Original Research Article

Male sexual dysfunction after anterior urethroplasty: results from a tertiary center

Abstract

Background: it has been proved that urethral stricture disease (USD) affects patient's quality of life (QoL) significantly. Various treatment approaches for management of USD exist, however open urethroplasty is considered as the mainstay technique being an efficient and durable method for managing USD. The aim of this work was to evaluate sexual dysfunction in patients subjected to surgical repair of anterior urethral stricture.

Methods: This prospective cohort study was conducted on 85 cases with clinical criteria of urethral stricture disease undergoing anterior urethral reconstructive surgery in the period from May 2020 to May 2022 at Tanta University Hospitals. Patients suffering pelvic fracture urethral injury (PFUI) or posterior urethral stenosis were excluded. Retrograde urethrography and uroflometry were performed. In addition, a detailed sexual history and a validated sexual health inventory for men (SHIM) questionnaire was filled by the patients before as well as following surgery.

Results: 74 patients (87.1%) reported no change in their sexual symptoms, while the patient (1.2%) who had a preoperative penile curvature showed an improvement of his curvature post-operatively. Nine patients (10.6%) developed de novo ED, while 2 patients reported having a shortening of penis (2.4%). Meanwhile, less frequent sexual problems were encountered such as cold glans, a reduced sensation of ejaculati5on and failure of emission in 3.5% of patients collectively. All the patients with ejaculatory dysfunction showed an improvement except the

patient who presented with failure of emission. Four patients (5.3%) showed an improvement of their transient postoperative ED while 4 patients had persistent ED. There were two more patients, one developed penile curvature and the other complained of prostatitis symptoms associated with haematospermia.

Conclusions: The present study demonstrated that anterior urethroplasty may be associated with transient ED in nearly 6.25 % of patients. Recovery of erectile function was depicted in approximately half of cases within 6-9 months of surgery. There was no difference in the incidence of denovo ED in patients undergoing anastomotic repair and in patients undergoing augmentation urethroplasty. Urethral lumen restoration may be associated with improvement of pre ejaculatory dysfunction.

Keywords: Sexual, Dysfunction, Anterior, Urethroplasty

Introduction

Male urethral stricture disease (USD) is one of the common health problems that has an adverse influence on QOL and health-care costs [1]. Mostly, strictures are anterior reaching about 92.2%. Bulbar urethra is the commonest location (46.9%), followed by penile, penile and bulbar, then pan urethral strictures at (30.5%, 9.9% and 4.9%) respectively [2].The main etiological causes of bulbar urethral strictures are idiopathic (forty percent), iatrogenic (thirty five percent), traumatic (fifteen percent) and inflammatory (ten percent) [3].

The different management modalities used in treatment of urethral stricture diseases such as urethral dilatation, endoscopic internal urethrotomies, and urethroplasty, primarily aimed to restore a state of normal voiding [4].

There has been a notable shift among urologists recently towards management of USD in males from endoscopic modalities with a low rate of success to urethroplasty with a significantly elevated success rate [5].

Lately, there has been a more attention towards inadvertent complications including sexual dysfunction (SD) particularly erectile function (EF) which is considered a main factor for sexual satisfaction. As general, SD includes erectile dysfunction, disorders of ejaculation, penile chordee and genital sensory disorders. Currently, several studies declared that the de-novo post urethroplasty sexual dysfunction isn't common, only one percent of cases following anterior urethroplasty (6).

Patients and methods

This study was designed as prospective study and it was performed in the urology department in Tanta University – Egypt in the period from May 2020 to May 2022. An approval was taken

from the ethical committee in addition to an informed consent from all participants. This project involved 85 patients who were all the patients admitted to Tanta Urology department.

All adults (≥ 18 years) fit male patients suffering urethral stricture disease undergoing anterior urethral reconstructive surgery. Patients with PFUI and posterior urethral stenosis were excluded. Patients' assessment involved precise history taking including: personal, medical and past surgical history. History of present illness and trauma also was considered.

A detailed sexual history, using the SHIM questionnaire [7], was taken before surgery as well as at the 3rd and 9th months following surgery. SHIM is a five-item scale in which each item is scored from 1-5. It includes items concerning maintenance capacity, erection confidence, maintenance frequency, and erection firmness along with one item concerning intercourse satisfaction. Grades of erectile dysfunction on SHIM scores are classified into severe erectile dysfunction (SHIM score: 5–7), moderate (8–11), mild-to-moderate (12–16), mild (17–21), and no erectile dysfunction (22–25).

A general examination, Body mass index (BMI) measurement and genitourinary system examination were carried out. The presence of any previous history of STDs or any ejaculatory problem, genital pain and penile curvature were also assessed. For all patients, urine analysis, urine culture and sensitivity and routinely preoperative laboratory investigations were done. Uroflowmetry, ascending and voiding cystourethrogram were also performed.

The collected data were tabulated to be statistically analyzed via SPSS software statistical computer package for Windows, version 21 (IBM Corp., Armonk, N.Y., USA).

Results

85 patients underwent anterior urethroplasty and completed the SHIM questionnaire preoperatively and at least one time post operatively were enrolled in the study, of them only 80 continued the follow-up at 9 months post operatively.

The mean age of studied patients was 39.7 ± 14.03 y (ranges from 18 to 66 years). **(Table.1)**

BMI: The mean BMI of the studied patients was 30.3 ± 5.48 while 43.5% and 40% of patients were obese and overweight respectively. **(Table.1)**

Table (1): Socio-demographic data of the participants (n=85)

Variables	No. (%)
Age	
Mean ± SD	39.7 ± 14.03
Min. – Max.	18.0 – 66.0
Median (IQR)	38.0 (26.0 – 52.0)
BMI	
Mean ± SD	30.3 ± 5.48
Min. – Max.	20.21 – 43.24
Median (IQR)	29.4 (27.375 – 34.12)
BMI	
Normal weight	14 (16.5)
Overweight	34 (40.0)
Obese	37 (43.5)

Fitness of the patients and associated co-morbidities

As shown in the **(Table.2)**, 18 patients had hypertension (HTN) and 4 patients had diabetes mellitus (DM) while 7 patients had both. Four patients had history of ischemic heart disease (IHD) and one presented with IHD with HTN.

As regards as the smoking history, 54 patients (63.5%) were non-smokers while 15 patients (17.6%) were active smokers. **(Table.2)**

Table (2): Fitness of the participants (n=85)

Variables	No.
Comorbidities	
HTN	18 (21.2)
DM	4 (4.7)
IHD	4 (4.7)

HTN & DM	7 (8.2)
HTN & IHD	1 (1.2)
Smoking	
Non-smoker	54 (63.5)
Smoker	15 (17.6)
Ex-smoker	16 (18.8)

Stricture etiology:

The etiologies of stricture were idiopathic in 28 cases (32.9%), iatrogenic in 25 patients (23.5%), traumatic in 11 patient (12.9%), Redo-urethroplasty in 12 patients (14.1%) and inflammatory in 9 patients (10.6%) **(Table.3).**

Table (3): Stricture's etiology (n=85)

Variables	No. (%)
Etiology	
Idiopathic	28 (32.9)
Iatrogenic	25 (29.4)
Trauma	11 (12.9)
Inflammatory	9 (10.6)
Redo urethroplasty	12 (14.1)

The mean pre-operative SHIM score was 22.3 ± 3.31 **(Table 4);** 17 patients (20%) were found to have mild ED, 2 patients (2.4%) had moderate ED and 1 patient (1.2%) had sever ED. two patients reported ejaculatory problems and 1 patient had a penile curvature.

Table (4): Pre-operative sexual history/activity (n=85)

Variables	No. (%)
Pre-operative ED	20 (23.5)
Anejaculation	2 (2.4)
Penile curvature	1 (1.2)

Type of surgery:

Both Heinke-Mikulicz stricturoplasty was carried out in 2 patients (2.4%), while excision and primary anastomosis (EPA) was performed in 25 patients (29.4%).

A single-stage urethroplasty was carried out in 49 patients (57.6 %), while a two-stage buccal mucosa graft (BMG) urethroplasty was carried out in 9 patients (10.6%). **(Table 5)**

Table (5): Operative techniques of the participants (n=85)

Variables	No. (%)
Procedure	
Heinke-Mikulicz stricturopalsty	2 (2.4)
Excision and primary anastomosis	25 (29.4)
Augmentation urethroplasty (single stage)	49 (57.6)
Two-stage BMG urethroplasty	9 (10.6)

Follow up after 3 months of the participants:-

74 patients (87.1%) reported no change in their sexual symptoms, while the patient (1.2%) who had a preoperative penile curvature showed an improvement of his curvature post-operatively **(Table 6).**

Nine patients (10.6%) developed de novo ED. There were 2 patients reported having a shortening of penis (2.4%). Meanwhile, less frequent sexual problems were encountered such as a cold glans, a reduced sensation of ejaculation and failure of emission in 3.5% of patients collectively **(Table6).**

Table (6): Sexual symptoms at 3 month follow up:

	No. (%)
No change in sexual symptoms	74 (87.1)
De novo ED	9 (10.6)
Improved curvature	1 (1.2)
Reduced sensation on ejaculation	1 (1.2)
Cold glans	1 (1.2)
Penile shortening	2 (2.4)
Failure of emission of ejaculation	1 (1.2)

Follow up after 9 months of the participants:

All the patients with ejaculatory dysfunction showed an improvement except the patient who presented with failure of emission. Four patients (5.3%) showed an improvement of their transient postoperative ED while 4 patients had persistent ED **(Table 7).**

There were two more patients, one developed penile curvature and the other complained of prostatitis symptoms associated with hematospermia. The three patients from the previous visit complaining of cold glans (1 patient) and penile shortening (2 patients) didn't show any improvement during this visit **(Table 7).**

Table (7): Sexual symptoms at 9 month follow up:

	No. (%)
No change	63 (82.9)
Persistent ED	4 (5.3)
ED improved	4 (5.3)
Ejaculatory problem improved	3 (3.9)
Penile curvature	1 (1.3)
Prostatitis + haematospermia	1 (1.3)
Cold glans	1 (1.3)
Penile shortening	2 (2.6)
Failure of emission of ejaculation	1 (1.3)

The mean post-operative **Q-max** at 9-month follow up visit showed a highly statistically significant improvement as compared to their preoperative values (17.1 *vs*. 5.6 mL/s, *p <0.001*), however, the mean postoperative SHIM score decreased in comparison with its preoperative value with statistically significant difference (21.8 vs. 22.3, *p = 0.042*) **(Table8).**

Table (8): pre and postoperative Q-max and SHIM scores:

Q-max (ml/sec)	**Pre-operative**	**At 3 months**	**At 9 months**	**P value**
Mean ± SD	5.6 ± 2.28	17.5 ± 4.17	17.1 ± 4.13	**<0.001***
Min. – Max.	1.2 – 10.7	5.0 – 26.0	8.4 – 25.4	
SHIM score				
Mean ± SD	22.3 ± 3.31	21.1 ± 4.44	21.8 ± 4.17	**0.042**
Min. – Max.	5.0 – 25.0	5.0 – 25.0	5.0 – 25.0	

As regards the incidence of de-novo erectile dysfunction according to the etiology of urethral stricture, there were no statistically significant differences between different etiological causes at the 3rd month (P = 0.837) and at the 9th month (P = 0.517). According to the patients' age, at 3 months, the mean age of the patients who developed de-novo ED was 48.7±12.2 years which was higher than the mean of those who didn't develop de-novo ED 38.6±13.9 years with statistically significant difference (P=**0.049)** while at 9 months, the mean age of the patients who had persistent de-novo was 54.0±5.03 years which was higher with statistically significant difference than those who didn't develop ED (P= 0.036**).**

According to the length of urethral stricture, the study didn't show that stricture length has an impact on erectile function after urethroplasty with no statistically significant difference between those who developed de-novo ED and those who didn't (P =0.674).

The current study did not reveal any statistically significant differences in the incidence of de-novo ED according to BMI, comorbidities and smoking history, although 50% of them were diabetic, 50% were hypertensive and 75% were obese.

Regarding the techniques used in urethral stricture repair there were no statistically significant differences between anastomotic urethroplasty and augmentation urethroplasty concerning de-novo ED incidence.

Discussion

In fact, USD has a significant influence on the patients QOL, usually due to the debilitating lower urinary tract manifestations and/or UTI. Various therapeutic approaches have been suggested, such as urethral dilation, visual internal urethrotomy, urethral stenting and open urethroplasty which remains an essentially efficient and durable treatment modality for USD [(8)].

Sexual dysfunction following urethroplasty is an extremely overbroad definition as it includes disorders such as ED, disorders of ejaculation, penile curvature or shortening in addition to genital sensitivity disorders [(9)].

Regarding the sexual outcomes at the 9-month follow-up visit, we had out of 80 patients, 7 developed sexual complications.

Among those patients, persistent de novo ED was present in 6.25%, penile shortening and cold glans were present in (2.5% each). Penile curvature, failure of emission and painful ejaculation were also found in (1.25% each). The mean preoperative SHIM score was 22.3 and postoperatively it was 21.1 at 3-months ($p<0.001$) and 21.8 at 9-months.

It has been postulated that, the causes of de novo erectile dysfunction following urethroplasty might be multi-factorial and may occur due to disruption of the bulbar arteries or cavernosal-spongiosal branches during mobilizing or transecting the bulbar urethra, or disruption of the cavernous or perineal nerves during splitting the bulbospongiosus muscle to expose the underlying corpus spongiosum [(9)]. Also, psychosomatic causes might have a role in the onset of erectile dysfunction as well [(10,11,12)].

For anterior urethroplasties, some degree of ED is not uncommon, but this tends to be transient, with most patients having resolution of their de novo ED within 12 months post-operatively [(12)].

This improvement of post urethroplasty ED may be attributable to relieve of the psychological impact of surgery and catheterization, in addition to the compensation of the arterial insufficiency by revascularization that happened during healing [(13)].

In an early multicenter study conducted by **Coursey *et al.*** in 2001, they have found that patients with anterior urethra stricture might be only at risk for temporary ED and no more liable to long term SD more in comparison with controls underwent simple circumcision [(10)].

A few years later, a prospective study performed by **Anger *et al*.** concluded that only 4 % of patients may experience de novo erectile dysfunction after a mean follow-up of six months post anterior urethroplasty [(14)].

In another prospective study performed by **Erickson *et al.*** using IIEF, they have reported that 90% of patients developed ED had regained EF by 6 months [(15)].

In a meta-analysis study including 36 articles conducted on 2323 patients by **Blaschko *et al*.**, although denovo erectile dysfunction ranged between zero and 38 percent, only 1% rate of persistent ED has been reported [(13)].

Mundy was the 1st to comment on erectile dysfunction following urethroplasty. He has reported a 5% rate of permanent erectile dysfunction following anastomotic repairs compared to only 0.9% following augmentation urethroplasty [(16)].

Among patients underwent penile urethroplasty, EPA and bulbar substitution urethroplasty, **Dogra *et al***. have demonstrated recovery of erectile function was documented in 96% of patients at mean follow-up of 5.6 months[(11)].

Similarly, **Palminteri *et al.*** have found graft urethroplasty had no impact on sexual function among cases who were sexually active [(17)].

Mondal *et al.* have performed a prospective study and have documented that the preoperative prevalence of the erectile dysfunction may be the driving force in developing the erectile dysfunction postoperatively, and that urethroplasty wasn't the essential etiology of de-novo erectile dysfunction [(18)].

Urkmez *et al.* suggested that urethroplasty per se doesn't significantly influence EF, orgasmic function, and overall sexual satisfaction irrespective to the type of operation, site and length of

the stricture. However, they have found that patients aged over 65 years were at a higher risk to develop ED post urethroplasty [19].

Till now, there is no agreement whether anastomotic procedures have a more effect on erectile dysfunction in comparison with grafting procedures or no. Results showed great variability and it is difficult to be compared because there is no standardized tool for assessment for postoperative sexual dysfunction [9].

In the current study, we had 2 patients (2.4%) who had anejaculation preoperatively, however at 9 months following urethroplasty they have shown an improvement in their ejaculatory function while one patient was complaining of failure of emission by 9 months postoperatively. Ejaculatory dysfunction (EjD) might be actually present before urethroplasty, leading to altered ejaculatory function following anterior urethroplasty. The preoperative prevalence has wide range between zero and eighty five percent. According to a study carried out by Erickson et al. 25% of patients documented poor ejaculatory function before surgery [20]. Most studies have revealed that restoring the urethral lumen led to improving ejaculatory function. However, occasionally EjD might persist or even become aggravated. This might be due to perineal nerve injury or by bulbospongiosus muscle (BSM) division during bulbar urethroplasty [9].

Following urethroplasty, patients might observe altered genital region sensitivity in addition to incomplete glans tumescence. Cold glans may occur due to corpus spongiosum transection for EPA, thus reducing the blood flow to the glans distally and, subsequently, reducing the glans stiffness. During dissection of the bulbar urethra, injury of the perineal nerve branches might account for genital sensitivity problem [9].

In literature, 0–5% of patients after urethroplasty have described developing cold glans. Reduced glans tumescence showed great variability; (0 %-60 %) in substitution series and (10-15 %) in

anastomotic series. nevertheless, what's really valuable is what is effect of such changes on the sexual life of the patient and his satisfaction with urethroplasty, as multiple studies mentioned that patients could maintain a satisfactory sexual life irrespective to the presence of these disorders[9].

In the current project, we had 1 patients who developed penile curvature and 2 patients who had penile shortening following urethroplasty. Kessler et al evaluated 225 patients who underwent anterior urethroplasty [21]. Patients in that study revealed no / mild, moderate and marked curvature in nearly 75 percent, 15 percent and 10 percent of cases, respectively. When compared to the overall severe shortening (15.6%), Excision and primary anastmosis was related with a greater proportion of severe penile shortening (thirty percent). In 22 percent & 14 percent of instances, the excision and primary anastomosis group had moderate or severe penile curvature, while the buccal mucosa graft group showed four percent moderate and four percent severe penile curvature postoperatively. Cases who had buccal mucosa graft urethroplasty didn't suffer significant shortening. Despite EPA is an efficient management procedure, it's suitable for short (3cm) bulbar stricture because of the higher probability of chordee and penile shortening.

In a series of 179 patients, Furr et al. have assessed the outcomes of EPA and dorsal BMG urethroplasty. Tethering with erection was significantly more common with excision and primary anastomosis (23.4 percent) *versus* buccal mucosa graft (3.1percent). Yet, 76 percent of cases who experienced tethering described satisfactory sexual activity [22].

Conclusion:

Anterior urethroplasty may cause transient erectile dysfunction in 6.25 % of cases. Recovery of erectile function may occur in 50% of cases within 6-9 months of urethroplasty. No significant differences were detected regarding the incidence of de-novo erectile dysfunction in patients

subjected to anastomotic repair and in cases subjected to augmentation urethroplasty. Urethral lumen restoration may be associated with improvement of pre-ejaculatory dysfunction. Pre as well as post-operative assessment of sexual function via the use of validated questionnaires is highly pivotal, it will yield helpful information for the appropriate preoperative counselling, outcomes assessment and early determination of any complications.

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