

Original Research Article

Outcomes of transecting urethroplasty in management of different types of bulbar urethral strictures: single center experience

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ABSTRACT

Background: The study aimed to evaluate the outcomes of transecting bulbar urethroplasty techniques used for management of bulbar urethral stricture as regards the success rate and sexual dysfunction.

Methods: Our study was a prospective study and it was carried out at urology department Tanta university, Egypt. The study was approved our ethical committee and an informed consent was obtained from all participants. Thirty patients underwent transecting urethroplasty either excision and primary anastomosis (EPA) or augmented anastomotic urethroplasty. Assessment of the sexual function by sexual health inventory for men (SHIM) questionnaire and postoperatively. Retrograde urethrogram (RGU) and micturating cystourethrogram (MCUG) were performed by an experienced urological surgeon.

Results: The age of studied patients ranged from 15-72 years with a mean of 41 ± 13.87 . The length of stricture ranged from 2-3 cm with a mean of 2.57 ± 0.38 . The stricture was non obliterative in 13 patients (43.3%), obliterative in 4 patients (13.3%) and near obliterative in 13 patients (43.3%). Anastomotic urethroplasty was carried out in 20 out of 30 patients (66.7%) and augmented anastomotic urethroplasty was carried out in 10 out of 30 patients (33.3%). The success rate was 90%. As regard erectile dysfunction, 5 patients reported erectile dysfunction (16.7%).

Conclusions: Anastomotic urethroplasty of short segment bulbar strictures continues to have excellent success rates and durability, but some patients who undergo anastomotic urethroplasty experience de novo sexual dysfunction.

Keywords: Urethra, Stricture, Urethroplasty, Urethrogram

INTRODUCTION

Urethral stricture disease causes a significant impact on patient quality of life (QoL), often because of debilitating lower urinary tract symptoms (LUTS) and/or urinary tract infections. A variety of treatment approaches exist including urethral dilation, internal urethrotomy and urethral stenting. Open urethroplasty is a highly effective and durable approach for treating stricture disease.¹

Bulbar urethroplasty can be accomplished through a variety of surgical techniques. These techniques can be categorized into urethral transecting and non-transecting groups. Transecting urethroplasty includes EPA, used for bulbar strictures <2 cm and augmented anastomotic urethroplasty (AAU) used for bulbar strictures 2-5 cm.²

EPA is a standardized, reproducible procedure with predictable long-term success rates ranging from 90 to

98.6%.³ Recently, there have been increasing concerns that urethral transection may adversely affect urethral blood supply resulting in urethral ischemia and sexual side effects.⁴⁻⁸

The purpose of this study was to review the long-term success rate of transecting bulbar urethroplasty in a single surgeon's experience as regard urinary and sexual outcomes.

METHODS

This prospective study was carried out at urology department in Tanta university, Egypt. After the approval of ethical committee, 30 patients with bulbar urethral stricture equal or less than 3 cm were included in the study during the period from May 2017 to May 2019. An informed consent was obtained from all participants. Patients with uncorrected coagulopathy, BXO, pan urethral stricture, abnormal bladder or patients with erectile dysfunction or no available partner were excluded from our project. Our patients were evaluated preoperatively by complete history taking including assessment of the sexual function by SHIM questionnaire. RGU and MCUG were performed by an experienced urological surgeon. Abdomino-pelvic ultrasound was used to detect hydronephrosis and to assess post void residual urine volume. Furthermore, preoperative endoscopic assessment by using small caliber ureteroscope to assess the stricture, urethra distal and proximal to it and to exclude any bladder pathology.

Operative techniques

The study was approved by the ethical committee in our university and an informed consent was obtained from all participants.

In all operative techniques the following steps were done. Methylene blue was injected intraurethrally 1 cm diluted in 10 cc saline. Midline perineal incision was done, opening the perineal fascia. Opening the bulbospongiosus muscle in the midline. Circumferential mobilization of the bulbar urethra was done. Opening the bulbar urethra longitudinally just distal to the stricture then going across the stricture.

In anastomotic urethroplasty

Circumferential mobilization of the bulbar urethra was done till the penoscrotal junction. Transaction of the urethra at the level of block. Removal of all fibrotic urethra till we got supple urethra proximally and distally. Spatulation of the distal urethra dorsally and proximal urethra ventrally. Anastomosis using 4/0 vicryl with 8 stitches (1, 11, 3, 9, 6, 12, 5 and 7th °clock) over 14 or 18 F silicone catheter.

In augmented anastomotic urethroplasty

Circumferential mobilization of the bulbar urethra till the penoscrotal junction. Transection of the urethra at the level of maximum obliteration. Removal of all fibrotic urethra till we got supple urethra proximally and distally. Spatulation of both distal and proximal urethra dorsally. Buccal mucosal graft was harvested from the left or right cheek according to patient preference and condition of the cheek. Fixing the graft dorsally to corpora cavernosa and anastomosing the urethra ventrally in 2 layers mucosa and spongiosum. Suture material was 4/0 vicryl. 14 or 18 F silicone catheter was used to drain the bladder for 1 month.

Postoperatively, we removed urethral catheter after 3 weeks preceded by pericatheter urethrogram and suprapubic catheter was clamped for 5-7 days till we were sure of good micturition. Thereafter, in the next visits we assessed the voiding function through patient reported outcome measures (PROM) questionnaire and sexual function through SHIM questionnaire. At 3 month postoperatively, all patients were evaluated by IPSS and PROM scores, sexual history including SHIM questionnaire and uroflowmetry and PVR were done for all patients. Patients with documented poor flow were scheduled for retrograde urethrogram in this visit. At 6 month postoperatively, RGU and MCUG was done for all patients. Also, postoperative sexual dysfunction was assessed that was defined as a postoperative decrease of 5 or more points on the SHIM questionnaire.

The primary endpoint of our study was measuring the effectiveness of different urethroplasty techniques in management of bulbar urethral stricture through measuring the Q max and doing RGU/MCUG for each patient and the need for auxiliary procedure, while the secondary endpoint was the assessment of postoperative sexual dysfunction.

Sample size calculation

Sample size was calculated using open Epi info software with a power of 90%. With an error level of 0.05 and level of confidence of 95%. Power of the study was 80%.

Statistical analysis

Cox regression analysis was performed and the Mantel-Cox test for time to failure was done on transecting urethroplasty success, while the Chi-square test was used to assess the relationship between techniques and complications or sexual dysfunction. Kaplan-Meier survival curves were constructed and Mantel-Cox analysis was performed with SPSS, version 24. Variables were considered as categorical or as continuous variables. Categorical variables included etiology (trauma, iatrogenic, infectious and idiopathic) and a patient reported adverse change in sexual function (erectile dysfunction, chordee and ejaculatory dysfunction).

Continuous variables included patient age in years and stricture length in cm. Two-sided $p < 0.05$ was considered statistically significant.

RESULTS

In this project, we had thirty patients underwent transecting urethroplasty. The age of studied patients ranged from 15-72 years with a mean of 41 ± 13.87 . Table 1 summarizes the characteristics of bulbar urethral stricture.

Regarding success of procedure, 27 patients (90%) had normal retrograde urethrogram at 6 months follow up. It was to be noted that we did RGU for all patients in both groups with normal and abnormal uroflowmetry at 6 months. We had noticed that 7 patients had poor flow with low Q_{max} at 6 months. The seven patients had abnormal RGU at 6 months follow up. Patients with recurrent bulbar stricture were treated by visual internal urethrotomy (VIU).

Regarding the postoperative sexual function, 5 patients reported erectile dysfunction (16.7%). The postoperative SHIM score ranged from 12-23 with a mean of 20.13 ± 2.40 . We had 5 patients reported feeling of cold glans and tingling (16.7%). 4 patients had genital pain causing sexual dysfunction with a percent of 13.3%. Table 2 summarizes the preoperative and postoperative Q_{max} and SHIM score.

In our study, the catheterization period ranged from 21-30 days with a mean of 24.60 ± 4.48 days. Hospital stay ranged from 2-3 days with a mean of 0.45 ± 2.73 days.

Regarding postoperative complications, we had one patient with catheter fall out (3.3%) and 2 patients with blocked catheter (6.6%). 2 patients developed postoperative fever with a percent of 6.6%. Perineal wound infection was noted in one patient.

Table 1: Stricture characteristics.

Characteristics	Transecting (n=30)	
	No.	%
Stricture etiology		
Iatrogenic	16	53.3
Idiopathic	9	30.0
Inflammatory	5	16.7
Stricture length (in cm)		
Minimum-maximum	2.0-3.0	
Mean \pm SD	2.57 \pm 0.38	
Median (IQR)	2.50 (2.50-3.0)	
Stricture site		
Midbulbar	14	46.7
Proximal bulbar	16	53.3
Distal bulbar	0	0.0
Proximal and midbulbar	0	0.0
Mid and distal bulbar	0	0.0
All bulbar	0	0.0
Stricture type		
Non obliterative	13	43.3
Obliterative	4	13.3
Near obliterative	13	43.3

Table 2: Preoperative and postoperative Q_{max} and SHIM score.

Q _{max}	Preoperative	Early postoperative Q _{max} (1)	Late postoperative	
			3 months	6 months
Transecting (n=30)				
Minimum-maximum	0.0-11.0	16.0-32.0	15.0-30.0	7.029.0
Mean±SD	6.70±2.94	21.43±3.49	21.27±3.68	19.23±4.69
Median (IQR)	7.0 (6.0-8.0)	22.0 (19.0-23.0)	21.0 (18.0-24.0)	20.0 (18.0-22.0)
Comparison between periods	p ₁ =1.000; p ₂ =0.441; p ₃ =0.579			
SHIM score				

Continued.

Q _{max}	Preoperative	Early	Late postoperative
Transecting (n=30)			
Preoperative			
Minimum-maximum		20.0-25.0	
Mean±SD		22.93±1.36	
Median (IQR)		23.0 (22.0-24.0)	
Postoperative 6 months			
Minimum-maximum		12.0-23.0	
Mean±SD		20.13±2.40	
Median (IQR)		21.0 (20.0-21.0)	

DISCUSSION

Urethral stricture disease causes a significant impact on patient QoL, often because of debilitating LUTS and/or urinary tract infections. A variety of treatment approaches exist, including urethral dilation, internal urethrotomy and urethral stenting. Open urethroplasty was a highly effective and durable approach for treating stricture disease.¹

Transection of the urethra for short bulbar strictures was originally challenged at the 2009 American urological association (AUA) meeting. The debate to transect or not to transect the bulbar urethra was based on stricture etiology and the success rates and development of sexual dysfunction after urethroplasty.⁹

Postoperative sexual dysfunction was strongly associated with patient dissatisfaction after urethroplasty and so surgeons should always be cared to preserve sexual function after urethroplasty.^{10,11}

Our study aimed to evaluate the results (safety and efficacy) of transecting urethroplasty techniques used for management of bulbar urethral stricture.

This project involved 30 patients with bulbar urethral stricture equal or less than 3 cm during the period from May 2017 to May 2019.

In this project our patients underwent one of two techniques according to stricture length. EPA was done for patients with bulbar stricture less than or equal to 2 cm or augmented anastomotic urethroplasty was done for patients with bulbar stricture length 2-3 cm.

As regards to stricture etiology, the etiology of stricture was iatrogenic in 15 patients (50%), idiopathic in 9 patients (30%), inflammatory in 5 patients (16.7%) and catheter induced in 1 patient (3.3%).

Mundy demonstrated that about 40% of bulbar strictures are idiopathic, particularly in the developed world. One-third of bulbar urethral strictures cases were reported to be iatrogenic, the rest of the patients were inflammatory, especially history of sexually transmitted diseases.¹²

Chapman et al reported that stricture etiology was idiopathic in 65.1% of cases, remote trauma in 19.9% of cases, iatrogenic in 11.9% of cases and inflammatory in 1.4% of cases.¹³ This multi institutional study was performed in developed countries. Welk et al in their retrospective COHORT study comparing augmented non transecting (ANTA) with dorsal onlay buccal grafting (DOB) for bulbar urethral strictures, they found that stricture etiology was unknown in 80% of cases and no patients had lichen sclerosis or hypospadias.¹⁴

In the current study, the postoperative Q_{max} at 6 months ranged from 7.0-29.0 with a mean of 4.69±19.23 ml/s.

Lumen et al in their prospective analysis of short-term functional outcome after urethroplasty they reported the preoperative mean Q_{max} was 5.83 ml/s (range: 0-13 ml/s) and raised to 24.92 ml/s (range: 7-61.9 ml/s) 6 months postoperative. This difference was statistically significant.¹⁵

As regard success of procedure (urethrogram at 6 months), our results showed, 27 patients (90%) had normal urethrogram at 6 months follow up while 3 patients (10%) had abnormal urethrogram at 6 months follow up with recurrence of the stricture.

Chapman and associates demonstrated, in a retrospective multi-institutional review, the success rate was 93.8 and 97.9% in the transecting group.¹³ Their success rate was higher than our study because the stricture length in their study was less. Their definition of failure was based on an anatomical finding of urethral stenosis on 16 Fr flexible cystoscopy, which likely represented a sensitive approach to detect early urethroplasty failure in their point of view.

Moreover, Beysens et al in their prospective study conducted on 90 patients with a bulbar stricture showed that estimated 2 year recurrence-free survival rate was 93%, for anastomotic repair.¹⁶

Barbagli et al in their study of long term follow up of patients after bulbar anastomotic urethroplasty, they found that of 153 cases 139 (90.8%) were successful and 14 (9.2%) were treatment failures. Treatment failure was managed with urethrotomy in 9 cases, end-to-end

anastomosis in 2, buccal mucosal graft urethroplasty in 1 and 2-stage repair in 2. Of 14 cases of failure 12 had a satisfactory final outcome, 1 was still waiting for the second stage of urethroplasty and 1 underwent definitive perineal urethrostomy.⁷

Ekerhult et al in their series, evaluating the sexual dysfunction after anastomotic bulbar urethroplasty and onlay augmentation urethroplasty, they reported that of the 94 transection cases 86 (91%) were considered successful and 8 (9%) were considered failures necessitating additional surgical interventions due to repeat stricture.¹⁷

As regard number of previous urethrotomies, 76.6% of our patients underwent at least one visual internal urethrotomy. In agreement with our results, Chapman et al noted in their retrospective, multi-institutional review that 70% of cases underwent at least one urethrotomy before definitive urethroplasty.¹³

For decades, urethral surgeons haven't paid much attention to erectile function after urethroplasty except in case of pelvic fracture related urethral injuries.¹⁸ A possible explanation for this was that in urethroplasty the urethra and corpus spongiosum were manipulated and not the corpora cavernosa which were responsible for the erectile rigidity. During the last years, there was emerging interest about the erectile function after anterior urethroplasty.

Regarding SHIM score, preoperatively in our project, SHIM score ranged from 20.0-25.0 with a mean of 22.93 ± 1.36 postoperatively, SHIM score ranged from 12-23 with a mean of 20.23 ± 2.40 .

In agreement with our results, Chapman et al demonstrated the mean preoperative SHIM score to be 19.6 ± 5.5 in transecting group while the mean postoperative SHIM score was 17.1 ± 6.8 in transecting group.¹³

Sexual dysfunction after urethroplasty was a very broad definition that also included disorders of erectile dysfunction, ejaculatory disorders, penile curvature or chordee and genital sensitivity disorders.¹⁹

Mechanism of post-urethroplasty ED may be due to disruption of the cavernous or perineal nerves when the bulbospongiosus muscle was split to expose the underlying corpus spongiosum or may be due to the disruption of bulbar artery flow. The perineal nerves were known to give somatic innervation to the bulbospongiosus muscle, which aided in semen expulsion and sensory input to the ventral surface of the penis. However, elegant anatomical studies by Yucel et al have showed that the perineal nerve may also have a role in erectile function.^{20,21}

Most patients who underwent urethroplasty and experienced de novo ED, they had noted to regain their erectile function over time, with the majority of patients returning to baseline erectile function between 5 and 12 months after treatment.²²

In our project as regard de novo erectile dysfunction, 5 patients reported erectile dysfunction (16.7%).

In 1993 Mundy was the first to comment on ED after urethroplasty, reporting a permanent ED rate of 5% after anastomotic repairs thought to be the result of disrupted nervous innervations and a compromised spongiosal vascular supply and 0.9% after graft urethroplasty.²³

The first study to specifically analyze EF after anterior urethroplasty was by Coursey et al in 2001. In this multicenter study, 250 men were retrospectively analyzed for post-urethroplasty sexual dysfunction and nearly 30% reported some degree of postoperative ED.²⁴

In the study of Erickson et al up to 40% of patients reported ED after anterior urethroplasty, however, in most cases the disturbances were transient and resolved in 6 months. The high percent of ED was attributed to early assessment of the erectile function before 6 months.²⁵

It was to be noted that sexual morbidity specifically following transecting anastomotic urethroplasty was inconsistent in the literature for a variety of reasons including heterogeneous patient populations, different urethroplasty techniques, varied stricture characteristics and variable follow up protocols. Furthermore, the psychogenic effects of genital or urethral surgery may further confound study findings.²⁵

According to our results, cold glans and tingling, 5 patients reported feeling of cold glans and tingling (16.7%).

Ekerhult et al in their series evaluating the sexual dysfunction after anastomotic bulbar urethroplasty, they reported neither ejaculatory nor glans dysfunction was found in either group.¹⁷

In our project genital pain causing sexual dysfunction, 4 patients had genital pain causing sexual dysfunction with a percent of 13.3%.

In agreement with our study, Chapman et al demonstrated sexual dysfunction due to persisting postoperative genital (penile or scrotal) pain in 7.3% of the patients.¹³

Limitations of our study included the relatively small sample size therefore, prospective studies comparing transecting and non-transecting urethroplasty techniques are encouraged to be designed to evaluate the efficacy and sexual adverse effects of both techniques.

CONCLUSION

Anastomotic urethroplasty of short segment bulbar strictures continues to have excellent success rates and durability, but some patients who undergo anastomotic urethroplasty experience de novo sexual dysfunction and further studies comparing results of transecting and non-transecting urethroplasty techniques are needed in a trial to conclude which technique has a reduced adverse effect.

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