

## THE PROBLEMS OF PENILE URETHROPLASTY WITH PARTICULAR REFERENCE TO 2-STAGE RECONSTRUCTIONS

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### ABSTRACT

**Purpose:** We evaluate the anecdotal high revision rate of 2-stage urethroplasty.

**Materials and Methods:** The short-term revision rates after 1-stage (139 cases) and 2-stage (103) urethroplasties were compared.

**Results:** There were 4 revisions after 1-stage urethroplasty (4 of 139, 3%) and all involved the penile urethra (20%). The revision rate was 37.8% after stage 1 and 25.3% after stage 2 and of 2-stage urethroplasty 85% involved the penile urethra.

**Conclusions:** Although 2-stage has a significantly lower re-stricture rate than 1-stage urethroplasty for complex strictures in the penile urethra, it does so at the expense of a significantly higher revision rate particularly of the penile urethra.

**KEY WORDS:** urethral stricture, reconstructive surgical procedures

For urethral strictures affecting the penile or pendulous part of the urethra, anastomotic urethroplasty is contraindicated as it would interfere with erection. Therefore, substitution is always necessary for urethroplasty at this site. Strictures usually are not common but the incidence seems to be increasing, particularly those due to lichen sclerosus (balanitis xerotica obliterans) and following previous hypospadias surgery.

Theoretically penile urethroplasty can be a 1 or 2-stage procedure. The 1-stage procedures are preferred to 2-stage procedures when the results are equally good. The Orandi procedure, which involves a "stricturotomy" and patch using a flap, is popular for simple strictures.<sup>1</sup> For more complicated strictures a stricturotomy and patch are not appropriate either because the lumen has been obliterated and there is nothing to patch, the corpus spongiosum is too fibrotic or the tissue quality of the urethra is poor. Therefore, the urethra must be excised and the urethral defect reconstructed circumferentially, either in 1 or 2 stages. A 1-stage reconstruction involves creating a tube from either a graft or flap at the time of excision of the urethra. A 2-stage reconstruction involves creating a flat neo-urethral plate with either a graft or a flap at the time of excision of the urethra and then rolling it up to form a tube, therefore completing the reconstruction 3 to 6 months later.

In 1999 we reported that the re-stricture rate after a 1-stage tubed repair was 2 to 3 times higher than that after 2-stage circumferential reconstruction of the urethra for complex penile urethral strictures,<sup>2</sup> after reporting previously that tubed urethral reconstructions of all types did not seem to do well compared with patch type reconstructions.<sup>3</sup> Subsequently we have used 2-stage repairs routinely for such strictures. Even before then it was clear that early revisions were common after 2-stage repairs, although the evidence is anecdotal and there appears to be nothing in the literature to support this assertion. We evaluate the revision rate after each stage of a 2-stage repair to determine the reasons for revision.

### PATIENTS AND METHODS

From January 1, 1998 to December 31, 2000 we performed urethroplasty on 242 male patients 10 to 76 years old (mean age 36.4, table 1). Of these patients 139 underwent a 1-stage and 103 a 2-stage repair. Of the 1-stage procedures 119 were

performed on the membranous and bulbar urethra and 20 on the penile urethra (table 2). Of the 2-stage procedures 63 were performed on the penile urethra, 11 on the bulbar urethra and 29 were full-length. During the study 87 of the 103 patients underwent stage 2 of the procedure, while the stage 2 procedure was performed subsequently in the remaining 16.

Two-stage urethroplasty was performed for lichen sclerosus, after previous failed hypospadias surgery or when the urethral lumen was obliterated, the degree of fibrosis of the corpus spongiosum rendered it completely inflexible or the tissue quality of the urethra was too poor (scarred or ischemic) to support a 1-stage repair. In such cases the diseased segment of urethra had to be excised to reconstruct the urethra. After excision the segment was replaced by a 2.8 cm strip of a full-thickness skin graft or buccal mucosal graft, quilted into the tunica albuginea and sutured to the skin margins. When the graft was soft and pliable 3 to 6 months later stage 2 was performed to mobilize the graft and roll it up to form a tube, closing the wound with a dartos layer interposition. Patients were followed symptomatically and with a flow rate study 6 weeks, and 3 and 6 months postoperatively at which time an ascending urethrogram and voiding cystogram were performed. Thereafter patients were seen annually at a special clinic unless problems occurred.

The techniques for all of the different types of urethroplasty have been described previously. Essentially the anastomotic urethroplasty technique was based on the progression approach described by Webster and Ramon.<sup>4</sup> The 1-stage bulbar patch urethroplasty was performed using the technique popularized by Barbagli et al.<sup>5</sup> For 1-stage penile urethroplasty we used the Orandi technique.<sup>1</sup> Two-stage urethroplasty involved excision of the diseased urethra with full-thickness grafting of either postauricular skin or buccal mucosa onto the tunica albuginea to bridge the defect with 3-layer closure 6 months later.<sup>2</sup>

### RESULTS

There was no case of early revision among the 119 membranous and bulbar urethral 1-stage repairs. Of the 20 penile 1-stage repairs 4 (20%) required drainage of a hematoma and re-suture of the wound.

The early revision rate for 2-stage surgery is shown in table 3. Of the 103 first stage urethroplasties 39 (37.8%)

TABLE 1. *Etiology*

	No. Pts
<i>1-Stage urethroplasty</i>	
Bulboprostatic anastomosis: trauma	57
Bulbobulbar anastomosis:	
Trauma	6
Idiopathic	5*
Bulbar patch (mainly Barbagli):	
Idiopathic	25*
Iatrogenic	18
Trauma	5
Infection	3
Penile patch (Orandi):	
Idiopathic	17†
Hypospadias	3
<i>2-Stage urethroplasty</i>	
Penile:	
Hypospadias	35
Lichen sclerosus	17
Degloving	4
Idiopathic	4†
Iatrogenic	3
Bulbar:	
Iatrogenic	10
Lichen sclerosus	1
Full length:	
Iatrogenic	12
Hypospadias	5
Idiopathic	4†
Lichen sclerosus	4
Electrotorture	2
Degloving	1
Pseudohermaphrodite	1

\* Thought to be congenital.

† Thought to be infective.

TABLE 3. *2-Stage urethroplasty early revisions*

	No. Pts
No. stage 1 revisions:	
1	21
2	6
3	2
No. stage 2 revisions:	
1	13
2	2
5 (infected tissue expander)	1
Of early revisions 85% were of the penile urethra and the remainder were for full length urethroplasty.	

TABLE 4. *Reasons for revisions*

	No. Pts
Stage 1 (29 pts):	
Stomal stenosis	19
Deepen glans cleft	13
Tidy up bands	4
Re-graft	3
Second stage 2 (16 pts):	
Re-suture wound	9
Fistula	7
Drain hematoma	6

TABLE 5. *Re-stricture rate 6 months after urethroplasty*

	No./Total No. 1-Stage		No./Total No. 2-Stage
	Anastomosis	Patch	
Membranous	2/57		
Bulbar	0/11	1/51	1/21
Penile		1/20	1/58
Full length			2/24
Totals	2/68	2/71	4/103

## DISCUSSION

Revisions are common with 2-stage procedures and in approximately 50% of cases a 2-stage repair will turn out in practice to be 3 stages. Penile urethroplasty seems to be peculiarly susceptible to revision. The reasons for this are not clear but drainage and re-suture of the wound are a regular albeit infrequent requirement for hematoma and subsequent infection after 1 or 2-stage urethroplasty. We are careful about hemostasis and use antibiotics prophylactically for the first 5 days postoperatively, and so there must be another explanation for revision of penile urethroplasty since it is never required for bulbar strictures or posterior strictures.

It may be that the underlying reason is erection during the early postoperative period, which might lead to reactive hemorrhage and compromise of the blood supply to the repair by tension on the skin edges or within the dartos layer. We do not routinely use measures to prevent postoperative erections. Some surgeons anecdotally use sedatives to prevent erection or freezing sprays to stop them but we have never found them to be effective. Nor have we tried antiandrogens such as cyproterone acetate as they must be given before and after surgery to have an effect, and they produce side effects. Stomal stenosis is more common in patients with lichen sclerosus,<sup>6</sup> which is not surprising as the disease is believed to show the Koebner phenomenon, which is the tendency of some skin diseases to develop in traumatized tissue.<sup>7</sup>

The other common reason for revision is to deepen the glans cleft, which had shallowed out after a first stage procedure. We suspect that there is a natural tendency for shallowing out of the glans cleft to occur anyway but wonder if shrinkage of the graft had a part in this as well. This condition would obviously tend to occur if the graft was sutured into the glans cleft under stretch which we always try to avoid. Shrinkage of the graft on the tunica albuginea would presumably be encountered by the stretching effect of

TABLE 2. *Urethroplasty types*

	No. Pts
1-Stage:	
Bulboprostatic anastomosis	57
Bulbobulbar anastomosis	11
Bulbar patch	51
Penile patch	20
2-Stage:	
Penile	63
Bulbar	11
Full length	29
Totals	242

erections during the postoperative period, whereas this would not happen on the glans.

It is possible that 2-stage reconstructions may be prone to a higher revision rate simply because the underlying problem is more severe and the surgery more extensive. On the other hand, we have shown that the early revision rate for a simple 1-stage Orandi urethroplasty of the penile urethra is 20% and no patient treated with a 1 or 2-stage urethroplasty of the bulbar or membranous urethra required early revision.

#### CONCLUSIONS

Although 2-stage reconstruction of complex penile urethral strictures (mainly after hypospadias and lichen sclerosis related) seems to reduce the re-stricture rate significantly compared with 1-stage tubed repairs, it does so at the expense of a significant revision rate. In practice this means that about 50% of patients will undergo a 3-stage rather than 2-stage procedure to reduce the re-stricture rate (short-term followup) from about 18%, as it might have been had they undergone a 1-stage repair, to 4%.

The 3 principal reasons for this revision rate appear to be early postoperative erections, lichen sclerosis as the underlying cause and shallowing out of the glans cleft. These are all problems that mainly affect the penile urethra. As a result

we are performing a more radical excision of the diseased urethra in our patients with lichen sclerosis, severe spongiofibrosis or severely compromised urethras. We are making deeper glans clefts at the first stage than might seem necessary when required and we put a separate graft on each side of the cleft rather than a single graft covering both sides across the midline. We have also started a trial of antiandrogen treatment before and after surgery to determine if this reduces the problems with penile urethroplasty by reducing the incidence of erections.

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