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THE USE OF TEFLON SERIAL DILATORS FOR URETHRAL DILATATION: OUR INSTITUTIONAL EXPERIENCE

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ABSTRACT
Objective: Urethral stricture is one of the morbid conditions in which patients require frequent hospital visits and admissions. More severe cases may present with complete retention, bladder stones, or recurrent urinary tract infections (UTIs).[1][2] Urethral dilation, optical internal urethrotomy, or open surgical reconstruction (urethroplasty) are few options available for urethral stricture management. Urethral dilation is done with metal dilators, teflon dilators, filiforms and followers, balloons, or coaxial dilators inserted over a guidewire. The Teflon was designed to facilitate the passage of the dilator over a guidewire through the stricture and the urethra with less pain and trauma. This study presents our experience with Teflon urethral dilatation. Materials and Methods: Total 360 patients had undergone teflon dilatation between 2017 August and 2022 August. The technique included the insertion of a hydrophilic floppy-tipped guidewire through the urethra directly into the bladder under direct vision or fluroscopy. The Teflon dilators were then inserted over the guidewire. Dilators of gradually increased size from 8F to 24F were used. The follow-up of the patients includes uroflowmetry and measurement of postvoid residual at 4 weeks, or in the case of a recurrence of symptoms. Results: The age of the patients were 69.08 ± 15.77 years. The causes of urethral stricture were iatrogenic (n = 132), traumatic (n = 41), infectious (n = 26), and of unknown origin (n = 161). The stricture length was 1.52 ± 0.75 cm. The mean number of dilations needed per case was 4 (range: 1–15), and the time between the dilations is 3 to 4 weeks. Conclusion: Teflon dilators for urethral dilation as a safe and effective technique because of their atraumatic cone shaped tip design and it is malleable so that it can negotiate into the male urethra with ease.

KEYWORDS: Teflon, dilation, lower urinary tract symptoms, urethral stricture.

INTRODUCTION
The leading cause in the developed countries is iatrogenic injury of the urethra due to instrumentation, prostate cancer treatments, and previous hypospadias surgery. Other causes like trauma with pelvic fracture and urethral distraction injuries, infections, post radiotherapy, postsurgical, Idiopathic causes, traumatic sclerosis are also significantly contributing to this condition. In contemporary series, however, common causes include straddle trauma, pelvic fracture urethral injury, instrumentation, prior hypospadias surgery, and prior prostate surgery, and/or radiation.[3]

Patients present with bladder outlet obstruction symptoms, which can lead to recurrent urinary tract infections (UTI), epididymorchitis and renal function impairment in untreated patients.

The evaluation usually begins with uroflowmetry, which will show an obstructive voiding pattern with sometimes elevated postvoid residual volume (PVR). The most common interventions used to establish the diagnosis are anterograde or ascending urethrography and cystoscopy. MRI and CT can also be useful in identifying the stricture and associated renal impairment. However, ultimate diagnosis requires imaging and endoscopic evaluation.[4]

The treatment options for urethral strictures include dilations, optical internal urethrotomy, and open reconstructive urethroplasty. The treatment choice depends on the stricture site, length, and patient's condition. Though urethroplasty offers 90% success rate[5-7], dilatations and optical internal urethrotomy are extensively used in stricture management because of minimally invasive nature of these procedures.

Urethral dilation can be done with metal dilators, Teflon dilators, filiform and followers and balloon dilators. In our department, we use the Teflon serial dilators for the performance of urethral dilations. These dilators follow the anatomy of the male urethra, which can gently dilate the stricture when compared to metal dilators. We, herein, present a long experience with the use of these dilators for the management of urethral stricture.

MATERIALS AND METHODS

Patients

Patients with urethral strictures were treated with Teflon dilators in our institution which is a tertiary care hospital over a period of 5 years. The diagnosis was established by cystoscopy or ascending urethrography. Before the dilation, a retrograde urethrography was always performed to detect the site and the length of the stricture. No exclusion criteria were applied regarding the location and length of the stricture as well as the presence of multiple strictures. The data of the patients were retrospectively collected.

Technique

Any infection should be treated with culture-specific antibiotics. A single dose of perioperative intravenous antibiotics should be given based on AUA recommendations. [8] After the urethrography, a 0.038 in. hydrophilic floppy-tipped guidewire was inserted through the urethra into the bladder. The insertion was done most of the times under fluoroscopic control or rarely with the help of an endoscope. The endoscopic approach was selected in cases that the fluoroscopic-guided insertion of the guidewire failed. Then, the Teflon dilators were introduced over the guidewire into the urethra. The set contains nine dilators from 8 to 24F, which were introduced serially into the urethra. The insertion of the dilators always follow the course of the guidewire by just pushing gently and rotating them. We ascertain the passage by seeing drop of urine in the tip of dilator or when urine drained through the dilator. Sometimes we use fluoroscopy in between to confirm the same. When the last dilator was introduced, it was left in place for a few minutes until the bladder was empty. Very rarely we place foley drainage after the procedure for 3 days.

Follow-up: After 3 to 4 dilatations, Patients were re-evaluated with uroflowmetry and measurement of the PVR. In the case of recurrence of symptoms, the patients were again subjected to ascending urethrography and ultrasonogram. Additional dilations were performed if deemed necessary. Technical success was defined as the insertion of the guidewire in the bladder and dilation up to 20Fr. Success of the treatment was defined as the lack of recurrence of the stricture over a period of 12 months from the last dilation. Recurrence was defined as obstructive pattern in uroflowmetry and/or symptoms and/or PVR >100 ml along with the urethrographic or urethroscopic confirmation of the condition. Patients were evaluated during their yearly urological investigation when the stricture was considered as cured. After completing 3 or 4 dilatations, with clear instructions, we teach our patients the sterile technique of introducing 14 or 16 fr male CIC catheter and ask them to introduce once in a month to assess the ease of passage and warn them not to force when the catheter is not freely going in. Some retrospective analyses report modest improvement in stricture recurrence rate with intermittent catheterization. No level I evidence exists, although many groups employ weekly to biweekly with a 14F catheter.[9-11] If self dilatation was successful, we followed them annually but when it failed we again evaluated them with ascending urethrogram and ultrasonogram.

Data analysis

Mean values with standard deviations and percentages were calculated. The range of the values was also considered.

RESULTS

There is significant heterogeneity in stricture length, follow-up time, and definition of success across the literature, with states' success rates ranging from 8% to 80% in some series.[12-15] Here, in our study total of 360 patients with an average age of 69.08 ± 15.77 years were candidates for urethral dilation with the teflon dilators. The causes of urethral stricture were iatrogenic (*n* = 132; 36.8%), traumatic (*n* = 41; 11.3%), infectious (*n* = 26; 7.1%), and of unknown etiology (*n* = 161; 44.8%) [Table 1]

Table 1.

Patient and stricture details	Description
Total no of patients	360 (total stricture 429)
Age	69.08 +/- 15.77
Etiology Iatrogenic Traumatic Infections/Inflammation Unknown	132 41 26 161
Stricture length	1.62+/-0.85
Stricture site	Meatus/fossa navicularis (n=48) Penile urethra (n=89) Bulbar urethra (n=179) Membranous urethra (n=55) Prostatic urethra (n=39)

	Bladder neck (n=19)
No of dilations/case	4 (range 1-15)
Time between dilations (days)	40 +/- 18
Complications	Urinary tract infection (n=33) Persistent or significant bleeding (n=11) Penile hematoma (n=2)

The mean cumulative length of the stricture was 1.52 ± 0.75 cm. The mean number of dilations needed was 4 (range: 1–15) percase, and the time between the dilations was 40+/-18 days. We had seven technical failures, in which the guidewire could not pass through the stricture. A total of 35 patients (11.5%) had incomplete follow-up data or were lost to follow-up. Successful treatment was observed in 185 (69%) of the patients with complete follow-up data. These patients underwent up to 4 dilations. The remaining of the patients underwent several dilations or was treated with a surgical approach appropriate for the characteristics of their strictures.

Complications included the development of UTI in 33 patients after the dilation. These cases were all managed conservatively with 12 of them requiring hospitalizations. Persistent hematuria (over 2 days) or hematuria requiring bladder irrigation was observed in 11 patients. In four of these cases, UTI was also diagnosed. About two cases of penile hematoma were observed and resided without the need for any intervention. All cases with hemorrhage did not require interventions for their management.

DISCUSSION

The success rate of urethroplasty is 81%-92% followed by visual internal urethrotomy and dilatation (54%-60%). Though most of the urologists prefer urethroplasty in recent times, there are other factors like lack of surgical expertise, patients willingness to undergo surgery, cost involved in surgery, which still favours dilatation and internal urethrotomy a viable option in management of stricture urethra.

Wong *et al*. compared the rates of recurrence between internal urethrotomy and dilation and found no significant difference at 3 years. Many ways have been described for urethral dilation such as filiforms and followers, balloons, or coaxial dilators inserted over a guidewire, even the use of Amplatz renal dilators.

The Teflon dilators are being used at our department for several years.

In the present study, we showed also that the use of Teflon dilators was effective and safe in most cases of stricture. We studied 360 patients of which we had seven failed attempts. The failed attempts could be attributed to the fact that some patients were referred to us after repeated failed efforts to pass a catheter and consequent significant injury of the urethra with false passages, hematuria, and edema. These cases are difficult to manage in the acute phase and may require a suprapubic catheter. A hydrophilic guidewire with the support of a ureteral catheter could provide under fluoroscopic control access to the bladder even in these cases. When the above maneuver is not successful, the placement of the guidewire under combined endoscopic and fluoroscopic guidance is possible. The current study reflects our experience that failure to dilate the strictures and gain access to the bladder are rare with the presented technique. In fact, it was rarely needed to place a suprapubic catheter in cases of urethral strictures due to the inability to dilate the strictures and gain access to the bladder.

The mean number of dilations needed was 4 (range: 1–15). The patients who needed a high number of dilations or frequent dilations were obviously candidates for urethroplasty; however, either they were unfit for such a procedure or they preferred repetitive dilations over other procedures such as urethroplasty. The Teflon dilator allows for an atraumatic dilation of the stricture which is well tolerated by the patients. Furthermore, most of the cases were performed under local anesthesia, while a limited number of cases were treated under sedation. According to our experience, older patients will opt for the dilations despite the need for frequent procedures. Nonetheless, it should be made clear that the most appropriate procedure should be suggested to each patient and the decision to undergo repetitive dilations with Teflon dilator does not reflect the best possible practice for these patients.

The complications of urethral dilation involve UTIs, false route, and injuries such as urethral perforation, bleeding, or even rectal injuries. The presented experience did not encounter any urethral perforations or rectal injuries, which are the most serious complications of the conventional methods. Probably, these two complications were avoided since the dilators were introduced over a guidewire, which was inserted under fluoroscopic control or, as mentioned above, under combined fluoroscopic and endoscopic control. Furthermore, the dilators allows for atraumatic dilation when compared to metal dilators. UTI were encountered in 10.8% of the cases. The incidence of this complication should probably be attributed to high residual volume of urine that these patients have and makes them prone to UTIs, rather than the use of the dilators. To avoid cross infections, Many patients bring their own Teflon dilator set everytime and get it sterilised in hospital before use. Similarly, the hemorrhagic complications (3.6%) could be related to the inclusion of all our experience in the current study without selecting any cases. A diverse population with urethral strictures was managed. Patients

already bleeding, such as patients with hemorrhage by repetitive attempts to place a urethral catheter or patients prone to bleeding such as those under anticoagulants or antiplatelet therapy, were included. It should be noted that a number of cases were done as emergent cases and consequently, and the interruption of anticoagulants or antiplatelet drugs would not provide any benefit. As a general rule, the procedure was not contraindicated when the aforementioned medication was not interrupted. The two penile hematomas of the current population were not developed during dilation but were already present when we initiated the procedure.

Considering the above, we recommend that these dilators could be used for all cases of difficult urethra catheterization due to the presence of significant strictures even in an emergency setting. Suprapubic catheters and their complications could be avoided while patients with anticoagulants or concomitant bleeding could be effectively managed.

The limitation of the study is its retrospective nature. Information on 34 patients was not sufficient for reporting their course while the lack of a prospective trial does not allow for a strict methodology for the evaluation of the strictures before the dilation and during the follow-up. A control group could provide additional integrity to the currently presented data and further strengthen to use of these dilators. The prospective comparative studies would provide the evidence for the wider acceptance of the technique and the establishment of the most appropriate indications.

CONCLUSION

The experience of our tertiary center with the Teflon dilators showed that these dilators are safe and effective for the management of cases with urethral strictures of diverse length, location, and etiology. When compared to metal dilators, which is a blind procedure, Teflon dilators offer atraumatic dilatation of urethra with least complications and can be safely done in all cases.

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Conflicts of interest
There are no conflicts of interest.

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