Characteristics of the urethroplasty and our approach-Experience in patients with urethral stricture

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ABSTRACT

Objective: Urethral stricture is a common pathology with different etiologic factors in different age groups and societies. In our research, patients who underwent urethroplasty because of urethral stricture were evaluated in terms of etiology, localization, surgical technique and demographic characteristics.

Material and methods: One hundred and sixty-three patients with a mean age of 53.43±16.5 years, operated between January 2008 and May 2016 because of urethral stricture were retrospectively included in the study. Diagnosis of the urethral stricture was established based on the complaints of the patient, results of urinalysis, urine culture, uroflowmetry, retrograde urethrography and/or voiding urethrography, and urethroscopy in case of need. Postoperative success for the patients was determined based on urinary flow rate and maximum flow rate of over 15 mL/sec were evaluated as success.

Results: Etiologic factors for urethral stricture included trauma in 40 (24.5%), urethral catheterization in 45 (27.6%), endoscopic procedure in 59 (36.2%), infection in 10 (6.2%), idiopathic etiologies in 9 (5.5%) out of 163 patients. Mean length of the stricture was 3.6±1.7 cm. While the indicated number of patients had buccal mucosa graft (n=73, 44.7%), penile skin flap (n=21, 12.8%), Heineke-Mikulicz repair (n=5, 3.0%), and end-to-end anastomosis (n=64, 39.1%). Mean follow-up period was 43.2±33.7 months. Buccal mucosa graft was applied as ventral (n=32, 43.8%), dorsal (n=22, 30.2%), and dorsolateral (n=14, 19.2%) onlay, and transventrally dorsal inlay (n=5, 6.8%) grafts. Average success rates were 83.5% (n=61/73) in buccal mucosa, 76.2% (n=16/21) in penile skin grafts; 85.9% (n=55/64) in end-to-end anastomosis and 80.0% (n=4/5) in Heineke-Mikulicz repair.

Conclusion: Our assumption is that urethroplasty procedures have satisfactory long-term results, regardless of the location and size of the stenosis. According to our clinical experience, deciding on the most appropriate surgical technique by assessing each patient individually in experienced centers will increase success rates.

Keywords: Open urethroplasty; success; urethral stricture.

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Introduction

Male urethral stricture, being one of the diseases known for ages in urological practice, has a high prevalence. Although the prevalence of urethral stricture has been reported as 0.6-1.4% by different authors, it affects 15-20% of adult men at some point of their lives.[1-3] A variety of etiologic factors play a role in the formation of the urethral stricture, which leads to the narrowing of the urethral lumens due to the fibrosis of the urethral epithelium and the surrounding corpus spongiosum. However, most commonly iatrogenic and idiopathic etiologies are encountered.[2-4] Treatment options are developing rapidly day by day in this disease which is easy to diagnose.

Minimal invasive methods, such as dilatation, direct visual internal urethrotomy (DVIU), and open urethroplasty techniques such as end-to end anastomosis, graft and flap urethroplasty (augmentation) and multi-staged urethroplasty can be used therapeutically. However, the optimal procedures for treating strictures with different localizations and length in different patients are still debatable among urologists all around the world.[5,6]

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Table 1. Mean values of age/stricture length/Qmax/ operative time

Mean age, year (range)	53.43±16.5 (29-83)
Mean stricture length, cm (range)	3.6±1.7 (2-14)
Mean postoperative Qmax, mL/sec (range)	17.2 (15-27)
Mean operative time, min (range)	125 (95-285)

Table 2. Descriptive values of the patients in the study

	(n)	(%)
Etiology		
Endourological Intervention	59	36.2
Catheterization	45	27.6
Trauma	40	24.5
Infection	10	6.2
Idiopathic	9	5.5
Localization of the stricture		
Mea-fossa navicularis	11	6.7
Penile urethra	32	19.6
Peno-bulbar urethra	13	7.9
Bulbar urethra	100	61.3
Membraneous urethra	7	4.3
DVIU-	93	57.1
DVIU+	70	42.9
Success rates		
Buccal mucosal graft	61/73	83.5
Penile skin flap	16/21	76.2
End-to end anastomosis	55/64	85.9
Heineke-Mikulicz	4/5	80.0

DVIU+ / DVIU-: With and without direct visual internal urethrotomy performed before urethroplasty

Even though most surveys conducted in different parts of the world have indicated that the gold standard method in open urethroplasty in the treatment of the urethral stricture, minimal invasive methods such as dilatation and endoscopic procedures are favorable due to their simplicity, affordability, which do not need much experience as in urethroplasty and can be done as a short-lasting outpatient surgery.[7-10] However, contrary to these advantages, the long-term success of minimally invasive methods is low and recurrence is high.[11-13] Therefore, in more recent studies, it is stated that the tendency of urethroplasty is increased due to minimally invasive methods in the treatment of urethral stricture and that greater number of urologists have urethroplasty experience.[14]

In this study, we have evaluated the patients treated with open urethroplasty because of urethral stricture in terms of etiological factors, localization, stricture length, surgical method used and demographic characteristics and reported our single-center based results.

Material and methods

We retrospectively evaluated 178 open urethroplasty cases performed in our clinic between January 2008 and May 2016 with the diagnosis of anterior urethral stricture. The study was performed in accordance with the Declaration of Helsinki and approved by the local ethics committee of Haydarpaşa Numune Training and Research Hospital. All patients were provided with informed consent forms. A total of 163 cases were included in the study after the patients with missing information were excluded.

Preoperative evaluation and operation of all patients were performed by the same surgical team and the preoperative diagnosis of the patients was made based on detailed anamnesis, careful physical examination, results of uroflowmetry, retrograde urethrography and/or voiding urethrography, and urethroscopy in case of need. The surgical method and the type of graft desired to be used are decided intraoperatively dependent on the etiology, localization and the length of the stricture. Etiologic factors, age, length and localization of stenosis, duration of follow-up and the type of surgical procedure were recorded. Disappearance of the previous voiding complaints and maximum flow rate of over 15 mL/sec were evaluated as success. Mean and standard deviation values were given as descriptive statistics.

Results

Mean age of the patients (53.43±16.5 years), stricture length (3.6±1.7 cm; range, 2-14 cm) and duration of follow-up (43.2±33.7 months) were also recorded (Table 1). The etiologies leading to development of stricture formation were transurethral endoscopic intervention in 59 (36.2%), urethral catheterization in 45 (27.6%), trauma in 40 (24.5%), infection in 10 (6.2%) and idiopathic causes in 9 (5.5%) patients (Table 2).

The stricture was localized in mea or fossa navicularis in 11 (6.7%), penile urethra in 32 (19.6%), peno-bulbar junction in 13 (7.9%), bulbar urethra in 100 (61.3%), and membranous urethra in 7 (4.3%) patients (Table 2).

Ninety-three of the 163 (57.1%) patients, had not received any endoscopic treatment due to urethral stricture before urethroplasty and 70 (42.9%) patients had at least one endoscopic treatment before the operation. Twenty-six (37.1%) patients were treated with once, 20 (28%) twice and 24 (35.2%) patients three times or more DVIU procedures before the definitive treatment. As in urethroplasty method, buccal mucosa graft was used in 73 (44.7%), end-to-end anastomosis in 64 (39.1%), penile skin flap in 21 (12.8%) and Heineke-Mikulicz repair in 5 (3.0%) patients.

Buccal graft was applied as ventrally onlay in 32, dorsally onlay in 22, dorsolaterally onlay in 14 and transventrally dorsal

inlay in 5 patients. The average success rates in patients who underwent urethroplasties using buccal mucosa grafts (83.5%, n=61), penile skin flaps (76.2%, n=16), end-to end anastomosis (85.9%, n=55) and Heineke-Mikulicz repair (80.0%, n=4) were as indicated (Table 2). The average postoperative Qmax [17.2 (mL/sec) (15-27)], and operative time [125 minutes (95-285 min)] were also estimated (Table 1).

As complications, peroneal nerve damage (n=1), compartment syndrome (n= 1), urethrocutaneous fistula (n=1) and bleeding at buccal mucosa (n= 1) were observed. These complications were solved without any problem with appropriate treatments.

Discussion

Treatment for male urethral stricture is continuously developing. Although urethroplasty is often described as being the gold standard by urologists, the confusion and debate still continue. Dilatation and DVIU have been applied all around the world as a first line treatment of urethral stricture because the procedure is relatively simple to apply, technically easier, and can be performed as an outpatient surgery. Besides it is less morbid than urethroplasty which has a long recovery time.[3,15] Surveys conducted in different regions of the world from the United States, the Netherlands, Italy and a study from our country have demonstrated its widespread application.[7-10]

The success rate of open urethroplasty, which is the gold standard in the definitive treatment of urethral stricture, was 85-95%;[15,16] while the success rate of DVIU, a much more common minimally invasive method has been reported to range between 20% to 90% in different series.[11-13] Recent studies have indicated that the high success rates of the minimally invasive methods in the short term, decreases with time and restenosis occurs. As a matter of fact, Santucci and Eisenberg[13] reported that the stricture-free rate (SFR) of the DVIU was only 9% in the follow-up of 1-3 years. In the study of Pansadoro and Emiliozzi[12], it was also stated that recurrent DVIUs did not increase success rates, and that the third internal urethrotomy fails in all patients. In a more recent study, after 6 months of follow-up, SFR after the first, second, and third DVIUs were 29.6, 22.6, and 13.3%, respectively.[17]

A lot of studies has been done on many risk factors such as patient age, etiologic factors, previous stricture treatment, location of stricture and length, which affect the success and cause recurrence of urethral stricture. However, it has been stated that the success of treatment depends entirely on the choice of patient, irrespective of any method and technique. Therefore, it is stated that DVIU and urethroplasty are two alternative techniques that do not compete with each other, each with different indications and limitations. It is indicated that DVIU should be used only for single and shorter than 1 cm strictures in the bulbar region, or otherwise because of improper use of the DVIU, new, longer and complicated strictures develop, and repetitive DVIUs do not increase the success, and thus SFR rates.[7,11,18-20] Most authors have stated that recurrent urethral manipulation and DVIUs do not increase treatment success and even reduce success rates of urethroplasty procedures. Moreover, the long-term outcomes of multivariate analyzes suggest that post-urethroplasty failure is directly related to previously failed DVIUs. Similarly, in the study of Roehrborn and McConnell, the use of a minimally invasive method prior to definitive treatment has been reported to increase the failure rates from 14% to 28%.[12,21-23] Our clinical observation is that the success of open urethroplasty in patients without DVIU before definitive treatment is better than the patients who underwent DVIU previously. Unlike the meta-analysis evaluating the etiologic factors for anterior urethral stricture which indicates involvement of iatrogenic factors in 32% and idiopathic causes in 34% of the cases, our study results revealed idiopathic causes in 5.5% and iatrogenic factors like catheterization and prior endourological intervention in 63.8% of the cases. These higher rates have been attributed to the widespread use of endourological procedures in recent years.

In our study, 57.1% (93/163) of the patients did not receive any minimally invasive treatment before urethroplasty, whereas 42.9% (70/163) of the patients received DVIU at least once. The reason for this relatively lower rate compared with most questionnaire studies that indicate the rate of DVIU as 80-97%, can be explained as the limited usage of DVIU in our clinic only for a very limited group of patients with a single <1 cm short strictures of the bulbar urethra.[7-10]

Different techniques have been defined for open urethroplasty, which is the gold standard method in the treatment of urethral strictures. There is no single method that defines different types of strictures in different regions of the urethra. Excision of the stricture area and using end-to end anastomosis, buccal mucosa graft and penile skin flap are the most frequently used methods.[3,5,19,24]

Today, the excision of the stricture area, the neat spatulation of the urethral ends and tension-free anastomosis of them which is called excision-primary anastomosis (EPA) is the best method for anterior urethral strictures and over %95 success rate has been reported. A recent study has shown that EPA success was 98% in an average 50-month follow-up and only 2% of the recurrence rate.[25] Similarly in our study, the most successful group was end-to end anastomosis with 85.9% success rate.

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Buccal mucosa graft is a solid tissue material to be used for urological reconstructive procedures in that it can easily be adhered to the tissue to which it is transferred with highly vascular lamina propria that can be easily removable from the cheek, inner lips and tongue without any hair. Buccal mucosa may be used in different localizations for strictures in different regions of the urethra. It is used in the form of dorsal onlay, dorsolateral onlay or transventral dorsal inlay in the penile urethra because the ventral surface of the corpus spongiosum is thinner and in bulbar urethra, it can be used as ventral onlay or dorsal onlay dependent on the thickness of corpus spongiosum. Another tissue used for surgical reconstruction of the urethra is the penile skin flap that is utilized more frequently as ventral onlay in the treatment of anterior urethral strictures. The success rates of urethroplasty indicated in various studies using buccal mucosa grafts or penile skin flaps were 84-87% and 73-80%, respectively.[26-30] In our study, we used buccal mucosa grafts entirely harvested from the internal side of the cheek. Our success rates in urethroplasty using buccal mucosa grafts or penile skin flaps were 83.5, and 76.2% similar to the results cited in the literature.

Our single center-study, relatively low number of patients and retrospective design are limitations of our study.

In conclusion, we assume that open urethroplasty is a satisfactory procedure, regardless of the location and size of the stenosis. According to our clinical experience, deciding the most appropriate surgical technique by assessing each patient individually in experienced centers will increase success rates.

Ethics Committee Approval: Due to its retrospective nature, ethics committee approval was not required.

Informed Consent: Written informed consent was obtained from patients who participated in this study.

Peer-review: Externally peer-reviewed.

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References

1. Santucci RA, Joyce GF, Wise M. Male urethral stricture disease. J Urol 2007;177:1667-74. [CrossRef]
2. Lumen N, Hoebeke P, Willemsen P, De Troyer B, Pieters R, Oosterlinck W. Etiology of urethral stricture disease in the 21st century. J Urol 2009;182:983-7. [CrossRef]
3. Mundy AR, Andrich DE. Urethral strictures. BJU Int 2011;107:6-26. [CrossRef]
4. Fenton AS, Morey AF, Aviles R, Garcia CR. Anterior urethral strictures: etiology and characteristics. Urology 2005;65:1055-8. [CrossRef]
5. Andrich DE, Mundy AR. What is the best technique for urethroplasty? Eur Urol 2008;54:1031-41.
6. Smith TG. Current management of urethral stricture disease. Indian J Urol 2016;32:27-33. [CrossRef]
7. Bullock TL, Brandes SB. Adult anterior urethral strictures: a national practice patterns survey of board certified urologists in the United States. J Urol 2007;177:685-90. [CrossRef]
8. Van Leeuwen MA, Brandenburg JJ, Kok ET, Vijverberg PL, Bosch JL. Management of adult anterior urethral stricture disease: nationwide survey among urologists in the Netherlands. Eur Urol 2011;60:159-66. [CrossRef]
9. Palminteri E, Maruccia S, Berdondini E, Di Pierro GB, Sedigh O, Rocco F. Male urethral strictures: a national survey among urologists in Italy. Urology 2014;8:477-84. [CrossRef]
10. Akyuz M, Sertkaya Z, Koca O, Caliskan S, Kutluhan MA, Karaman MI. Adult urethral stricture: practice of Turkish urologists. Int Braz J Urol 2016;42:339-45. [CrossRef]
11. Veeratterapillay R, Pickard RS. Long-term effect of urethral dilatation and internal urethrotomy for urethral strictures. Curr Opin Urol 2012;22:467-73. [CrossRef]
12. Pansadoro V, Emiliozzi P. Internal urethrotomy in the management of anterior urethral strictures: long-term follow up. J Urol 1996;156:73-5. [CrossRef]
13. Santucci R, Eisenberg L. Urethrotomy has a much lower success rate than previously reported. J Urol 2010;183:1859-62. [CrossRef]
14. Liu JS, Hofer MD, Oberlin DT, Milose J, Flury SC, Morey AF, et al. Practice patterns in the treatment of urethral stricture among American urologists: a paradigm change? Urology 2015;86:830-4.
15. Gallegos MA, Santucci RA. Advances in urethral stricture management. F1000Res 2016;5:2913. [CrossRef]
16. Barbagli G, Palminteri E, Bartoletti R, Selli C, Rizzo M. Long-term results of anterior and posterior urethroplasty with actuarial evaluation of the success rates. J Urol 1997;158:1380-2. [CrossRef]
17. Pal DK, Kumar S, Ghosh B. Direct visual internal urethrotomy: Is it a durable treatment option? Urol Ann 2017;9:18-22.
18. Morey A. Urethral stricture is now an open surgical disease. J Urol 2009;181:953-4. [CrossRef]
19. Barbagli G, Lazzeri M. Urethral reconstruction. Curr Opin Urol 2006;16:391-5. [CrossRef]
20. Waxman SW, Morey AF. Management of urethral strictures. Lancet 2006;29:1379-80.
21. Culty T, Boccon-Gibod L. Anastomotic urethroplasty for posttraumatic urethral stricture: previous urethral manipulation has a negative impact on the final outcome. J Urol 2007;177:1374-7. [CrossRef]

22. Singh BP, Andankar MG, Swain SK, Das K, Dassi V, Kaswan HK, et al. Impact of prior urethral manipulation on outcome of anastomotic urethroplasty for post-traumatic urethral stricture. Urology 2010;75:179-82. [CrossRef]
23. Roehrborn CG, McConnell JD. Analysis of factors contributing to success or failure of 1-stage urethroplasty for urethral stricture disease. J Urol 1994;151:869-74. [CrossRef]
24. Lee YJ, Kim SW. Current management of urethral stricture. Korean J Urol 2013;54:561-9. [CrossRef]
25. Reynaldo GGomez, Steven B Brandes.Stricture excision and primary anastomosis for anterior urethral strictures. Totowa,USA: Humana Press; 2008.p.107-17.
26. Barbagli G, Brandes SB. Buccal mucosal graft urethroplasty. Totowa, USA: Humana Press; 2008.p.119-34.
27. Barbagli G, Palminteri E, Guazzoni G, Montorsi F, Turini D, Lazzeri M. Bulbar urethroplasty using buccal mucosa grafts placed on the ventral, dorsal or lateral surface of the urethra: are results affected by the surgical technique? J Urol 2005;174:955-7.
28. Andrich DE, Dunglison N, Greenwell TJ, Mundy AR. The long-term results of urethroplasty. J Urol 2003;170:90-2. [CrossRef]
29. Elliott SP, Metro MJ, McAninch JW. Long-term followup of the ventrally placed buccal mucosa onlay graft in bulbar urethral reconstruction. J Urol 2003;169:1754-7. [CrossRef]
30. Barbagli G, Palminteri E, Rizzo M. Dorsal onlay graft urethroplasty using penile skin or buccal mucosa in adult bulbourethral strictures. J Urol 1998;160:1307-9. [CrossRef]