# Management for Prostate Cancer Treatment Related Posterior Urethral and Bladder Neck Stenosis With Stents

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**Abbreviations and Acronyms**

AUS = artificial urinary sphincter

BNC = bladder neck contracture

PCa = prostate cancer

Submitted for publication May 3, 2010.

Study received institutional review board approval.

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**Purpose:** Prostate cancer treatment has the potential to lead to posterior urethral stricture. These strictures are sometimes recalcitrant to dilation and urethrotomy alone. We present our experience with the Urolume® stent for prostate cancer treatment related stricture.

**Materials and Methods:** A total of 38 men with posterior urethral stricture secondary to prostate cancer treatment were treated with Urolume stenting. Stents were placed in all men after aggressive urethrotomy over the entire stricture. A successfully managed stricture was defined as open and stable for greater than 6 months after any necessary secondary procedures.

**Results:** The initial success rate was 47%. After a total of 31 secondary procedures in 19 men, including additional stent placement in 8 (18%), the final success rate was 89% at a mean ± SD followup of 2.3 ± 2.5 years. Four cases (11%) in which treatment failed ultimately requiring urinary diversion (3) or salvage prostatectomy (1). Incontinence was noted in 30 men (82%), of whom 19 (63%) received an artificial urinary sphincter a mean of 7.2 ± 2.4 months after the stent. Subanalysis revealed that irradiated men had longer strictures (3.6 vs 2.0 cm, $p = 0.003$) and a higher post-stent incontinence rate (96% vs 50%, $p < 0.001$) than men who underwent prostatectomy alone but the initial failure rate was similar (54% vs 50%, $p = 0.4$).

**Conclusions:** Urolume stenting is a reasonable option for severe post-prostate cancer treatment stricture when patients are unwilling or unable to undergo open reconstructive surgery. Incontinence should be expected. The need for additional procedures is common and in some men may be required periodically for the lifetime of the stent.

**Key Words:** prostate, prostatic neoplasms, urethral stricture, stents, urinary bladder neck obstruction

Of the almost 200,000 men diagnosed with PCa in the United States annually[1] all those electing definitive treatment are at risk for posterior urethral stricture.[2,3] Radical prostatectomy is complicated by BNC in 1 to 25% of cases[4] and radiation therapy can lead to stricture along the entire length of the posterior urethra.[5] Fortunately many strictures are amenable to simple endoscopic procedures.[6] However, a small percent in which conservative measures fail require more radical intervention if a permanent solution is sought.

Traditionally 2 options have been available in these men. One generally involves open perineal and/or abdominal surgery, in which the strictured segment is excised and an anastomo-



0022-5347/11/1851-0198/0
THE JOURNAL OF UROLOGY®

Vol. 185, 198-203, January 2011
Printed in U.S.A.
DOI:10.1016/j.juro.2010.09.020

sis is then formed.[7] While these operations often successfully remove the stricture, they may lead to postoperative incontinence and are often technically challenging.[8] The other option is urinary diversion, which patients and urologists usually think is an option of last resort.[9,10]

In 2001 we began using the Urolume urethral stent for recalcitrant PCa treatment related strictures. We hoped that the stent would provide a reasonable alternative in men who elected definitive stricture management but were not interested in complex surgical options and those in whom we thought surgery would not be successful or advisable. Initial reports of stent use were encouraging with an overall success rate of greater than 80%.[11] We discuss our updated experience with the stents, focusing specifically on management for PCa therapy related posterior urethral stricture.

## MATERIALS AND METHODS

### Patient Population

We reviewed our large, single surgeon, prospective, institutional review board approved stricture database on all men in whom Urolume stents were placed for posterior urethral stricture. We included only those in whom stricture was a result of PCa treatment and then only if the stent had been placed at our institution with greater than 6 months of followup.

### Procedure Characteristics

The Urolume stent is a biocompatible, corrosion resistant, super alloy mesh that self-expands to almost 30Fr in the urethra after deployment from a 24Fr disposable delivery tool. All stents were placed by a single surgeon (JWM). The surgical technique for stent placement has been described previously[11,12] but a few important technical considerations/modifications are worth mentioning. 1) The entire length of the urethral stricture must be stented. In our experience if a previously strictured segment is opened but not stented, the stricture recurs in the nonstented area despite aggressive urethrotomy. Also, if the stricture is greater than 3 cm, which is the currently the length of the largest stent provided by the Urolume manufacturer, overlapping stents of at least 5 mm must be placed and one should always work from proximal to distal if multiple stents are needed. 2) We prefer to have 5 mm of the stent protruding into the bladder in men with pure BNC, which we have found can help prevent proximal intraluminal recurrence with little morbidity. 3) We prefer to place all patients with a Urolume stent on suppressive, prophylactic antimicrobial therapy, generally nitrofurantoin, for the lifetime of the stent.

### Patient Followup

Patients are followed with uroflowmetry and post-void residual urine measurement at 3-month intervals. If large post-void residual urine is noted, or there is an obstructed voiding curve and/or low flow rate on uroflowmetry, retrograde urethrogram and/or cystoscopy is done. If stricture recurrence or stone encrustation is noted within the existing stent, the tissue is excised as previously described with a holmium laser or resectoscope.[13] If recurrence is proximal or distal to the existing stent, it is managed by another stent. If incontinence is noted after stenting, we prefer to wait at least 6 months before AUS placement to ensure a stable stricture. If recurrence or obstruction due to stone formation is noted after AUS placement, resection is done with a pediatric resectoscope or ureteroscope with the cuff deactivated.

### Statistical Analysis

Initial success was defined as stent placement that achieved a patent urethra for greater than 6 months without the need for secondary procedures. Overall treatment success was defined as a currently stable stricture for greater than 6 months regardless of the number of secondary procedures required. Incontinence was defined as the need for more than 1 pad daily.

We used descriptive statistics to characterize the study population. For all categorical variables we used the chi-square test. The unpaired t test was used to assess differences among continuous variables. We developed multivariate logistic regression models with predictor variables selected a priori. The final model included only variables associated with progression to surgery at $p \leq 0.20$. Statistical significance was considered at $p < 0.05$ and all tests were 2 sided. Stata® 11 was used for all analysis.

## RESULTS

A total of 38 men met study inclusion criteria (table 1). in 24 men (63%) radiation therapy was the primary treatment (16) or adjuvant therapy after radical

**Table 1.** *Demographics in men with posterior urethral strictures after prostate cancer treatment managed by stents*

| | No. Pts | Mean ± SD Followup (yrs) | Mean ± SD Age | Mean ± SD Time to Stricture (yrs) | Mean ± SD Stricture Length (cm) | Mean ± SD No. Stents |
|---|---|---|---|---|---|---|
| Overall | 38 | 2.3 ± 2.5 | 67.2 ± 6.9 | 2.9 ± 3.2 | 3.0 ± 1.7 | 1.4 ± 0.6 |
| Radical prostatectomy, no radiation | 14 | 2.6 ± 3.1 | 64.2 ± 7.6 | 1.3 ± 2.3 | 2.0 ± 0.7 | 1.1 ± 0.4 |
| Radiation: | 24 | 2.0 ± 2.0 | 68.9 ± 6.0 | 3.8 ± 3.3 | 3.6 ± 1.9 | 1.6 ± 0.7 |
| Adjuvant external beam radiotherapy | 8 | 1.9 ± 1.1 | 68.7 ± 6.1 | 3.7 ± 3.2 | 3.25 ± 1.9 | 1.3 ± 0.5 |
| External beam radiotherapy + salvage prostatectomy | 2 | 3.9 ± 3.7 | 67.8 ± 6.1 | 0.3 ± 0.12 | 3.75 ± 1.8 | 1.5 ± 0.7 |
| Brachytherapy | 8 | 1.2 ± 0.9 | 66.6 ± 6.8 | 3.4 ± 3.3 | 3.5 ± 1.6 | 1.6 ± 0.7 |
| Brachytherapy + external beam radiotherapy | 6 | 2.4 ± 3.1 | 72.8 ± 3.2 | 5.6 ± 3.4 | 4.4 ± 2.5 | 2.3 ± 0.8 |
| p Value (unpaired t test) | | 0.4 | 0.02 | 0.008 | 0.003 | 0.05 |