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## UROLOGICAL SURVEY

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## STONE DISEASE

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**Renal functional effects of multiple-tract percutaneous access**

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J Endourol. 2009; 23: 1951-6

**Introduction:** Percutaneous nephrolithotomy (PCNL) can involve establishing more than one access into the urinary collecting system. The present study examined whether multiple percutaneous accesses results in a more severe reduction in renal function than that after single-percutaneous access.

**Methods:** Adult female pigs were anesthetized, and percutaneous access to the left urinary collecting system was achieved by puncturing the lower pole calyx (single-tract access, n = 16) or serially puncturing the lower pole, interpolar region, and upper pole calyces [multiple (three)-tract access, n = 11]. Renal function measurements included glomerular filtration rate and effective renal plasma flow, and were taken immediately before and 1.5 and 4.5 hours after percutaneous access. We also examined glomerular function in a group of adult patients with normal preoperative serum creatinine (Cr) levels ( $\leq 1.4$  mg/dL) who underwent either unilateral single-tract PCNL (23 patients) or unilateral multiple (two)-tract PCNL (10 patients). Access tracts were dilated to 30F with a NephroMax balloon dilator system in animal and human patients.

**Results:** Single- and multiple-tract percutaneous access procedures in pigs resulted in a similar renal functional response; both glomerular filtration rate and effective renal plasma flow significantly declined by approximately 60% immediately after access and remained depressed throughout the experimental observation period. A retrospective analysis of patients with normal serum Crs ( $\leq 1.4$  mg/dL) who underwent single- or multiple-tract PCNL demonstrated that the procedures produced similar and significant increases in serum Cr on postoperative day 1 (0.33  $\pm$  0.09 [standard error of mean] mg/dL and 0.39  $\pm$  0.11 mg/dL, respectively) and day 2 (0.33  $\pm$  0.09 mg/dL and 0.25  $\pm$  0.09 mg/dL, respectively).

**Conclusions:** Multiple-tract access does not lead to a more severe reduction in renal function than single-tract access; that is, the acute renal hemodynamic response to PCNL appears independent of the number of access tracts.

**Editorial Comment**

The human study is limited as there were significant differences in baseline renal function between the two groups analyzes. Creatinine clearance calculations based on spot serum levels is a relatively crude measure of renal function, and could also be impacted by anemia, hydration and medications in the perioperative period.

In the porcine study, though changes in ipsilateral kidney function were marked ( $>60\%$  decrease GFR and RPF), no difference was noted whether one or three tracts were created. In contrast, multiple tract access appeared to have a greater impact on the contralateral untreated kidney, with greater decreases in GFR and RPF ( $>45\%$  vs.  $<20\%$ ). Though this did not reach statistical significance, it does warrant concern - suggesting that greater caution is warranted at least in the perioperative period if multiple-tract access is utilized with regards to using medications that rely on renal clearance or have the potential for nephrotoxicity. Long-term prospective studies evaluating the relative impact of multiple vs. single tract access with more liberal use of flexible nephroscopy and/or ureteroscopy as an adjunct are warranted.

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**Residual fragments after percutaneous nephrolithotomy: cost comparison of immediate second look flexible nephroscopy versus expectant management**

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J Urol. 2010; 183: 188-93

**Purpose:** We performed a cost comparison of immediate second look flexible nephroscopy vs expectant management for post-percutaneous nephrostolithotomy residual fragments.

**Materials and Methods:** We used a decision analysis model to compare the cost of managing residual fragments by second look flexible nephroscopy vs observation. Outcomes of residual fragments after percutaneous nephrostolithotomy were determined from institutional experience and published shock wave lithotripsy series. Cost data were obtained from billing records. One-way sensitivity analysis was done to evaluate incurred costs of second look flexible nephroscopy while varying the likelihood of a stone event, the probability of surgery and the cost of surgical intervention. Two-way sensitivity analysis was done to assess the model across a range of scenarios.

**Results:** Based on data in the literature and our institutional experience 40% of patients with residual fragments 4 mm or less had a stone event, of whom 57% required surgical intervention. Based on these estimates the average cost of expectant management for a residual fragment 4 mm or less vs greater than 4 was \$1,743 vs \$4,674. The average incremental cost of second look flexible nephroscopy at our institution was \$2,475. Two-way sensitivity analysis showed that varying assumptions dramatically altered conclusions about the cost benefit of second look flexible nephroscopy.

**Conclusions:** Our model suggests that second look flexible nephroscopy is not cost advantageous in all patients with post-percutaneous nephrostolithotomy residual fragments. Cost benefit analysis is significantly impacted by the likelihood of a stone related event, the need for surgical intervention and surgical costs. Compared to an observational strategy second look flexible nephroscopy incurs lower costs for greater than 4 mm but not for 4 mm or less residual fragments.

**Editorial Comment**

The authors have conducted a critical appraisal of their protocol for CT scan imaging on postoperative day 1 followed by second look nephroscopy. The current study confirms that second-look flexible nephroscopy (SLFN) is not warranted for residual stone fragments smaller than 2 mm, but is a good approach for fragments larger than 4mm. A “grey zone” exists for stones 3 and 4mm in size; though cost of observation vs. SLFN is equivalent in this group, 75% of those observed will experience a stone related event and as such, these patients may benefit clinically from a SLFN. The authors were limited in their ability to build a decision model based on data from patients undergoing PCNL due to the scarcity of studies reporting long-term outcomes with residual fragments in this setting. The use of SWL literature to build the decision model may be limited by the difference in initial stone burden between the two patient groups. Patients with a smaller stone burden (SWL) may be more likely to undergo less invasive secondary procedures for residual fragments - indeed the distribution of secondary procedures used in the metanalysis strongly favored SWL (77%); one would anticipate a higher use of endoscopic procedures post-PCNL. The decision to select SLFN vs. URS or SWL is often determined by the quality of the initial percutaneous renal access and the location of the RF in relation to the access. With the stone size criteria established, one must now re-evaluate the need for postoperative CT scan imaging - indeed

intraoperative fluoroscopy with magnification in conjunction with endoscopic evaluation may be sufficient to identify those fragments that really matter.

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## ENDUROLOGY & LAPAROSCOPY

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### **7-year oncological outcomes after laparoscopic and open partial nephrectomy**

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J Urol. 2010; 183: 473-9

**Purpose:** Open partial nephrectomy has proven long-term oncological efficacy. Long-term outcomes of laparoscopic partial nephrectomy are pending. We present the long-term outcomes of patients undergoing laparoscopic or open partial nephrectomy for a single cT1 renal cortical tumor 7 cm or less.

**Materials and Methods:** Of 2,246 patients undergoing partial nephrectomy for a single cT1 tumor (1999 to 2008), minimum 7-year followup was available in 77 and 310, and minimum 1-year followup was available in 672 and 944 after laparoscopic and open partial nephrectomy, respectively. Survival and recurrence data obtained from medical records, radiographic reports and patient contact were analyzed retrospectively.

**Results:** Median followup after laparoscopic and open partial nephrectomy was 4.0 and 5.7 years, respectively. Oncological outcomes were excellent in both groups. On multivariable analysis predictors of all cause mortality included advancing age ( $p < 0.0001$ ), comorbidity ( $p < 0.0001$ ) and preoperative renal dysfunction ( $p = 0.0001$ ) but not tumor size ( $p = 0.6$ ) or operative approach (laparoscopic vs open partial nephrectomy,  $p = 0.06$ ). Cancer recurred infrequently and only rarely caused mortality after laparoscopic or open partial nephrectomy. At 7 years metastasis-free survival was 97.5% and 97.3% ( $p = 0.47$ ) after laparoscopic and open partial nephrectomy, respectively. After accounting for baseline differences between the cohorts using propensity score matching 7-year metastasis-free survival was similar after laparoscopic and open partial nephrectomy.

**Conclusions:** Laparoscopic and open partial nephrectomy appear to provide similar long-term overall and cancer specific survival in patients undergoing partial nephrectomy for clinical stage T1 (7 cm or less) renal cortical tumors. Oncological outcomes at 7 years after laparoscopic and open partial nephrectomy are excellent with the majority (97%) of patients experiencing metastasis-free survival.

### **Editorial Comment**

The authors have demonstrated that laparoscopic and open partial nephrectomy appear to provide similar long-term overall and cancer specific survival in patients undergoing partial nephrectomy for clinical stage T1. This manuscript describes a well known fact that the laparoscopic surgical technique has not compromised

oncological outcomes particularly in renal cancer and renal surgery. Moreover, the complication rates with the laparoscopic technique have been demonstrated to be comparable to the open technique.

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### **Cost analysis of robotic versus open radical cystectomy for bladder cancer**

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J Urol. 2010; 183: 505-9

**Purpose:** Recently robotic approaches to cystectomy have been reported, and while clinical and oncological efficacy continues to be evaluated, potential financial costs have not been clearly evaluated. In this study we present a financial analysis using current cost structures and clinical outcomes for robotic and open cystectomy for bladder cancer.

**Materials and Methods:** The financial costs of robotic and open radical cystectomy were categorized into operating room and hospital components, and further divided into fixed and variable costs for each. Fixed operating room costs for open cases involved base cost as well as disposable equipment costs while robotic fixed costs included the amortized machine cost as well as equipment and maintenance. Variable operating room costs were directly related to length of surgery. Variable hospital costs were directly related to transfusion requirement and length of stay. The means of the prior 20 cases of robotic and open cystectomy were used to perform a comparative cost analysis.

**Results:** Mean fixed operating room costs for robotic cases were \$1,634 higher than for open cases. Operating room variable costs were also higher by a difference of \$570, directly related to increased operating room time. Hospital costs were nearly identical for the fixed component while variable costs were \$564 higher for the open approach secondary to higher transfusion costs and longer mean length of stay. Based on these findings robotic cystectomy is associated with an overall higher financial cost of \$1,640 (robotic \$16,248 vs open \$14,608). Cost calculators were constructed based on these fixed and variable costs for each surgical approach to demonstrate the expected total costs based on varying operating room time and length of stay.

**Conclusions:** Robotic assisted laparoscopic radical cystectomy is associated with a higher financial cost (+\$1,640) than the open approach in the perioperative setting. However, this analysis is limited by its single institution design and a multicenter followup study is required to provide a more comprehensive analysis.

### **Editorial Comment**

Independently of the techniques used for the surgical treatment of bladder cancer, the oncological principles must be followed and outcomes ought to be equal or exceed the tumor control and improve the recovery time.

This article demonstrates that robotic radical cystectomy has similar short-term cancer control and complication rates, less operative time and a shorter hospital stay than laparoscopic or open radical cystectomy. The authors recently performed completely intracorporeal robotic cystectomy and diversion setting the bar for minimally invasive radical cystectomy and urinary diversion very high. It will be important for other centers to duplicate these results and take into account the price of acquiring the robot and servicing it plus the cost of disposables utilized during robotic surgery.

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## IMAGING

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### **Clinical stage T1c prostate cancer: evaluation with endorectal MR imaging and MR spectroscopic imaging**

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*Radiology. 2009; 253: 425-34*

**Purpose:** To assess the diagnostic accuracy of endorectal magnetic resonance (MR) imaging and MR spectroscopic imaging for prediction of the pathologic stage of prostate cancer and the presence of clinically nonimportant disease in patients with clinical stage T1c prostate cancer.

**Materials and Methods:** The institutional review board approved-and waived the informed patient consent requirement for-this HIPAA-compliant study involving 158 patients (median age, 58 years; age range, 40-76 years) who had clinical stage T1c prostate cancer, had not been treated preoperatively, and underwent combined 1.5-T endorectal MR imaging-MR spectroscopic imaging between January 2003 and March 2004 before undergoing radical prostatectomy. On the MR images and combined endorectal MR-MR spectroscopic images, two radiologists retrospectively and independently rated the likelihood of cancer in 12 prostate regions and the likelihoods of extracapsular extension (ECE), seminal vesicle invasion (SVI), and adjacent organ invasion by using a five-point scale, and they determined the probability of clinically nonimportant prostate cancer by using a four-point scale. Whole-mount step-section pathology maps were used for imaging-pathologic analysis correlation. Receiver operating characteristic curves were constructed and areas under the curves (AUCs) were estimated nonparametrically for assessment of reader accuracy.

**Results:** At surgical-pathologic analysis, one (0.6%) patient had no cancer; 124 (78%) patients, organ-confined (stage pT2) disease; 29 (18%) patients, ECE (stage pT3a); two (1%) patients, SVI (stage pT3b); and two (1%) patients, bladder neck invasion (stage pT4). Forty-six (29%) patients had a total tumor volume of less than 0.5 cm<sup>3</sup>. With combined MR imaging-MR spectroscopic imaging, the two readers achieved 80% accuracy in disease staging and AUCs of 0.62 and 0.71 for the prediction of clinically nonimportant cancer.

**Conclusion:** Clinical stage T1c prostate cancers are heterogeneous in pathologic stage and volume. MR imaging may help to stratify patients with clinical stage T1c disease for appropriate clinical management.

**Editorial Comment**

Similar to other studies the authors showed that MR imaging findings might represent additional useful variables for predicting disease extent in patients with clinically localized prostate cancer. Combined endorectal MRI-MR spectroscopic imaging had 80% accuracy in the staging of disease in patients with clinical stage T1c prostate cancer. These combined techniques had a moderate accuracy, 62-72%, in the prediction of clinically non-important cancer in this group of patients. As the authors pointed out it would be of clinical interest in the future to investigate whether multiparametric examination which combination of conventional T2-w images, spectroscopy, diffusion-weighted image (DWI) and perfusion studies can yield superior diagnostic information for stratifying patients with T1 c prostate cancer. Since 2004, we have been using in our department this multiparametric evaluation in patients with organ-confined tumor, based on finding of conventional T2-weighted images.

We have found that DWI and perfusion techniques, similarly to spectroscopy are very useful to detect tumor > 0.5 cm<sup>3</sup> and with higher Gleason grades. All techniques have difficult to detect smaller and low grades tumor. In other words, when we find a lesion with imaging characteristics of a possible aggressive tumor on T2-w images and spectroscopy, but without concordant findings on DWI and perfusion studies, our tendency is to downgrade the lesion to a possible less important one. We have found that usually a large and aggressive tumor will present as an area with restricted diffusion (lower ADC values) and with abnormally elevated values of the pharmacokinetics parameters obtained with perfusion studies. On the other hand, patients with normal multiparametric prostate examination has a very high probability of have a clinically non-important cancer.

Another important finding of this study is that from 158, 124 (78%) patients had organ-confined disease (stage pT2), 29 (18%) had extracapsular extension (stage pT3a), two (1%) had seminal vesicle invasion (stage pT3b), and two (1%) had bladder neck invasion (stage pT4). We have to remember that clinically T1 c patients typically are considered to have localized early-stage disease of relatively low risk. Additionally 30 (19%) of the patients met the criteria to be considered for active surveillance as a management strategy, 4(13%) had extraprostatic extension of disease at surgical-pathologic analysis. These findings further enhance the value of endorectal MRI examination in the pre-operative evaluation of patients with T1c prostate carcinoma.

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**Bladder tumor staging: comparison of contrast-enhanced and gray-scale ultrasound**

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AJR Am J Roentgenol. 2010; 194: 151-6

Objective: The purpose of this study was to evaluate the effectiveness of contrast-enhanced sonography in comparison with conventional sonography in differentiating muscle-infiltrating and superficial neoplasms of the urinary bladder.

**Subjects and Methods:** Conventional and contrast-enhanced sonography were performed on 34 consecutively registered patients with bladder tumors. All examinations were reviewed by two independent sonologists. At gray-scale sonography, interruption of the hyperechoic bladder wall was considered the main diagnostic criterion for differentiating superficial and infiltrating tumors. At contrast-enhanced sonography, a tumor was considered superficial when the hypoechoic muscle layer of the bladder wall was intact; disruption of the muscle layer by enhancing tumor tissue was considered diagnostic of infiltration. A level of confidence in the diagnosis of tumor infiltration of the muscle layer was assigned on a 5-degree scale. Receiver operating characteristic analysis was used to assess overall confidence in the diagnosis of muscle infiltration by tumor at both conventional and contrast-enhanced sonography. Histologic diagnosis was obtained for all patients.

**Results:** Final pathologic staging revealed 25 superficial tumors (Ta-T1 disease) and nine muscle-infiltrating tumors (>T1). Conventional sonography depicted five of nine muscle-infiltrating tumors, and contrast-enhanced sonography depicted all nine. The diagnostic performance of contrast-enhanced sonography approached that of the reference standard (area under the receiver operating characteristic curve, 0.996), but the diagnostic performance of gray-scale ultrasound was worse (area under curve, 0.613).

**Conclusion:** Our study showed that contrast-enhanced sonography is better than conventional sonography for differentiating muscle-infiltrating and superficial neoplasms of the urinary bladder.

### **Editorial Comment**

According to the American College of Radiology Appropriateness Criteria, the use of transabdominal ultrasound for pretreatment staging of invasive bladder cancer receives rating 3 (rating scale 1 = least appropriate and 9 = most appropriate). This poor rating is due to the inherent limitation of the abdominal transducers in the visualization of the layers of the bladder wall, which usually appeared homogeneously hyperechoic. Based on their previous observation that after microbubble administration the layers of the bladder wall were clearly differentiated with conventional ultrasound the authors decided to investigate the effectiveness of contrast-enhanced sonography compared with conventional gray-scale sonography in differentiating muscle-infiltrating and superficial neoplasms of the urinary bladder. The diagnostic performance of contrast-enhanced sonography was much better than the gray scale ultrasound (AUC 0.996 x AUC 0.613). As already mentioned by the authors contrast-enhanced sonography has many of the limitations of other ultrasound techniques (difficulty to detect flat lesions; obesity and calcification impairs bladder wall evaluation; columnar hypertrophy of the bladder wall, calcification and tumor location may be troublesome during examination). However, one of the most important limitations of this technique is that the FDA did not approve yet its use for internal medicine examination. Another important limitation is related to the necessity of specialized contrast-specific ultrasound techniques found only in state-of-the art equipments. With contrast-enhanced ultrasound is also very difficult to obtain information on the extent of extra-vesical spread of large, widely infiltrating tumors and on the status of pelvic lymph node. For this reason, we still prefer to use magnetic resonance imaging as the main imaging modality for local staging of possible invasive bladder cancer (T staging accuracies 73% to 96% of cases and 73% to 98 % accuracy for staging of nodes and metastases).

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## UROGENITAL TRAUMA

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### **Straddle injuries to the bulbar urethra: management and outcomes in 78 patients**

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J Urol. 2004; 171(2 Pt 1): 722-5

**Purpose:** We describe our experience with blunt straddle injuries to the anterior urethra and identify factors that may affect patient outcome.

**Materials and Methods:** We reviewed the San Francisco General Hospital Urologic Trauma data base to identify men with blunt straddle injury. We analyzed presentation and initial management, location and length of urethral stricture, surgical options, and long-term outcome after reconstruction.

**Results:** Of 78 patients, 40% presented to the emergency department acutely and 60% presented 6 months to 10 years after injury complaining of obstructive symptoms, of whom 30% reported at least 1 episode of urinary retention. Initial acute management was suprapubic cystostomy in 81% of cases and primary realignment in 19%. Urethral strictures were predominantly located in the proximal bulb. Mean stricture length was significantly longer in men with delayed presentation (2.7 vs 1.8 cm,  $p < 0.05$ ). No relationship was found between stricture length and the mechanism of injury or initial management technique. However, patients who had undergone primary realignment required complex flap or graft urethroplasty at a greater rate compared with men who had undergone suprapubic diversion ( $p = 0.054$ ). Transperineal urethroplasty was required in 92% of patients with the majority undergoing end-to-end anastomosis. The success rate was 95% at a mean followup of 25 months (range 10 to 180). Recurrent stricture occurred in 4 men with prior urethral manipulation and it was managed successfully by direct vision internal urethrotomy alone.

**Conclusions:** After blunt straddle injury to the perineum the primary morbidity is anterior urethral stricture, for which suprapubic cystostomy is appropriate initial management. The majority of patients require surgery but with careful preoperative planning and adequate resection of fibrotic tissue the long-term success rate can approach 95%. If it arises, recurrent stricture responds well to direct vision internal urethrotomy alone.

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### **Management of low velocity gunshot wounds to the anterior urethra: the role of primary repair versus urinary diversion alone**

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J Urol. 1993; 150: 70-2

The management of partial transection of the anterior urethra following penetrating penile injuries is controversial. Optional therapeutic techniques range from a primary sutured reapproximation to urinary diversion alone. We recently managed 17 low velocity gunshot wounds to the external genitalia in which the missile traversed the penile corpus cavernosum, and was associated with less than 40% transection of the corpus spongiosum and anterior urethra. Nine patients were managed with suprapubic diversion, skin débridement and corporeal

closure along with placement of a urethral catheter. Eight patients were managed by suprapubic diversion, débridement, closure of the corporeal bodies and a primary sutured reapproximation of the anterior urethra. Urethral strictures developed in 7 patients (78%) managed by a suprapubic tube and urethral stenting during an average followup of 20 months (range 18 to 24). In contrast, 1 patient (12%) managed by a sutured urethral approximation had a urethral stricture during an average followup of 20 months (range 18 to 30,  $p < 0.01$ ). Our data support a significantly better prognosis for partial transection of the anterior urethra secondary to low velocity gunshot wounds if managed by aggressive wound débridement, corporeal repair, placement of a suprapubic catheter and primary repair of the urethra.

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### **Straddle injuries to the bulbar urethra: management and outcome in 53 patients**

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Int Braz J Urol. 2009; 35: 450-8

**Objective:** To describe our experience with blunt injuries to the bulbar urethra and their late sequelae to identify factors that may affect patient outcome.

**Materials And Methods:** A retrospective study was performed on 53 male patients who presented, between January 2001 and December 2005, with blunt traumatic injury to the bulbar urethra. The definitive diagnosis of urethral rupture was made by retrograde urethrography, where urethral rupture was classified into partial or complete. The minimum follow-up period was 3 years. The initial management was either suprapubic cystostomy or endoscopic urethral realignment over a urethral catheter using a cystoscope to pass a guide-wire over which the catheter was inserted. Stricture formation was managed by visual internal urethrotomy (VIU) for passable strictures and urethroplasty (stricture excision and re-anastomosis) for impassable strictures or recurrence after VIU. The follow-up period was three years. The results were analyzed by SPSS software (chi-square and Student's-t-test).

**Results:** Stricture formation occurred in 19 of 22 patients (86%) with complete urethral rupture and in 10 of 31 (32%) with partial rupture ( $p < 0.001$ ). Strictures occurred in 11 of 31 (35%) patients treated initially with suprapubic cystostomy and in 18 of 22 (82%) treated with primary urethral realignment ( $p < 0.001$ ). The success rate after VIU was 15% (4 of 26 patients) and after urethroplasty it was 96% (24 of 25 patients) ( $p < 0.001$ ).

**Conclusions:** Suprapubic cystostomy is better than urethral realignment and catheterization as primary management after straddle injury to the bulbar urethra. Stricture excision and re-anastomosis is better than VIU as delayed management for strictures that develop after straddle injury to the bulbar urethra.

### **Editorial Comment**

While a few of the above articles are old, they illustrate important teaching points about how urethral injury etiology dictates outcome and the best choice for management.

Blunt crush injuries to the urethra typically results in a short segment of spongiofibrosis that occurs in the mid bulbar urethra. Stricture etiology, location and length typically dictate the type of repair selected and the success of the long term outcome. With a blunt injury, the stricture is typically less than 2 cm and the natural elasticity of the mobilized urethra can bridge the gap. The spongiofibrosis from a straddle injury is isolated to a short segment, while the rest of the urethra and the rest of the corpus spongiosum are normal. Inflammatory strictures typically cause a more diffuse spongiofibrosis, and thus are often best managed by an onlay skin flap or buccal mucosal graft.

Straddle injuries are not to be confused with the stenoses that occur from pelvic fracture. With pelvic fracture, the injury is a distraction injury where there is disruption of the urethra and corpus spongiosum at the level of the membranous - bulbar junction or the membranous and the prostate. Here there is no real spongiosum fibrosis and “urethral stricture” – but scar tissue that fills the gap. Primary realignment is the preferred management of such injuries because it a distraction injury and not a stricture. Historically, the outcomes of primary realignment are a reduction in urethral stricture by 50%, while the rates of erectile dysfunction and incontinence are the same as a suprapubic tube. Furthermore, the eventual stricture that does occur is often shorter and more amenable to urethrotomy.

From the above abstracts, I think the conclusion that straddle injuries should be managed by suprapubic tube alone, as the best management that should be followed. Intuitively, we would assume that the Denis Browne principle would apply here and stenting would promote epithelialization. However, until a randomized prospective trial takes pace – and I doubt that any such study will be done soon – we should resist the temptation to primarily realign the urethra. As to urethral penetrating urethral injuries from low velocity gunshot wounds (no delayed ischemia or blast effect) the site of injury is typically short. A short area of injury can be bridged by adequate mobilization and natural elasticity of the urethra, particularly in the bulbar urethra. In the penile urethra, over mobilization and an anastomosis on tension may result in chordee or stricture failure. Primary realignment of a short penile urethral injury is not the first treatment of choice – but rather surgical exploration and primary repair. When the defect is too long (more than 1 cm or so), urethral marsupialization and a two stage repair (in the method of Johansson) is probable best.

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## **PATHOLOGY**

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### **Does perineural invasion on prostate biopsy predict adverse prostatectomy outcomes?**

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BJU Int. 2009 Aug 19. [Epub ahead of print]

Objective: To determine the relationship between perineural invasion (PNI) on prostate biopsy and radical prostatectomy (RP) outcomes in a contemporary RP series, as there is conflicting evidence on the prognostic significance of PNI in prostate needle biopsy specimens.

**Patients and Methods:** From 2002 to 2007, 1256 men had RP by one surgeon. Multivariable logistic regression and Cox proportional hazards models were used to examine the relationship of PNI with pathological tumour features and biochemical progression, respectively, after adjusting for prostate-specific antigen level, clinical stage and biopsy Gleason score. Additional Cox models were used to examine the relationship between nerve-sparing and biochemical progression among men with PNI.

**Results:** PNI was found in 188 (15%) patients, and was significantly associated with aggressive pathology and biochemical progression. On multivariate analysis, PNI was significantly associated with extraprostatic extension and seminal vesicle invasion ( $P < 0.001$ ). Biochemical progression occurred in 10.5% of patients with PNI, vs 3.5% of those without PNI (unadjusted hazard ratio 3.12, 95% confidence interval 1.77-5.52,  $P < 0.001$ ). However, PNI was not a significant independent predictor of biochemical progression on multivariate analysis. Finally, nerve-sparing did not adversely affect biochemical progression even among men with PNI.

**Conclusion:** PNI is an independent risk factor for aggressive pathology features and a non-independent risk factor for biochemical progression after RP. However, bilateral nerve-sparing surgery did not compromise the oncological outcomes for patients with PNI on biopsy.

### Editorial Comment

Perineural invasion (PNI) on needle prostatic biopsies as a marker of extraprostatic extension has been controversial. In almost all studies, perineural invasion has been related to extraprostatic extension in univariate analysis but in only a few studies in multivariate analysis. The practical importance relates to the decision of whether to sacrifice part or all of the neurovascular bundle on the side of the biopsy with PNI in planning nerve-sparing radical prostatectomy.

Egan and Bostwick (1) found on univariate analysis that PNI on needle biopsy was significantly associated to extraprostatic extension and seminal vesicle invasion. On multivariate analysis, however, only preoperative PSA, proportion of the biopsy involved by cancer, and Gleason score were significant. Ukimura et al. (2) found that PNI on biopsy was a good predictor among others studied for extraprostatic extension on univariate analysis but not on multivariate analysis. In the study by Vargas et al. (3) PNI was not an independent predictor of extraprostatic extension when PSA was included.

D'Amico et al. (4) evaluated the clinical use of PNI at biopsy for predicting time to PSA failure following radical prostatectomy of 750 men with clinically localized or PSA detected prostate cancer. The presence of PNI on biopsy was not a significant predictor of PSA outcome following RP for patients in the intermediate or high risk group. O'Malley et al. (5) compared 78 biopsies with PNI with 78 matched controls without PNI and were unable to show that PNI on needle biopsy influences long-term tumor-free survival.

In the study surveyed, Loeb's et al. found that PNI is an independent risk factor for aggressive pathology features like extraprostatic extension and seminal vesicle invasion, and a non-independent risk factor for biochemical progression after radical prostatectomy. According to the authors, the findings support the routine reporting of PNI in biopsy pathology reports. They also concluded that nerve-sparing surgery did not adversely affect biochemical progression even among men with PNI.

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**Transurethral resection specimens of the bladder (TURB): Outcome of invasive urothelial cancer involving muscle bundles indeterminate between muscularis mucosae and muscularis propria**

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Mod Pathol 2010;in press [Abstract from the USCAP meeting, 2010]

Background: It may be difficult to diagnose muscularis propria on TURB as thin muscle fibers on TURB may represent either muscularis propria destroyed or splayed by urothelial carcinoma or muscularis mucosae, which may be hyperplastic.

Design: 95 invasive bladder cancers seen at our institution (1986-2008) with follow-up (mean 25.4 months) where the initial TUR pathologic stage was ambiguous (T1 vs. T2) were analyzed (73 men; 22 women; mean age 69.4 years).

Results: Subsequent restaging TURB or definitive therapeutic procedures performed  $\leq 3$  months after the original TURB done in 58 cases revealed 22 (37.9%) patients with non-muscle invasive disease and 32 (55.2%) patients with  $\geq$  pT2 disease. Staging in 4 cases remained ambiguous. 37 cases eventually developed  $\geq$  pT2 disease in 2/22 (9.1%) cases with non-muscle invasive disease on initial restaging TURB, 2/4 (50.0%) of cases with uncertain stage disease, and 14/37 (37.8%) cases with no restaging TURB. Patients with a final stage of non-muscle invasive disease had a lower risk of progression (T4 or metastatic disease) vs. those with a final stage of  $\geq$ pT2 ( $p=0.003$ ), uncertain stage ( $p=0.012$ ), or no stage confirmation ( $p=0.043$ ).

Conclusions: This is the first study to evaluate follow-up when initial TURB is equivocal for muscularis propria invasion. Similar to an atypical prostate needle biopsy, urologists should be encouraged to perform restaging TURBs in cases of equivocal muscularis propria invasion. Although this may seem intuitive, 37/95 cases did not have repeat staging/therapeutic procedures done within 3 months of initial TURB; 37.8% of these patients eventually developed  $\geq$  T2 disease.

**Editorial Comment**

It is of utmost importance the staging of urothelial carcinomas of the urinary bladder. In stage pT2 (invasion of the muscularis propria) is indicated radical cystectomy. Sometimes the distinction between muscularis mucosae and muscularis propria is a dilemma for the pathologist. Invasion of the muscularis mucosa is stage pT1.

Morphologically these two muscular layers are distinct. In muscularis mucosa, the fibers are thin and spaced; in muscularis propria, the fibers form compact aggregates. It is interesting to note that description of the muscularis mucosae will not be found in Histology texts. The existence and morphology of this layer was

described in 1983 by Dixon and Gosling (1) and the importance for staging and treatment of bladder urothelial carcinoma by Ro JY et al (2) from the MD Anderson Hospital in Houston.

In some cases it is difficult if not impossible for the pathologist to recognize that the invaded muscular layer is the muscularis mucosae. This happens because the fibers of this layer may be thick due to hypertrophy. In doubt, the pathologist should always ask for a restaging TUR of the bladder. Another much commoner condition for asking a restaging TUR is whenever the specimen does not contain muscularis propria.

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## BASIC AND TRANSLATIONAL UROLOGY

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### **Temporary segmental renal artery occlusion using reverse phase polymer for bloodless robotic partial nephrectomy**

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*J Urol.* 2009; 182:1582-7

**Purpose:** Renal vascular clamping with ensuing warm ischemia is typically needed during robotic or laparoscopic partial nephrectomy. We developed a technique for angiographic delivery of the novel intra-arterial reverse thermoplastic polymer LeGoo-XL that allows temporary selective vascular occlusion with normal perfusion of the remaining kidney.

**Materials and Methods:** Eight pigs underwent a total of 16 selective angiographic occlusions of the lower pole segmental artery using gel polymer. The technical feasibility of 2 hemostatic techniques, perfusion hemostasis and local plug formation, was assessed in 4 pigs each. Selective ischemia time was recorded and the vascular occlusion site was noted radiographically and laparoscopically. The feasibility of reversing the polymer from solid back to liquid state to allow reperfusion was determined. Pathological analysis of the kidney was completed in these acute model pigs. In the last 2 cases lower pole robotic partial nephrectomy was done using the da Vinci surgical system.

**Results:** Selective lower pole ischemia was achieved in all 8 cases. Perfusion hemostasis yielded an inconsistent duration of occlusion (zero to greater than 60 minutes). Vascular occlusion time using local plug formation was more reliable (17 to 30 minutes) with consistent ability to reverse the plug to liquid state by cold saline flush. Two lower pole robotic partial nephrectomies were completed with minimal blood loss.

Conclusions: We developed a reliable technique of angiographic delivery of gel polymer for temporary vascular occlusion of selective renal artery branches using local plug formation. Ongoing studies are under way to assess technique consistency and the long-term effects of the polymer.

### Editorial Comment

This is an interesting experimental study in pigs, on which the authors tested the intra-arterial injection of reverse thermoplastic polymer LeGoo-XL that allows temporary selective vascular occlusion. The polymer was used with the intend of facilitate hemostasis for laparoscopic partial nephrectomy of the lower (caudal) pole. The perfusion hemostasis was not reliable in achieving occlusion while when using a local plug formation for hemostasis the results were consistent, with occlusion time from 13 to 30 minutes. The authors performed 2 robotic partial nephrectomies and concluded that the technique allowed minimal blood loss. Nevertheless, the authors did not take into account previous studies on intra-renal anatomy in pigs. While the collecting system anatomy is very similar to that of humans (1), the arterial (2) and venous (3) intra-renal anatomy in pigs is different from that of humans in many aspects that would be interesting to be discussed. Also, there are many important differences in the upper and lower pole vascular anatomy, being the upper pole vessels much more complex in distribution. Although we cannot transpose the results to clinical setting, the study opened new avenue to enhance the possibility of partial nephrectomy.

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### Sildenafil as a protecting drug for warm ischemic kidney transplants: experimental results

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*J Urol.* 2009; 182: 1222-5

Purpose: In an experimental model we studied the protective effects of the phosphodiesterase-5 inhibitor sildenafil on kidney grafts autotransplanted after 45 minutes of warm ischemia by vascular clamping, nephrectomy and 60 minutes of isolated hypothermic pump perfusion.

**Materials and Methods:** A total of 14 laboratory minipigs were divided into group 1-7 administered 100 mg sildenafil orally 1.5 hours preoperatively and group 2-7 in which no sildenafil was given. Right single nephrectomy was completed after 45 minutes of warm ischemia by complete vascular clamping. Before autotransplantation all kidneys underwent 60 minutes of hypothermic pulsatile perfusion. Renal flow, arterial pressure and renal vascular resistance were recorded in real time for 60 minutes after autotransplantation. Nitric oxide levels were determined in blood samples from the renal vein at predefined intervals. Optical and electronic microscopy was done in all organs at the end of the procedure.

**Results:** In group 1 vs 2 renal vascular flow was significantly higher (155.30 vs 29.04 ml per minute per 100 gm) and renal vascular resistance was significantly lower (0.59 vs 3.10 mm Hg/ml per minute, each  $p < 0.01$ ). No significant differences were observed in systemic arterial pressure between groups 1 and 2 (84.08 and 84.65 mm Hg, respectively,  $p > 0.05$ ). Nitric oxide levels were significantly higher for all periods in group 1 (49.94 vs 16.85  $\mu\text{M}$ ,  $p < 0.01$ ). No significant differences were observed in histological studies, although endothelial cell structure was better preserved in the sildenafil group.

**Conclusions:** To our knowledge our study suggests for the first time in the literature a positive effect of sildenafil in the immediate posttransplantation outcome of warm ischemic kidneys without secondary systemic effects.

#### **Editorial Comment**

This is a very elegant and complete study on the effects of sildenafil administered as a preconditioning drug before a period of warm ischemia to protect kidneys for transplantation in 14 minipigs. The authors analyzed its hemodynamic, biochemical and histological effects. The study demonstrated a beneficial effect of sildenafil on immediate post-transplantation reperfusion parameters in warm ischemic kidneys without significant systemic secondary effects. Since the kidney in pigs is very similar to humans from a physiological standpoint I believe that this new knowledge will be rapidly transposed to clinical setting.

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## **RECONSTRUCTIVE UROLOGY**

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### **Multivariate analysis of risk factors for long-term urethroplasty outcome**

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J Urol. 2010; 183: 613-7

**Purpose:** We studied the patient risk factors that promote urethroplasty failure.

**Materials and Methods:** Records of patients who underwent urethroplasty at the University of California, San Francisco Medical Center between 1995 and 2004 were reviewed. Cox proportional hazards regression analysis was used to identify multivariate predictors of urethroplasty outcome.

Results: Between 1995 and 2004, 443 patients of 495 who underwent urethroplasty had complete comorbidity data and were included in analysis. Median patient age was 41 years (range 18 to 90). Median followup was 5.8 years (range 1 month to 10 years). Stricture recurred in 93 patients (21%). Primary estimated stricture-free survival at 1, 3 and 5 years was 88%, 82% and 79%. After multivariate analysis smoking (HR 1.8, 95% CI 1.0-3.1,  $p = 0.05$ ), prior direct vision internal urethrotomy (HR 1.7, 95% CI 1.0-3.0,  $p = 0.04$ ) and prior urethroplasty (HR 1.8, 95% CI 1.1-3.1,  $p = 0.03$ ) were predictive of treatment failure. On multivariate analysis diabetes mellitus showed a trend toward prediction of urethroplasty failure (HR 2.0, 95% CI 0.8-4.9,  $p = 0.14$ ).

Conclusions: Length of urethral stricture (greater than 4 cm), prior urethroplasty and failed endoscopic therapy are predictive of failure after urethroplasty. Smoking and diabetes mellitus also may predict failure potentially secondary to microvascular damage.

### Editorial Comment

In this publication, Dr. McAninch's group ushers us into the next generation of outcomes research in urethral stricture disease. Only with a surgical volume as large as his could one account for all of these variables with enough power to reach meaningful conclusions. It is interesting to note that with long follow-up and when using Kaplan-Meier methods, the success rate of urethroplasty, by procedure type, is generally 5-10% lower than what has been reported in the literature. Anastomotic urethroplasty, for instance drops from 95% to about 85%. The fact that smoking is just as important a risk factor as previous urethroplasty underlines the strong negative impact smoking has on wound healing. Diabetes had a similar strong impact but with diabetes only present in 4% of the cohort, the study was underpowered to detect a statistically significant effect. As only 10% of the cohort was over age 65, this variable might have been better analyzed in 10 year age groups or as a continuous variable.

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### **Internal urethrotomy and intraurethral submucosal injection of triamcinolone in short bulbar urethral strictures**

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Objectives: In clinical practice, internal urethrotomy is an easy procedure and is offered as a first modality for treatment of short urethral strictures. Internal urethrotomy refers to any procedure that opens the stricture by incising or ablating it transurethrally. The most common complication of internal urethrotomy is stricture recurrence. The curative success rate of internal urethrotomy is approximately 20%. Triamcinolone has anti-fibroblast and anticollagen properties. This study evaluated the efficacy of triamcinolone in the prevention of anterior urethral stricture recurrence after internal urethrotomy.

**Methods:** Fifty male patients with anterior urethral stricture were randomized to undergo internal urethrotomy with or without urethral submucosal injection of triamcinolone. Using general anesthesia urethrotomy was performed. Triamcinolone (40 mg) was injected submucosally at the urethrotomy site in 25 patients. The patients were followed for at least 12 months and the stricture recurrence rate was compared between the two groups. **Results:** 23 patients in the triamcinolone group and 22 in the control group completed the study. There were no significant differences in the baseline characteristics of the patients or the etiology of the stricture between the two groups. Mean follow-up time was 13.7 +/- 5.5 months (range: 1-25 months). Urethral stricture recurred in five patients (21.7%) in the triamcinolone group and in 11 patients (50%) in the control group (P = 0.04). **Conclusions:** Injection of triamcinolone significantly reduced stricture recurrence after internal urethrotomy. Further investigations are warranted to confirm its efficacy and safety.

### Editorial Comment

There have been several efforts to increase the efficacy of internal urethrotomy using injection of agents designed to reduce scar formation. Among these, include steroids and botulinum toxin. As described by Wright et al, even a modest increase in the success rate of internal urethrotomy would translate into a much greater preference for urethrotomy over urethroplasty in cost-effectiveness models (1). The current article represents the first randomized trial of steroid injection at the time of internal urethrotomy. The initial results are encouraging. Follow-up was short and the mean time to stricture recurrence was longer in the steroid group. It is possible; therefore, that steroid injection only delays rather than reduces recurrence. Longer follow-up and repeat studies in other clinical settings are needed.

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## UROLOGICAL ONCOLOGY

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### **Outcome of patients who refuse cystectomy after receiving neoadjuvant chemotherapy for muscle-invasive bladder cancer**

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*Eur Urol.* 2008; 54: 126-32

**Objectives:** To determine the outcome of patients who refuse cystectomy after receiving neoadjuvant chemotherapy for muscle-invasive bladder cancer.

**Methods:** Between 1995 and 2001, 63 patients were evaluated who declined to undergo a planned cystectomy, because they achieved a complete clinical response to neoadjuvant cisplatin-based chemotherapy. Patient, tumor, and treatment features were assessed prospectively, and correlated in univariate and multivariate analyses with overall survival. The median follow-up was 86 mo and all patients were followed for more than 5 yr.

**Results:** Forty patients (64%) survived, with 54% of them having an intact functioning bladder. The number and size of invasive tumors were strongly associated with overall survival. The most significant treatment variable predicting better survival was complete resection of the invasive tumor on re-staging transurethral resection before starting chemotherapy. Of 23 patients (36%) who subsequently died of disease, 19 (30%) relapsed with invasive cancer in the bladder. Over 90% of surviving patients had solitary, small, and low-stage invasive tumors completely resected, and 83% survived without relapses in the bladder.

**Conclusions:** Selected patients with muscle-invasive bladder cancers may survive after transurethral resection and neoadjuvant chemotherapy, and tumor features can identify which patients responding completely to chemotherapy may survive without cystectomy.

### Editorial Comment

In Northern America neoadjuvant chemotherapy before radical cystectomy became standard few years ago. What happens if patients (or their doctors, the medical oncologists who deliver chemotherapy) refuse radical cystectomy if a complete response is found in the bladder? This paper gives some very important answers.

The study group was well chosen with only patients having residual muscle-invasive tumors receiving neoadjuvant chemotherapy. After at least 85% of the planned four cycles of cisplatin-based chemotherapy, complete clinical response and negative transurethral resection (TUR) of the primary tumor site, these patients were deemed complete responders and were evaluable for follow-up in this group.

The good news is that 64% of these patients survived at least 5 years and 54% of them with functioning bladders. The bad news is that 36% died of bladder cancer after a mean of 32 months. The survivors could be identified by their good prognostic factors, namely single ( $p < 0.001$ ), or small tumor ( $p < 0.01$ ), complete restaging TUR ( $p = 0.02$ ), and noninvasive stage after relapse ( $p = 0.05$ ). Thus patients with worse tumor features, despite responding completely to chemotherapy, should be strongly advised to undergo radical cystectomy at the earliest convenience.

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### **Long-term rates of undetectable PSA with initial observation and delayed salvage radiotherapy after radical prostatectomy**

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*Eur Urol. 2008; 54: 88-94*

**Background:** Randomized trials have shown an improvement in progression-free survival rates with adjuvant radiation therapy (ART) after radical prostatectomy for patients with a high risk of cancer recurrence. Less is

known about the relative advantages and disadvantages of initial observation with delayed salvage radiation therapy (SRT).

**Objective:** To examine the results of SRT in a large single-surgeon radical prostatectomy series.

**Design, Setting, and Participants:** From a radical prostatectomy database, we identified 859 men with positive surgical margins (SM+), extracapsular tumor extension (ECE), or seminal vesicle invasion (SVI) who chose to defer ART. Following a period of initial observation, 192 ultimately received SRT for prostate-specific antigen (PSA) progression.

**Measurements:** Survival analysis was performed to examine the outcomes of initial observation followed by SRT.

**Results and Limitations:** In patients with SM+/ECE and SVI, the 7-yr PSA progression-free survival rates with observation were 62% and 32%, respectively. Among those who had PSA progression, 56% and 26%, respectively, maintained an undetectable PSA for 5 yr after SRT. The long-term rates of undetectable PSA associated with an SRT strategy were 83% and 50% for men with SM+/ECE and SVI, respectively. In the subset of 716 men who did not receive any hormonal therapy, the corresponding long-term rates of undetectable PSA were 91% and 75%, respectively.

**Conclusions:** Following radical prostatectomy, initial observation followed by delayed SRT at the time of PSA recurrence is an effective strategy for selected patients with SM+/ECE. Some patients with SVI may also benefit from this strategy. However, additional prospective studies are necessary to further examine the survival outcomes following SRT.

### Editorial Comment

The debate goes on and on. Should a patient with positive surgical margins (SM+) or seminal vesicle infiltration (SVI) after radical prostatectomy be irradiated, and if so – when? This paper supports an affirmative standpoint. In short, positive surgical margins might have a relative benign course with a 62% PSA no progression rate if left untreated. In contrast, patients with SVI do worse with only 50% of them not showing up with increasing PSA during the 7-year follow-up. Thus, one may safely choose to wait until PSA becomes measurable after radical prostatectomy.

When should I offer adjuvant radiation if PSA shows up? The answer from this paper is – as soon as possible, because the final outcome was better if radiation started when PSA was < 1 ng/ml.

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## NEUROLOGY & FEMALE UROLOGY

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### Repeat synthetic mid urethral sling procedure for women with recurrent stress urinary incontinence

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*J Urol. 2010; 183: 241-6*

**Purpose:** We reported and compared the outcomes of repeat mid urethral sling with primary mid urethral sling in women with stress urinary incontinence.

**Materials and Methods:** A total of 1,225 consecutive women with urodynamic stress incontinence underwent a synthetic mid urethral sling procedure (955 retropubic, 270 transobturator) at our institution between 1999 and 2007. Of the patients 91% (1,112) were interviewed via telephone call with a structured questionnaire and were included in the analysis. Mean +/- SD followup was 50 +/- 24 months (range 12 to 114). A comparison between repeat (77, mean age 62 +/- 12 years) and primary (1,035, mean age 60 +/- 13 years) mid urethral sling groups was performed. Repeat sling was placed without removal of the previous sling.

**Results:** The preoperative incidence of intrinsic sphincter deficiency was higher in patients who had a repeat mid urethral sling (31% vs 13%,  $p < 0.001$ ). The subjective stress incontinence cure rate was 86% and 62% in the primary and repeat group, respectively ( $p < 0.001$ ). The repeat retropubic approach was significantly more successful than the repeat transobturator approach (71% vs 48%,  $p = 0.04$ ). The rates of sling related and general postoperative complications were similar between the primary and the repeat groups. However, de novo urgency (30% vs 14%,  $p < 0.001$ ) and de novo urge urinary incontinence (22% vs 5%,  $p < 0.001$ ) were more frequent in the repeat group compared with the primary group.

**Conclusions:** A repeat synthetic mid urethral sling procedure has a significantly lower cure rate than a primary mid urethral sling procedure. The repeat retropubic approach has a higher success rate than the repeat transobturator approach. The incidence of de novo urgency and urge incontinence are significantly higher in repeat procedures.

### Editorial Comment

This is a report on the efficacy of the repeat mid- urethral sling after a failed mid urethral sling. The authors examined an impressive pool of patients numbering well over a thousand of which 77 patients had a repeat mid-urethral sling. The authors noted a significantly lower rate of success (62%) as well as a fairly high rate of failure of the repeat transobturator sling of salvaging continence (53% or less). The authors were able to collate the results of their surgeries through the use of clinical interaction as well as telephone communication. To assess the results, a questionnaire made of select questions from previous validated questionnaires was utilized. The patient population was fairly young being between 60 and 62 years of age. It was noted that the repeat surgery group suffered from a higher rate of de novo urgency as well as urinary urge incontinence.

This study is very important in view of its' large numbers and examining the efficacy of mid-urethral sling. Take home messages include the confirmation of the difficulty in salvaging previously failed mid-urethral sling procedures as well as the fairly important singular finding of the limited efficacy of a transobturator sling to salvage either a failed retropubic or a previous transobturator sling. The difficulty in salvaging a gold standard operation has been noted in the past with regard to pubovaginal slings with autologous fascia (1). For further reading on management of failed suburethral slings, I direct the reader to an excellent reference summary article authored by Scarpero and Dmochowski (2).

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**An International Urogynecological Association (IUGA)/International Continence Society (ICS) joint report on the terminology for female pelvic floor dysfunction**

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*Neurourol Urodyn. 2010;29(1):4-20.*

**Introduction:** Next to existing terminology of the lower urinary tract, due to its increasing complexity, the terminology for pelvic floor dysfunction in women may be better updated by a female-specific approach and clinically based consensus report.

**Methods:** This report combines the input of members of the Standardization and Terminology Committees of two international organizations, the International Urogynecological Association (IUGA), and the International Continence Society (ICS), assisted at intervals by many external referees. Appropriate core clinical categories and a subclassification were developed to give an alphanumeric coding to each definition. An extensive process of 15 rounds of internal and external review was developed to exhaustively examine each definition, with decision-making by collective opinion (consensus).

**Results:** A terminology report for female pelvic floor dysfunction, encompassing over 250 separate definitions, has been developed. It is clinically based with the six most common diagnoses defined. Clarity and user-friendliness have been key aims to make it interpretable by practitioners and trainees in all the different specialty groups involved in female pelvic floor dysfunction. Female-specific imaging (ultrasound, radiology, and MRI) has been a major addition while appropriate figures have been included to supplement and help clarify the text. Ongoing review is not only anticipated but will be required to keep the document updated and as widely acceptable as possible.

**Conclusion:** A consensus-based terminology report for female pelvic floor dysfunction has been produced aimed at being a significant aid to clinical practice and a stimulus for research.

**Editorial Comment**

This is a very noteworthy review article which should be kept as a reference point for the various terminologies and definitions used in the contemporary literature. It may hold a keen value when preparing manuscripts for publication. As stated in the article, this terminology report is user friendly, clinically based, and quite explanatory in its description. That it was developed by leaders of the specialties concerned with pelvic floor dysfunction, including what appears to be an exhaustive number of internal and external reviews and evaluations, lends to its value and strength as a reference article. Also to the interested party, reading the entire journal in which this article is published (*Neurourology and Urodynamics*, Vol. 29(1), 2010) is of good intellectual value with regards to the time expended and subsequent knowledge gleaned.

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**PEDIATRIC UROLOGY**

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**Risk factors for urinary tract infection after dextranomer/hyaluronic acid endoscopic injection**

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**Purpose:** Endoscopic injection of dextranomer/hyaluronic acid is an option for primary vesicoureteral reflux. Few groups have assessed the rate of urinary tract infection after dextranomer/hyaluronic acid injection. We reviewed our experience with dextranomer/hyaluronic acid injection, and determined the incidence of and risk factors for postoperative urinary tract infection.

**Materials and Methods:** A retrospective cohort study was performed of all children with primary vesicoureteral reflux treated with dextranomer/hyaluronic acid from 2002 to 2007 at a single institution. Patient demographics and clinical outcomes were abstracted from the medical record. Risk factors for postoperative urinary tract infection, including female gender, preoperative vesicoureteral reflux grade, recurrent urinary tract infection, bladder dysfunction, nephropathy and persistent vesicoureteral reflux after surgery, were analyzed in a multivariate logistic regression model.

**Results:** We treated 311 children, of whom 87% were female and 13% were male (464 renal units), during the study period. Mode of presentation was urinary tract infection in 85% of cases. Mean followup was 2.6 years. Postoperatively urinary tract infection developed in 40 patients (13%) and febrile urinary tract infection developed in 11 (3.5%). Of patients with urinary tract infection 26 had initially negative postoperative voiding cystourethrogram, of whom 16 underwent repeat voiding cystourethrogram and 9 showed recurrent vesicoureteral reflux. Five of these 9 patients had clinical pyelonephritis. Of assessed risk factors only preoperative recurrent urinary tract infection (OR 2.2,  $p = 0.03$ ) and bladder dysfunction (OR 3.3,  $p = 0.001$ ) were independent predictors of post-injection urinary tract infection.

**Conclusions:** In our series urinary tract infection after dextranomer/hyaluronic acid injection was rare. Patients with recurrent urinary tract infections and bladder dysfunction preoperatively are at increased risk for urinary tract infection after treatment. Patients with febrile urinary tract infection after dextranomer/hyaluronic acid injection are at high risk for recurrent vesicoureteral reflux.

**Editorial Comment**

This manuscript studies 311 children over a five-year period that had Dx/HA. Secondary causes of reflux and poor follow-up patients were excluded. Bladder dysfunction included patients with enuresis, frequency/urgency, or urge incontinence and when discovered, standard treatment was instituted prior to surgery. This behavior and dietary modifications were continued after surgery if the bladder dysfunction persisted. Antibiotic prophylaxis was continued until a follow-up VCUg at 2-3 months showed no further reflux. The results showed 87% of their patients were female and 85% presented with a UTI and 60.5% were febrile. 90% of their patients had Grade III reflux or less. Preoperative nephropathy was present in 62 patients (20%) and bladder dysfunction was present in 64 patients (21%). The mean patient age was 5.7 years with mean follow-up of 2.6 years. The first time success rate for the sting procedure was 70%. With follow-up injections, the overall success rate by patient was 81% and renal unit 88% and these results correlated with preoperative grade of reflux. Postoperatively 40 patients (13%) developed UTI and 11 (3.5%) had febrile UTI's. Independent risk factors for postoperative UTI's by multivariate analysis were preoperative recurrent UTI's and bladder dysfunction. 4

of the 11 febrile UTI patients had a follow-up VCUg showing vesicoureteral reflux and subsequently 5 more of these patients had a VCUg positive for VUR. 10 patients of the afebrile UTI group were positive for VUR. Upon repeat, 11 more showed VUR later.

Vesicoureteral reflux and urinary tract infection are known risk factors for kidney scarring and modifications of both of these risk factors have been sought over the years to prevent permanent kidney damage. As noted in the discussion, the international reflux study group, a 28% incidence of afebrile UTI and 18% instance of febrile UTI in that population over 10 years. It is interesting to note that subureteric injection of Dx/HA seems to add some protective benefit for recurrent UTI's. In my mind, this may be the most important benefit. Recurrent UTI's correlate quite well with failed Deflux, although it is interesting to note that in a recent study by Lee et al. (1), it was showed the sting patients only had 46% of a durable reflux resolution after one year. During this 2.6 years of follow-up, that should mean that half of these patients had their reflux return, and yet the sting procedure seems to offer a UTI prevention benefit even in patients that did not have a long-term success. Readers should watch this data carefully and I think that these issues will become more clear over the next several years.

#### References

1. Lee EK, Gatti JM, Demarco RT, Murphy JP. Long-term followup of dextranomer/hyaluronic acid injection for vesicoureteral reflux: late failure warrants continued followup. *J Urol.* 2009; 181: 1869-74; discussion 1874-5.

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#### **Straightening ventral curvature while preserving the urethral plate in proximal hypospadias repair**

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**Purpose:** We report the efficacy of an expanded algorithm for penile straightening in proximal hypospadias surgery to preserve the urethral plate for urethroplasty. We also compared ventral corporotomy with grafting to multiple superficial ventral corporotomies without grafting for straightening greater than 30-degree ventral curvature.

**Materials and Methods:** The need for urethral plate transection was compared in 2 groups comprising consecutive patients with proximal shaft to perineal hypospadias repair done by one of us (WS). The 47 patients in group 1 underwent surgery from 2000 to 2005 and had ventral curvature greater than 30 degrees after degloving, leading to urethral plate transection, while in 23 in group 2 from 2006 to 2008 mobilization of the corpus spongiosum/urethral plate and proximal urethra were also performed before urethral plate transection. Patients in group 1 with greater than 30-degree ventral curvature after urethral plate transection underwent ventral corporotomy with grafting (7) or multiple transverse corporotomies without grafting (4), while those in group 2

with greater than 30-degree ventral curvature after corpus spongiosum/urethral plate and urethral mobilization underwent multiple transverse corporotomies without grafting.

Results: Excluding 10 group 1 and 3 group 2 boys without ventral curvature after degloving the rate of urethral plate transection significantly decreased from 54% to 15% using the expanded algorithm ( $p = 0.005$ ). At a mean followup of 11 months in those with corpus spongiosum/urethral plate and urethral mobilization there was no recognized recurrent ventral curvature. Seven patients with greater than 30-degree ventral curvature underwent ventral corporotomy with grafting, while 11 underwent multiple transverse corporotomies without grafting. At a mean followup of 27 and 19 months, respectively, no patient had recurrent ventral curvature.

Conclusions: Mobilization of the corpus spongiosum/urethral plate and the urethra in proximal hypospadias cases with greater than 30-degree ventral curvature after penile degloving decreases the need for urethral plate transection. Ventral lengthening to correct corporeal disproportion can be achieved by corporotomy with grafting or by multiple transverse incisions without grafting.

### Editorial Comment

Seventy patients with proximal shaft or scrotal hypospadias had preoperative testosterone therapy. From 2000-2005 those with less than 30° of curvature, estimated by an artificial erection, were corrected by a dorsal plication. During that same time period, if the curvature was greater than 30° the urethral plate was transected. From 2006-2008, if the curvature was greater than 30°, the urethral plate was mobilized. If after mobilization there was less than 30° of curvature, then a midline dorsal plication was performed, while greater than 30° curvature led to three transverse corporotomies in the region of greatest curvature on the ventrum without grafting and usually in combination with a single dorsal plication. The corporotomies were not deep enough to expose the corpora cavernosa tissue. A third technique included a ventral corporotomy with grafting that was done from the dermis. Of their 70 consecutive patients, after degloving the penis 19% had no curvature. Curvature less than 20° was correctable by dorsal plication in 31% of the patients and in the 50% of patients with greater than 30° one group had the urethral plate divided and the other group had plication plus the corporotomy incision or grafting. The outcome showed no difference in the followup. Only two cases in the early group had recurrent ventral curvature and none in the later group with preservation of the urethral plate.

It is interesting to note that corporotomies only without grafting in combination with plication and urethral mobilization was sufficient to correct curvature. It could be that grafting is unnecessary and it will be interesting to see if these patients over long-term growth and development continue to do so well. Hypospadias repairs based on the urethral plate enjoy a very good success rate and this shows that extended efforts to preserve the urethral plate may very well be worth it. In this era where two stage hypospadias repairs seem to be gaining in popularity, here is a technique to complete the hypospadias repair in one stage dealing with severe curvature at the same time. In simplistic terms, even if two stage repairs were entirely successful after two stages, they will never enjoy the same success rate as single stage repairs with followup surgeries to correct the complications.

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