Urinary and Sexual Function after Perineal Urethrostomy for Urethral Stricture Disease: An Analysis from the TURNS

Gregory P. Murphy,* Kirkpatrick B. Fergus, Thomas W. Gaither, Nima Baradaran, Bryan B. Voelzke, Jeremy B. Myers, Bradley A. Erickson, Sean P. Elliott,† Nejd F. Alsikafi, Alex J. Vanni, Jill C. Buckley and Benjamin N. Breyer

From the Division of Urology, Washington University (GPM), St. Louis, Missouri, and University of Utah (JBM), Salt Lake City, Utah, Departments of Urology, University of California-San Francisco (KBF, TWG, NB, BNB), San Francisco and University of California-San Diego Health System (JCB), San Diego, California, University of Washington (BBV), Seattle, Washington, University of Iowa (BAE), Iowa City, Iowa, University of Minnesota (SPE), Minneapolis, Minnesota, and Lahey Hospital and Medical Center (AJV), Burlington, Massachusetts, and UroPartners (NFA), Gurnee, Illinois

Abbreviations and Acronyms

AU = anterior urethroplasty

CLSS = Core Lower Urinary Tract Symptom Score

I-PSS = International Prostate Symptom Score

MSHQ = Men's Sexual Health Questionnaire

PROM = patient reported outcome measure

SHIM = Sexual Health Inventory for Men

TURNS = Trauma and Urologic Reconstructive Network of Surgeons

Purpose: Perineal urethrostomy is a viable option for many complex urethral strictures. However, to our knowledge no comparison with anterior urethroplasty regarding patient reported outcome measures has been published. We compared these groups using a large multi-institution database.

Materials and Methods: We performed a retrospective study of anterior urethroplasty in the TURNS (Trauma and Urologic Reconstructive Network of Surgeons) database. The anterior urethroplasty cohort was defined by long strictures greater than 6 cm. We compared demographic, clinical, urinary and sexual characteristics using validated patient reported outcome measures between patients treated with long stricture anterior urethroplasty and those who underwent perineal urethrostomy.

Results: Of the 131 patients 92 treated with long stricture anterior urethroplasty and 39 treated with perineal urethrostomy met study inclusion criteria. The cumulative incidence of failure at 2 years was 30.2% (95% CI 18.3–47.3) for long stricture anterior urethroplasty and 14.5% (95% CI 4.8–39.1) for perineal urethrostomy ($p = 0.09$). Compared to baseline metrics, patients who underwent long stricture anterior urethroplasty and perineal urethrostomy had similar improvements in urinary function and stable sexual function after surgery.

Conclusions: Patients reported improvement in urinary function after perineal urethrostomy with no deleterious effect on sexual function. These patient reported outcome measures were comparable to those of long stricture anterior urethroplasty. Perineal urethrostomy failure rates were similar to those of long stricture anterior urethroplasty.

Key Words: urethral stricture, patient reported outcome measures, quality of life, erectile dysfunction, urination

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* Correspondence: Division of Urologic Surgery, Washington University School of Medicine, 4960 Children's Pl., Suite 216, Wohl Hospital, St. Louis, Missouri 63110 (telephone: 314-273-1597; e-mail: murphyg@wustl.edu).

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URETHRAL reconstruction in experienced hands achieves a greater than 90% success rate for simple short bulbar strictures with anastomotic urethroplasty.[1] AU failure requiring a repeat procedure is associated with longer strictures, prior urethroplasty, failed hypospadias and lichen sclerosus.[2–5] While urethral reconstruction techniques can be successful for complex strictures, they are difficult cases with higher recurrence and complication rates.[2–7] The best reconstruction method for complex strictures is not always clear.

An underused and under studied technique for recurrent and complex anterior strictures which spares the posterior and proximal anterior urethra is perineal urethrostomy.[8] The AUA (American Urological Association) guidelines on male urethral strictures recommend perineal urethrostomy as an option in patients with "recurrent or primary complex anterior stricture, advanced age, medical comorbidities precluding extended operative time, extensive lichen sclerosus, numerous failed attempts at urethroplasty and patient choice."[9]

Upon initial consideration perineal urethrostomy often is not well received by patients. However, Barbagli et al retrospectively reviewed an Italian cohort of 173 patients treated with perineal urethrostomy and found a 70% success rate and a 97% patient satisfaction rate using a nonvalidated questionnaire.[10] Of the patients 78% were satisfied and 19.1% were very satisfied. A smaller case series demonstrated a lower revision rate for perineal urethrostomy in patients with lichen sclerosus than for anterior urethroplasty, although patient quality of life outcomes were not discussed.[11] To our knowledge no group has compared the functional and quality of life outcomes in men after perineal urethrostomy compared to AU.

In this study we evaluated sexual and urinary function in men with longer urethral stricture disease when comparing perineal urethrostomy surgery to AU. We hypothesized that men treated with perineal urethrostomy would have quality of life outcomes similar to those in men with longer strictures.

MATERIALS AND METHODS

Study Population

This is a retrospective cohort study of 2,484 patients with urethral stricture disease who were recorded in the TURNS database. The TURNS is a research group of 13 reconstructive surgeons from across the United States.[12] Excluded from study were 122 patients who underwent fistula repair, direct vision internal urethrotomy, extended meatotomy or hypospadias repair. Of the remaining patients 2,163 underwent AU and 199 underwent perineal urethrostomy. We further excluded 1,025 patients with no available sexual and urinary function PROMs, 41 in whom the surveys were administered 30 days or more after surgery and 9 who underwent a prior perineal urethrostomy. For AU we included only patients with strictures greater than 6 cm and defined this as long stricture AU. Finally, we selected patients with at least 1 baseline and 1 followup PROM. A total of 131 patients met inclusion criteria.

In our study population we compared demographic and clinical characteristics, including patient age, body mass index, diabetes, hypertension and stricture length, location and etiology. Stricture location and etiology were not mutually exclusive categories.

Exposures and Outcomes

Exposures consisted of 2 surgical procedures, that is AU and perineal urethrostomy. We defined AU to include graft urethroplasty, and excision and primary anastomosis. Long stricture AU was defined as a stricture greater than 6 cm. PROMs for urinary and sexual function were our primary study outcome. We administered validated PROMs, including the I-PSS,[13] the CLSS,[14] the SHIM[15] and the MSHQ,[16] preoperatively and at the most recent postoperative followup.

Statistical Analysis

We provide descriptive statistics of demographic variables with long stricture AU and perineal urethrostomy in patients compared by the Mann-Whitney test for nonnormally distributed continuous variables (total followup) and a simple t-test for normally distributed continuous variables (age and body mass index). We performed Cox proportional hazards survival analysis to identify the 2-year cumulative incidence of failure for each procedure and used the log rank test of difference. We applied the Wilcoxon matched pairs signed ranks test to compare preprocedure and post-procedure urinary and sexual function scores for long stricture AU and perineal urethrostomy. All p value alphas were 2-sided with statistical significance considered at $p < 0.05$. All analyses were performed with Stata®, release 15.

RESULTS

Of the 131 patients who met study inclusion criteria 92 underwent long stricture AU and 39 underwent perineal urethrostomy. Median followup in our cohort was 390 days (IQR 132–771). There was no statistically significant difference in followup between the 2 groups. The 2 patient groups were remarkably similar and the only significant difference was the proportion with hypertension (see table).

The 2-year cumulative incidence of failure, defined by the re-intervention rate, was 30.23% (95% CI 18.32–47.30) for long stricture AU and 14.50% (95% CI 4.83–39.1) for perineal urethrostomy ($p = 0.09$). Figure 1 shows the Kaplan-Meier curve comparing re-intervention rates in these 2 cohorts during 2 years. Compared to long stricture AU, the unadjusted HR was 0.36 (95% CI 0.10–1.25) in the perineal urethrostomy group.

Baseline demographic and stricture characteristics of patients who underwent perineal urethrostomy and anterior urethroplasty

	Long Anterior Urethroplasty	Perineal Urethrostomy	p Value
No. pts	92	39	—
Mean ± SD age	52.3 ± 12.6	55.6 ± 14.9	0.19
Mean ± SD body mass index (kg/m^2)	32.1 ± 7.5	33.5 ± 7.7	0.36
No. diabetes (%)	13 (14.1)	11 (28.2)	0.057
No. hypertension (%)	37 (40.2)	25 (64.1)	0.012
Mean ± SD stricture length (cm)	10.3 ± 3.7	9.4 ± 5.5	0.27
No. previous urethroplasty (%)	25 (27.8)	14 (36.8)	0.31
No. stricture etiology (%):*			
Lichen sclerosus	20 (21.7)	14 (35.9)	0.13
Idiopathic	33 (35.9)	7 (18.0)	0.061
Failed hypospadias	9 (9.8)	5 (12.8)	0.76
Iatrogenic	20 (21.7)	6 (15.4)	0.48
Trauma	9 (9.8)	3 (7.7)	>0.9
Infectious	2 (2.2)	2 (5.1)	0.58
Unknown	5 (5.4)	6 (15.4)	0.084
No. baseline stricture location (%):			
Meatus	28 (30.4)	15 (38.5)	0.42
Fossa navicularis	33 (35.9)	15 (38.5)	0.84
Penile urethra	67 (72.8)	29 (74.4)	>0.9
Bulbar urethra	75 (81.5)	27 (69.2)	0.17
Membranous urethra	8 (8.7)	1 (2.6)	0.28
Median No. followup days (IQR)	378 (193.5–695)	449 (109–1,166)	0.84

* Categories are not mutually exclusive and there were no prostatic urethral or radiation strictures.

PROM questionnaires were administered postoperatively at a median of 343 days (IQR 120–582). Patients treated with long stricture AU had statistically significantly improved scores on the I-PSS ($p = 0.003$), the CLSS ($p < 0.014$) and the MSHQ ($p < 0.028$) when comparing baseline and most recent followup values. However, SHIM scores showed no statistically significant change during this interval ($p = 0.22$). Patients treated with perineal urethrostomy had significantly improved I-PSS scores ($p = 0.011$). No significant change was noted in the SHIM or the MSHQ.

Figure 2 shows descriptive changes in urinary function scores from baseline to followup visits for long stricture AU and perineal urethrostomy. For the I-PSS 26 patients were included, of whom 14 and 12 underwent long stricture AU and perineal urethrostomy, respectively. For the CLSS 12 patients were included, of whom 8 and 4 underwent long stricture AU and perineal urethrostomy, respectively. Figure 3 shows changes in sexual function in these 2 cohorts. For the SHIM 81 patients were included, of whom 68 and 13 underwent long stricture AU and perineal urethrostomy, respectively. For the MSHQ 76 patient were included, of whom 59 and 17 underwent long stricture AU and perineal urethrostomy, respectively.

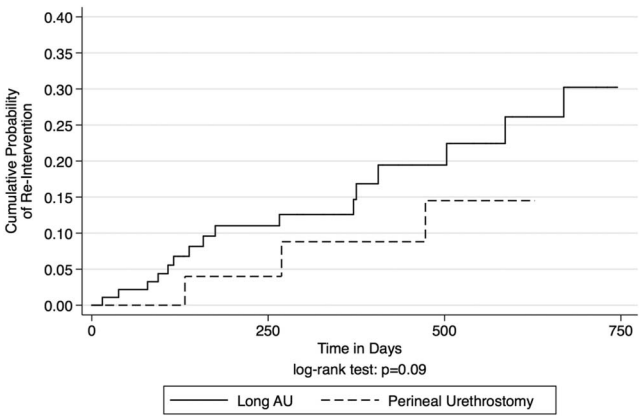

Figure 1. Kaplan-Meier curve comparing re-intervention rates of long stricture AU in 193 patients and perineal urethrostomy in 158.

DISCUSSION

Men with urethral stricture disease reported no significant difference in PROM scores after undergoing perineal urethrostomy compared to long stricture AU. The 2-year cumulative incidence of perineal urethrostomy failure was similar to that of long stricture AU. Furthermore, when compared to baseline metrics, patients treated with perineal urethrostomy reported improved urinary function and no deleterious effect on sexual function, similar to patients treated with long stricture AU.

Perineal urethrostomy often remains a last resort for many reconstructive urologists.[17] Reasons for patient resistance to perineal urethrostomy have not been well studied but may be due to the change in the appearance of the perineum, changes in voiding posture and changes in ejaculatory function, which should be discussed with the patient preoperatively.[18] Despite these issues, our study can help when counseling men regarding expectations and lifestyle changes after surgery, and it

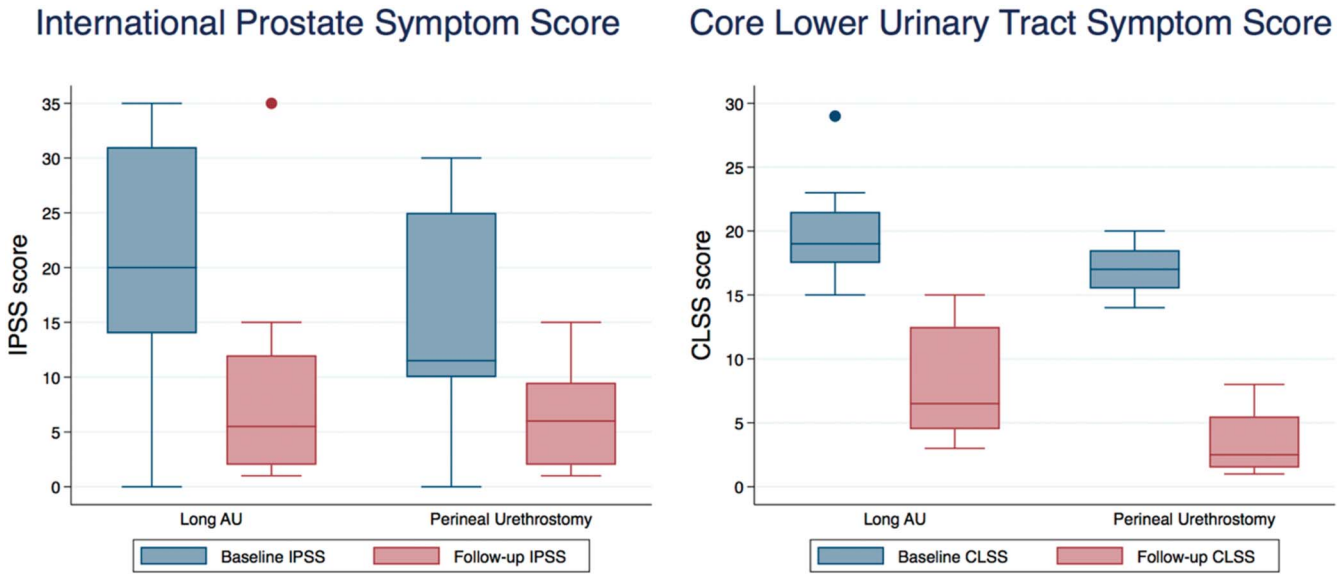

Figure 2. Box plots of urinary function scores comparing perineal urethrostomy to AU. For long AU 14 and 8 patients, and for perineal urethrostomy 12 and 4 completed I-PSS and CLSS, respectively.

supports the AUA guidelines as a reasonable option in men with complex urethral strictures.[9] An analogous lesson could be learned from the cystectomy literature. Urinary diversion via an ileal conduit has not been associated with inferior quality of life outcomes and it may even be superior in certain ways compared to a neobladder despite urine flow rerouting.[19–21]

A previous series showed the benefits of perineal urethrostomy but the investigators administered nonvalidated patient questionnaires including little about urinary or sexual function.[10] Furthermore, they used neither preoperative questionnaires nor a control or comparison group. Other investigators retrospectively reviewed 2 techniques of perineal urethrostomy (the Johanson and Blandy techniques) and found similar recurrence rates and urinary quality of life outcomes.[22] However, in that study nothing was related to sexual function and there was no AU comparison. A series from the Lahey Clinic demonstrated that patients with lichen sclerosus had the highest success rate of 93% for perineal urethrostomy compared with 2-stage and 1-stage urethroplasty at 76% and 75%, respectively, but no

Figure 3. Box plots of sexual function scores comparing perineal urethrostomy to AU. For long AU 68 and 59 patients, and for perineal urethrostomy 13 and 17 completed SHIM and MSHQ, respectively.

quality of life data were included.[11] Peterson et al confirmed that longer strictures due to lichen sclerosus in particular may be better candidates for perineal urethrostomy than for staged reconstruction.[23] That group highlighted that many patients planning to undergo 2-stage urethroplasty elected to stop after stage 1 and live with a perineal urethrostomy.[22]

Despite the benefits, there are risks associated with perineal urethrostomy, including stricture recurrence, especially when there is a history of prior radiation and lichen sclerosus.[17] All TURNS surgeons perform similar perineal urethrostomy using an inverted U perineal flap to reach down to the bulbar urethra, which is incised longitudinally and sutured to the skin. By avoiding urethral transection the better blood supply to the corpus spongiosum reduces the risk of stenosis.[17] Recurrence rates, defined as the need for re-intervention, were similar for long stricture AU and perineal urethrostomy. Because of the complex nature of these strictures and the possibility of recurrence, we recommend referral to an experienced reconstructive urologist for management.

Limitations of our study include the exclusion of patients with incomplete quality of life data, which introduced a potential source of selection bias. Given the nature of urethral stricture disease and reconstructive subspecialization, we believe that it is more likely for unsatisfied patients to return than satisfied patients but to our knowledge this is unknown. Selection bias may also be present as men who are unwilling to undergo perineal urethrostomy select out of that surgical option during preoperative counseling.

Regarding our definition of long stricture AU, certainly other definitions are valid. However, we chose a strict definition which generated a cohort similar to the perineal urethrostomy group. Due to the small sample size of the perineal urethrostomy group, the study may be under powered to detect a true difference in PROMs.

The strengths of the study include the fact that it is a large multisurgeon series. We also used preoperative and postoperative PROMs with a long stricture AU comparison group, which to our knowledge is the first study of its kind.

We hope that this study will allay the fears of men who are hesitant to undergo perineal urethrostomy by demonstrating that their urinary and sexual satisfaction will rival that of men who elect AU.

CONCLUSIONS

Patients reported improved urinary function after perineal urethrostomy with no deleterious effect on sexual function, similar to results in patients treated with long stricture AU. Recurrence rates are similar after perineal urethrostomy and long stricture AU. Perineal urethrostomy should be offered to patients with long urethral strictures.

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EDITORIAL COMMENTS

Perineal urethrostomy is commonly considered a last resort operation, often in the belief that patients may find it too mutilating. In the current study Murphy et al from the TURNS analyzed postoperative sexual and urinary function as parameters of patient satisfaction and the need for re-intervention in patients treated with perineal urethrostomy. These findings were compared to those in patients who underwent urethroplasty of long segment strictures (greater than 6 cm).

This study presents 2 important conclusions. 1) Patients treated with perineal urethrostomy reported the same urinary and sexual outcomes postoperatively. 2) The perineal urethrostomy re-intervention rates appeared to be lower than those of urethroplasty.

These conclusions would advocate for more frequent use of perineal urethrostomy not only for long segment strictures but possibly also for other complex urethral strictures, such as after prior failed reconstruction or in patients with lichen sclerosus. Offering the alternative of perineal urethrostomy instead of urethroplasty to a patient with a complex urethral stricture would, therefore, be recommended.

Matthias D. Hofer
Department of Urology
Feinberg School of Medicine
Northwestern University
Chicago, Illinois

In the last several years the TURNS group has elevated the standard of quality for genitourinary reconstructive surgery research. As the first study to evaluate preoperative and postoperative PROMs after perineal urethrostomy and compare them to AU, this study is another important contribution from the group. The data presented support what urologists have presumed for decades: urinary function improves similarly after perineal urethrostomy and complex urethroplasty.

The study also demonstrates that delivering high quality evidence about complex urethral stricture disease is not easy. Even a large group of high volume reconstructive surgeon-investigators could identify only 39 patients who underwent perineal urethrostomy and had preoperative and postoperative PROMs with only 17, 13, 12 and 4 completing the MSHQ, the SHIM, the I-PSS and the CLSS, respectively. These low numbers limited the ability to detect differences between the cohorts. As such, with greater numbers the reader might infer that re-intervention rates after perineal urethrostomy are likely superior to those after long AU (note the divergent survival curves in figure 1) but sexual function may worsen after perineal urethrostomy (note the wide box plot of SHIM in figure 3).

Shortcomings aside, these data will certainly help us counsel future patients with stricture who are trying to decide between perineal urethrostomy and orthotopic urethral reconstruction.

Steven J. Hudak
Department of Surgery-Urology
Brooke Army Medical Center
San Antonio, Texas