

Erectile dysfunction after urethroplasty

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Introduction The aim of this study was to analyze the influence of urethroplasty on sexual function.

Material and methods We analyzed 75 operations: 41 anastomotic, 13 labial graft, 6 thigh skin mesh graft, and 15 penile skin flap urethroplasties. The severity of erectile dysfunction was assessed in the International Index of Erectile Function (IIEF5) questionnaire, preoperatively and at least 3 months after the surgery. The appearance of possible penile deformities was also evaluated postoperatively.

Results The etiology and location of the stricture had no impact on the erectile dysfunction in men with untreated urethral stricture. The difference in mean IIEF5 score before and after the first urethroplasty was not statistically significant (12.58 ± 9.01 and 10.88 ± 9.28 ; $t(42) = 1.25$, $p = 0.220$). The length of the stricture had no impact on the preoperative and postoperative IIEF5 score. Stricture in penile urethra caused a risk of postoperative penile curvature ($p = 0.023$).

Conclusions Patients with urethral stricture have a higher rate of erectile dysfunction than healthy men. Proper therapy should not negatively affect erectile function in a significant way, regardless of the length or location of the stricture, though it may have some influence on the penile anatomy.

Key Words: erectile dysfunction ◊ penile curvature ◊ sexual function ◊ urethral stricture ◊ urethroplasty

INTRODUCTION

Patients with urethral stricture complain of difficulties in passing urine caused by the reduced urethral lumen. The stricture weakens the urine stream and impairs the emptying of the bladder [1]. It can also disturb ejaculation, which becomes slow and painful [2]. Men with urethral stricture may also suffer from erectile dysfunction (ED), caused by the trauma itself or by the treatment, with not well-known prevalence [3]. Internal urethrotomy is presently a widely accepted initial treatment method for urethral stricture. It usually enables the temporary removal of the obstacle in voiding, but rarely provides a permanent cure [4]. Urethroplasty is usually a more effective way to eliminate the stricture [4, 5]. However, some patients and some urologists are worried that surgery will cause or will further worsen ED, and this may influence their choice of treatment [2].

The etiology of ED in men with urethral stricture has not been conclusively established, and the in-

fluence of urethroplasty on sexual function has not been well evaluated. Erectile dysfunction is observed in patients after multiple surgeries, as well as in the untreated ones [3].

Unfortunately, only minimal research has been done on this subject, and the results are difficult to compare because of different patient groups and various assessment methods. Moreover, an issue that needs to be taken into consideration is that sexual function depends not only on the erection quality itself, but also on other factors, such as penile length, penile curvature, and penile sensation, all of which can be influenced by the urethral stricture surgery.

The purpose of our study was to analyze the influence of urethroplasty on the sexual function in men with urethral stricture.

MATERIAL AND METHODS

Seventy-five men referred for urethroplasty due to urethral stricture were included in the study.

Thirty-two of them had been previously treated surgically with urethroplasty, so our treatment was the second-line treatment. For 43 of them, our treatment was their first surgical procedure. Characteristics of the study group are presented in Table 1.

Routine preoperative assessment included detailed clinical history, uroflowmetry, retrograde urethrography and voiding urethrocytography, and in selected cases, ultrasonography of the urethra and urethroscopy. Presence and severity of ED were assessed on the basis of the International Index of Erectile Function (IIEF5) questionnaire, which consists of 5 questions regarding erectile function and intercourse satisfaction [6]. A result below 22 points was considered as a marker of ED.

A postoperative follow-up visit was performed at least three months after the surgery. It included a medical history, physical examination, and uroflowmetry. Patients were asked once again to fill out the IIEF5 questionnaire and another questionnaire created by the authors, evaluating the sexual function in relation to the performed operation. It consisted of 3 questions regarding postoperative changes in penile sensation, shortening of the penis, and its curvature (see Supplementary information).

The collected data were statistically analyzed using MS Excel 2013 and IBM SPSS v.22 software. A p-value <0.05 was considered significant.

RESULTS

Seventy-five operations were performed in the study group: 41 anastomotic urethroplasties, 13 buccal mucosa graft operations, 15 penile skin flap operations, and 6 operations with thigh skin mesh graft implantation. A catheter was kept in place for 14 days after the surgery. The mean follow-up was 13 months (3–37).

To assess the influence of urethroplasty on sexual function, we compared patients' IIEF5 score before and after the surgery, using the T-test. The mean IIEF5 score was 12.58 ± 9.01 and 10.88 ± 9.28 respectively; thus, the difference was not statistically significant ($p = 0.22$). After the first urethroplasty undergone by the patient, the mean IIEF5 score changed from 12.68 ± 8.97 to 10.80 ± 9.15 ($p = 0.16$). The proportion of patients with ED did not change significantly after treatment, both in the whole study group and in the group of men, who underwent urethroplasty for the first time (Table 2). In 26 of 75 (34.7%) patients, the post-operative IIEF5 score decreased by >1 pt, in 17 (22.7%) it did not change significantly (± 1 pt), and in 32 (42.7%) increased by >1 pt.

To determine the potential risk factors of ED in men with urethral stricture, we used one-way analysis

of variance (one-way ANOVA) to assess the influence of etiology and location of the stricture on the intensity of ED in the same group of men with urethral stricture.

A mean IIEF5 score of patients with urethral stricture not previously treated with urethroplasty varied depending on the etiology of the stricture, and it was the lowest in patients with a pelvic fracture urethral injury (PFUI), but the differences were not statistically significant ($p = 0.126$). A mean IIEF5 score was also the lowest in men with the stricture localized in the membranous urethra. However, the differences were not statistically significant either ($p = 0.836$).

As some of our patients had one or more urethroplasties before our treatment, we have also used a Pearson correlation to assess a possible influence of the number of previous surgeries on the patient's erectile function (EF), but the change in the IIEF5 score was not statistically significant ($r = -0.22$, $p = 0.059$).

In order to evaluate the relationship between the length of the stricture and the level of ED in all of the patients subjected to surgery, we divided them

Table 1. Patients characteristics (n = 75)

	n (%) or (range)
Median age	43 (1986)
Mean stricture length (mm)	26 (5–80)
Etiology	
hypospadias	7 (9)
perineal trauma	15 (20)
iatrogenic	19 (25)
inflammation	1 (1)
PFUI	23 (31)
idiopathic	10 (13)
Location	
penile	19 (25.3)
bulbar	31 (41.3)
membranous	25 (33.3)
Comorbidities	
cardio-vascular	21 (28)
diabetes	5 (7)
Smoking	10 (13)
Median BMI	25 (21–35)

PFUI – pelvic fracture urethral injury; BMI – body mass index

Table 2. Prevalence of erectile dysfunction

Group:	Prevalence of ED (%)		P value
	Pre-op	Post-op	
All patients (n = 75)	81.3%	78.6%	P = 0.68
Untreated before (n = 43)	81.4%	79.1%	P = 0.78

ED – erectile dysfunction

into three groups, according to the length of the strictured fragment of urethra: <20 mm, 20–40 mm, and >40 mm. Differences in the IIEF5 score between these three groups were analyzed using one-way ANOVA and occurred not statistically significant both before and after the operation ($p = 0.733$ and $p = 0.859$ respectively).

Influence of urethroplasty on the penile condition

Using one-way ANOVA we have analyzed the impact of performed urethroplasty on penile length, its curvature and changes in penile sensation, depending on the etiology, location, and the stricture length, the type of performed urethroplasty, and the number of previous operations. This analysis was based on a questionnaire in which patients subjectively, and in a semiquantitative way, reported the above-mentioned disturbances and rated their intensity. We have found that the stricture location had a significant impact on the postoperative penile curvature ($p = 0.023$). Patients with a penile location of the stricture were more likely to suffer from penile curvature after the surgery. The stricture length, as well as its etiology, the type of performed urethroplasty, and the number of previous operations had no significant impact on the penile anatomy and sensation after the surgery. Statistical data are presented in Table 3.

DISCUSSION

The anatomy of the male pelvis plays a crucial role in urethral stricture etiology-related impotence. The common penile artery, the main vessel supplying the penis, runs in the vicinity of the ischiopubic ramus, and it may be damaged during blunt perineal trauma. Both straddle injury and pelvic fracture may also cause damage to the cavernous nerves and pudendal arteries [7–11].

The exact ED incidence in men with urethral stricture is not well defined in the literature, neither before the treatment nor after [3]. However, we know that the ED level in non-operated patients

varies according to the urethral stricture etiology, and it is usually highest in men with pelvic fractures [7]. It is understandable, considering the energy of the injury and the trauma extent, which usually occurs. In cases of posterior urethral disruption after pelvic fracture, ED is present in 25–85% of patients [3, 12, 13, 14]. In our study, 35 out of 43 patients (81%) with previously untreated stricture had ED expressed as IIEF5 score <22 points. All of the men with urethral stricture after pelvic fracture had ED before the treatment and this group had also the lowest mean IIEF5 score, even if the differences, compared to other groups, were not statistically significant due to the small number of cases. Similarly, the level of ED in our patients differed depending on the location of the stricture, with the highest value in cases of disruption of the membranous urethra. Again, the differences in IIEF5 score were not statistically significant, probably for the same reason.

Studies available in the literature rarely define if they correlate the post-operative results to the situation before the trauma causing urethral stricture, or to the one before the surgery. Andrich observed ED in 2% of patients after substitution, and in 7% after anastomotic urethroplasty. In both groups, ED was transient and of highest intensity in the early postoperative period of 2 to 3 months [15]. In the study of Erickson et al., up to 44% of patients reported ED after anterior urethroplasty, however, in most cases the disturbances were transient and resolved in 6 months [16]. The majority of authors claim that urethroplasty does not have a great impact on EF, but they admit that when it occurs, it may have a significant impact on the patients' assessment of the treatment's success and their quality of life, regardless of the postoperative urinary function [7, 15, 17–22]. In our study, we did not find urethroplasty to cause ED. The proportion of patients with ED did not change significantly after treatment, both in the whole study group and in the group of men, who underwent urethroplasty for the first time. We have not shown that the number

Table 3. The impact of length, etiology and location of the stricture and type of urethroplasty on postoperative penile anatomy and sensation

	Changes in penilesensation	Penilecurvature	Penileshortening
Etiology	$p = 0.315$	$p = 0.703$	$p = 0.532$
Location	$p = 0.247$	$p = 0.023^*$	$p = 0.579$
Length	$p = 0.558$	$p = 0.586$	$p = 0.550$
Type of urethroplasty	$p = 0.076$	$p = 0.114$	$p = 0.44$

*statistically significant

of previous urethroplasties is associated with the risk of ED.

The impact of urethroplasty on EF may theoretically depend on the stricture location and the site of the performed surgery. As to the anterior urethra, the majority of authors state that surgery in this region does not predispose to ED [17, 18, 23]. However, Dogra reports that in the anterior urethra, a longer stricture may cause transient ED, as well as penile shortening and penile curvature [21].

Most available papers analyze the bulbar urethroplasty. According to Anger, in this part of the urethra, neither anastomotic urethroplasty nor buccal graft will cause ED [23]. Similarly, Carlton and Palminteri deny the influence of bulbar urethroplasty on EF [2, 7]. Barbagli described disturbances of ejaculation in up to 23% and changes in penile sensation in 18% of patients, but not ED [24]. Most of the data underline that membranous urethroplasty also has a minimal impact on ED; observed cases of ED have a neurovascular origin and are caused by the initial injury, not by the reconstruction. The intensity of the ED is comparable before and after the surgery [7, 14, 25].

We did not observe a significant influence of stricture location on the level of preoperative and postoperative ED. We observed, beyond the statistical analysis, that there is a group of patients in whom the post-operative IIEF5 score decreased by >1 pts, what may be clinically relevant. However, even in such cases, none of the stricture locations was associated with an increased risk of potency deterioration. Patients whose IIEF5 score decreased by >1 pts, were more likely smokers and more frequently suffered from being overweight and diabetes or cardiovascular diseases (Table 4). These additional risk factors can undoubtedly affect the obtained results.

In our opinion, if the operation method and the surgical technique are appropriate, then the location of the stricture has no impact on the outcome, i.e. in any part of the urethra, and the operation should not negatively affect erectile function in a significant way.

Opinions about the influence of the stricture length on the occurrence of ED also vary [7, 17, 19, 21, 23]. The length may increase the risk of ED, at least transiently, which results from the usage of additional intraoperative maneuvers like separation of cavernous bodies or pubectomy, which increase the risk of neurovascular injury [7, 17, 19]. Additionally, longer strictures carry the risk of penile shortening and curvature [2, 19]. In our study, we have proposed three length compartments: <20 mm, 20–40 mm, and >40 mm, and we have not observed the influence of the stricture length on postoperative ED.

Table 4. Comparison of patient groups depending on the change in IIEF5 score

	Δ IIEF5 ≥(-1)	Δ IIEF5 <(-1)	P value
N (%)	49 (65%)	26 (35%)	
Median age	43	47	P = 0.08
Median BMI	25	26	P<0.001†
Smoking	10%	19%	P<0.001†
Comorbidities*	31%	42%	P=0.02†

*diabetes mellitus and cardio-vascular diseases

Δ IIEF5 – change in the IIEF5 score after the surgery; BMI – body mass index

Apart from erectile function, we have also investigated other aspects related to urethral stricture treatment that may influence patients' sexual performance. Urethroplasty almost always affects the spongy body, which is incised, shortened or stretched; hence every operation may change the anatomy of the penis. It is described in other papers and was also observed in our practice, manifesting itself in penile shortening, curvature, or changes in penile sensation. Theoretically, these problems depend on the length of the stricture [2, 19, 26]. Although we have not found such a correlation in our analysis, we have found that the stricture location in the penile urethra is accompanied by a significant risk of penile curvature.

On the basis of our preliminary, relatively small study, as well as the available literature, we think that with a proper and cautious surgical technique, potency after the operation should not deteriorate significantly. It seems to us that erectile function mainly depends on the type and extent of the initial injury which has led to the development of the stricture. Correctly performed urethroplasty gives a chance to preserve sexual function on at least a similar level [2, 23]. It should be an argument for performing earlier urethral reconstruction, instead of repeating the ineffective endoscopic treatment. We observe that urethroplasty, despite its proven effectiveness, is still underused, and it seems that some urologists neither perform this operation nor propose it to the patients. One of the causes of this situation is a fear of complications, especially postoperative ED, which is also a frequent concern for patients [2].

In conclusion, erectile dysfunction is a common complaint of men with urethral stricture. It seems that the extent and mechanism of the injury have a major impact on these disturbances. Proper therapy should not significantly deteriorate erectile function, regardless of the stricture length or location. The risk of postoperative ED is higher in men

with other proven risk factors of impotence like obesity and cardiovascular diseases. Treatment of stricture may have some influence on sexual functions not directly related to erection. This is especially distinct in the penile location of the stricture and has to be discussed with the patient before the

surgery. The obtained treatment results may encourage a wider use of urethroplasty in the therapy of urethral stricture.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest

PATIENT QUESTIONNAIRE

Instructions: Please circle one response that best describes you

- | | |
|---|---|
| <p>1. Have you noticed any changes in penile sensation after your surgery?</p> <p>– yes</p> <p>– no</p> | <p>– significantly</p> <p>– very significantly</p> |
| <p>2. To what degree has your penis shortened after your surgery?</p> <p>– not at all</p> <p>– slightly</p> <p>– moderately</p> | <p>3. To what degree has your penis curved after your surgery?</p> <p>– not at all</p> <p>– slightly</p> <p>– moderately</p> <p>– significantly</p> <p>– very significantly</p> |

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