonstrated decreased α-SMA staining after pBOO when compared to WT mice.

**Conclusions:** In EGR-1 KO mice, pBOO resulted in decreased smooth muscle hypertrophy and extracellular matrix deposition in the lamina propria. Blockade of EGR-1 may play a role in the treatment of bladder inflammation and resultant fibrosis.

Poster 41)

**PREDICTORS OF SURGERY FOR VESICOURETERAL REFLEX: A STUDY OF 3858 CHILDREN.**

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Andres D. Silva, Urology, Children's Hospital Boston, Boston, MA
Alan B. Retik, Department of Urology, Children's Hospital Boston, Boston, MA
Hiep T. Nguyen, Urology, Children's Hospital Boston, Boston, MA

**Purpose:** Choosing medical or surgical management for vesicoureteral reflux (VUR) often depends on the parents' and surgeon’s preference. While statistical models predicting spontaneous resolution of VUR exist, no methods of establishing the likelihood of corrective surgery have been published. Our goals were to analyze practice patterns at a major pediatric centre, to recognize differences between children operated for distinct indications and to develop a parental counseling tool.

**Methods:** We analyzed a prospective cohort of 3858 children who presented with primary VUR between 1996 and 2006. We categorized surgical indications into 3 groups: 1) breakthrough urinary tract infection (UTI), 2) non-resolution over 3 years and 3) parent/surgeon preference. Logistic regression was used to model the probability of surgery. We used deviation coding to determine practice variation among surgeons.

**Results:** Surgical intervention was associated with higher age at presentation (OR 1.17, 95% CI 1.04-1.31, p=0.009), being followed for antenatal hydronephrosis (ANH) (OR 1.95, 95% CI 1.44-2.66, p=0.0001), bilateral VUR (OR 1.18, 95% CI 1.01-1.37, p=0.03) and high grade (grade 1: OR 0.33, 95% CI 0.21-0.52, grade 2: reference, grade 3: OR 2.04, 95% CI 1.69-2.46, 4: 6.76, 95% CI 5.28-8.66, 5: 9.26, 95% CI 6.75-12.7, all p<0.0001). Female gender (p=0.54) was not a statistically significant predictor of surgery. There was
evidence of practice heterogeneity among the 10 surgeons. Girls were more likely than boys to be operated
for breakthrough UTI and less likely for parent/surgeon preference. Children followed for ANH were more
often operated for preference and those with bilateral VUR for non-resolution. Higher age at presentation
and higher grade were associated with undergoing surgery for all 3 indications. Surgical propensity scores
were calculated for possible clinical variable combinations.

**Conclusion:** Higher age at presentation, being followed for ANH, bilaterality and high grade were
independent predictors of surgery. As predictors vary with indication, distinct populations may be operated
for particular reasons. Surgical propensity scores will be a helpful counseling tool.

**Poster 42)**

**IS REIMPLANTATION OF URETERS NECESSARY IN THE TREATMENT OF HIGH GRADE
VESICOURETERAL REFLUX IN COMPLETE URETERAL Duplication?**

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Hunziker, Pediatric Surgery, National Children's Hospital, Dublin 24, Ireland Prem Puri, The Children's
Research Centre, Our Lady's Hospital for Sick Children, Dublin 12, Ireland**

**Purpose:** Vesico-ureteral reflux (VUR) is the commonest urological abnormality seen in children
presenting with urinary tract infection (UTI). Endoscopic treatment has become an established alternative
to long term antibiotic prophylaxis and reimplantation of ureters in the management of VUR. It is well
recognised that spontaneous resolution of high grade VUR in complete duplex systems is unlikely and
therefore considered as an indication for surgical correction. The aim of this study was to evaluate the
effectiveness of endoscopic treatment of high grade VUR in complete duplex renal systems using
Dextranomer/Hyaluronic acid copolymer (Dx/HA).

**Methods:** Between 2001 and 2008, 96 consecutive children with high grade VUR into complete duplex
systems, who underwent endoscopic treatment of reflux using DX/HA were evaluated. There were 22
males and 74 females with a median age of 3 years (range 4 months to 12 years). VUR was diagnosed by
Voiding cystourethrography. Patients with ureteroceles were excluded from this study. DMSA scan was
performed to evaluate the renal scarring and classified into three groups: mild scarring-focal defects with
relative uptake greater than 40%, moderate scarring-uptake between 20% and 40% and severe scarring-
shrunken kidney with relative uptake less than 20%. The children were followed up clinically as well as
radiologically and the median follow up was of 3.5 years (range 6months to 7 years).

**Results:** The duplex system was unilateral in 86 and bilateral in 10, resulting in 106 refluxing ureters. The
reflux was into the lower moiety in 64, upper moiety in 6, both upper and lower moieties in 36. The reflux
was grade II in 2, grade III in 45, grade IV in 43 and grade V in 16 ureters. Two ureters with grade II VUR
had higher grade of VUR on the contralateral side. DMSA scan showed scarring in 42 (39.6%) renal units,
mild in 20, moderate in 18 and severe in 4. There was complete resolution of reflux in 75 (70.8%) ureters
after one injection. In 5 (4.7%) ureters VUR was downgraded to grade I and these cases received no further
treatment. Twenty two (20.8%) ureters required two injections and 4 (3.7%) required a third injection for
the correction of VUR. Six (6.3%) patients presented with symptomatic UTIs during the follow up period.
No children in this series needed reimplantation of ureters. Follow up renal and bladder ultrasound did not
reveal any evidence of delayed ureteral obstruction.

**Conclusions:** Resolution of high grade VUR in complete duplex system occurs in over 95% of ureters after
two endoscopic injection of DX/HA which is comparable to the success rates reported after open ureteral
reimplantation. We recommend endoscopic injection of Dx/HA as the first line of treatment in the
management of high grade VUR in complete duplex systems.

**Poster 43)**

**LAPAROSCOPIC-ASSISTED SURGICAL RECONSTRUCTION OF A RARE CONGENITAL
ABDOMINAL WALL DEFECT IN TWO CHILDREN MISDIAGNOSED WITH PRUNE-BELLY
SYNDROME.**

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Center, Valhalla, NY Israel Franco, MD, FAAP, Section of Pediatric Urology, New York Medical College,
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**Purpose:** We describe a rare congenital abdominal wall defect that has been commonly confused with
prune-belly syndrome and a novel laparoscopic-assisted technique to repair this defect. Abdominal wall
laxity is typically associated with Prune-belly Syndrome (PBS). This syndrome has been classically described as an anterior abdominal wall laxity with muscular deficiencies of the rectus muscles with an ensuing coexistence of undescended testicles and genitourinary tract anomalies. Pseudoprune-belly syndrome has been described as an incomplete form of prune-belly syndrome where the patients typically have the prune-belly urinary tract anomalies without the coexistence of abdominal wall or testicular abnormalities. Incomplete forms of prune-belly syndrome have been rarely reported with only the abdominal wall defect as the only abnormality. Herein we describe two children referred to the senior author with bilateral abdominal wall laxity. Both patients were diagnosed with congenital, bilateral abdominal wall defects from birth and labeled erroneously as having an incomplete form of prune-belly syndrome.

Methods: Two boys with symmetrical, bilateral absence or hypoplasia of the internal and external oblique muscles and no genitourinary abnormalities underwent a laparoscopic-assisted abdominal wall reconstruction utilizing the technique previously described by Firlit. Each patient had a Ct scan which confirmed the absence of the obliques. In one patient EMG data confirmed no electrical activity of the obliques. Radiologic evaluation of the urinary tracts revealed no abnormalities. The abdominal wall was plicated utilizing bilateral subcostal incisions.

Results: Both patients had excellent cosmetic and functional results with no weakness or bulging of the lateral abdominal wall and improvement of associated symptoms.

Conclusions: We believe these two cases and their congenital abdominal wall defects are a rare and often misdiagnosed muscular deficiency separate from prune-belly syndrome. This novel laparoscopic-assisted surgical reconstruction described is feasible and highly successful for these and possibly other congenital abdominal wall defects in the future.

Poster 44)
IMPACT OF CROSSING VESSELS ON LAPAROSCOPIC PYELOPLASTY IN CHILDREN.
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Purpose: In the absence of a reliable test to confirm the absence of intrinsic fibrosis, the standard approach to UPJ obstruction with a crossing vessel has been dismembered pyeloplasty with anterior transposition of UPJ. In view of technical difficulties in laparoscopic pyeloplasty in children, new trend has been proposed to do vascular hitch without dismembering. We assess whether the presence of crossing vessel would have an impact on the feasibility and the outcome of laparoscopic dismembered pyeloplasty in children.

Methods: Crossing vessel with severe hydronephrosis was encountered during laparoscopic pyeloplasty for UPJO in 18 patients with mean age 111 months (20-176) (Group I). Another age matched group of 18 patients with mean age 93 ms (19-192) to whom retroperitoneal laparoscopic pyeloplasty, with no intraoperative evidence of crossing vessels, was enrolled in the study (Group II). We retrospectively compared the operative time, intraoperative complication, hospital stay and postoperative complications on followup.

Results: Retroperitoneal approach was used in all cases except in 2 patients in group I who had transperitoneal approach. In group I, dismembered pyeloplasty with anterior transposition of UPJ was performed in 16 patients while uretero-ureteral anastomosis in one patient and only dissection of UPJ in the other one. In group II, dismembered pyeloplasty was performed in all patients. No intraoperative complications were documented in both groups. Mean operative time was comparable in both groups (219 min, range 125-315, in group I Vs 198 min, range 140-310, in group II). Mean hospital stay was also comparable in both groups (2.72 days, range1-5, Vs 2.38, range 1-5). One patient in group I had increased dilatation that needed redo pyeloplasty. Mean followup was 23 months (9-36) and 18 (6-38) in group I and group II respectively.

Conclusion: Retroperitoneal approach was used in all cases except in 2 patients in group I who had transperitoneal approach. In group I, dismembered pyeloplasty with anterior transposition of UPJ was performed in 16 patients while uretero-ureteral anastomosis in one patient and only dissection of UPJ in the other one. In group II, dismembered pyeloplasty was performed in all patients. No intraoperative
complications were documented in both groups. Mean operative time was comparable in both groups (219 min, range 125-315, in group I vs 198 min, range 140-310, in group II). Mean hospital stay was also comparable in both groups (2.72 days, range 1-5, vs 2.38, range 1-5). One patient in group I had increased dilatation that needed redo pyeloplasty. Mean followup was 23 months (9-36) and 18 (6-38) in group I and group II respectively.

**Poster 45) TRANSLOCATION RENAL CELL CARCINOMA: AN EVOLVING ENTITY IN PEDIATRIC UROLOGIC ONCOLOGY.**
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**Purpose:** Translocation renal cell carcinoma (tRCC) is an RCC subtype with chromosomal translocations involving the Xp11 locus breakpoint. This RCC subtype accounts for a significant number of pediatric RCC cases, but numbers are limited to case reports and small series to date.

**Methods:** A retrospective review of our institutional surgical pathology archive was performed identifying all pediatric patients with the diagnosis of RCC over the past 2 years. These cases were evaluated for the TFE-3 and TFE-B translocation products by immunohistochemical staining. We identified 3 cases of tRCC and report their immunohistochemical and clinical features.

**Results:** Of the 3 patients with tRCC, 2 had radical nephrectomy and 1 had a partial nephrectomy due to prior contralateral nephrectomy for Wilms tumor. The mean age at diagnosis was 12 years (range 8-17) and the mean tumor size was 2.5cm (range 0.8-21.5). All 3 patients had TFE-3 positive, TFE-B negative tRCC. Two patients are now disease free. The third had residual tumor at the time of resection, and now has distant metastases, one year following resection. Recent studies have shown an association of tRCC with prior chemotherapy for childhood malignancies. In our series, two of the patients had prior chemotherapy; the youngest had multi-drug chemotherapy for treatment of an anaplastic Wilms tumor. The second oldest patient was found to have the largest tumor burden and progressed to widespread metastatic disease within a year of surgery. This case with more advanced disease also had immunohistochemistry profile positive for HMB-45 and Melan A.

**Conclusion:** Diagnosis of tRCC as a subtype of RCC is likely underrepresented, even in pediatric series. To truly assess the prevalence of tRCC and to further elucidate the outcomes compared to other RCC subtypes, prospectively testing for tRCC with immunohistochemical staining is essential in all RCC specimens in the pediatric and young adult population and in those patients with a history of prior chemotherapy. Close monitoring for disease recurrence and progression is vital in the care of tRCC until the natural history is better understood.

**Poster 46) THE UTILITY OF SCROTAL ULTRASOUND WAVEFORMS IN PREDICTING TESTICULAR TORSION: DO WAVE FORMS MATTER?**
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**Purpose:** Color Doppler ultrasound is capable of documenting the presence or absence of central biphasic blood flow lending itself to the diagnostic work up of the acute scrotum. Additional information may be gleaned by interpreting spectral waveform; i.e., systolic and diastolic flow velocities. The purpose of this study was to determine the utility of spectral waveform parameters in the diagnosis of testicular torsion and to determine if the evaluation of these waveforms confers any additional benefit over central blood flow documentation.

**Methods:** We performed a retrospective cohort study of patients undergoing testicular ultrasonography in 2008 for the complaints of testicular pain at our institution. The ultrasound images were reviewed for the testicular position, parenchymal echotexture, discrepancy in size, presence of central and peripheral flow,
and spectral waveforms for testicles with documented central flow. Peak systolic and end diastolic velocities were obtained from spectral waveforms. The diagnosis of torsion was confirmed pathologically by the demonstration of at least 360 degrees of torsion. Independent t-tests were used to estimate relationship with torsion. Inter-relationship of different variables was then elicited using multivariate linear regression analysis and partial correlation tests using SPSS software (p<0.05).

**Results:** Of the 386 ultrasound scans performed, mean age 11.7 years (1 mo-20.4 years), 24 (6.2%) were interpreted and later confirmed as torsion. The remaining scans were either normal or demonstrated other non-torsion pathology (such as inflammation and varicoceles). While univariate analysis found that heterogeneous echotexture, absence of central blood flow, absence of systolic, and diastolic flow to be predictors of testicular torsion (p<0.05), only the absence of central blood flow and systolic flow significantly predicted testicular torsion on multivariate analysis (p<0.001). Absence of central blood flow was an excellent predictor of torsion (Sensitivity = 95.8%, Specificity = 85%, Positive Predictive Value = 29.5%, and Negative Predictive Value = 99.6%). However, there was no linear relationship between peak systolic velocity and the diagnosis of testicular torsion; i.e., peak systolic velocity did not correlate with testicular torsion when there is documented stolic flow.

**Conclusion:** The absence of central systolic/color flow in the testis is the only significant predictor for testicular torsion. The spectral waveform measuring systolic blood velocity and diastolic flow does not improve diagnostic value of ultrasound in boys with acute scrotal pain.

**Poster 47)**

**ENDOSCOPIC TREATMENT OF VESICOURETERAL REFUX (VUR) IN ADULT POPULATION. CAN WE TEACH OUR ADULT UROLOGY COLLEAGUES?**

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*Alon Fridmans, MD, Division of Pediatric Urology, Shaare Zedek Medical Center, Jerusalem, Israel*

*Dmitry Koulikov, MD, Division of Pediatric Urology, Shaare Zedek Medical Center, Jerusalem, Israel*

*Orly Prat, MD, Division of Pediatric Urology, Shaare Zedek Medical Center, Jerusalem, Israel*

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*Ofer Z. Shenfeld, MD, Division of Pediatric Urology, Shaare Zedek Medical Center, Jerusalem, Israel*

*Amicur Farkas, MD, FAAP, Division of Pediatric Urology, Shaare Zedek Medical Center, Jerusalem, Israel*

**Purpose:** VUR is a well-recognized entity in the pediatric population, but is not well described or understood in adults. Its diagnosis is, however, still important, with VUR accounting for at least 10% of adult patients with end-stage renal disease. With early detection and careful management, the secondary complications of VUR such as renal failure may be prevented. Since endoscopic correction of VUR has become a first line therapy in the treatment of VUR in children we aimed to evaluate the efficacy of endoscopic treatment of VUR in adult patients.

**Methods:** Over the last 20 years (1988-2008) 49 adult patients (6 males and 43 females) with a mean age of 33.6 years (range 18-64 years) underwent endoscopic treatment of VUR. VUR was unilateral in 17 (34.7%) and bilateral in 32 (65.3%) patients comprising 81 refluxing units (RRU). Of those, primary VUR was in 71(87.7%) RRU and 10 (12.3%) comprised complex cases: 5 with duplex system, 4 after failed open surgery and one after failed endoscopic correction in childhood. VUR was Grade I in 14(17%), Grade II in 46(56.8%), Grade III in 17(21%) and Grade IV in 4(4.9%) RRU respectively. Mean renal function (RF) at surgery was 41.2% while 15 (19%) patients had RF less than 30%. Endoscopic correction was performed utilizing Polytetrafluoroethylene (Teflon) in 38 (77.6%) and DS/HA copolymer in the remaining 11(22.4%) patients. Recurrent febrile UTI served as an only indication for surgery in all patients. Grade I VUR was treated only in patients with contralateral high grade VUR.

**Results:** The reflux was corrected in 63(77.8%) RRU after a single injection, after second injection in 9 (10.6%) and after third in 4(4.8%) RRU respectively. In 3 (3.5%) RRU VUR improved to Grade I, which required no further treatment. In 2(2.4%), endoscopic correction failed and they underwent open reimplantation. One patient with corrected VUR underwent nephrectomy due to non functioning kidney and recurrent pyelonephritis. 14(28.6%) patients suffered afebrile UTI without VUR recurrence. 5(10.2%) developed febrile UTI following successful endoscopic correction, which drove reevaluation resulting in the diagnosis of VUR recurrence in 2(4.1%) patients.
**Conclusion:** Our data show that endoscopic correction of VUR in adults is a simple and effective procedure as in pediatric practice. However, in spite of the high rate of successful correction of VUR these patients present with a high incidence of afebrile and febrile UTI in the long term follow up.

**Poster 48)**

**THE OUTCOME OF DOUBLE-J STENTS IN THE MANAGEMENT OF PRIMARY OBSTRUCTIVE MEGAURETERS PRESENTING BEFORE ONE YEAR OF AGE.**

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**Purpose:** Re-implantation of primary obstructive megaureters before one year of age remains challenging due to the discrepancy between the dilated ureter and small bladder. The insertion of a Double-J stent is an alternative strategy. We present the outcome of 45 infants (54 renal units) with primary megaureter, of whom 17 (19 renal units) were initially stented.

**Methods:** A retrospective case-note and imaging review of all infants with primary megaureter managed between 1992 and 2007 (15 years). Data presented as medians (range).

**Results:** The condition was detected prenatally in 62% (28 patients). Seventeen infants presented between one and 44 (median 16) weeks postnatal age, most commonly with urosepsis. Following postnatal investigation with ultrasound, micturating cysto-urethrogram and MAG-3 scans, 16 renal units were found to be non-obstructive, non-refluxing megaureters and treated conservatively. Nineteen obstructed renal units were stented at a median age of 24 (1 day to 40) weeks: 15 stents were inserted at open surgery, and four endoscopically. One infant was later found to have a PUJ obstruction and excluded from analysis. A further 19 infants underwent ureteric reimplantation, ureterostomy or nephrectomy. Eleven renal units (61%) had improved drainage on post-operative MAG-3 following removal of stent. Three of them (27%) developed stent-related complications (migration, stone-formation). All infants in this group had an initial differential function above 40%. Failure in seven cases was due to recurrent stent migration (3), UTI’s and/or functional deterioration (4). Of these, three (43%) had an initial differential function below 40%, of whom two (with an initial function of 37% and 18%) eventually required a nephrectomy.

**Conclusion:** Insertion of a Double-J stent in infants with primary obstructing megaureter may be a definitive procedure in cases where the initial differential function is above 40%. In poorly functioning units, stenting is more likely to be a temporising strategy. Vigilance is warranted as stent-related UTI’s could exacerbate renal impairment. Endoscopic stent insertion was only successful in one fifth of infants.

**Poster 49)**

**PROBIOTIC LACTOBACILLUS–MEDIATED IMMUNOMODULATION OF VAGINAL EPITHELIUM IS STRAIN–SPECIFIC AND MODIFIED BY ESTROGEN.**

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**Purpose:** Vaginal lactobacilli may exert anti-pathogenic, probiotic effects in part through immunomodulation of the vaginal epithelium. Estrogenization of the vagina, such as during the neonatal and pubertal periods, is temporally associated with increased vaginal Lactobacillus counts. We hypothesized that probiotic lactobacilli exert immunomodulatory effects on vaginal epithelium in a strain-specific manner, and that estrogen shapes these interactions.

**Methods:** Near-confluent VK2/E6E7 vaginal epithelial cells, grown with or without estradiol on polystyrene, were cultured with no bacteria or the TNF-inhibitory Lactobacillus reuteri PTA 6475 or TNF-stimulatory L. reuteri ATCC 55730 strains. After 6 hours, VK2/E6E7 RNA was isolated using Qiagen AllPrep kits. High quality RNA was amplified by real-time RT-PCR with primers for 84 immune response genes using SABiosciences Human Adaptive and Innate Immune Responses PCR Arrays. Triplicate arrays were performed for each set of culture conditions. Data was analyzed using DD_Ct methods and Ingenuity Pathways Analysis.
Results: Each co-culture combination featured a distinct immune response gene expression pattern relative to other combinations (>2-fold change in expression of at least 1 gene, p<0.05). Growth of VK2/E6E7 cells with L. reuteri 6475 decreased expression of pro-inflammatory genes such as the antimicrobial protein beta-defensin 4 and antigen-presenting molecule CD1d. Co-culture of VK2/E6E7 cells with L. reuteri 55730 led to upregulation of pro-inflammatory genes including the chemokine receptor CXCR4, interferon gamma receptor 1, and interferon regulatory factor 1. Addition of estradiol to VK2/E6E7-L. reuteri 6475 co-cultures caused upregulation of pro-inflammatory mediators such as IL-1 family member 6, toll-like receptor 10, and NF-kappa B2. The presence of estradiol in VK2/E6E7-L. reuteri 55730 co-cultures induced upregulation of the TLR4-associated Ly96 protein (LPS recognition) and downregulation of lysozyme. Canonical pathways analysis confirmed the importance of innate and adaptive immune response pathways in our co-culture model (p<0.05).

Conclusion: Probiotic lactobacilli induce immunomodulatory effects on vaginal epithelium in a strain-specific manner that is influenced by estrogen. The pathways activated by probiotics represent links between innate and adaptive immunity. These findings have profound implications for genitourinary applications of probiotics.

Poster 50)
ULTRASOUND ESTIMATE OF TESTICULAR VOLUME AS AN INDICATION FOR ADOLESCENT VARICOCELECTOMY: IMPACT OF FORMULA CHOICE AND MEASUREMENT ERROR ON SIZE DISCREPANCY.
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Purpose: Relative testicular volume disparity measured by ultrasound is a commonly followed parameter in pediatric varicocele patients and is a formal indication for surgery. Cut off values triggering correction, differences in formulas used for calculation, impact of inter/intra-observer discrepancies and measurement error are relevant yet not well studies issues. In this study we evaluate the implications of these measurement matters on volume difference, considering changes in testicular size and true discrepancies in testicular volume.

Methods: A mathematical model was programmed in SPSS syntax and queried for measurement discrepancies and indication for surgery triggered by different cut offs (10, 15, 20%). Ellipsoid, prolate ellipsoid and Lambert's empiric formulas were used for volume calculation. Critical error, defined as the error that would lead to surgery based on a pre-established cut-off value, was calculated for different height, length and width values taking into account true testicular volume differences.

Results: The use of each formula lead to different volume estimates for equal value parameters and divergent volume differences (p<0.01 for all comparisons) (fig. 1). Critical error values varied significantly with testicular size, true testicular volume difference and cut off for surgery (p<0.01). In an average adolescent testicle measurement error of 0.10-0.98 cm (fig. 2) lead to surgery based on a 20% cut-off value and 0.03-0.48 cm on 10% respectively. The limited reported intra/inter-observer variability is within these margins of error.

Conclusion: Ultrasound measurement of testicular parameters can lead to statistically different results depending on multiple factors, thus highlighting the importance of standardization. Intra/inter-observer measurement inconsistencies can lead to clinically important differences, issue that should be further explored considering the potentially important implications for treatment and monitoring.
NEAR INFRA RED SPECTROSCOPY (NIRS): A NON-INVASIVE METHOD TO EVALUATE THE FUNCTION OF THE LOWER URINARY TRACT IN CHILDREN.

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Purpose: NIRS is a non invasive method to study lower urinary tract function by monitoring the changes in concentration of the chromophores (oxy and deoxy hemoglobin) in the detrusor. Although NIRS has been approved for adult lower urinary tract studies there is no data available in children. The purpose of this study was to assess the feasibility of NIRS in children and to correlate the findings with uroflowmetry and cystometrogram results in healthy children and those with lower urinary tract symptoms.

Methods: PortaMon® (Artinis Medical Systems) wireless NIRS system was used. 13 children (4 male, age range: 4-17y median: 10y) were evaluated. These included 4 healthy subjects. The remaining 9 had a diagnosis of non-neurogenic lower urinary tract dysfunction (8 patients) and urethral strictures (1 patient).
Simultaneous uroflow or cystometrogram was done in 12 and 2 cases respectively. The NIRS emitters and receivers were secured to the abdominal wall 1-2 cm above the symphysis pubis. NIRS data collection started 10-15 seconds before permission to void and continued for 30 seconds following termination of voiding. NIRS chromophores graphs and urodynamic tracings were compared between normal and symptomatic cases.

**Results:** In 4 cases the data was not useful due to technical issues (positioning of the probe, motion artifacts, etc.). Comparison of patients with abnormal bladder function with healthy subjects revealed two reproducible differences: lack of initial increase in detrusor oxyhemoglobin concentration following permission to void and steady increase in deoxygenated hemoglobin during detrusor contraction. NIRS chromophore changes were also observed during overactive detrusor contractions seen throughout filling cystometry.

**Conclusions:** Our preliminary results are showing that NIRS is technically feasible in children and able to differentiate between normal and abnormal lower urinary tract function. Further studies are required to confirm these qualitative findings and measure them quantitatively.

**Poster 52)**

**RENOGRAM WASHOUT CURVE MORPHOLOGY IS PREDICTIVE OF SIGNIFICANT INTERMITTENT URETEROPELVIC JUNCTION OBSTRUCTION.**

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**Purpose:** Intermittent ureteropelvic junction obstruction (UPJO) is a morbid condition that is difficult to diagnose. Diagnostic imaging performed during pain-free periods is often unrevealing. Lasix renogram studies are used for diagnosing persistent obstruction, but a sensitive standard for identifying intermittent UPJO during pain-free periods remains to be found. We examined the utility of lasix renogram washout curve morphology to predict the presence of intermittent UPJO in both adult and pediatric patients undergoing pyeloplasty.

**Methods:** We performed a retrospective review of all pediatric and adult patients who underwent open or laparoscopic pyeloplasty for intermittent flank pain at our institution between December 2000 and February 2008. Only those patients with a preoperative MAG-3 Lasix renogram were included in the study. The renogram washout curve morphology for the affected kidney and the contralateral kidney was categorized into 3 groups: predominantly convex, predominantly concave, and predominantly flat. Two observers blinded to the clinical outcome independently categorized each kidney. The correlation of curve morphology to surgical outcome was analyzed using Pearson chi square test and logistic regression adjusting for age and relative renal function. A p value of less than 0.05 was considered significant.

**Results:** A total of 43 pediatric and 115 adult patients were identified, of which 23 pediatric and 34 adult patients had baseline renograms. These 57 patients (113 kidneys) were included in the analysis. A predominantly concave morphology was associated with a nonobstructed kidney, while a predominantly convex or flat curve was associated with an intermittently obstructed kidney. 44 out of 49 (90%) kidneys with concave curves were not operated on, while 52 out of 64 (81%) kidneys with non-concave curves were operated on and had pain resolution. The sensitivity and specificity of non-concave curve shape for predicting outcome was 91% and 79%, respectively. When adjusted for relative decreased kidney function (function <= 40%) and $T_{0.5} < 10$, there was still a significant association (p < 0.02).

**Conclusion:** With relatively high sensitivity and specificity, lasix renogram curve morphology can be utilized to help predict which patients with intermittent flank pain may benefit from pyeloplasty. Along with the conventional workup, this additional diagnostic tool may be useful to both confirm a suspected case of intermittent obstruction and also to support a decision to undergo pyeloplasty.

**Poster 53)**

**WNT SIGNALING IN URETHRAL DEVELOPMENT.**


**Purpose:** Studies on the urethra have increased with the recognition that proper urethral organogenesis and its functional integrity are a crucial component in maintenance of both the lower and upper urinary tract. Previous reports have shown that signaling through sonic hedgehog, FGFR2, FGF8, BMP4 and BMP7 is important in development of the urethra and genital tubercle. Our studies evaluated the role of Wnt signaling in development of the urinary tract.

**Methods:** Wnt expression was evaluated in mice at embryonic days 16 and 17 using an RT-PCR array. Urogenital development was evaluated in Wnt5a knockout and wild-type littermates. Mice with knockout of Wnt5a die immediately prior to or just after birth, so studies were performed on embryos. Anatomic details were evaluated using hand-held microinjection of India ink. Gross morphologic evaluation and dissection was performed and documented by photography. Histologic evaluation was performed by hematoxylin and eosin staining of paraffin-embedded tissue sections following fixation in 10% buffered formalin or 4% paraformaldehyde.

**Results:** Array results showed that mRNA for several members of the Wnt family are highly expressed during urethral development, including Wnt3a, 10a, 7b, 14, receptors Fz7 and 8, and regulators Sox 17 and mdkk-1, suggesting that Wnt expression and signaling are important during urethral development. Wnt5a knockout mice demonstrate appropriate development of the bladder, ureters and kidneys but lack external genitalia and anus. The distal colon fails to develop but terminate in fibrous structures near the bladder. The urethra is present but appears to terminate prior to reaching an external meatus. Microinjection of India ink into the bladder of E18.5 wild type Wnt5a knockout littermates resulted in release through the urethra. However, microinjection into Wnt5a bladders resulted in retrograde injection into the ureters and kidneys. These data indicate that Wnt5a is necessary for formation and function of the distal urethra.

**Conclusion:** Wnt signaling is an important component of urethral development and Wnt5a is essential for the functional development of the urethra. It may also play a critical role in distal anorectal development. The Wnt5a knockout mouse is a useful model for study of urethral development.

**Poster 54**

**BODY MASS INDEX AS A PREDICTIVE VALUE FOR COMPLICATIONS ASSOCIATED WITH RECONSTRUCTIVE SURGERY IN THE NON-MYELODYSPLASIA PATIENT.**

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**Purpose:** Previous reports have shown that myelodysplasia patients undergoing reconstructive surgery to achieve urinary and/or fecal continence are at a significantly higher risk for postoperative complications if their body mass index (BMI) is classified as obese. We sought to determine if this is also true for the non-myelodysplasia patient undergoing the same reconstructive surgery.

**Methods:** A retrospective review of all non-myelodysplasia patients at our institution undergoing urinary or fecal reconstructive procedures was performed. Data for BMI and any documented complication occurring during or after hospital admission was analyzed. Patients were categorized based on the CDC’s standardized BMI growth chart percentile ranks for children as underweight (BMI <5th percentile), normal weight (BMI 5th - 85th percentile), or overweight and obese (BMI >85th percentile). Statistical analyses using chi-square and Fisher's exact test were performed, with p<0.05 set as level of significance.

**Results:** Reconstructive procedures were performed in 76 non-myelodysplasia patients between 1996 and 2008. Forty-three bladder augmentations were performed with a total of 78 stomas created. Mean follow up was 46.3 months. Height and weight were available for BMI calculation in 65 patients. The underweight and overweight/obese populations represented 12.3% (8/65) and 29.2% (19/65) of our study cohort. The overall rate of major and minor complications in this series was 73.8% (48/65). When complications were analyzed based on BMI category, we noted 100% of underweight BMI and 84.2% of overweight/obese BMI patients had complications, as compared to 60.5% of those patients with a normal BMI (p=0.038).
Early complications were most common in the underweight population, 37.5% (3/8). Of the 15 patients (23.1%, 15/65) that had 2 or more complications, 46.7% (7/15) occurred in the obese patients.

**Conclusion:** There is a high rate of complications in children undergoing reconstructive surgery to achieve urinary and/or fecal continence. Those patients classified as underweight by BMI are at significant risk for complications with most occurring in the early recovery period. Those patients classified as overweight/obese by BMI are also at a significant risk for complications and for multiple complications during their follow-up period. Pre-, peri-, and post-operative weight management and nutritional supplementation may support these 2 at risk cohorts of patients.

**Poster 55)**

**MALE GENDER ASSIGNMENT IN 4 PATIENTS WITH CONGENITAL VIRILIZING ADRENAL HYPERPLASIA DURING INFANCY AFTER FULL DISCLOSURE TO PARENTS.**

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**Purpose:** To present 4 patients for whom parents chose a male gender after being informed of the diagnosis, pathophysiology, karyotype, and internal and external reproductive system development.

**Methods:** The medical history of 4 patients has been reviewed by their endocrinologist or consultant, with the goal of administering standardized questionnaires to parent and patients according to an approved IRB protocol.

**Results:** Four 46,XX patients were diagnosed with CAH and marked virilization. Parents chose a male sex of rearing for each after being fully informed of the karyotype, presence of ovaries, internal female reproductive structures, and potential for fertility if raised as female. Based on current parents' perceptions for these boys aged 3 to 15 years, all 4 appear to have developed a male gender identity and are living a male gender role, without unusual behaviors. All parents indicate satisfaction with their decisions and remain wholly committed to a male sex of rearing. However, these parents are hesitant to allow their sons to participate in further evaluation including standardized questionnaires, in an effort to avoid focusing their child's attention on gender identity and to avoid any risk of public revelation of their child's medical situation.

**Conclusion:** For decades the recommendation of gender assignment for 46,XX patients with congenital adrenal hyperplasia (CAH) 21-hydroxylase deficiency has been female despite the extent of virilization of the external genitalia at birth. However, outcome data are lacking for such patients. Despite medical recommendation in all cases, 4 newborns' parents were initially and are now convinced that the appropriate gender assignment is male. Further outcome information is needed. An accompanying abstract reports outcome data for adult males considered to be male at birth, not being diagnosed with CAH during infancy. None of these males appear to have gender confusion. If chosen by parents after full disclosure, a male gender sex of rearing should be respected.

**Poster 56)**

**HISTOPATHOLOGIC CHANGES FOLLOWING DEXTRANOMER/HYALURONIC ACID INJECTION: IS THERE A CORRELATION WITH RADIOGRAPHIC BLEB CALCIFICATIONS?**

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**Purpose:** The etiology of bleb calcifications following endoscopic treatment of vesicoureteral reflux (VUR) remains unknown. To date, no radiographic findings have been reported in ureters where
Pathologic specimens are available. We aimed to correlate histopathology of ureteral specimens previously injected with dextranomer/hyaluronic acid (Dx/HA) and radiographic imaging of the same specimens.

**Methods:** We identified all patients undergoing Dx/HA injection from January 2002 to June 2008. Patients who underwent Dx/HA injection followed by ureteral reimplantation secondary to Dx/HA failure, and who had ureteral pathology available for review, were included in our analysis. Distal ureteral specimens underwent radiographic imaging via both plain film and computed tomography (CT). Attenuation levels were measured in Hounsfield units, accounting for partial volume averaging due to small tissue surface area of the paraffin-embedded specimens. Radiographic results were then compared with histopathologic findings.

**Results:** 472 patients (689 ureters) underwent Dx/HA injection; 47 patients (64 ureters; 9.3%) later underwent reimplant. 33 patients (50 ureters) had pathologic records available. Mean age at injection was 5.1 years (range: 1.0-10.8). Mean time between injection and reimplant (I-R interval) was 11.1 months (range: 1.0-47.9). The most common histopathologic finding was local foreign body reaction (FBR) in 45 ureters (90%). Serial renal ultrasounds (RUS) were performed during the I-R interval in 30 patients; 29 patients underwent voiding cystourethrogram (VCUG) a mean of 13.6 months (range: 1.8-32.0) after injection. No calcifications were visible on RUS or VCUG in any patient, nor on plain film imaging of the ureteral specimens. 13/50 (26%) ureteral specimens from 11 patients demonstrated increased attenuation on CT consistent with calcific densities; all had FBR on histopathologic examination. Volume of Dx/HA injected and I-R intervals were similar between ureters with increased attenuation and those without (p=0.19 and 0.33, respectively).

**Conclusion:** FBR is a common histopathologic finding following Dx/HA injection, and is known to be associated with dystrophic microcalcification. Radiographic findings of bleb calcification in some patients following endoscopic VUR treatment may reflect these histopathologic changes. Further investigation is needed to determine why bleb calcifications occur in only a subset of ureters injected with Dx/HA.

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**POST-TRAUMATIC PANCREATITIS FOLLOWING ISOLATED LEFT BLUNT RENAL TRAUMA IN THE PEDIATRIC POPULATION: A COMPARISON OF A SINGLE-INSTITUTION EXPERIENCE AND A NATIONAL TRAUMA REGISTRY.**

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**Purpose:** Post-traumatic pancreatitis (PTP) is a potential sequela following blunt renal trauma (BRT) in children, but this phenomenon remains poorly defined. Furthermore, the occurrence of PTP in pediatric BRT is not currently reported in urologic literature. We report our institutional experience with PTP in patients with apparent isolated BRT, and compare that experience with findings from the National Trauma Data Bank (NTDB).

**Methods:** We identified patients presenting to our institution with BRT between July 2003 and June 2008. Patient demographics, laterality, grade of renal injury, mechanism of injury, and associated injuries were recorded. We reviewed the clinical course of patients with isolated BRT; data collected included length of stay (LOS), time to oral intake tolerance, surgical procedures, and laboratory results. Data extracted from NTDB included incidence of isolated pediatric BRT, incidence of mild pancreatic injury (MPI), LOS, and severity of renal injury.

**Results:** From our institution, 21 patients with isolated BRT were identified; 12 (57%) were diagnosed with isolated left BRT following initial evaluation. Of these 12, 9 had complete data available for analysis. Median age was 12 years (range: 6-16). All 9 patients were managed conservatively. Two (22.2%) patients developed poor tolerance of oral intake associated with elevated serum amylase and lipase. These patients were diagnosed with PTP and suspected to have occult pancreatic contusions. 9 (43%) patients had isolated right BRT; none developed PTP. Both mean time to oral intake tolerance (5 vs. 1.1 days; p=0.0001) and mean LOS (5.0 vs. 3.6 days; p=0.19) were prolonged in patients with PTP. No correlation between PTP and grade of renal injury was found. Data from NTDB revealed a 0.9% incidence of MPI and
isolated BRT. Nationally, MPI was associated with a longer mean LOS (9.7 vs. 3.9 days; p=0.04), but did not correlate with renal injury severity.

**Conclusion:** Patients with isolated left BRT may be at increased risk for PTP. PTP incidence differs greatly between our institutional experience and national data; this may reflect our small patient cohort or limitations of data entry and extraction techniques used in national registries. Urologists need to be aware of this sequela of renal trauma, as it affects patient outcomes. Further research is needed to determine the etiology and true incidence of this phenomenon. This study also highlights the need for more standardized collection of patient data in national registries.

**Poster 58)**

THE PRESENCE OF GENOMIC ALTERATIONS IN VACTERL ASSOCIATION.

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**Purpose:** VACTERL (Vertebral, Anorectal, Cardiac, TracheoEsophageal, Renal, or Limb) association is the non-random co-occurrence of 2-3 of 7 congenital defects affecting 1 in 5000 live births. These anomalies can be devastating psychologically, financially, socially, and medically for the child and family. Despite its frequency, the cause(s) of VACTERL is poorly understood, but occasionally karyotypic anomalies have been reported. Given the recent advances in molecular medicine, we screened a population of VACTERL patients with the more sensitive whole genome microarray comparative genomic hybridization (CGH) for genomic alterations.

**Methods:** Using IRB-approved protocols, severely affected VACTERL patients (three or more defects) and willing family members were recruited. Detailed phenotypic information was obtained from medical records. Peripheral blood was obtained for blood lymphocyte immortalization and high quality DNA extraction. Whole genome microarray CGH was performed per protocol with unaffected patient samples serving as controls. On average, the oligonucleotide probes were spaced every 6000bp throughout the entire nonrepetitive portion of the human genome.

**Results:** From 2002-2008, 43 VACTERL patients were recruited. 36 (83.7%) were screened by microarray CGH, with 12 having positive findings. Of these 12 patients, 6 had results thought to be of potential significance. One male patient had partial trisomy 22 resulting in a polygenic duplication which has previously been reported to cause VACTERL and Der(22) syndrome. Four patients had: (1) a homozygous microdeletion of a single gene on chromosome 11, (2) a microduplication on chromosome 8 involving 3 known genes, (3) a microduplication of a region of chromosome 18 encompassing 2 known genes, and (4) a microdeletion of a single gene in chromosome 15 and a microduplication of 2 genes in chromosome 7 respectively. The remaining patient had a polygenic mutation comprised of a chromosome 12 deletion and a chromosome 16 duplication.

**Conclusion:** Genomic alterations were detected in 34% of our severely affected VACTERL patients via array CGH. Further study of each of these chromosomal alterations may lead to the identification of causal genes, thereby leading to mechanistic insight in VACTERL pathogenesis.

**Poster 59)**

PORCN MUTATIONS MEDIATE CLASSIC BLADDER EXSTROPHY IN PATIENTS WITH FOCAL DERMAL HYPOPLASIA.

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Purpose: The causes of classic bladder extrophy (CBE) remain unknown. Patients with focal dermal hypoplasia/Goltz Syndrome (FDH, OMIM #305600) have recently been reported to have mutations in the \( \text{PORCN} \) gene on chromosome Xp11.23. Having identified a patient with FDH and CBE, we hypothesized that \( \text{PORCN} \) may be implicated in the etiology of CBE. We screened a population of CBE patients for \( \text{PORCN} \) mutations and performed a literature search for additional cases.

Methods: After patient recruitment, genomic DNA was isolated from lymphocytes. \( \text{PORCN} \) coding exons 1-11 from CBE patients were screened by directional PCR sequencing. In 59 normal control DNAs, identified \( \text{PORCN} \) mutations were screened for SNPs. X-chromosome microarray comparative genomic hybridization (aCGH, Nimblegen, Madison, WI) was performed on samples with identified \( \text{PORCN} \) mutations to assess for copy number variations. A PubMed literature search was performed for additional FDH cases screened for \( \text{PORCN} \) mutations, identifying FDH cases with CBE.

Results: 10 CBE patients (5M:5F) were screened for \( \text{PORCN} \) mutations, of which 3 had CBE only (1M:2F), 6 had CBE + additional congenital anomalies (4M:2F), and 1 had FDH + CBE (1F). A previously unreported novel heterozygous missense point mutation (W312R) was identified in our one female patient with FDH + CBE; X-chromosome-specific aCGH was negative for copy number variations in this patient. No other mutations were detected. Literature search revealed three additional published female cases with FDH + CBE with point mutations (G60R, C385Y and W439X). Overall, we found CBE to be present in four of 73 (5.5%) FDH patients in which \( \text{PORCN} \) was sequenced.

Conclusion: FDH and CBE are individually rare disorders, and their co-occurrence in at least four patients suggests etiological relatedness. Importantly, all 4 (100%) of these patients have \( \text{PORCN} \) mutations. While \( \text{PORCN} \) genomic alterations are present in ~75% of FDH patients, we did not find \( \text{PORCN} \) mutations in the isolated cases of CBE, perhaps due to the small study group that also included males. \( \text{PORCN} \) governs WNT protein palmitoylation, a necessary step for WNT protein trafficking to the extracellular membrane. WNT genes are crucial for embryonic development; further study of WNT and \( \text{PORCN} \) genes may yield insight into molecular causes for CBE. Despite the lack of mutations in our CBE cohort, \( \text{PORCN} \) remains a strong candidate gene for CBE and warrants further investigation.
molecular target that may provide future significance in the evaluation & treatment of patients with altered detrusor dynamics.

Poster 61)

EX-VIVO URETERAL SPATULATION DURING LAPAROSCOPIC PYELOPLASTY: A NEW TECHNIQUE.

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Purpose: In performing a laparoscopic pyeloplasty, ureteral spatulation can be extremely difficult to perform. Exact placement of the apical sutures is critical in obtaining a good result. It is also known that knot tying can be quite time consuming. We describe a novel ex-vivo technique of ureteral spatulation and placement of apical anastomotic sutures that expedites the process and improves the accuracy of suture placement.

Methods: The technique was performed on 7 patients, 6 pediatric and one adult. After gaining laparoscopic intraperitoneal access and performing the initial steps of laparoscopic pyeloplasty, including transection of the ureter, a 5-mm trocar is placed directly over the ureter. After measuring the length of ureter that needs to be spatulated, the proximal transected ureter is brought out through the trocar to the skin. Ex-vivo spatulation is performed. Two sutures are tied to each other and placed at the apex of the spatulated ureter. The ureter is then placed back intra-abdominally. The uretero-pelvic anastomosis is sutured in a continuous fashion.

Results: In our experience of using this technique, we have found that ex-vivo ureteral spatulation and anchorage of the apical anastomotic suture during laparoscopic pyeloplasty provides a simpler means of performing this task, that may be challenging otherwise. Aside from simplifying the task it expedites the process as well. No complications were encountered during the procedure and all patients had no evidence of obstruction post operatively.

Conclusion: The ex-vivo technique of ureteral spatulation and initial placement of the anchoring apical suture is an excellent technique for the surgeon that lacks a robot to perform intracorporeal manipulation and suturing but needs to perform a laparoscopic pyeloplasty.

Poster 62)
VOIDING PROBLEMS IN PATIENTS WITH URETEROCELE.

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Purpose: Along with reports on voiding dysfunction in patients with ureterocele, controversy exists over whether this voiding dysfunction is due to extensive surgery involving the trigone or should be considered as a part of this disease. We investigated the association between voiding dysfunction and type of surgery in ureterocele patients.

Methods: A retrospective review of 117 patients (M:F=42:75) who were surgically treated for ureterocele between January 2000 and June 2008 was performed. Mean age at last follow up was 3.7 years, mean age at surgery 1.3 years and mean duration of follow up was 2.2 years.

Results: Ureterocele was involved in a duplex system in 91 (77.8%), single system in 21 (17.9%) and bilateral ureterocele was noted in 5. Ureteroceles were intravesical in 40.2% and ectopic in 59.8%. Associated urological abnormalities included VUR in 32.5% and MCDK in 2.6%. Of the 35 patients who were older than 5 years at last follow up, 16 patients (45.7%, m:f=5:11) presented with voiding symptoms including incontinence, urinary frequency, residual urine sense and urgency. Abnormal uroflow was noted in 9 (25.7%) and large volume of residual urine was noted in 4 (11.4%). Presence of post operative voiding symptom showed a significant difference according to type of surgery (TUI 23.1%, ureteropyelostomy 50%, common sheath reimplantation 64.3%, p=0.035) and occurred more frequently in ectopic than intravesical ureteroceles. (18.8% vs. 81.3%, p=0.008) Excision of remnant ureterocele in bladder or urethra did not significantly contribute to development of voiding symptoms. (p=0.7) Of 82 patients younger than 5 years 6 (7.3%) presented with large residual volume or straining pattern of voiding.

Conclusion: Voiding dysfunction was frequently noted in ectopic ureteroceles and although the incidence was higher in patients who underwent bladder surgery, it occurred in 50% of those who received surgery at the upper tract level. Preoperative evaluation of bladder function in ureterocele patients might be useful in postoperative follow up and investigation of postoperative voiding dysfunction.