

# Urethrotomy Has a Much Lower Success Rate Than Previously Reported

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**Purpose:** We evaluated the success rate of direct vision internal urethrotomy as a treatment for simple male urethral strictures.

**Materials and Methods:** A retrospective chart review was performed on 136 patients who underwent urethrotomy from January 1994 through March 2009. The Kaplan-Meier method was used to analyze stricture-free probability after the first, second, third, fourth and fifth urethrotomy. Patients with complex strictures (36) were excluded from the study for reasons including previous urethroplasty, neophallus or previous radiation, and 24 patients were lost to followup.

**Results:** Data were available for 76 patients. The stricture-free rate after the first urethrotomy was 8% with a median time to recurrence of 7 months. For the second urethrotomy stricture-free rate was 6% with a median time to recurrence of 9 months. For the third urethrotomy stricture-free rate was 9% with a median time to recurrence of 3 months. For procedures 4 and 5 stricture-free rate was 0% with a median time to recurrence of 20 and 8 months, respectively.

**Conclusions:** Urethrotomy is a popular treatment for male urethral strictures. However, the performance characteristics are poor. Success rates were no higher than 9% in this series for first or subsequent urethrotomy during the observation period. Most of the patients in this series will be expected to experience failure with longer followup and the expected long-term success rate from any (1 through 5) urethrotomy approach is 0%. Urethrotomy should be considered a temporizing measure until definitive curative reconstruction can be planned.

**Key Words:** urethral stricture, treatment failure, retreatment

URETHRAL strictures are often treated with urethrotomy, most commonly DVIU.<sup>1,2</sup> The popularity of this procedure has been attributed to the ease of performance, a perceived low complication rate and the fact that many North American urologists do not perform open urethroplasty so they may be forced to perform repeat urethrotomy.<sup>1,3</sup> Despite its popularity the failure rate after initial urethrotomy is reported to be at least 50%.<sup>4,5</sup> The failure rate after the second urethrotomy is considered much higher and can be as high as 100%.<sup>2,4,5</sup> Therefore, we hy-

pothesized that despite its popularity urethrotomy has poor performance characteristics resulting in a low SFR. To test this hypothesis we performed a retrospective review of more than 100 patients treated with urethrotomy, which represents the first such study in North America to our knowledge to evaluate the stricture-free rate not only after a single urethrotomy, but after 2 through 5 procedures.

## MATERIALS AND METHODS

After institutional review board approval was received charts were reviewed for 136

### Abbreviations and Acronyms

DVIU = direct vision internal urethrotomy

SFR = stricture-free rate

TTR = time to recurrence

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Study received institutional review board approval.

Nothing to disclose.

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Results of urethrotomies 1 through 5

	DVIU 1	DVIU 2	DVIU 3	DVIU 4	DVIU 5
No. pts	74	32	11	5	3
No. censored (survivors)	6	2	1	0	0
% SFR	8	6	9	0	0
Median mos TTR (95% CI)	7 (4.23–9.77)	9 (5.00–13.00)	3 (1.53–4.47)	20 (0.00–56.50)	8 (0.00–19.02)
Mean mos treatment failure followup (range)	14 (0.5–79)	17 (1–65)	10 (1–17)	14 (1–24)	6 (1–10)
Mean mos survivor followup (range)	18 (1–30)	0.8 (0.3–2)	1 (not applicable)	Not applicable	Not applicable
Mean age at procedure	53	57	61	68	74

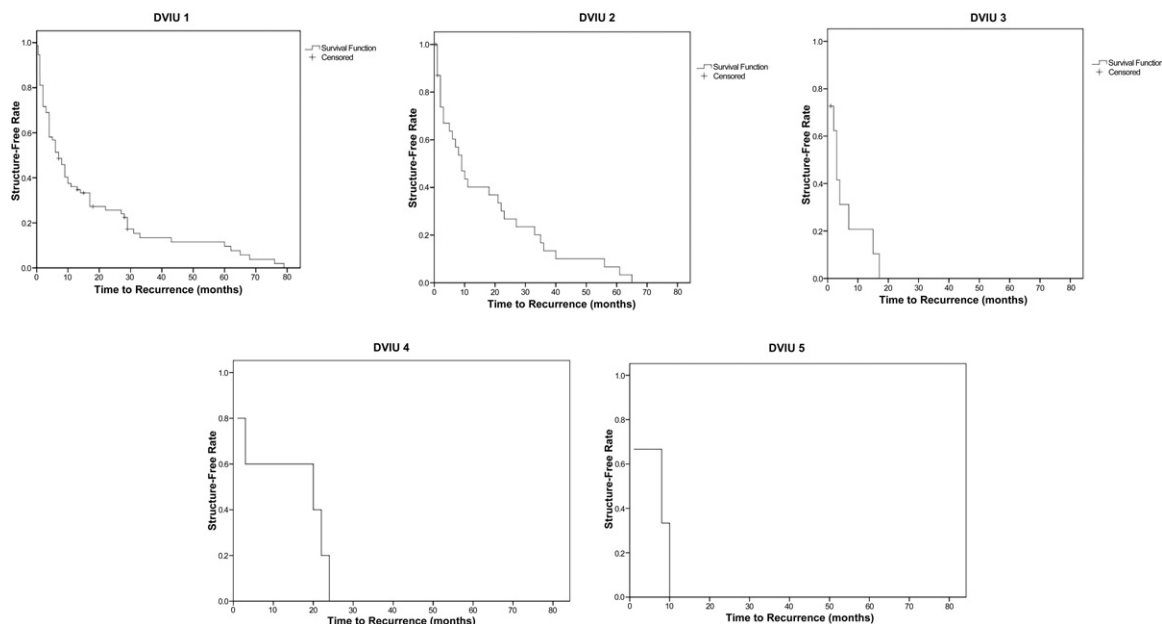
patients who underwent urethrotomy from January 1994 to March 2009. There were 36 patients with complex strictures who were excluded from the study due to previous radiation, previous urethral surgery including urethroplasty, neophallus and UroLume® placement, and when performed for bladder neck contracture as opposed to urethral stricture. A total of 24 patients were lost from the sample population due to lack of followup, leaving a remainder of 76 patients to be analyzed. The causes of the remaining strictures mirrored those commonly reported in the literature of sexually transmitted diseases, catheter trauma, repeated instrumentation or unknown.<sup>1,5</sup>

Urethrotomy was performed by more than 7 urologists using a single incision at the 12 o'clock position,<sup>4</sup> or a modified procedure including multiple radial incisions at the 3, 6, 9 and 12 o'clock positions with a cold knife or Indigo laser. The Kaplan-Meier method was used to evaluate the stricture-free rate (the survival function) after the first, second, third, fourth and fifth urethrotomy using SSPS® (v. 15.0). Patients without recurrence (ie survivors) were censored at the appropriate month of followup for the specific patient in question. For example, a patient who underwent urethrotomy on January 1, 2009, with no symptoms at study end in March 2009, was appropriately

censored at 3 months. No survivor had been followed more than 3 years. TTR was defined as the time from urethrotomy until the first subjective or objective sign of recurrence (if known), or the actual date of the subsequent repeat urethrotomy. In our study as in others signs of recurrence included decreased force of stream, incomplete emptying, recurrent urinary tract infections, increased post-void residual urine, obstructive pattern on uroflow study, or definitive radiographic or cystoscopic evidence of recurrent stricture.<sup>4,5</sup>

RESULTS

The results are summarized in the table and the stricture-free survival curves as determined by the Kaplan-Meier method are shown in the figure. Mean patient age was 53 years (range 17 to 100). Stricture length data were available in 50 of the 100 patients, resulting in a mean stricture length of 15 mm (range 2 to 50). Of the original 76 patients 10 ultimately underwent urethroplasty. Urethroplasty was performed after 1 urethrotomy in 5 patients, after 2 urethrotomies in 2, after 3 urethrotomies in 2 and



Kaplan-Meier curves predicting SFR after urethrotomy 1 through 5

after 5 urethrotomies in 1. Most strictures occurred in the bulbar urethra (37 of 76 or 49%) with only a few in the penile urethra (2 of 76 or 3%), penile bulbar urethra (1 of 76 or 1%), fossa navicularis (2 of 76 or 3%) or unknown.

## DISCUSSION

To our knowledge this is the first study performed in the United States evaluating the success rate of urethrotomy in the last decade. As hypothesized the success rate of the first urethrotomy was much lower than previously reported, and lower than most practitioners would probably predict. Previously published studies have reported the initial urethrotomy success rate to vary from 20% to 95% while our study showed a success rate of only 8% for the first urethrotomy.<sup>1,2,4-6</sup> Repeat urethrotomy, up to 5 procedures, also had poor success rates ranging from 0% to 9%. Poor performance characteristics of urethrotomy were seen for all causes of stricture and for every attempted urethrotomy method (single cut, multiple cut, laser cut). These survivors have been followed only for a mean of 1 month. We predict that the success rates after the second and third urethrotomy would decrease further when the patients are followed longer.

The method of failure investigation appears irrelevant as most or all of our failures had endoscopic proof of stricture recurrence, regardless of whether the doctor was alerted to failure by symptoms, poor urine stream, increased urinary residuals or abnormal retrograde urethrogram.

### Subsequent Urethrotomies Have a Higher Failure Rate Than Initial Urethrotomy

Despite the fact that reported urethrotomy success rates vary widely, these data align closely with previously published results. After 1 urethrotomy Pansadoro and Emiliozzi found a 5-year stricture-free survival rate of 6%, which closely matched our 5-year stricture-free survival rate of 7%.<sup>5</sup> Treatment eventually failed in all 7% of the patients by 79 months. We have no subset analysis that explains why some patients did not have recurrence for 5 years while others had recurrence much earlier, and this may be an area for further study. After repeat urethrotomy Pansadoro and Emiliozzi reported success in only 2 of 47 (4%) patients treated with a second urethrotomy, and complete failure after the third and fourth procedure, similar to our findings.<sup>5</sup> Heyns et al also found no value in performing a third urethrotomy because these patients had a 0% stricture-free rate.<sup>4</sup> Ours is the first United States study of which we are aware to show success rates after a fifth urethrotomy of 0%.

Heyns et al found that 60% of patients remained stricture-free at 48 months if there was no stricture

recurrence by 3 months after the first DVIU.<sup>4</sup> Our data show only a 12% SFR at 43 months if no evidence of recurrence was found by 3 months, clearly highlighting a difference between our 2 studies. Heyns et al also stated that if there was recurrence after 6 months of the initial DVIU, there was a 40% chance of long-term cure with a second DVIU.<sup>4</sup> This might suggest usefulness of a second urethrotomy in patients who had recurrence more than 6 months after first DVIU. However, we saw no such effect. In contrast, our data showed 33 of 74 patients (45%) had recurrence after 6 months, and 24 (73%) of these patients underwent a second DVIU. Of these 24 patients 18 had recent followup (1 died, 1 had SPT placed at DVIU, 4 were lost to followup). Of our 18 patients 2 recently underwent a second DVIU, and were only followed for 2 months at study end. Only 2 of the remaining 16 patients were stricture-free at 48 months (13%) in comparison to Heyns et al with 50% to 60%. Treatment did eventually fail in both of these patients at 63 and 65 months.

### Urethroplasty is a Desirable Alternative to Urethrotomy

During the last 30 years urethroplasty has improved in efficacy and safety,<sup>6</sup> while urethrotomy is increasingly considered neither cost-efficient nor effective in the long term.<sup>6,7</sup> Urethroplasty is reported to have lifetime success rates ranging from 75% to 100%.<sup>8</sup> Repeat and unsuccessful urethrotomies impose costs to the patients in the form of lost wages, unnecessary health care expenditures, decreased quality of life and unnecessary anesthesia. The fact that urethrotomy has a low success rate is a strong argument for opting for the more effective urethroplasty instead of a less effective urethrotomy. It may be more cost-effective as well. In the United States the cost of performing 2 urethrotomies is \$17,700 while the cost of immediate urethroplasty is \$16,400.<sup>9</sup> In Britain, where health care costs are lower, the numbers are similar at \$6,700 for 2 urethrotomies vs \$7,522 for an immediate single stage urethroplasty.<sup>1</sup> It is predicted that the cost to cure a single patient with urethrotomy is \$141,952.<sup>7</sup>

Several hypotheses can be advanced for the continued use of urethrotomy despite its lack of efficacy. It can be conducted on an outpatient basis, is fairly quick and easy to perform, has a short recovery time and has the perception of a low incidence of complications. In addition, most American urologists lack urethroplasty expertise and we believe a certain percentage of Americans live far from a urethroplasty referral center.<sup>3</sup> We are currently performing research to quantify this problem.

### Complications of Urethrotomy

Urethrotomy is not only ineffective but it can also have serious complications. While we believe most urologists perceive urethrotomy as having a low potential for complications, they can in fact occur

in up to 27% of cases.<sup>10</sup> In a review of the literature individual complication rates can be high with hemorrhage (20%), perineal hematoma (20%), scrotal edema (13%), false passages (10%), rectal perforation (10%), epididymo-orchitis (9%), meatal stenosis (9%), incontinence (9%), fever (4%), extravasation (3%), bacteremia (3%), urinary sepsis (2%), scrotal abscess (1%), impotence (0.6%) and chordee (0.4%).<sup>2</sup> It is not known if urethrotomy also increases stricture length as some have hypothesized. However, if true, this would be a further indictment of the procedure. Despite whether urethrotomy increases stricture length, it does appear to reduce the success of future urethroplasty, perhaps by the worsening of spongiofibrosis.<sup>11</sup>

### Limitations

There are several limitations to this study. It was a retrospective review and as with most urethral stricture research, there was no standard objective measure for recurrence. However, this may be unimportant as most patients had proven stricture recurrence during cystoscopy, and the method by which the urologist was alerted to the stricture recurrence seems unimportant. As in most urethral stricture studies we were unable to accurately determine the stricture etiology in almost half of the patient population. We believe this is of no concern because urethrotomy failed at the same high rate for all of the known or

unknown causes and it has been reported that etiology is not an important predictor of recurrence.<sup>5</sup>

Another limitation of our study might be that not all urethrotomies were performed by the same surgeon. Nonetheless the technique was similar in every case, and despite having different surgeons and different techniques, urethrotomy failed in almost every case. We do not believe this limits the impact of the study, but rather proves that urethrotomies are equally unhelpful in the hands of many different surgeons. Finally these data are a mix of cold knife and Indigo laser urethrotomy, both of which were equally ineffective. We believe this is not a confounding variable as it has been documented that the laser offers no advantage compared to conventional urethrotomy.<sup>4</sup>

### CONCLUSIONS

DVIU is currently the most popular modality used to treat male urethral stricture disease.<sup>2</sup> Performance characteristics for this procedure are poor. The success rate after 1 urethrotomy was a mere 8% and after multiple urethrotomies was close to 0%. Because urethroplasty has long-term success rates ranging from 75% to 100%, increased use of this more effective treatment may be warranted.<sup>8</sup> Urethrotomy should be reserved as a temporizing measure for poor surgical candidates or until further reconstruction can be planned and executed.

### REFERENCES

- Greenwell TJ, Castle C, Andrich DE et al: Repeat urethrotomy and dilation for the treatment of urethral stricture are neither clinically effective nor cost-effective. *J Urol* 2004; **172**: 275.
- Naude AM and Heyns CF: What is the place of internal urethrotomy in the treatment of urethral stricture disease? *Nat Clin Pract Urol* 2005; **2**: 538.
- Bullock TL and Brandes SB: Adult anterior urethral strictures: a national practice patterns survey of board certified urologists in the United States. *J Urol* 2007; **177**: 685.
- Heyns CF, Steenkamp JW, De Kock ML et al: Treatment of male urethral strictures: is repeated dilation or internal urethrotomy useful? *J Urol* 1998; **160**: 356.
- Pansadoro V and Emilozzi P: Internal urethrotomy in the management of anterior urethral strictures: long-term followup. *J Urol* 1996; **156**: 73.
- Morey A: Urethral stricture is now an open surgical disease. *J Urol* 2009; **181**: 953.
- Wessells H: Cost-effective approach to short bulbar urethral strictures supports single internal urethrotomy before urethroplasty. *J Urol* 2009; **181**: 954.
- Santucci RA: Male urethral stricture disease. In: *Urologic Diseases in America*. Edited by MS Litwin and CS Saigal. US Department of Health and Human Services, Public Health Service, National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases. Washington, D.C.: US Government Publishing Office 2007; NIH publication No. 07-5512, pp 531-552.
- Rourke KF and Jordan GH: Primary urethral reconstruction: the cost minimized approach to the bulbous urethral stricture. *J Urol* 2005; **173**: 1206.
- Smith PJ, Roberts JB, Ball AJ et al: Long-term results of optical urethrotomy. *Br J Urol* 1983; **55**: 698.
- Roehrborn CG and McConnell JD: Analysis of factors contributing to success or failure of 1-stage urethroplasty for urethral stricture disease. *J Urol* 1994; **151**: 869.