Impact of urethroplasty on male sexual function

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Purpose
To evaluate the impact of anterior urethroplasty on male sexual function.

Patients and methods
A total number of 35 patients with anterior urethral stricture who underwent urethroplasty at Assiut Urology and Nephrology Hospital from March 2015 to March 2016 were included in the study. The mean age was 36.1 ± 11.1 years (range: 25–56 years). Evaluation of postoperative erectile function was done using a validated questionnaire (International Index of Erectile Function-5 questionnaire) at 3 and 6 months posturethroplasty, while evaluation of ejaculatory and orgasmic function was done by using ejaculation/orgasm score at 3 and 6 months posturethroplasty.

Results
The mean age of the included patients was 36.1 ± 11.1 years (range: 25–56 years). As regards the incidence of Erectile dysfunction (ED) after urethroplasty, 3 months posturethroplasty, nine (25.7%) patients developed ED, with statistically significant difference (P = 0.001). At 6 months posturethroplasty, just two (5.7%) patients showed ED, with no statistically significant difference (P = 0.15). As regards the incidence of ED according to the etiology of urethral stricture, there was no statistically significant difference between postinflammatory and post-traumatic cases at 3 months (P = 0.636) and at 6 months (P = 0.234). According to the length of urethral stricture, the impact on erectile function after urethroplasty was greater in shorter urethral stricture segment (1.9 ± 0.2 cm) than in longer urethral stricture segment (3.1 ± 1.3 cm) with no statistically significant difference between the two groups (P = 0.514). ED occurred in anastomotic urethroplasty (39.1%) more than free graft urethroplasty (0%), with statistically significant difference (P = 0.012).

Conclusion
Anterior urethroplasty has a probability of causing transient ED in as much as 25% of patients, with recovery of erectile function occurring in 78% of cases within 6 months of urethroplasty. The incidence of ED is higher in patients undergoing anastomotic repair than in patients undergoing free graft urethroplasty. Urethral reconstructive surgery has a minimal effect on ejaculatory and orgasmic functions.

Keywords:
erectile dysfunction, urethral stricture, urethroplasty

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Introduction

Urethral stricture accounts for about 52% of urethral and 1.8% of urologic pathology, respectively, and presents an estimated prevalence of 0.6% [1,2]. Relatively young, active individuals are mostly affected. Its association with an unequivocal negative impact on the quality of life, whether resulting from the disease itself and its complications or whether consequence of the treatment employed, was studied [3].

At present, there is no doubt that reconstructive surgery in the form of different types of urethroplasty represents the 'gold standard' in the treatment of these patients. Urethroplasty is associated with reproductively high success rates, when properly used. There is enough data in the literature regarding the results obtained with several techniques, anastomotic or substitution. When objective variables such as flow rates are considered, several authors describe success rates that exceed in many cases 80% whether for anterior urethra, bulbar [4,5], or penile [6–8], or for posterior urethra [9–11].

Although in recent years there has been a growing interest in relation to urethral stricture's andrologic implications, the relationship between urethroplasty and erectile dysfunction, for example, remains controversial up to the present day. The existence of few specific studies, heterogeneous study populations, differing methodologies, and diversity of procedures analyzed makes it very difficult to provide definitive answers [12].

Concerning erectile and ejaculatory dysfunction, potentially injured structures in the course of urethroplasty include several arterial structures, nerve branches (autonomic and/or somatic), and eventually myogenic components [13].

There is a recognized potential for injury of branches of the common penile artery, essential in the hemodynamics of erection in posterior urethroplasties, and of more distal vessels, of smaller and questionable practical importance, in anterior urethroplasties. Equally important are neurogenic autonomic lesions due to the proximity of neurovascular bundles to the membranous urethra, potentially damaged in instrumentation of the posterior urethra [14–16]. Somatic neurogenic components, either sensory or motor, involving the dorsal penile or perineal nerve and its branches, are also at risk, particularly during anterior urethroplasties [17–19].

Finally, section and aggressive mobilization or denervation of the bulbospongiosus muscle to expose the bulbar urethra may result in more or less subtle changes in ejaculation dynamics, since the rhythmic contractions of the muscle during the expulsion phase are fundamental in seminal fluid expulsion [20–22].

The aim of this study is to evaluate the impact of anterior urethroplasty on male sexual function.

Patients and methods

This is a prospective, hospital-based study that was conducted in Assiut Urology and Nephrology Hospital from March 2015 to March 2016. A total of 35 patients with anterior urethral stricture who underwent urethroplasty were included in the study.

Evaluation of patients preoperative and postoperative was done as follows:

(1) Evaluation of erectile function: a validated questionnaire [International Index of Erectile Function (IIEF)-5 questionnaire] was used to evaluate erectile function preoperative and postoperative at 3 and 6 months
(2) Evaluation of ejaculatory and orgasmic function: a validated questionnaire [ejaculation/orgasm score (EO)] was used to evaluate the ejaculatory and orgasmic functions preoperative and postoperative at 3 and 6 months.

Statistical analysis

Statistical analysis was done by using IBM statistical package for the social sciences (SPSS, version 21, IBM corporation, New York, U S); the *P* value was considered significant if it was less than 0.05.

Results

The mean age of the included patients was 36.1 ± 11.1 years (range: 25–56 years).

According to the etiology of urethral stricture in the included patients, the etiology was post-traumatic in 21 (60%) patients and postinflammatory in 14 (40%) patients.

As regards the site of stricture, the whole 35 patients participated in the study were with bulbar urethral stricture. The length of the urethral stricture was 1.5–5 cm with a mean length of 2.8 ± 1.3 cm.

The type of urethroplasty was anastomotic urethroplasty in 23 (65.7%) patients and free graft urethroplasty in 12 (34.3%) patients. The duration between the time of trauma and the time of urethroplasty was 3–6 months (mean = 4.5 months) and the operative time was 120–210 min.

As regards the incidence of ED after urethroplasty, 3 months posturethroplasty, nine (25.7%) patients developed ED, with statistically significant difference (P = 0.001), while at 6 months posturethroplasty, just two (5.7%) patients showed ED, with no statistically significant difference (P = 0.15).

As regards the incidence of ED according to the etiology of urethral stricture, there was no statistically significant difference between postinflammatory and post-traumatic cases at 3 months (P = 0.636) and at 6 months (P = 0.234). According to the patients' age, our study detected that the impact on erectile function after urethroplasty is greater in men in the age group of more than 40 years than in men in the age group of 20–40 years with no statistically significant difference between the two age groups (P = 0.326).

According to the length of urethral stricture, the impact on erectile function after urethroplasty was greater in shorter urethral stricture segment (1.9 ± 0.2 cm) than in longer urethral stricture segment (3.1 ± 1.3 cm) with no statistically significant difference between the two groups (P = 0.514).

As regards the impact of the type of urethroplasty on erectile function, our study detected that ED occurred in anastomotic urethroplasty (39.1%) more than free graft urethroplasty (0%) with statistically significant difference (P = 0.012) as shown in Table 1.

As regards the IIEF score preurethroplasty and posturethroplasty, IIEF score for the studied 35 patients preoperatively was 22–25 (mean = 23 ± 0.8). At 3 months posturethroplasty, the IIEF score

was decreased to 14–23 (mean = 20.3 ± 3) with a statistically significant difference ($P < 0.001$), while at 6 months posturethroplasty, the IIEF score rebounded to 18–25 (mean = 23.0 ± 1.5) with no statistically significant difference ($P = 0.085$) from the preoperative score.

As regards the EO score preurethroplasty and posturethroplasty, the EO score for the studied 35 patients preoperatively was 8–10 (mean = 8.9 ± 0.7). At 3 months posturethroplasty, the EO score was decreased to 6–10 (mean = 8.1 ± 1.2) with a statistically significant difference ($P < 0.002$), while at 6 months posturethroplasty, the IIEF score rebounded to 8–10 (mean = 8.8 ± 0.6) with no statistically significant difference ($P < 0.86$) from the preoperative score.

According to the effect of the etiology of urethral stricture on IIEF score, there was no statistically significant difference between postinflammatory and post-traumatic cases neither after 3 months of urethroplasty ($P = 0.457$) nor after 6 months of urethroplasty ($P = 0.451$). As regards the effect of the etiology of urethral stricture on EO score, there was no statistically significant difference between postinflammatory and post-traumatic cases neither after 3 months of urethroplasty ($P = 0.299$) nor after 6 months of urethroplasty ($P = 0.379$).

As regards the effect of type of urethroplasty on IIEF score, there was a statistically significant difference between anastomotic urethroplasty and free graft urethroplasty after 3 months ($P = 0.001$) with no statistically significant difference after 6 months of urethroplasty ($P = 0.938$; Table 2).

As regards the effect of the type of urethroplasty on EO score, there was a statistically significant difference between anastomotic urethroplasty and free graft urethroplasty after 3 months ($P = 0.001$) with no statistically significant difference after 6 months of urethroplasty ($P = 0.241$; Table 3).

Table 1 Incidence of ED after 3 months according to the type of urethroplasty

Items	Anastomotic urethroplasty (*n*=23) [*n* (%)]	Free graft urethroplasty (*n*=12) [*n* (%)]	*P*
Patients with ED	2 (8.7)	0 (00.0)	0.293
Normal patients	21 (91.3)	12 (100.0)	

Table 2 Effect of the type of urethroplasty on International Index of Erectile Function score

Items	Anastomotic urethroplasty	Free graft urethroplasty	*P*
IIEF score preoperatively	23.5±0.73	23.1±1	0.191
IIEF score 3 months posturethroplasty	19.4±3.34	22.1±0.67	0.001*
IIEF score 6 months posturethroplasty	23±1.74	23±1.04	0.938

IIEF, International Index of Erectile Function. *It mean statistically significant *P* value less than 0.05.

Table 3 Effect of the type of urethroplasty on ejaculation/orgasm score

Items	Anastomotic urethroplasty	Free graft urethroplasty	*P*
EO score preoperatively	8.9±0.69	8.8±0.83	0.892
EO score 3 months posturethroplasty	7.5±1.08	9.2±0.72	<0.001*
EO score 6 months posturethroplasty	8.7±0.54	9±0.74	0.241

EO, ejaculation/orgasm. *It mean statistically significant *P* value less than 0.05.

Discussion

Although male urethral reconstruction has become increasingly widely used, few long-term, patient-reported outcome data are available regarding erectile function after urethral operation. Previous studies have focused primarily on stricture recurrence and incontinence. However, erectile function is usually discussed as only a small part of broader reports of operative outcomes. Some reports have indicated that the age of the patient, sexual function before surgery, elapsed time after surgery, and stricture length and severity are likely to have direct influences on long-term erectile function after treatment [23,24].

The incidence of ED after urethroplasty in our study was 25.7% (nine patients) after 3 months and was 5.7% (two patients) after 6 months.

Erickson *et al.* [25] reported that ED after urethroplasty was 38% (20/52 patients). Eighteen patients recovered at a mean postoperative period of 6 months. In another study done by Dogra and colleagues, 78 men underwent single-stage anterior urethroplasty from January 2008 to March 2010 and were followed prospectively. This study showed that 38% of patients developed ED posturethroplasty. After 6 months, 96% of patients were recovered from ED and only 4% of patients showed persistent ED [26]. The results of these studies were compatible with the results of our study.

The IIEF score is a validated, multidimensional, self-report instrument widely used for the evaluation of male sexual function. It has been recommended as a primary end point for clinical trials of erectile dysfunction and for diagnostic evaluation of erectile dysfunction severity. The IIEF is divided into five domains of sexual function, including EF, orgasmic function, intercourse satisfaction, sexual desire, and overall satisfaction [27].

As regards the impact of urethroplasty on IIEF score, the preoperative IIEF score for our study was 22–25 (mean = 23 ± 0.8). At 3 months posturethroplasty, there was significant decrease in the IIEF score compared with the preoperative scores that declined to 14–23 (mean = 20.3 ± 3) with statistically significant difference ($P < 0.001$). At 6 months posturethroplasty, the IIEF score rebounded to 18–25 (mean = 23.0 ± 1.5) with no statistically significant difference ($P = 0.085$).

In a study done by Xie *et al*. [28], erectile function was studied for 125 patients with urethral strictures who underwent urethroplasty. Before surgery the mean IIEF score for the studied patients was 16.57 ± 7.98. At 3 months posturethroplasty the mean IIEF score significantly decreased to 11.52 ± 6.43 ($P < 0.05$). At 6 months posturethroplasty, there was significant rebound of the mean IIEF score to 17.22 ± 8.41 ($P < 0.05$). In another study done by Dogra *et al*. [29], the erectile function of 78 patients were studied preurethroplasty and posturethroplasty and showed that the mean IIEF score for patients preoperative was 24.6. The mean IIEF score declined to 22.5 after 3 months posturethroplasty, with statistically significant difference ($P = 0.002$). At 6 months postoperatively, the mean IIEF score rebounded to 24.1 with no statistically significant difference ($P = 0.57$). The results of these studies were compatible with the results of our study.

As regards the impact of the type of urethroplasty and ED, our study showed that ED was higher in patients who underwent anastomotic repair than in patients underwent free graft urethroplasty. Out of the 23 patients who underwent anastomotic urethroplasty, nine developed ED postoperatively (39.1%). Although 12 patients underwent free graft urethroplasty, none of them developed postoperative ED, with a statistically significant difference between the two groups ($P = 0.012$).

This difference may implicate the degree of urethral mobilization as a risk factor for postoperative ED. Our policy was to divide the urethra and to remove a segment of stricture for all bulbar repairs and resect more stricture and mobilize the urethra more extensively for anastomotic urethroplasty than free graft urethroplasty, which may explain the differences.

In a prospective study done by Erickson *et al.* [25], a total number of 52 patients who underwent anterior urethroplasty were included in the study. He detected that patients who underwent anastomotic repairs had higher postoperative ED rates (50%) than patients who underwent free graft repairs (26%). In another study, Dogra *et al*. [29] showed that patients who underwent anastomotic repairs had higher postoperative ED rates (28%) than patients who underwent free graft repairs (10%). The results of our study were compatible with the results of these studies.

Stricture length often correlates with 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.

According to the length of urethral stricture, our study detected that the impact on erectile function after urethroplasty is greater in shorter urethral stricture segment (1.9 ± 0.2 cm) than in longer urethral stricture segment (3.1 ± 1.3 cm) with no statistically significant difference between the two groups ($P = 0.514$). In similar studies by Xie *et al*. [28], Erickson *et al.* [25] and Dogra *et al*. [29], the length of urethral stricture was not found to be statistically significant with occurrence of ED after urethroplasty. The results of these studies were compatible with the results of our study.

The urethra has an essential role in ejaculation as it serves as a conduit and most likely surgical damage to the branches of the perineal nerves or bulbospongiosus muscles may have a role in determining the loss of efficient bulbar urethral contraction, causing difficulties in ejaculation [30].

In our study, the ejaculatory function and orgasm were evaluated by the EO score. Our study reported that the EO score for the studied 35 patients preoperatively was 8–10 (mean = 8.9 ± 0.7). Three months posturethroplasty, the EO score declined to 6–10 (mean = 8.1 ± 1.2) with statistically significant difference ($P < 0.002$), while at 6 months posturethroplasty, the EO score rebounded to 8–10 (mean = 8.8 ± 0.6) with no statistically significant difference ($P < 0.86$).

Beysens *et al*. [31] studied 37 patients who underwent anastomotic repair and free graft urethroplasty (23 and 14 patients, respectively). The ejaculatory function was evaluated preoperatively and postoperatively by using the EO score. Overall, there was no significant postoperative change in EO score at 6 weeks (−0.7; $P = 0.111$). After 6 months, the EO score returned to baseline.

A study by Erickson and colleagues, 43 men who underwent anterior urethroplasty were asked to

complete the ejaculatory function component of the Male Sexual Health Questionnaire preoperatively and postoperatively after resuming sexual activity. Postoperatively, decreased and improved ejaculation was defined as an increase and a decrease of 5 or more points, respectively. The overall ejaculatory score did not change postoperatively at a mean follow-up of 8.1 months, but men with poor preoperative function had significant improvement. The overall ejaculatory force and volume did not change significantly. Postoperative ejaculatory function was stable in 30 (70%) men, improved in eight (19%), and worse in five (11%) patients. This study concluded that urethroplasty appears to have a minimal effect on ejaculatory function when evaluated by the Male Sexual Health Questionnaire [30].

According to the orgasmic function, our study showed that urethroplasty does not significantly affect orgasm after 6 months of follow-up ($P = 0.86$).

Two studies evaluated the orgasmic function posturethroplasty. In both studies, the orgasmic domain was analyzed together with the other domains of IIEF. Both works refer to case series with less than 20 patients on various circumstances, urethroplasty for hypospadias and bulbar urethroplasty. None of the authors found any negative influence of urethroplasty on orgasmic function [26,32].

Our study had some limitations

(1) Our study was limited by its small sample size
(2) Also, our patient population was for the most part young and healthy, and our findings may not be generalizable to older, less healthy groups of men with stricture disease.

Conclusion

(1) Anterior urethroplasty has a probability of causing transient ED in as much as 25% of patients
(2) Recovery of erectile function occurs in 78% of cases within 6 months of urethroplasty
(3) The incidence of ED is higher in patients undergoing anastomotic repair than in patients undergoing free graft urethroplasty
(4) Urethral reconstructive surgery has a minimal effect on the ejaculatory and orgasmic functions.

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Conflicts of interest

There are no conflicts of interest.

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