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Surgical Outcome of Excision and End to End Anastomosis Urethroplasty in Patients with Short Bulbar Urethral Stricture

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Original Article

Summary

Many surgical techniques had been approved to repair anterior bulbar urethral strictures according to stricture length, in general short bulbar stricture managed by excision and primary end-to end anastomosis urethroplasty. This study aimed to analyze short term outcome of excision and primary end to end anastomosis urethroplasty in patients with anterior bulbar urethral stricture. This study conducted during the period from March 2018 to September 2019. The study included 12 patients with stricture of less than 2.5 cm and met the inclusion criteria. Urethroplasty operations were done by using excision and end to end primary anastomotic urethroplasty, and followed up for at least 12 months. Patients with history of hypospadias, previous urethroplasty and urethral stricture other than bulbous urethra were excluded. Postoperatively patient's follow up by uroflowmetry, post-void residual and any complication were reported at 3, 6, and 12 months scheduled visits, or whenever patient became symptomatic .Treatment failure was defined as the need for any postoperative intervention including urethral dilation. Findings revealed a mean age of the patients of 35.5 ± 15.3 years. A mean stricture length of 2.1 (range: 1 – 2.5) cm. Success was reported in 11 patients giving a success rate of 91.7%. In conclusion, excision and primary anastomosis is a safe and reliable procedure for short anterior bulbar urethral stricture with excellent results and minor complications.

Keywords: *Urethral Stricture, Pathology, Management, Urethroplasty Surgery, End to end anastomosis*

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1.INTRODUCTION

Urethral stricture is a disease that characterized as a narrowing of the anterior urethra due to fibrous tissue, which leads to obstructive voiding dysfunction with actually serious concerns for the whole urinary tract (1). The causes of anterior urethral stricture disease may be broadly categorized into iatrogenic, traumatic, inflammatory, and idiopathic causes (2). The specific pathological process for a stricture development is alteration of the normal corpus spongiosum beneath to urethral epithelium by dense scarred tissue (3) . Authors shows that the key alteration is metaplasia of the urethral epithelium from its usual pseudo-stratified columnar subtype to stratified squamous epithelium . Microbial infection as many several other factors: chemical, physical and biological can prompt this squamous metaplasia (4). Stratified squamous epithelium are more fragile, which therefore tends to split when distended during voiding. These fissures or ulcers in the epithelium lead to focal extravasation of urine on voiding that leads in turn to sub-epithelial fibrosis (5). It is obligatory to know the anatomy of the bulbar urethra, to make proper reconstructive decisions, it is situated between the penile urethra distally and proximally membranous urethra (6). In addition, the bulbous- urethra is sub-divided to proximal, middle and distal bulbous-urethra. The spongious tissue in the proximal and middle parts is distinctive, which is more developed in these regions and thicker ventrally and thinner on the dorsal surface. Thus, lumen is positioned more dorsally and not centrally (7).

2. PATIENTS and METHODS

Since March 2018, until September 2019 urethroplasty operations were done for 12 patients who fulfilled the requirement of our inclusion criteria, by using excision and end-to end primary anastomotic urethroplasty, and completed at least 12 months follow-up period .

Inclusion criteria :Including all patients who have bulbous urethral stricture of less than 2.5 cm in length.

Exclusion criteria :Patients with history of the followings were excluded:

1-operated on hypospadias .

2-previous urethroplasty surgery.

Evaluation of patients includes stricture etiology , previous management, general preoperative assessment, surgical findings, follow-up results, and early and late complications.

Statistical analysis:

Data were entered managed and analyzed using the statistical package for social sciences (SPSS) version 26, variables presented as mean, median, standard deviation, frequencies and percentages accordingly. Appropriate statistical tests were applied according to the type of comparison and relationship. Wilcoxon Signed Ranks Test used to assess the significance of difference between preoperative and 12 months values for Qmax and PVR. Student's t test (independent 2 groups model) used to compare mean age, mean BMI, mean Stricture length and mean operative time according to successfulness categories. Due to small sample size and to get more precise decision about the significance of differences in cause of stricture, culture findings, past surgical history, smoking, blood transfusion, overall complication, postoperative leakage, postoperative collection, these variable were compared as proportional distribution using Z test . P. value of 0.05 or less considered significant. Data were summarized and displayed in tables and figures with an explanatory paragraph for each using Microsoft Office; Word and excel Software version 2016.

3.RESULTS

A total of 12 patients were included in this prospective study, the mean age of the patients was 35.9 ± 15.3 (Range: 18 – 65) years. The mean body mass index was 24.8 ±4.2 (range: 19.0 – 33.1) kg/m2 .The preoperative baseline characteristics of the studied group revealed that the mean Qmax was 5.8 (range: 4 - 8) ml/sec, mean PVR was 272.2 (range: 80 - 1000) cc, mean excised stricture length was 2.1 (range: 1 – 2.5) cm , the mean operative time was 307.1 (range: 240 – 360) minutes, and 3 patients (25%) were smoker (Table 2). Furthermore, the stricture length was 1 – 1.5 cm in 2 patients (16.6%), 1.5– 2 cm in 5 patients (41.7%) and 2– 2.5 cm in 5 patients (41.7%), (Tables 1,2,&3 and Figures 1,2,3 &4).

Table 1. Baseline characteristics of the studied group (N = 12)

Variable	Mean	SD*	Range
Age (year)	35.9	15.3	18 - 65
Body mass Index (kg/m2)	24.8	4.2	19.0 – 33.1
Q_{max} preoperative (ml/sec)	5.8	1.6	4.0 – 8.0
Preoperative PVR (cc)	272.2	281.3	80 - 1000
Stricture length (cm)	2.1	0.5	1.0 - 2.5
Operative time (minutes)	307.1	41.8	240 - 360
Smoker: 3/12 (25%)	-	-	-
**SD: standard deviation*			

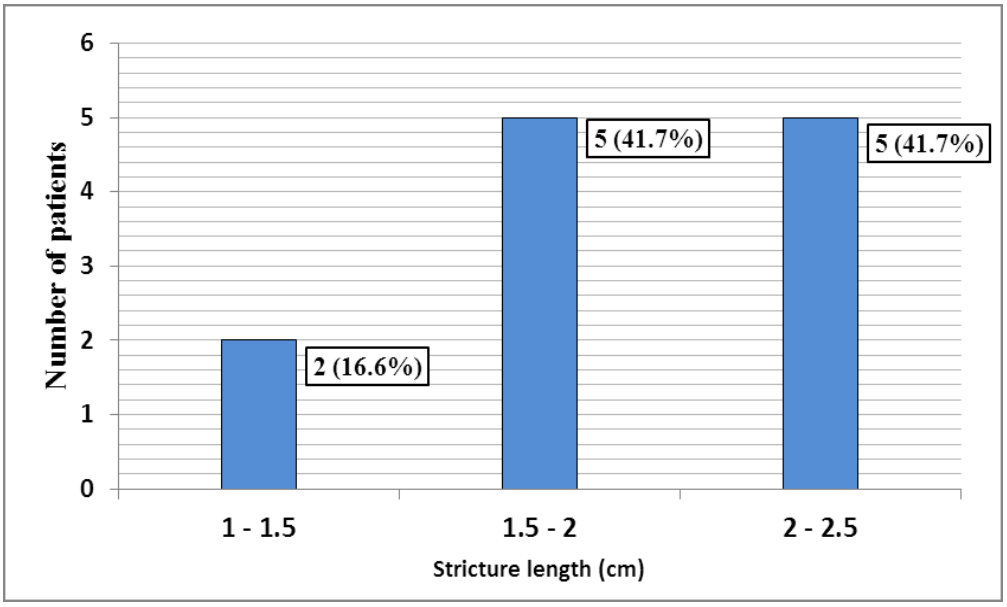

Figure 1. Bar-chart showing the number and percentage of patients according to stricture length (N=12)

Table 2. Causes of stricture of the studied group

Cause	Number of patients	%
Infection	8	66.6
Trauma	2	16.7
Idiopathic	2	16.7
Total	12	100.0

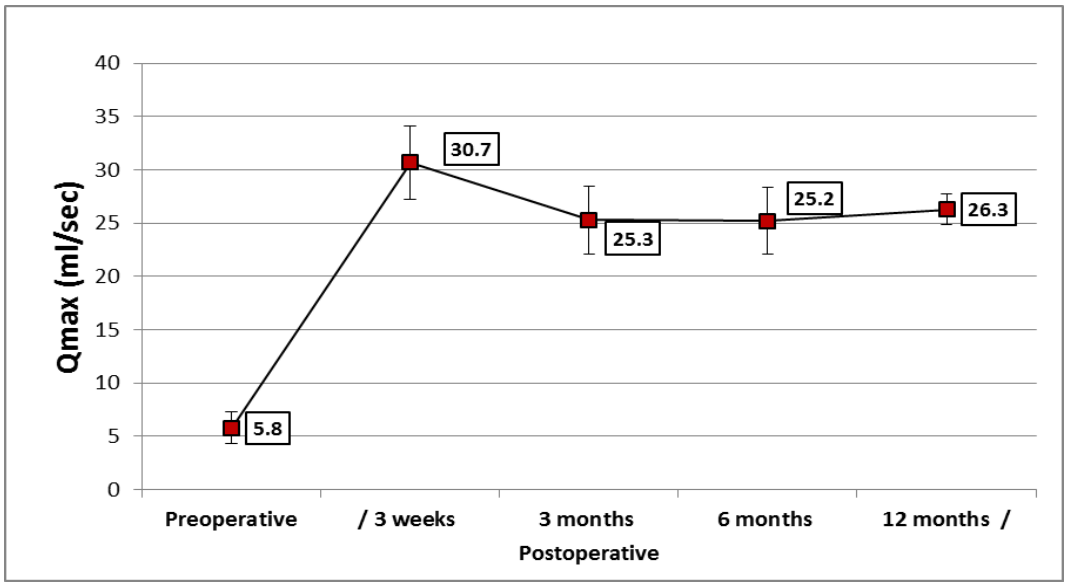

Figure 2. Trend of change in Q_{max} during the follow-up period (Preoperative to 12 months postoperative).

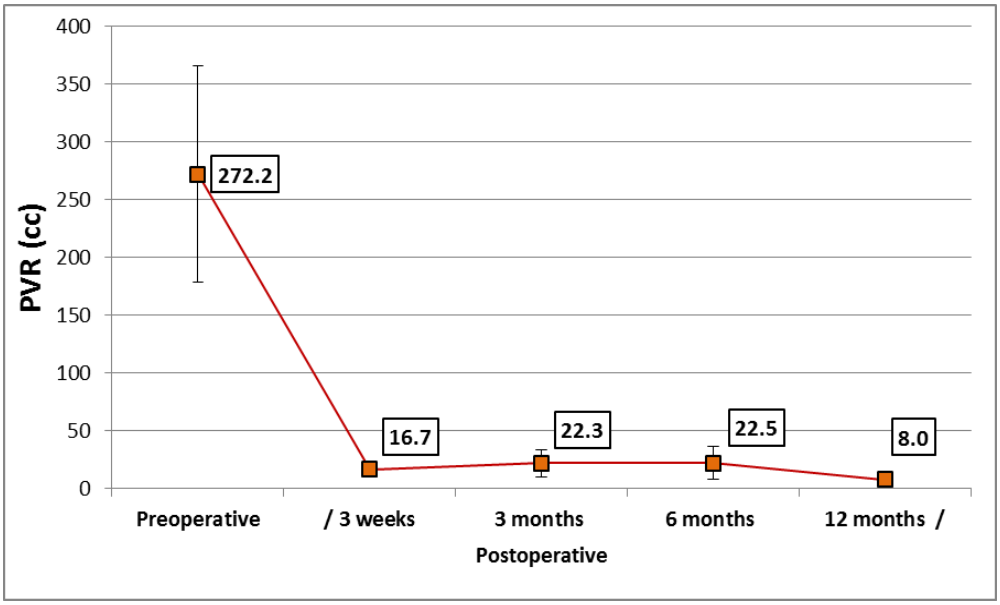

Figure 3. Trend of change in PVR during the follow-up period (Preoperative to 12 months postoperative).

Table 3. Incidence of postoperative complications among the studied group

Complication*	Number of patients	%
Leakage	2	16.7
E.D.	2	16.7
Collection	1	8.3
Failure	1	8.3
*Two patients had more than one complication		

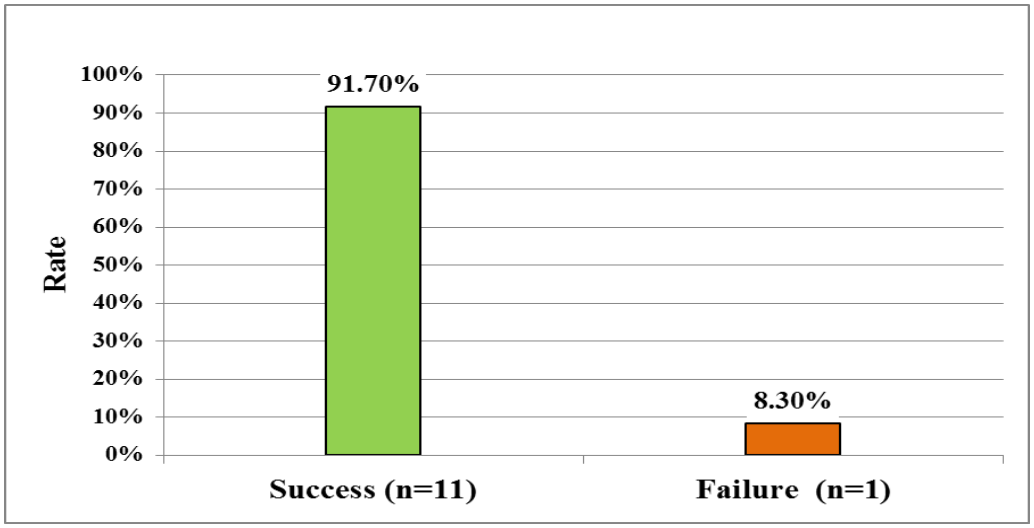

Figure 4. Bar-chart demonstrates the success and failure rates of excision and end to end anastomosis urethroplasty of the studied group.

4. DISCUSSION:

The surgical handling of urethral structural disease remains debatable, although most specialists consider urethroplasty the gold standard (8). In this study we enrolled 12 patients with anterior urethral stricture involving the bulbar urethra and operated them by using excision and primary anastomotic urethroplasty(EPA) technique. The mean age of those patients was 35.9 ± 15.3 years, the number and age of patients were comparable with Sudeep et al study (9). The mean time of operation in our institute was 307.1 minutes which was longer than reported by Sudeep et al, Jun-Gyo et al who report that their mean time was 131.66 min and 151 min respectively (9,10). This increment in operative time was partly due routine on table pre-urethroplasty check urethrocystoscope and new team experience with such type of surgery. In our study most common cause of strictures was infection which is comparable with Ofoha et al study (11), while David et al and Jun-Gyo et al show idiopathic and trauma , respectively as most common causes for stricture development (10,12). There is significant regional variation in stricture etiology with different patterns noted in other parts of the world, in developing countries infectious etiology still predominant cause for stricture development (13).

The time of catheter removal is also a matter of debate. We usually keep the catheter for 3 weeks and after removal, perform traditional urethrogram ,which can detect even a small

leak at site of anastomosis by applying a higher intra urethral pressure when compare to pericath-urethrogram.

The success rate of using EPA urethroplasty has been extensively studied in many literature with different results .We achieved a high success rate (91.7%) which was comparable to the result of Jun-Gyo et al and Ofoha et al who achieved 87.9% and 92.3% success rate respectively (10,11).

The single case of failure was in patient who is older in age (65 years) than others (mean age; 33.3 ± 15.2) years, (P. value =0.039) .This finding suggests that older patients may predict more failure rate ,which is comparable with VIERS et al. (14).On the other hand LEVY et al and Sudeep et al conclude in their studies that; Age is not a predictor of failure after urethroplasty operation .our finding about the relationship between age and urethroplasty failure might be in part due to age increment associated with increased comorbid burden such as peripheral vascular disease , that might result in decreased urethral blood flow (9,15). The BMI of the patient with failed urethroplasty was 33.1 kg/m2, it is higher when compared to those with successful urethroplasty (mean BMI = 24.1 kg/m2) (p.value=0.034) .Thus obesity considered an undependable predictive factor for urethroplasty failure, which is parallel with Chapman et al and Breyer et al studies (16,17) While David E et al study demonstrate that; BMI not have a statistical significance as a predictor for urethroplasty outcome (12). The relationship between obesity and higher rate of urethroplssty surgical failure is ill- defined and more likely a multi-factorial. In general, obese patients are likely to have an impaired immune response, greater risk of cardiovascular disease and obese patients often have numerous other comorbidities that can affect surgical outcome. So, surgical outcomes in obese patients might be affected by either direct or indirect pathways (18).

From the etiology point of view, our study revealed that failure was significantly associated with infectious etiology (P. value =0.001) , which is parallel with results of Adam et al and Chapman et al studies (16,19). While Jun-Gyo et al in his study shows that; the idiopathic etiology of stricture a predictor for recurrence (10). The exact explanation for why urethral stricture secondary to infection is more probable for recurrence after urethroplasty is poorly understood, but could be that; urethral stricture secondary to infection associated with extensive urethral involvement and more spongiofibrosis when compared to other possible

causes of urethral stricture development. Our study revealed that being a smoker and having a history of multiple previous DVIUs were significantly associated with urethroplasty failure (P .value <0.001),which is comparable with Breyer et al study (17). On the other side ,Adam et al study shows that smoking is not a predictor for recurrence (19) Also, Jun-Gyo et al study failed to prove that multiple previous DVIUs is a factor blamed in stricture recurrence after urethroplasty (10). Multiple endoscopic urethrotomies are widely practiced; it is easy to use and has a low rate of complications ,but many literatures suggested that with each urethrotomy, a cumulative tissue injury happen and manifested as amplified spongiofibrosis. In our study, the stricture length failed to be a predictor for recurrence, which is comparable with Levy et al study (20). We included strictures up to 2.5 cm in our study which considered the ideal length as in many literatures.

5. CONCLUSIONS

Excision and primary anastomosis is a safe and reliable procedure for short anterior bulbar urethral stricture with excellent results and minor complications. High success rate up to 91.7%.was reported in our study and it was comparable to that reported in other studied worldwide. Failure was associated with older age. We recommend further studies to be conducted including larger sample size for more precise results. Longer follow up duration, more than one year, to assess any late complications and also we recommend to avoid over-practice and unnecessary multiple DVIUs as it worsen the spongiofibrosis.

Ethical Clearance: Ethical clearance and approval of the study are ascertained by the authors. All ethical issues and data collection were in accordance with the World Medical Association Declaration of Helsinki 2013 of ethical principles for medical research involving human subjects. Data and privacy of patients were kept confidentially.

Conflict of interest: Authors declared none

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