

# Moderated Poster Session 6: Pediatric Urology

## June 29, 2010, 1400-1520

### MP-06.01 Urologic Outcomes of a Pediatric Spina Bifida Clinic

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**Introduction and Objective:** The urinary and gastrointestinal tracts remain an enormous burden to the quality of life in the patient with a spinal dysraphism. We believe that the analysis of contemporary outcomes is essential for patient and family counseling.

**Methods:** After ethics approval, a chart review was performed to compile all pertinent genitourinary and gastrointestinal outcomes from the pediatric and adolescent spina bifida clinics at the Glenrose Rehabilitation Hospital in Edmonton, Canada. There were 152 patients under the age of 17 years with a spinal dysraphism identified.

**Results:** The most common spinal cord pathology is myelomeningocele (45%), followed by tethered spinal cord (21%), lipomyelomeningocele (18%), spinal cord injury (8%), meningocele (1%) and other (9%). The most common level of myelomeningocele is lumbosacral (37%), followed by lumbar (31%), sacral (16%), thoracolumbar (10%) and thoracic (6%). 84% of children with a myelomeningocele have a ventricular shunt. Of our cohort, 46% perform clean intermittent catheterization, 40% are on an anticholinergic medication, and 46% void spontaneously. Six percent have used overnight catheter drainage and 3% have had either Botox injections or urethral dilation; 7% have an incontinent urinary diversion; 84% catheterize per urethra, and 16% via an abdominal stoma. Intestinecystoplasty rates varied with level of lesion, with 31% of thoracic myelomeningoceles, 22% of lumbar, 11% sacral, and 6% of tethered cord patients requiring surgical intervention. Of the entire population, 44% of patients above the age of 5 years are continent of urine. Of voiding patients, 40%, and 27% of those managed medically, are continent. Continence varies with level of lesion; with 33% of thoracic myelomeningocele patients continent, 27% lumbar 43% sacral, and 58% of tethered cords. There are 73% of patients who are continent of feces, 71% of those who manage their bowels conservatively are continent while 67% of those who have had advanced management (cecostomy or MACE) are continent. Twenty-four percent of patients have a history of hydronephrosis, and of these only 10% have persisted; 3% have mild renal insufficiency and 9% have documented renal scarring. None have required renal replacement therapy.

**Conclusions:** To our knowledge, this is the largest and most comprehensive cohort reported in the literature. This data will help serve as a reference for a contemporary spina bifida clinic, lead to a prospective study, and help improve pre and post-natal counseling.

### MP-06.02 Non-Operative Management of High Grade Pediatric Renal Trauma from a National Dataset

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**Introduction and Objective:** Attention to the management of pediatric high-grade renal injuries has been limited. Current management of high-grade pediatric renal injuries has followed algorithms studied and designed for adult patients. Our aim was to describe initial and subsequent management as well as eventual outcome of high-grade pediatric renal injuries using a national data set.

**Methods:** High-grade renal injuries are uncommon preventing single-institution analysis; therefore, we utilized the National Trauma Data Bank (NTDB) 2002-07, the largest current collection of trauma registry data of injured persons. Pediatric (ages 0-18) renal injuries were identified by AIS codes and converted to American Association for the Surgery of Trauma (AAST) injury grade. We analyzed demographic data, injury severity score (ISS), and acute management of AAST grade IV and V injuries. Interventions were stratified by endoscopic, endovascular, and open operative procedures.

Table 1. MP-06.02

	Non-operative n = 274 (60%)	Endoscopic n = 32 (7.0%)	Endo-vascular 22 (4.8%)	Open operation n = 132 (29%) Grade n (%)
				IV
232 (85)	27 (84)	16 (73)	79 (60)	V
42 (15)	5 (16)	6 (17)	53 (40)	Mean ISS
(SD)	25 (14)	17 (7.1)	34 (15)	29 (13)
Median hours to Procedure	-	42	<1	1
Number of additional procedures				
1	-	13	1	8
2	-	2	-	4
3	-	3	-	1
4	-	1	-	2
Total no. patients with additional procedures	-	19	1	15
Total no. additional procedures	-	30	1	27
Nephrectomies	-	0	0	105

**Results:** We identified 2213 pediatric renal injuries, including 460 (21%) high-grade injuries (354 grade IV and 106 grade V). Of these, 68/460 (14.7%) were penetrating. Initial management for each cohort is shown in the table. Successive procedures were more commonly needed for the endoscopic and open surgical cohorts. Among the operative cohort needing successive surgery, 4/15 had eventual nephrectomy. The most common successive procedure among the endoscopic cohort was retrograde pyelography. Endovascular management appeared durable as only one required successive therapy. Among the 460 patients, overall renal salvage was 77.2%. Nephrectomy was only performed in the open operative cohort, with a renal salvage rate of 20.5%. Comparison of mean ISS between open operative patients with and without renal salvage was 30.9 and 31.5 respectively.

**Conclusions:** Non-operative management of grade IV and V renal injuries is common in children. Given that ISS is similar in the non-operative and open operative groups, it is unclear what factors led to surgical intervention. This argues in favor of a more informative grading system, perhaps based not only on anatomic injury, to guide management decisions.

### MP-06.03 Engineered Endothelialized Vesical Equivalent in a Dynamic Bioreactor

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**Introduction and Objective:** Bladder reconstruction performed by enterocystoplasty or bioengineered substitutes is associated with significant complications, which led us to elaborate a vesical equivalent (VE) as a new alternative. This model has already proven its structural conformity. The challenge is to reconstruct our model in a physiological environment, with the use of a bioreactor that mimics the dynamic of bladder filling and emptying, to acquire watertight properties and increase mechanical resistance. It is also necessary to develop a microvascularization within our reconstructed tissue, in order to deliver oxygen and nutrients for its survival after grafting.

**Methods:** Three cellular types are extracted simultaneously from a small porcine bladder biopsy, according to a technique previously described. Fibroblasts, urothelial and endothelial cells evolve in a three-dimensional culture to obtain a VE easy to handle. It is dynamically cultured in our bioreactor, which delivers cyclic pressure progressively increasing up to 15 cmH<sub>2</sub>O every four hours, followed by a rapid decrease. The VE are characterized by histology, immunohistochemistry and electron microscopy. In addition, mechanical resistance is evaluated by uniaxial tensile tests, and the tissue absorption is measured with <sup>14</sup>C-urea, which quantifies the degree of impermeability of our VE.

**Results:** Compared to our model in static conditions, the dynamic culture led to the obtention of a thicker matrix, with a pseudostratified urothelium on a more defined basal membrane. Moreover, positive markers for cytokeratin 20 and the physiological aspect in electron microscopy demonstrated the terminal differentiation of our VE. Permeability profiles displayed the same profile as the native bladder, coinciding with uroplakins organization into apical plaque. Finally, the mechanical results obtained showed an appropriate resistance for suturing and handling, and this, even when a network formed by capillary-like structures were observed throughout the matrix.

**Conclusions:** This method to produce VE seems very promising to meet the needs in the urological field. Our substitute has proven its efficiency as a barrier to urea and has a sufficient mechanical resistance to support physiological pressures. Additionally, this model is completely free of exogenous biomaterials, and its endothelialization could promote the early vascularization process after grafting and it would significantly reduce inflammation and possible rejection.

### MP-06.04 Incidence of Enlarging Macroplastique® Bolus Calcification Detected During Long Term Follow-Up after Injection for Vesico-Ureteral Reflux

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**Introduction:** Macroplastique® gained acceptance in many parts of the world as an injectable bulking agent for correction of vesico-ureteral reflux or incontinence. As with other substances, the long-term consequences of such intervention remain largely unknown. Herein we present one important complication detected during follow-up in a single institution series.

**Materials and Methods:** A total of 232 children underwent subureteric injection between 1998 and 2004, being regularly monitored since. Of these, all patients that have presented with submucosal stones in the prior area of injection have been prospectively captured. Clinical features and data on patient characteristics were obtained by chart review.

**Results:** Three patients ages 10, 13 and 15 developed enlarging submucosal bladder calcifications 5, 7 and 9 years following the initial injection for vesicoureteral reflux. In all the intervention was uneventful and no clinical or sonographic abnormalities were detected after the procedure. Patients subsequently presented with worsening hydronephrosis, hematuria and irritative lower urinary tract symptoms. On ultrasound and pelvis X-ray we encountered calcifications at the site of prior injection. At time of endoscopic surgery the calcified material was extracted after unroofing the overlying eroded mucosa. To date no recurrences have been detected and none of the patients have undergone ureteral reimplantation.

**Conclusions:** This experience calls attention to a potentially important complication that can be encountered following endoscopic injection with Macroplastique®. Monitoring of these patients appears warranted as long-term issues with new injectable materials remains largely unknown.

### MP-06.05 Outcome of Two Stage Buccal Mucosa Graft for Salvage Urethroplasty in Children

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**Introduction:** Although staged buccal mucosa graft (SBMG) 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-fatted 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:** Thirty 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.

### MP-06.06

#### Surgery versus Observation for Antenatally Detected Congenital Ureteropelvic Junction Obstruction in the Setting of Preserved Renal Function: A Systematic Review

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**Introduction and Objective:** Ureteropelvic junction obstruction (UPJO) is a common renal anomaly diagnosed on antenatal ultrasounds and does not always cause impairment in renal function. Children with UPJO can be managed with surgery or observed with follow-up imaging. Surgery carries risks of anaesthetic complications, bleeding, infection, and reoperation while observation may result in a decline in renal function. Because both interventions may pose certain risks, it is imperative to determine which has the best outcome with lowest risk. We conducted a systematic review to analyze the evidence for surgery versus observation in children with UPJO to determine what impact the interventions have on renal function.

**Methods:** The Cochrane Controlled Trials Register, MEDLINE, EMBASE, PubMed, Web of Science, Scopus, and OCLC Proceedings First Database were searched. Identified studies included children antenatally diagnosed with UPJO who underwent observation or surgery for this condition. Patients had to have had a nuclear renal scan postnatally demonstrating preserved (>40%) differential function. Secondary outcomes including infection, hydronephrosis, drainage, pain, and hypertension were also reviewed.

**Results:** Twenty-one studies were selected for review. One RCT, one single arm cohort for surgery, and 19 single arm cohort studies on observation were found. The proportion of patients with decline in renal function during observation ranged from 2-73% and was 7% in the single surgery study. Combining all studies 13% of patients in the observation group had deterioration in renal function, requiring surgical correction and 26% of those patients had a documented return to baseline differential renal function. Other indications for surgery in the observation group included urinary tract infections in 5 studies (9%), pain in 4 studies (7%), and worsening hydronephrosis in 2 studies (23%). The only surgical complications were loss of renal function in the surgery study.

**Conclusions:** The most appropriate management of children with antenatally diagnosed UPJO and preserved differential renal function is unclear. Several cohort studies on observation exist showing maintained normal renal function. Children may present later with infection or pain requiring surgical correction. Surgery can also result in a decrease in renal function but in general has a low incidence of complications. Further prospective studies are necessary to draw a definitive conclusion and should include quality of life data.

### 5-STAR

#### MP-06.07

#### Is it Zero? The Natural and Management History of Non-Functioning vs. Very-Low-Functioning Kidneys

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**Introduction and Objectives:** The natural history of multicystic dysplastic kidney (MCDK) is generally accepted to be benign. By definition, MCDK shows 0% relative function (fnx) on renal scintigraphy. However, given the lack of fnx and dysplastic characteristics of MCDK, it remains controversial whether kidneys with very low relative fnx (close to 0%) also follow the same benign natural history and merit the same expectant management as MDCK. We determined whether very low functioning kidneys have a unique clinical course, a distinct clinical and pathological outcome, and prompted different management history compared with MCDK.

**Methods:** We reviewed all DMSA scans performed in our institution from 2000 to 2008 and selected those possessing one renal unit with 0%-10% fnx and ultrasonographic (U/S) features of MCDK. For purposes of the study, scans were divided into an MCDK Group (0% fnx) and a Dysplastic/Dysmorphic (DK) Group (1 to 9% fnx). Records from patients in each group were then compared with respect to natural history of the index kidney, clinical course, and management history, with emphasis on possible related complications: hypertension, vesicoureteral reflux, pyelonephritis, and carcinoma.

**Results:** A total of 162 patients had a DMSA with one renal unit with <10% fnx and U/S features of MCDK. As defined, 120 patients fit the MCDK Group criteria and 42 patients fit the DK Group criteria. Many pts in the DK Group were labeled as "MCDK" in their records. There were 16/120 (13%) in the MCDK Group (0% fnx) who experienced recurrent UTI or hypertension, for which 7 (6%) underwent nephrectomy (Nx). In the DK Group of patients with minimal fnx, 13/42 (31%;  $p < 0.5$  vs. MCDK Grp) showed complications (UTI, hypertension, carcinoma). Seven of them (17%) underwent Nx for size increase or hypertension ( $p < 0.01$  Nx vs. MCDK Group). One DK patient, (1/42 vs. 0/120 MCDK Group;  $p < 0.01$ ), a 14yr female followed for several years by U/S developed progressive enlargement of the index kidney. Imaging was suspicious and Nx confirmed renal cell carcinoma. This patient currently shows no evidence of recurrence at 5 yrs F/U.

**Conclusions:** U/S characterization of MCDK should be supported by a DMSA scan confirming true 0% fnx before diagnosis of MDCK is used clinically. Conversely, renal units with residual fnx (1 to 9%) may be at risk for more and potentially lethal complications. The non-0% low functioning kidney seems to progress differently compared to those with true 0% fnx, thus advocating for closer clinical scrutiny and a lower intervention threshold in the non-0% kidney.