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THE OUTCOMES AFTER POSTERIOR URETHROPLASTY REVIEW

Evaluation of the outcomes after posterior urethroplasty

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Pelvic fracture;
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ABBREVIATIONS

PFUI, pelvic fracture urethral injury;
AUASS, AUA Symptom Score;
Q_{max}, maximum urinary flow rate;
DVIU, direct visual internal urethrotomy;
PVR, postvoid residual urine volume

Abstract Posterior urethral injury is a clinically significant complication of pelvic fractures. The management is complicated by the associated organ injuries, distortion of the pelvic anatomy and the ensuing fibrosis that occurs with urethral injury. We report a review of the outcomes after posterior urethroplasty in the context of pelvic fracture urethral injury.

Introduction

There are limited reports on the assessment of the outcome after urethroplasty for pelvic fracture urethral injury (PFUI). The most commonly used outcomes have included re-stenosis, incontinence and erectile dysfunction. This discussion focuses on re-stenosis, as the other outcomes are covered elsewhere in this issue.

Outcomes have been assessed using urinary flow rates, urethrography, endoscopy and validated

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questionnaires [1,2]. Unfortunately there is no clear consensus on the follow-up after urethroplasty. Although most experts define the failure of urethroplasty as a need for a subsequent procedure, lack of a long-term follow-up and limited use of validated questionnaires make the evaluation of outcomes difficult. In this analysis we review the existing reports and the recommendations for the follow-up of urethroplasty after PFUI.

When evaluating rates of re-stenosis after anterior or posterior urethroplasty, it is important to define how failure is described. In previous reports success is often defined in clinical, radiological or endoscopic terms, but there is no clear consensus on what defines re-stenosis [2,3]. In a survey in 2013 of members of the Society of Genitourinary Reconstructive Surgeons, methods to screen for re-stenosis included uroflowmetry (defined as a maximum urinary flow rate, Q_{max}, of <10–15 mL/s, or an obstructive shape of the flow curve; used by 85% of respondents), the postvoid residual urine volume (PVR, threshold value not defined; used by 58%), the AUA Symptom Score (AUASS of >15; used by 42%), urine analysis (criteria not defined; used by 38%), cystoscopy (endoscopic appearance of stricture recurrence; used by 19%), and narrowing apparent on a retrograde urethrogram (used by 17%) [2].

Success rates after anterior urethroplasty are excellent, at 85–99% based on technique [4,5]. Early comparisons of success rates of posterior vs. anterior urethroplasty for trauma reported higher failure rates for posterior urethroplasty (recurrence rates up to 29%) [6]. However, a more recent and thorough analysis of re-stenosis rates after posterior urethroplasty reported 17.5%, based on a systematic review by Meeks et al. in 2009 [3]. Following a 25-year experience at the University of California at San Francisco, of 134 men who underwent posterior urethroplasty, Cooperberg et al. [7] reported an 84% initial success rate without re-stenosis and of 93% allowing for those who had an additional single internal urethrotomy. Other high-volume reconstructive urologists like Koraitim report similar results, with re-stenosis rates of $<10\%$ [8]. In a retrospective review Koraitim reported that of 20 failures from 1979 to 2010, 55% were within 3 days of catheter removal, and nine of those failures were due to repeated obstruction at the anastomotic site. The delayed group had failures due to re-stenosis at any time between 1 month and 12 years after the posterior urethroplasty, and this was attributed to a failure to make a mucosa-to-mucosa anastomosis, or to incomplete scar excision [9].

Meeks et al. [3], in their meta-analysis of screening protocols after urethroplasty, showed that 45% of the screening protocols currently reported use of a multi-tiered approach to surveillance. Moreover, in this same review Meeks et al. described that surveillance protocols should involve a noninvasive test to primarily screen all patients after surgery for recurrence (e.g. questionnaires or uroflowmetry), followed by more invasive and expensive testing if a recurrence is suspected [3].

Uroflowmetry alone has not been found to be an accurate predictor of re-stenosis. In 278 anterior and posterior urethroplasties, 63 (23%) patients had re-stenosis confirmed by an endoscopic evaluation. Of these, only 34 (54%) had a Q_{max} of <10 mL/s. If endoscopic evidence of recurrence is taken to be the standard, then this means that the sensitivity of uroflowmetry for detecting recurrence is only 54%. The highest sensitivity and negative predictive value (each $>99\%$) were achieved when men had subjective voiding symptoms and/or had an obstructive pattern on uroflowmetry, defined by an obstructive flow curve and a Q_{max} of <10 mL/s [10]. An additional analysis, again in men with anterior or posterior urethral strictures, showed that when a comparison of the Q_{max} before and after surgery was used, the loss of >10 mL/s of the Q_{max} had a sensitivity of 92% and a specificity of 78% as a screen for re-stenosis determined by the routine urethrogram [11].

The AUASS has clinical validity as a screening tool after urethroplasty. In a study of 50 men with urethral stricture disease, Morey et al. [12] described that a persistently high AUASS correlated well with radiographic evidence of re-stenosis. A formal validation of the AUASS in patients with a urethral stricture was determined by the narrowing of the urethral lumen at the site of the surgical repair on endoscopy and/or urethrography. Morey et al. [12] determined that an AUASS of >10 provided 93% sensitivity, 78% specificity, 78% positive predictive value and 89% negative predictive value in assessing a recurrence of urethral stricture. Importantly, 12 of the 50 (24%) strictures studied were posterior [12]. Furthermore, Heyns and Marais [13] showed that using an AUASS of >10 or a Q_{max} of <15 mL/s as the threshold would have prevented further invasive studies in 34% of patients, while a clinically significant stricture would have been missed in only 4.3%. Notably, only seven of 52 (13%) of these urethroplasties were for posterior strictures.

Whereas the interpretation of urethrography can be variable, urethral calibration by catheters, sounds or cystoscopy provide a subjective evaluation of the anatomical, but not symptomatic, recurrence. Amongst these methods, cystoscopy might be the most accurate means of detecting a recurrence, but comes with associated costs. There is some evidence that cystoscopy has been shown to be capable of detecting strictures before other studies, including uroflowmetry and symptoms [14], again showing the difference between an anatomical and a functional recurrence. Conversely, cystoscopy is not without its limitations. This method fails to allow for visual staging with respect to stricture length and location, as most strictures are smaller than the cystoscope [15].

Table 1 Algorithm for following up patients.

Test	3 months	1 year	Annually thereafter
Urethroscopy	X	X	If AUASS >10 or Q_{max} < 15 mL/s
AUASS	X	X	X
Flow rate and PVR	X	X	X
Sexual Health Inventory for Men	X	X	X
Male Sexual Health Questionnaire	X	X	X

Unsuccessful outcomes after urethroplasty can be detected shortly after removing the urethral catheter, or can be delayed for several months or years after surgery. Koraitim [9] defined unsuccessful outcomes after posterior urethroplasty for PFUI as 'early' (< 1 month) and 'late' (> 1 month). The patients with early failures presented with an inability to void, whereas the late group presented with a weak stream. The causes of failure in the early group included obstruction at the site of repair, retraction of the bulbar urethra, and anastomosis to a false tract. The causes of failure in the late group were due exclusively to narrowing of the anastomosis.

The management of re-stenosis after posterior urethroplasty largely depends on the time of the recurrence and the findings of urethrography and urethroscopy. In late failed cases with a narrow urethral anastomosis associated with minimal or no fibrosis, direct visual internal urethrotomy (DVIU) is recommended. Studies of re-stenosis after urethroplasty for PFUI showed that the chances of success after a single urethrotomy are high, because the scar tissue has already been excised during urethroplasty [7–9]. When a recurrence is associated with fibrosis, and in early failed cases with complete obstruction, DVIU is not suggested. The best solution is a repeat urethroplasty involving complete resection of the scar tissue and repeat urethral anastomosis. Cases of distal retraction of the anterior urethra, which are usually due to an anastomosis made under tension, and cases complicated by a para-urethral bladder base fistula, might require an elaborated perineal or a perineo-abdominal procedure [9,16]. Finally, bulbar urethral necrosis, although rare, can require a complicated repeat repair.

The follow-up schedule for urethroplasty

Table 1 shows the follow-up protocol in our institution, that is not unlike others reported above. This approach allows screening for the most common adverse effects of PFUI and posterior urethroplasty.

Conclusion

Posterior urethral injury is a clinically significant complication of pelvic fractures. The management is complicated by the associated organ injuries, distortion of pelvic anatomy, and the ensuing fibrosis that occurs with urethral injury. Added to the complexity of this problem is the lack of evidence-based guidelines for management and postoperative surveillance. Although early complications have been reported after urethroplasty for PFUI, it is essential for the urologist to maintain a long-term follow-up, with the patient using validated questionnaires and noninvasive testing as screening tools, with more invasive testing applied as appropriate.

Conflict of interest

None.

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