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Repeat Urethroplasty After Failed Urethral Reconstruction: Outcome Analysis of 130 Patients

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Abstract

Purpose—Male urethral stricture disease accounts for a significant number of hospital admissions and health care expenditures. Although much research has been completed on treatment for urethral strictures, fewer studies have addressed the treatment of strictures in men with recurrent stricture disease after failed prior urethroplasty. We examined outcome results for repeat urethroplasty.

Materials and Methods—A prospectively collected, single surgeon urethroplasty database was queried from 1977 to 2011 for patients treated with repeat urethroplasty after failed prior urethral reconstruction. Stricture length and location, and repeat urethroplasty intervention and failure were evaluated with descriptive statistics, and univariate and multivariate logistic regression.

Results—Of 1,156 cases 168 patients underwent repeat urethroplasty after at least 1 failed prior urethroplasty. Of these patients 130 had a followup of 6 months or more and were included in analysis. Median patient age was 44 years (range 11 to 75). Median followup was 55 months (range 6 months to 20.75 years). Overall, 102 of 130 patients (78%) were successfully treated. For patients with failure median time to failure was 17 months (range 7 months to 16.8 years). Two or more failed prior urethroplasties and comorbidities associated with urethral stricture disease were associated with an increased risk of repeat urethroplasty failure.

Conclusions—Repeat urethroplasty is a successful treatment option. Patients in whom treatment failed had longer strictures and more complex repairs.

Keywords

urethra; urethral stricture; male; reoperation; treatment failure

Male urethral stricture disease accounts for more than 5,000 hospitalizations in the United States annually with estimated health care costs in 2000 exceeding 200 million dollars.[1] Although much research has been completed on the treatment of urethral strictures with endoscopic and open repair, fewer studies have addressed treatment for strictures in men with recurrent stricture disease after failed prior urethroplasty.[2,3]

Recurrent urethral stricture disease after urethroplasty creates reconstructive challenges that are not present with initial repair. Patients with urethroplasty failure typically have less healthy tissue to use for reconstruction and they may have denser, more extensive scarring.

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Surrounding tissue for flaps may have already been used and the penile blood supply may be altered.[4] In addition, patients with recurrent stricture disease may have an etiology that predisposes to failure, such as prior hypospadias repair, pelvic radiation history and lichen sclerosis.[5,6] A recent multivariate analysis of risk factors for long-term urethroplasty outcome demonstrated that prior urethroplasty was predictive of treatment failure.[7]

We evaluated outcomes in patients who underwent repeat urethroplasty. We hypothesized that outcomes would be worse than in patients with initial urethroplasty.

MATERIALS AND METHODS

Study Population

A prospectively collected, single surgeon urethroplasty database was queried from January 1, 1977 to April 30, 2011 for patients treated with repeat urethroplasty after failed urethral reconstruction. Of 1,156 cases 168 patients underwent repeat urethroplasty after at least 1 failed prior urethroplasty. As our study cohort, we selected the 130 patients with a followup of 6 months or more. University of California-San Francisco institutional review board approval was obtained.

Patients were assessed with history, physical examination, retrograde urethrogram, voiding cystourethrogram, uroflowmetry and post-void residual urine measurement. The surgical technique for each patient was determined on an individual basis in the operating room by the senior surgeon (JWM). The urethroplasty techniques performed included anastomotic, fasciocutaneous penile flap, onlay graft or a combined approach.

Clinical Outcomes

After repeat urethroplasty, patients were followed at regular 3-month intervals for postoperative year 1 and annually thereafter. Uroflowmetry was performed at each followup visit to assess for a decrease in the flow rate or an obstructive voiding curve. Retrograde urethrogram and voiding cystourethrogram were performed at postoperative catheter removal and 1 year postoperatively. Additional retrograde urethrograms and voiding cystourethrograms were performed as indicated based on patient symptoms, a decrease in the flow rate or an obstructive voiding curve on uroflowmetry. Several patients were followed by their local urologist after the initial followup visit when the travel distance for followup was prohibitive.

Primary success was defined as no additional surgical procedure required after repeat urethroplasty. Secondary success was defined as the need for a single subsequent endoscopic intervention. Failure was defined as the need for more than 1 endoscopic intervention or subsequent urethroplasty. Dilatation, internal urethrotomy, intermittent catheterization and self-dilatation were included as possible endoscopic interventions when assessing success and failure.

Statistical Analysis

Characteristics of the success and failure groups were compared by the 2-tailed t or proportion test, as appropriate. Univariate and multivariate logistic regression was performed to evaluate which patient characteristics were associated with failure. The multivariate model included stricture length (less than 3 cm, 3 or greater to less than 5 and 5 or greater), history of comorbid conditions (hypospadias, lichen sclerosis, urethritis and pelvic radiation), number of prior failed urethroplasty procedures (1, or 2 or greater) and age at surgery. For all analyses $\alpha = 0.05$ was considered significant. Statistical analysis was performed with Stata®, version 12.1.

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RESULTS

Repeat Urethroplasty Population

Of the 1,156 urethroplasty cases in our database we identified 168 patients who underwent repeat urethroplasty after at least 1 failed prior urethroplasty. We evaluated the 130 patients with a followup of 6 months or more. Of these patients 117 (90%) underwent the initial operative procedure elsewhere and were later referred for repeat urethroplasty. Median age was 44 years (range 11 to 75), median followup was 55 months (range 6 to 249) and median stricture length was 4.4 cm (range 0.7 to 20) (table 1). Of the 130 patients 52 (40%) had bulbar urethral strictures. Two patients had panurethral strictures.

Of the 130 patients 85 (65%) had undergone failed endoscopic procedures before presenting for repeat urethroplasty. In this cohort 8 of the 130 men (6%) had been treated with 2 or more failed prior urethroplasties. Only 45 patients (35%) had only undergone a single prior urethroplasty without any additional intervention for stricture disease. In this cohort 21 of the 130 men (16%) had a history of comorbid conditions that have been reported to make urethroplasty more difficult, including hypospadias in 7 (5%), lichen sclerosis in 9 (7%), urethritis in 4 (3%) and a history of pelvic radiation treatment in 3 (2%) (table 1).

Operative Reconstruction and Repeat Urethroplasty Outcomes

Of the 130 patients 54 (42%) underwent anastomotic repeat urethroplasty. Fasciocutaneous flap urethroplasty was the second most common procedure (29 of 130 patients or 23%) (table 1). The overall success rate was 78% (102 of 130 patients) with primary success defined as no additional treatment and secondary success defined as the need for 1 subsequent endoscopic intervention. Primary success was achieved in 87 of the 130 patients (67%) and secondary success was achieved in 15 (12%).

Failure occurred in 28 of the 130 patients (22%), of whom 18 of 28 (64%) required repeat urethroplasty and 10 of 28 (36%) required more than 1 endoscopic intervention. For patients with failure median time to failure was 17 months (range 7 months to 16.8 years). Data on time to failure were available on 21 of the 28 patients with treatment failure, including all who required subsequent urethroplasty. Of the failures 13 occurred in the first 2 years after reoperation, while in subsequent years there were zero to 2 failures (see figure).

In the failure cohort mean stricture length was 1.8 cm longer than in the success cohort and men in the failure cohort were younger than those in the success cohort. In addition, the failure group included a significantly lower proportion of patients who underwent anastomotic urethroplasty, a significantly higher proportion with hypospadias or lichen sclerosis and a significantly higher proportion treated with 2 or more failed prior urethroplasties (table 2).

On univariate analysis a history of 2 or more failed prior urethroplasties, a history of hypospadias and a history of lichen sclerosis were associated with increased odds of repeat urethroplasty failure. A history of hypospadias and lichen sclerosis continued to be associated with increased odds of repeat urethroplasty failure when controlling for age, stricture length and a history of 2 or more failed prior urethroplasties. The association between increasing stricture length and failure trended toward statistical significance (table 3).

DISCUSSION

Of 130 patients with multiple prior urethral procedures and comorbidities, such as hypospadias and lichen sclerosis, 102 (78%) were successfully treated. Patients in whom

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repeat urethroplasty failed had longer strictures and more complex repairs. Various surgical approaches and combined urethroplasty techniques were used to achieve this success rate. Fewer patients in the failure group underwent anastomotic urethroplasty, which indicates the increased complexity of technique required for difficult repeat cases. There is no standardized approach to urethroplasty techniques, particularly in the setting of repeat stricture disease, and surgeon judgment on a case by case basis must be considered.[8]

Although the 78% success rate is lower than the rate (approaching 95%) in patients treated with initial anastomotic, graft or flap urethroplasty by the same surgeon,[9–11] the repeat success rate is similar to that of published success rates across multiple cohorts. Systematic review of urethroplasty failure rates in 86 urethroplasty outcomes series between 2000 and 2008 revealed an overall stricture recurrence rate of almost 16% with the stricture recurrence rate approaching 19% in some series.[12] This failure rate in studies of patients primarily treated with initial urethroplasty is similar to our 22% failure rate (28 of 130 patients) for repeat urethroplasty. These comparison rates suggest that repeat urethroplasty may achieve a reasonable success rate when performed by surgeons who have good success rates in initial urethroplasty cohorts. Of 28 failures 13 occurred in the first 2 years after reoperation with failure in only zero to 2 patients in the subsequent 20 years (see figure). Failures that occurred 16 years after reoperation reinforce the necessity of long-term followup when reporting urethroplasty outcomes.

Our cohort included men who are often excluded from cohort analysis of urethral stricture disease.[13] The increased likelihood of urethroplasty failure and the reconstructive challenge presented by men with prior failed hypospadias repair, radiation therapy and lichen sclerosis is well recognized[6,14,15] and was confirmed in this study. We included men with these diagnoses in analysis to truly evaluate repeat urethroplasty success in those with recalcitrant stricture disease.

Internal urethrotomy has long been recognized as a temporizing measure for urethral stricture disease with a low success rate and a decreasing success rate with repeat procedures.[8] Although there is a paucity of randomized, controlled trial data to support the superiority of the long-term durability of the success of urethroplasty compared to endoscopic management, surgeon and patient experience supports this finding.[16] With the increasing costs and decreasing success rates of repeat endoscopic procedures, it was suggested that urethroplasty is the most cost-effective step after failed endoscopic intervention.[17,18] Most patients in this cohort underwent multiple failed prior procedures, demonstrating the recalcitrant nature of stricture disease in some patients and the need for additional evaluation of cost-effective measures for recurrent stricture disease.

The limitations of this study include the facts that it is a retrospective study of a single surgeon experience and results may not translate to the same success or failure rates as other surgeons. Since this study includes 35 years of experience, surgical techniques have changed with time. For a brief period acellular matrix grafts and tubularized grafts were used, which were largely unsuccessful. However, most patients in this cohort underwent anastomotic or onlay graft urethroplasty, which comprise most contemporary urethroplasty procedures.

There is a lack of long-term followup for some patients, which is due in part to the fact that some patients were followed by their local urologist after repeat urethroplasty. Lack of referral back to our clinic may have resulten in some missed failures in this cohort rather than successes. We attempted to limit this by excluding patients with less than 6 months of followup. Since repeat urethroplasties in this cohort span 35 years, we could not contact all patients with shorter followup for evaluation.

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Although to our knowledge this is the largest reported cohort of repeat urethroplasty, there is still limited power to detect associations for predictors of failure, given the small number of patients.

CONCLUSIONS

Patients in whom repeat urethroplasty failed had longer strictures and more complex repairs. A history of 2 or more failed prior urethroplasties and comorbid conditions, such as hypospadias and lichen sclerosis, are associated with an increased risk of repeat urethroplasty failure. Various surgical approaches and combined urethroplasty techniques were used to achieve a 78% success rate (102 of 130 patients) in this cohort. There is no standardized approach to repeat urethroplasty techniques and treatment decisions should be made on a case by case basis.

Acknowledgments

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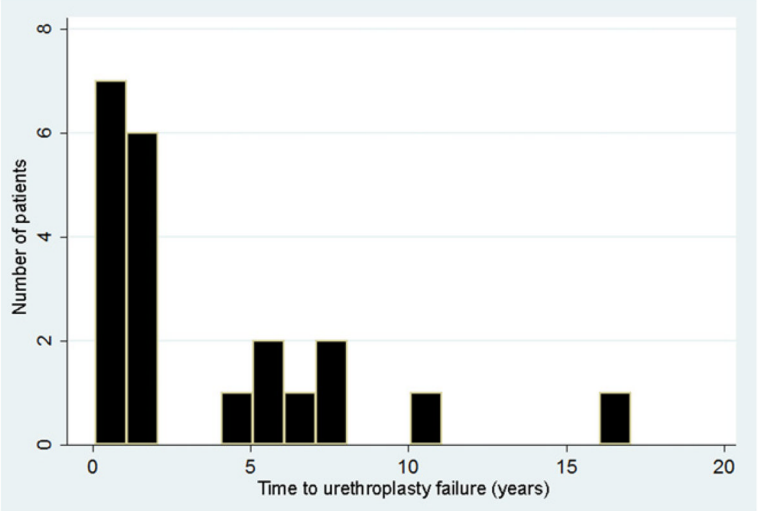

Figure 1.

Figure Number of repeat urethroplasty failures with time. Most failures occurred in first 2 years after surgery. One occurred 16 years after reoperation, reinforcing need for long-term followup for patients with urethroplasty.

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Table 1

Cohort characteristics

No. pts	130
Median age (range)	44 (11–75)
Median cm stricture length (range)	4.4 (0.7–20)
Median mos followup (range)	55 (6–249)
No. referred for repeat urethroplasty (%)	117 (90)
No. failed prior endoscopic procedure (%) *	85 (65)
No. failed prior urethroplasty technique (%):	
Anastomosis	6 (5)
Vascular flap	20 (15)
Onlay graft	3 (2)
Combined	3 (2)
Staged	4 (3)
Unknown	95 (73)
No. repeat urethroplasty technique (%):	
Anastomosis	54 (42)
Onlay graft	31 (24)
Fasciocutaneous flap	29 (23)
Combined	15 (12)
Tubularized flap	1 (1)
No. comorbid condition (%):	
Any	21 (16)
Hypospadias	7 (5)
Lichen sclerosis	9 (7)
Urethritis	4 (3)
Pelvic radiation	3 (2)

*Direct vision internal urethrotomy and/or dilatation.

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Table 2

Success and failure groups

	Success	Failure	p Value*
No. pts	102	28	
Mean ± SD age	44.7 ± 14.1	43.1 ± 16.5	0.606
Mean ± SD stricture length (cm)	4.0 ± 3.2	5.8 ± 5.0	0.019
No. stricture location (%):			
Bulbar	44 (43)	8 (29)	0.163
Penile/bulbar	14 (14)	13 (46)	<0.001
Prostatomembranous	22 (22)	2 (7)	0.081
Penile	10 (10)	4 (14)	0.498
No. reop technique (%):			
Anastomosis	48 (48)	6 (21)	0.013
Fasciocutaneous flap	21 (21)	8 (29)	0.383
Onlay graft	21 (21)	10 (36)	0.102
Combined	11 (11)	4 (14)	0.620
No. comorbid condition (%):			
Any	9 (9)	12 (43)	<0.001
Hypospadias	1 (1)	6 (21)	<0.001
Lichen sclerosis	4 (4)	5 (18)	0.010
Pelvic radiation	2 (2)	1 (4)	0.615
Urethritis	2 (2)	2 (7)	0.160
No. 2 or greater failed prior urethroplasties (%):	3 (3)	5 (18)	0.004
No. prior endoscopic procedure (%):†	63 (62)	22 (79)	0.098

*Student t test for continuous variables and 2-tailed test of proportions for proportions.

†Direct vision internal urethrotomy and/or dilatation.

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Table 3

Patient characteristics and failed repeat urethroplasty

	Univariate OR (95% CI)	p Value	Multivariate OR (95% CI)*	p Value
2 or Greater prior urethroplasties	7.2 (1.6–32.2)	0.010	4.3 (0.6–28.8)	0.150
Stricture length (cm):				
Less than 3	Referent		Referent	
3 or Greater-less than 5	1.4 (0.5–3.9)	0.465	1.2 (0.4–3.6)	0.807
5 or Greater	2.3 (0.8–6.6)	0.131	2.4 (0.7–8.0)	0.170
Comorbid condition:				
None	Referent		Referent	
Hypospadias	29.1 (3.2–265.3)	0.003	17.8 (1.7–187.5)	0.017
Urethritis	2.9 (0.2–34.0)	0.395	3.4 (0.3–41.5)	0.332
Lichen sclerosis	7.3 (1.8–30.0)	0.006	6.2 (1.4–27.1)	0.015
Pelvic radiation therapy	2.9 (0.2–34.0)	0.395	2.6 (0.2–37.8)	0.475

*Adjusted for age at repeat urethroplasty.