

·Review·

Erectile function after urethral reconstruction

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Abstract

Advances in urogenital plastic surgical tissue transfer techniques have enabled urethral reconstruction surgery to become the new gold-standard for treatment of refractory urethral stricture disease. Questions remain, however, regarding the long-term implications on sexual function after major genital reconstructive surgery. In this article, we review the pathologic features of urethral stricture disease and urologic trauma that may affect erectile function (EF) and assess the impact of various specific contemporary urethroplasty surgical techniques on male sexual function. (*Asian J Androl* 2008 January; 10: 75–78)

Keywords: urethral reconstruction; urethral stricture; erectile function; sexual function

1 Introduction

Surgical reconstruction of urethral stricture disease has now become a mainstay for treatment in refractory cases. Reconstructive techniques have advanced markedly in the past two decades and their success rates are now well documented throughout the urological community. At the same time, as effective medical treatments have emerged for erectile dysfunction (ED), increasing attention has been directed toward preservation of sexual function for all male urologic patients. Surprisingly, despite the magnitude of genital dissection required for many complex urethroplasty procedures, little has been reported regarding the effect of urethral reconstruction surgery on erectile function (EF). The present article discusses the anterior and posterior effects of various urethral reconstructive techniques on EF.

2 General considerations

2.1 Age

Age and condition of the patient are important to

consider when determining which form of reconstruction to perform and how the procedure might affect EF. Erickson *et al.* [1] note the greatest impact on EF after urethroplasty surgery in men in the age group of 50–59 years. A similar, but not as dramatic decrement in EF was noted for the 60–69-year age group. In contrast, men under 50 years showed practically no change in EF postoperatively [1]. Similarly, Anger *et al.* [2] report that older men, as well as men with peripheral vascular disease, are at higher risk of developing ED postoperatively. Clearly, men at advanced age and with greater numbers of comorbidities might also have compromised sexual function prior to urethroplasty, and it behooves the reconstructive urologist to carefully question these patients in this area before surgery [2].

2.2 Stricture length

Stricture length often correlates to both the severity and magnitude of fibrosis within the urethra and surrounding tissues. It is this parameter that governs which reconstructive procedures are selected, with more elaborate tissue transfer techniques being required for strictures of greater length. Long strictures are often associated with inflammatory disease, repeated urethral dilations and instrumentations, a history of prolonged urethral catheterization, and/or traumatic urethral distraction. Coursey *et al.* [3] report that men undergoing repair of longer strictures report ED more often, with most in their series requiring extensive penile flap procedures for longer strictures.

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2.3 Stricture location

Recent reports suggest that stricture location has an insignificant effect on EF in men undergoing urethral reconstruction for anterior strictures. Anger *et al.* [2] evaluated 25 men who underwent four different types of bulbar urethroplasty, to assess whether injury to the neurovascular supply to erectile tissue might occur. They found bulbar urethroplasty to have an insignificant effect on EF [2]. One drawback of the study by Anger *et al.* [2] was a small population size and a mostly young and healthy group. However, Shenfeld *et al.* [4, 5] also found that membranous urethral stricture repair showed minimal effect on EF. Of 13 patients, only one complained of decreased EF postoperatively, whereas nine obtained ED before surgery [4, 5]. Kessler *et al.* [6, 7] report on the long-term results of urethral stricture repair via primary anastomosis: membranous, membranobulbar and bulbar strictures constituted 33%, 10% and 58% of stricture location sites, respectively. Only two of the 40 who underwent anastomotic repair in these locations reported ED postoperatively [6, 7]. These series argue that location of urethral stricture plays an insignificant role in EF after urethral reconstruction.

2.4 Time between injury and surgery

Another consideration in assessing EF after urethral reconstruction is the time elapsed from the injury to the date of surgery. A report by Berger *et al.* [8] found a difference in nocturnal penile tumescence testing for patients who underwent urethroplasty surgery within 6 months of a urethral disrupting injury, with a 20% improvement noted in those who were operated on after 6 months [8]. It was postulated that nerve function, given ample time after injury, can reconstitute and, therefore, might influence patient reports of EF.

Yu *et al.* [9] compare simple urethral cystoscopic realignment and immediate end-to-end anastomosis as immediate treatments for posterior urethral disruption, and find that EF after early anastomotic urethroplasty (within 24 h after injury) results in significantly worse erectile function. Yu *et al.* [9] suggest that early aggressive anastomotic surgery worsens vascular and pelvic nerve involvement with posterior urethral injury.

2.5 Time after surgery

As time progresses from the date of surgery, considerable psychological and physical healing takes place. As a result, any compromise of sexual function after anterior urethroplasty tends to be transient in nature. Several authors have noted a tendency of returning EF with elapsing time. According to Mundy [10], 53% of patients who underwent end-to-end anastomosis and 33% of patients who underwent urethral augmentation reported ED within 3 months after surgery, while as time progress-

ed, the rates of reported ED dropped remarkably to 5% and 9%, respectively [1, 10]. In a large multi-institutional study, Coursey *et al.* [3] also demonstrate major improvements in EF after time elapsing, including improvements in erectile length and angle. Andrich *et al.* [11] report that ED appeared in the weeks after surgery more often in the anastomotic group than the augmented group, and that improved EF was noted in the majority within 2–3 months. Patients should be counseled on the tendency of ED to occur within a few months of surgery, if at all, and the trend toward steady recovery thereafter. Case series that do not mention the time in which patients report their EF are of limited value.

3 Anterior urethroplasty reconstruction

3.1 Anastomotic urethroplasty

Primary end-to-end anastomosis is the gold-standard reconstructive technique for short bulbar urethral strictures (< 2 cm), with free grafts and pedicled flaps best reserved for longer strictures. Eltahawy *et al.* [12] find new onset ED to be negligible following anterior anastomotic urethroplasty (2.3%) [12]. Similarly, Santucci *et al.* [13] report that new onset of ED occurred in less than 1% of 168 men having bulbar urethroplasty via primary anastomosis [13]. Others have reported a range of 5%–26% of men with anastomotic reconstruction for anterior strictures complaining of ED [3, 6, 14]. These figures, taken together, justify the continued aggressive use of primary anastomosis for short-length urethral strictures.

3.2 Augmentation urethroplasty

As stricture length increases, the likelihood of requiring a graft or skin flap to complete urethral reconstruction also increases. Pendulous urethral strictures are especially appropriate for urethral substitution procedures because resection with primary anastomosis in this area is contraindicated because of the risk of contributing to excessive tension and/or chordee.

3.2.1 Buccal mucosa grafts

Buccal mucosa is now the preferred donor site for urethral grafts. Although buccal grafts are utilized mainly in the bulbar urethra, their use in distal areas during complex or reoperative cases appears to be well justified, and any adverse effects on sexual function after buccal mucosa graft urethroplasty appears to be negligible [3, 14]. Nelson *et al.* [15] also find that sexual function after reoperative hypospadias repair using buccal mucosa is excellent postoperatively. Partial resection with anastomosis during dorsal or ventral graft onlay has not been shown to increase the risk of ED [16]. Graft position, either ventral or dorsal, has not been shown conclusively to adversely impact sexual outcomes [8].

3.2.2 Penile skin flap

Penile skin flap urethroplasty has now virtually replaced scrotal flap procedures for urethral reconstruction because it is hairless, versatile, and highly reliable. Penile flap techniques, however, should be reserved for long distal strictures and those in which the stricture is too fibrotic to support a graft. Transfer of a long penile skin flap to the deep perineum is associated with tethering of the penis during erections, with the results often including pain and disruption of the anastomosis. For this reason, skin flap urethroplasty is most appropriate for pendulous strictures.

Coursey *et al.* [3] found that, compared to other techniques, such as primary anastomosis and buccal mucosal grafting, patients reported the highest incidence of postoperative sexual dysfunction after penile skin flap urethroplasty. Mean stricture length was 6.7 cm for patients undergoing penile flap procedures in that series, much longer than in men having other urethroplasty techniques, which likely indicates both more fibrosis in the periurethral tissues and a more complex genital dissection in the surgical correction [3]. Kessler *et al.* [6, 7] also reported the highest incidence of ED resulting from flap urethroplasty, with 32% of men noting a negative change in EF, often moderate to severe in magnitude. Al-Qudah *et al.* [14] report that performing fasciocutaneous skin flap resulted in major complications in 40% of patients, including chordee and temporary fistula.

3.2.3 Two-stage mesh graft

When stricture length and severity is extreme, as in cases of lichen sclerosis, a two-stage procedure involving stricture excision with implantation of a meshed skin graft might be appropriate. The second stage of the mesh graft urethroplasty involves tubularizing the graft and interposing healthy dartos tissue.

Erickson *et al.* [1] report a mean stricture length of 7.8 cm for patients undergoing two-stage urethroplasty involving mesh graft substitution. Kessler *et al.* [6] found that significant ED developed after two-stage procedures in nearly half of their patients. Similarly, Coursey *et al.* [3] found that, among 26 men having two-stage procedures, 23.1% and 11.5% reported major changes in erectile length and angle, respectively. Clearly, stricture length and complexity of repair warrant additional counseling regarding the possibility of altered sexual function. It is also likely that extensive two-stage repairs will produce ejaculatory and sensory disturbances of some degree (Figure 1).

4 Posterior urethral reconstruction

Traumatic injury to the pelvis is associated with both

urethral disruption and ED. Shenfeld *et al.* [4] investigate nocturnal penile tumescence after posterior urethral reconstruction and find that both vascular and neurogenic disturbances are often prevalent. Pelvic fractures and significant straddle injuries commonly cause injury to the cavernous nerves and pudendal artery branches, which are proximal to the pelvic bones and membranous urethra [3, 11, 12].

Men with shorter urethral defects (< 3 cm) are expected to sustain less neurological damage. In those with longer defects, during posterior urethral reconstruction, it might be necessary for the surgeon to develop the intracorporeal space, thus placing the delicate neurovascular structures at additional risk. Additional challenging maneuvers, such as inferior or complete pubectomy, might be required for complex deformities, thus further increasing the likelihood of impaired EF (Figure 2).

The initial injury, not the reconstructive surgery, is responsible for most of the long-term problems with sexual function. Delayed anastomotic repairs in experienced hands are the gold standard for treatment of pelvic fracture-related urethral disruptions. Asci *et al.* [17]

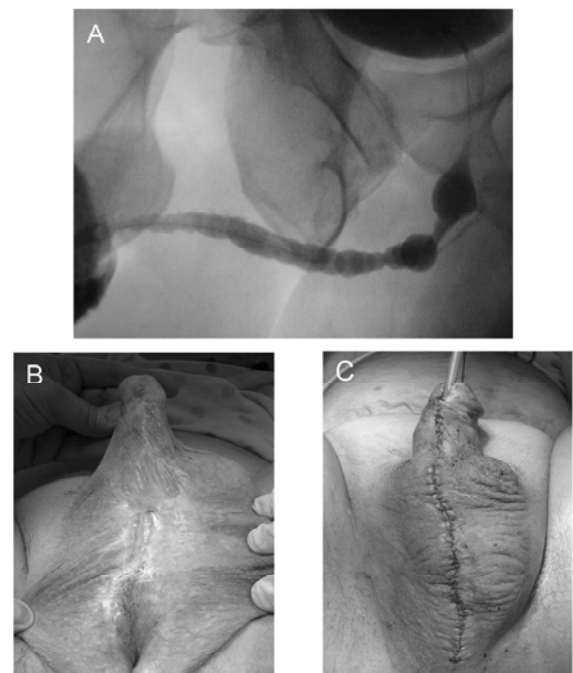


Figure 1. Two-stage urethroplasty has been shown to carry a high likelihood of associated sexual dysfunction and is, therefore, reserved for only the most advanced anterior strictures. (A): Preoperative retrograde urethrogram showing panurethral stricture. (B): Appearance after first stage urethroplasty involving complete excision of fibrotic urethra with multiple buccal mucosa graft inlay. (C): Appearance after second stage urethroplasty 6 months later during which the buccal grafts were tubularized and closed over a catheter.



Figure 2. Extensive pelvic trauma resulting in complex urethral injury is often associated with refractory erectile dysfunction (ED).

report that the EF of patients having initial suprapubic cystostomy with delayed urethroplasty after pelvic fracture urethral injuries is similar to those having immediate primary urethral realignment. Berger *et al.* [8] report similar pre- and postoperative ED rates after urethral reconstruction for post-traumatic urethral stricture: roughly 17%. Morey and McAninch [18] recorded the long-term outcome of 82 men who underwent posterior urethroplasty after traumatic strictures. With follow-up longer than 1 year, they observed that impotence rates dropped from 54% before surgery to 38% after surgery, thus indicating that young men often demonstrate a delayed return to sexual function, which might occur several years after posterior urethral injury [18].

5 Conclusion

Many factors influence the sexual outcomes of men having urethral reconstruction surgery. Age of the patient, sexual function prior to surgery, elapsed time following surgery, stricture length and severity, and the magnitude of pelvic trauma are likely to have a direct influence on long-term sexual function after treatment.

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