Moderated Poster Session 3: Miscellaneous
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MP-03.01
Outcome of Dorsal Buccal Graft Augmented Anastomosis for Urethral Strictures

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Introduction and Objective: The use of buccal graft onlay has been shown to be an excellent option for long bulbar urethral strictures. A narrow lumen may preclude the use of an onlay alone, and in these instances an augmented anastomosis is needed. We therefore performed this study to evaluate the outcomes and complications of dorsal buccal graft augmented anastomosis urethroplasty (BGAA) for anterior urethral strictures.

Methods: Seventy-six patients underwent BGAA between 2000-2009. Their charts were retrospectively reviewed. Failure was defined as recurrent stricture requiring intervention. Three weeks post surgery, patients underwent voiding urethrography. Flexible cysto-urethroscopy is performed 6 months after surgery. Patients are then followed yearly.

Results: Mean age was 44 years. Follow-up averaged 49 months (range 3.6 to 108). Stricture
etiology was idiopathic in 39/76 (51%), perineal trauma in 13/76 (17%), instrumentation in 9/76 (12%), non-specified trauma in 7/76 (9%), post hypospadias surgery in 4/76 (5%), post infectious in 3/76 (4%), radiation for local urethral cancer in 1/76. Mean stricture length was 6cm (range 2-15cm). There were 70/76 (92%) who had previous urethral procedures, including dilation 54/76 (71%), urethrotomy 46/76 (61%), >/= 2 prior procedures 52/76 (68%), and urethroplasty 20/76 (26%) before referral to our centre. Two buccal grafts were used on 20/76 (26%) of patients; one graft was used on 56/76 (74%); 72/76 (95%) of repairs were successful and 4/76 (5%) failed. Three patients underwent urethrotomy and are free from recurrence. One patient underwent dilation and is free from recurrence. One other patient has a wide caliber recurrence that is currently being monitored. Significant perioperative complications included one pulmonary embolus (this patient was found to have a coagulopathy), one superficial venous thrombosis and two postoperative fevers presumed to be febrile urinary tract infections.

Conclusions: Dorsal buccal graft augmented anastomosis for anterior urethral strictures has excellent results with a 95% success rate. Continued surveillance of these patients is needed to confirm persistent durability.

MP-03.02
Fibrin Glue Stabilizes Tissue-Engineered Matrix-Free Urothelium for Reconstructive Urology

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Introduction and Objective: For tissue-engineering of urothelial cell-matrix implants appropriate biodegradable matrices are a continued challenge concerning biocompatibility, stability, and degradation *in vivo*. To overcome these problems, autologous urothelium generated *in vitro* without matrices or scaffolds might be an alternative. However, matrix-free urothelium (MFU) is unstable and thus has to be stabilized for reconstructive surgery, e.g. of the urethra. Aim of the study was to prove 1) fibrin glue as a stabilization factor concerning influence on the viability of fibrin glue-sprayed human urothelial cells (HUCs) and for surgical manipulation of MFUs sprayed with fibrin glue and 2) to investigate the outcome of transplanted MFUs sprayed with fibrin glue in a pilot nude rat model.

Methods: The influence of fibrin glue on the viability of proliferating and confluent monolayer HUC cultures was analyzed with the metabolic WST-1 assay. Seven enzymatically detached MFUs established from three different primary HUC lines were sprayed with fibrin glue and investigated for mechanical stability. For verifying the outcome *in vivo*, MFUs were sprayed with fibrin glue and sutured on the musculus rectus abdominis of athymic rats. For *in vivo* tracking, HUCs have been labelled with fluorescent PKH26 cell linker. Transplants were examined histologically and immunologically for epithelial pancytokeratin (AE1/AE3) after 7 days.

Results: Viability of fibrin glue-sprayed HUC cultures both in the proliferative and confluent phase reached up to 62% and 89%, respectively, of the control group at day seven. MFUs sprayed with fibrin glue after detachment demonstrated a good mechanical stability compared to unsprayed MFUs. The fibrin glue-sprayed MFUs were handled well with surgical instruments. In performed cryosections of MFUs at day 7 after transplantation the integration in the target tissue and the epithelial phenotype could be demonstrated. Fibrin glue was nearly degradated. There was no inflammatory reaction.

Conclusions: Clinical application of tissue-engineered MFU requires stabilization factors due to its mechanical instability. Spraying with fibrin glue enhanced the mechanical stability of MFUs so that they could be well manipulated with surgical instruments. The impact of fibrin glue on the vitality of HUCs was considerably low. These findings are encouraging and suggest fibrin glue as biocompatible stabilizer for urothelial constructs generated *in vitro*. The study will be extended to develop a myourothelial flap in a nude rat model for reconstructive ureteral and urethral surgery.

MP-03.03
Evaluation of Endoscopic Subureteral Injection for Treatment of Vesicoureteral Reflux in Adults

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Introduction and Objective: Search of vesicoureteral reflux (VUR) is part of the standard work-up of children with febrile urinary tract infection (UTI). However, VUR can present later in life and should be investigated in cases of recurrent pyelonephritis. Herein we prospectively evaluated the efficacy of endoscopic injection in the adult population.

Methods: Between December 2005 and September 2009, 27 post-pubertal patients (3 males, 24 females) were treated endoscopically with subureteral injection of polydimethylsiloxane (13) or hyaluronic acid (14). A total of 41 refluxing units were injected (14 bilateral). Median age was 23 years (12-65 years). The VUR was evaluated as grade I in 5 ureters, II in 28, III in 7 and IV in 1. Indications for surgery were recurrent pyelonephritis in all patients except one with dorsal pain during voiding. Renal scars were present in 15 renal units (37%) and duplex systems in 6 (15%). Five patients (12%) had previous ureteral surgeries (2 reimplantations). The procedure was performed by a single surgeon on an outpatient basis, with the patient under general anesthesia. Patients were followed with renal ultrasonography and voiding cystourethrography were repeated as needed based on the clinical evolution.

Results: VUR was corrected in 38 (93%) of 41 ureteral units. Of the 3 failures, one patient had a large Hutch diverticulum and another one had previously undergone ureterocele incision. All of the failures were injected with hyaluronic acid. Therefore success with polydimethylsiloxane was 100% and 87% with hyaluronic acid. De novo hydronephrosis appeared

in 1 renal unit and obstruction was confirmed by MAG3-lasix. Temporary diversion with a double J stent was necessary. Hydronephrosis resolved after removal of the stent.
Conclusions: Subureteral injection is an effective treatment for VUR after puberty. In cases of recurrent pyelonephritis, imaging should be mandatory to detect scars and VUR because the endoscopic treatment is simple, non-invasive and gives a good success rate, comparable to the one reported for children.

5-STAR
MP-03.04
Prostate Gland Volume Measurement Using Trans-Rectal Ultrasound: How Accurate It Is?

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Introduction and Objective: There are many novel techniques to treat localized prostate cancer. Almost all use prostate volume as a cut-point to obtain better results. Imaging methods (computed tomography, magnetic resonance, ultrasound) may have a wide measurement variability between each other. We have compared reports of trans-rectal ultrasound (TRUS) and digital rectal examinations (DRE) with the actual dimensions and weight of prostate specimens after radical prostatectomy; other than the usual "ellipsoid shaped formula", we also used a new "bullet shaped formula" for validation.
Methods: During 18 months, three dimensions (height, width and length) were obtained from 150 fresh specimens after radical prostatectomy and before formalin fixation. The prostate gland was also weighted. In this study, those values were compared with transrectal ultrasound measurements. Each TRUS measurement was compared to fresh specimen dimensions to evaluate which were more susceptible to errors. Clinical patterns were analyzed to verify the main reasons of error.
Results: Median age was 61 years old. Gleason score 6 or 7 was observed in 44.7% and 42.0%, respectively. Clinical stage T1c or T2a was present in 88.7% of cases. Laparoscopic or open radical prostatectomy was done in 64% and 34% of cases, respectively. When evaluating the DRE data, there was a clear tendency by the clinician to overestimate small (<40 g) and underestimate big prostates (>60 g). The overall rate of precise measurements (error less than 10%) was 21.3%, 22.0% and 31.3% for DRE, TRUS (ellipsoid shaped formula) and TRUS (bullet shaped formula). The "bullet-shaped formula" got results closer to the actual volume when compared to "ellipsoid shaped formula" and DRE. The dimension with fewer errors was width. When correlating subgroups with error or not and clinical-pathological features (PSA, Gleason score, margins, extracapsular extension, clinical stage), no predictor for inaccuracy during TRUS could be identified.
Conclusions: The prostate measurements obtained using TRUS are often inaccurate. The height and length dimensions have a larger degree of error. The DRE tend to aggregate the cases between 30 and 60 g, under or overestimating the others. At least in prostate cancer set, we couldn't determine any clinical factor as a predictor of inaccuracy during TRUS exams. In light of the findings, further caution is necessary when using prostate volume as main criteria to include or exclude non-surgical treatments as therapeutic choice for localized prostate cancer.

MP-03.05
Acute Reversible Kidney Injury Secondary to Bilateral Ureteric Obstruction

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Introduction and Objective: Acute reversible kidney injury (ARKI) secondary to bilateral ureteric obstruction (BUO) is not uncommon. Our goals were to describe the etiology and management in such patients identified between 2006 and 2009 and to compare the etiologies to a similar historical study (CMAJ 127:601, 1982).
Methods: Chart review was performed on 75 patients with renal injury secondary to BUO who were admitted to our hospital. Those with bladder outlet obstruction (7) or who refused intervention (1) were excluded. Fifty-two of the remaining patients had ARKI as defined by ≥33% reduction in SCr after intervention.
Results: Eighty-three per cent of patients had BUO secondary to malignancy, 28% of these presenting for the first time. Prevalence of bladder cancer was increased ($p = 0.04$) and cervix decreased ($p = 0.09$) compared with the earlier study; prostate cancer was unchanged ($p = 0.79$). Most common cause of benign BUO was ureteric stones compared with retroperitoneal fibrosis earlier. There was no significant difference in the mean presenting and discharge SCr for the malignant (741±57 µmol/L and 223±19) compared with the benign group (721±162 and 205±40). All patients were treated initially with ureteric stents/nephrostomy tubes/ureteric catheters.

Table 1. MP-03.05

	Malignant		Benign		
Site	1982 (n = 38)	2010 (n = 43)	Etiology	1982 (n = 12)	2010 (n = 9)
Cervix	11 (29%)	5 (12%)	Retro-peritoneal fibrosis	8 (67%)	2 (22%)
Prostate	8 (21)	11 (26)	Ureteric stones	2 (17)	5 (56)
Bladder	5 (13)	15 (35)	Ligated ureters	2 (17)	0
Colon	5 (13)	6 (14)	Other	0	2 (22)
Ovary	5 (13)	1 (2)			
Other	3 (8)	2 (5)			
Lymphoma	1 (3)	3 (7)			

Conclusions: Patients with ARKI secondary to BUO most likely have an underlying malignancy, often being diagnosed for the first time. In this group of patients, the prevalence of bladder cancer increased while cervix decreased. The cause for the former is unclear; the latter may be due to aggressive screening; however, a similar effect in men with prostate cancer was not seen despite the availability of PSA testing.

MP-03.06
Modular Urological Surgical Training Log: Assessing Residents' Needs in Development of a New Surgical Curriculum

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Introduction and Objectives: As training hours decline we are developing an OR curriculum to teach complicated procedures based on a modular design. This model has been employed by various disciplines, including MIS urologists for some time now. It has been shown to decrease time to proficiency without increasing complication rates. Central to our design is a web-based log where residents record their involvement for each predefined step in a given surgery (i.e., pelvic node dissection during RRP). They may choose from roles (i.e., 1st assist, performed inde-

pendently, etc), and periodically attendings review their progress. Focus can be tailored to least attempted or most challenging steps. As steps are ranked by difficulty, they may also be matched to house staff of varying years. Data collected from the logs can then be used fine tune the training program at various levels. We have attempted to define resident ideas and expectations in regards to their current surgical experiences to assess whether the modular education would address their needs.

Methods: Residents of Dalhousie's Department of Urology were surveyed to delineate the needs, learning styles and perceived deficiencies of our current teaching model.

Results: Of our residents, 92% participated in our survey and were analyzed in respect to their training levels. Residents felt surgical competencies were most effective with mentor driven group learning, and with immediate/specific feedback. However, knowledge based competencies were self-learned, and clinical competencies were best learned in a group. Junior residents (PGY3 and below) felt repetition of basic skills (i.e. suturing) was most helpful, while concentrating on discrete steps of a procedure was most important to seniors. Prior to performing a procedure independently, residents were most comfortable if each step was familiar, and complicated tasks were broken down to key elements. In regards to their current training, most felt that time is a determining factor in level of involvement, and that specific feedback may be improved upon. Difficulties in reporting experiences gained from one rotation, often led to decreases in surgical involvement on their subsequent rotation.

Conclusions: In general our residents have shown attitudes and preferences to more structured OR experiences and formalized and frequent assessments by their attendings. We feel that by structuring our teaching within the OR, we will continue to provide appropriate surgical training, and a more consistent learning experience within the constraints of decreased cumulative surgical training hours.

MP-03.07

Designing a High-Fidelity Model of Laparoscopic Partial Nephrectomy: Determining the Resistance and Tear Strength of the Renal Capsule

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Introduction and Objectives: With the growing frequency of small renal masses, the rate of partial nephrectomy is on the rise. Despite the increasing number of laparoscopic radical nephrectomies being performed, laparoscopic partial nephrectomy has not gained wide-spread acceptance. This is likely due to the steep learning curve necessary to perform the procedure. We have endeavored to create a high fidelity model of laparoscopic partial nephrectomy in order to reduce the learning curve. In making the model, we ventured to identify the resistance and tear strength of the renal capsule.

Methods: Using eight (8) fresh porcine kidneys, the tear strength was measured by placing a 2-0 vicryl in the upper pole and laterally attached to a strain gauge fixed within a standardized apparatus to apply traction force. The resistance of the renal capsule was measured using a commercial Durometer at ten points along the upper pole and ten points on the lateral aspect of the kidney. The same measurements were made on post-radical nephrectomy specimens (including the resistance of the tumour) and on a preliminary silicone model. The mean resistance and tear strength values from the specimens were calculated and student T-tests performed for statistical analysis.

Results: The tear strength of the porcine renal capsule was significantly different between the lateral aspect (317 ± 8 g) and the upper pole (278 ±116 g); however, this was opposite to what was seen in the human kidney (242 ± 26 g in the lateral aspect vs. 286 ± 17 g in the upper pole). The resistance of the porcine kidney in the lateral aspect (61.7 ± 24.5 units) was significantly higher than the upper pole (44 ± 13.4 units). However the resistance in the lateral aspect (17.4 ± 2.8 units) and the upper pole (17.1 ± 2.3 units) of the human kidney was not different. The resistance of the tumour was significantly higher at 41.8 ± 9.2 units. The tear strength of the preliminary model was significantly higher than that seen in the porcine or human kidney 526 ± 51.2 g as was the resistance (35.7 ± 3.1 units)

Conclusions: There is a significant difference in the tear strength of the renal capsule in differing regions of the kidney. Also, the resistance of the renal capsule overlying a renal tumour is substantially higher than normal tissues. These characteristics will be used to increase the fidelity of our model and may also be the basis of studies into visuo-spatial haptics in surgery.

MP-03.08

Surgical Case Volume in Canadian Urology Residency: A Comparison of Trends in Open and Minimally Invasive Surgical Experience

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Introduction and Objective: The application of minimally invasive technology has become increasingly common in urological training programs and clinical practice. However, there is little published data on the impact of this technology on urology resident surgical case volume. Our objective was to review surgical case data from all 12 Canadian residency programs to identify trends in resident exposure to minimally invasive and open surgical procedures over a 6 year period.

Methods: Every year, beginning in 2003, an average of 41 PGY 3-5 residents voluntarily self-reported surgical case data to a secure internet relational database (T-Res®). Accumulated data was anonymized, extracted and analyzed for the period 2003-2009 by measuring a set of 11 predefined index cases which could be performed in both an open and MIS fashion. [Nephrectomy(donor, radical, simple, partial), Prostatectomy (simple, radical), Cystectomy (radical, partial), Nephroureterectomy, Pyeloplasty, Adrenalectomy]

Results: There were 78,897 cases recorded in the database over the study period by a total of 198 residents. Of these entries, 16,687 represented index cases. As a proportion of all index procedures logged by trainees, there was a significant increase in minimally invasive surgeries over the study period from 16% in 2003-04 to 33% in 2008-09 (p = 0.025). A significant decrease in the proportion of index cases performed with an open approach was also observed from 84% in 2003-04 to 67% in 2008-09 (p = 0.025). The majority of these shifts were secondary to the significantly increased application of MIS for Nephrectomies of all types (43-51%), Nephroureterectomy (34-75%), Adrenalectomy (47-72%), and Pyeloplasty (26-48%) (p < .001 for all). While there was a significant increase in MIS experience with radical prostatectomy (6.5%-18%, p < 0.0001) the majority of these were still taught in an open fashion during the study period.

Conclusion: Minimally invasive surgery constitutes an increasingly significant component of surgical case volume in Canadian urology residency programs. This has caused a reciprocal decrease in resident exposure to open surgery for some index urological procedures. These trends require ongoing evaluation in order to assess and maintain the integrity of postgraduate urological training.