INTRODUCTION

Scoring systems have been an important tool of clinical decision-making in medicine. As scoring systems like Glasgow Coma scale have made a revolutionary change in stratifying the patient, in particular, clinical scenario. Wiegand et al. in 2012 proposed UREThRAL Score a novel method to quantify anterior urethral stricture.

Aims: The aim was to validate urethral stricture score (USS) for evaluating the efficacy of operative procedures.

Settings and Design: Study was done in a retrospective manner and includes patients operated for anterior urethral stricture by a single surgeon in tertiary care center over the period of 2008–2014.

Subjects and Methods: A total of 57 cases were included in this study who met the inclusion criteria, of these cases 7 underwent excision and primary anastomosis (EPA), 20 underwent preputial flap urethroplasty (PFUP), 22 underwent tunica albuginea urethroplasty (TAU), and rest 8 underwent scrotal flap urethroplasty (SFUP). Procedures were assigned different complexity level, and USS was compared with the particular procedure to see the relation between both.

Statistical Analysis Used: Data were analyzed using ANOVA on SPSS software.

Results: Mean USS for EPA, PFUP, TAU, and SFUP in our study group was found to be 6.57, 8.95, 9.00, and 10.00, respectively, with an overall USS of 9.03, with a standard deviation of 1.56. USS was significantly associated with complexity.

Conclusions: Mean USS increased with increase in surgical complexity indicating that higher USS correlates with more complex surgery. Strongest association between complexity and the individual parameter was found with location and length.

Key Words: Anterior urethral stricture, urethral stricture score, urethroplasty
affects about 300 per 100,000 men,\textsuperscript{(1)} but despite such a huge burden there was no scoring system to quantify the severity of anterior urethral strictures. Wiegand and Brandes\textsuperscript{(2)} in 2012 proposed UREThRAL Score [Table 1] a novel method to quantify anterior urethral stricture. We hereby report a study of patients operated for anterior urethral stricture by a single surgeon in our institute. The original scoring system included five key factors namely location, length, etiology, number of stricture, history of retention. The pre- and intra-operative decision-making process is complex. There is scant prospective literature to support one procedure over another, so comparing results is difficult. Outcomes of complex repairs are also difficult to interpret without an objective measure of the characteristics of the strictures being repaired. The purpose of this study was to quantify anterior urethral stricture in a universally accepted numeric system for better preoperative decision-making.

SUBJECTS AND METHODS

Institutional Health Ethics Research Board approval was taken to create a prospectively maintained, retrospective database of all anterior urethral reconstructions performed between 2008 and 2014. A single surgeon at an academic tertiary referral center performed all operations and data were collected using patient hospital and medical records. Data included age, stricture length, location, etiology, number of strictures, and history of retention. All patients were assessed using preoperative uroflowmetry and retrograde urethrogram. We excluded all patients who had posterior strictures or who had a prior open urethroplasty, a known risk factor predictive of failure.\textsuperscript{(3)} Any patient who did not have complete data regarding the type of surgery or stricture characteristics was also excluded. These patient’s stricture data were then coded into a Microsoft Excel (Microsoft corporation, USA) spreadsheet. Each data point from the stricture score were quantified and summed according to the proposed urethral stricture score (USS). The type and complexity of each particular patient’s surgical procedure were also coded according to the complexity of the operation. Ranking order as to level of complexity [Table 2] was determined based on the senior author’s surgical experience with over 400 urethroplasties. After compiling all of the data, ANOVA analysis was performed using SPSS software (IBM, USA) to determine if our USS was correlating with more complex surgery.

RESULTS

During 2008 and 2014 we identified 91 patients of anterior urethral urethroplasty; out of which 57 met our inclusion criteria. The mean age of presentation was 41.22 years. Overall mean USS for our study group was found to be 9.03 [Table 3] with a standard deviation of 1.56. Of the 57 cases, 7 underwent excision and primary anastomosis (EPA), 20 underwent preputial flap urethroplasty (PFUP), 22 underwent tunica albuginea urethroplasty (TAU),\textsuperscript{(4)} and rest 8 underwent scrotal flap urethroplasty (SFUP). Mean USS increased with increase in surgical complexity [Table 4] indicating that higher USS correlates with more complex surgery.

DISCUSSION

Urethral stricture has an estimated worldwide incidence of 0.6%\textsuperscript{(5)} Urethral stricture classically presents with lower urinary tract symptoms and acute urinary retention, a proportion of men (7%) present with a life-threatening condition.\textsuperscript{(6)} The most common etiologies differ worldwide, in our study it was traumatic. Causes of stricture are classified as: Iatrogenic, traumatic, Lichen sclerosis, infectious, hypospadias, radiation exposure, and idiopathic.\textsuperscript{(7)} Of all above Lichen sclerosis are the most difficult to treat and has been implicated with failure after repeat urethroplasty.\textsuperscript{(8)}
Levine et al.\(^9\) showed that patients undergoing urethroplasty for Lichen sclerosus et atrophicus (LSA)-related strictures were more likely to develop recurrence than those patients without (5/13, 38\% for LSA vs. 3/40, 7\% for non-LSA). Moreover, Andrich et al.\(^{10}\) also showed that LSA increases surgical complexity and the risk for stricture recurrence.

Anatomically, stricture or stenosis may occur anywhere along the urethra, defined as spongiosfibrosis of the anterior (pendulous/bulbar, about 15 cm in length) urethra or as a posterior (membranous/prostatic, about 3 cm) urethral stenosis.\(^{11}\) It has been observed that bulbar stricture is quite easy to repair and most of the stricture in this area can be repaired with an EPA only, where penile stricture [Figures 1 and 2] is difficult one, due to anatomical peculiarities like thinner corpus spongiosum.\(^{12}\) Furthermore, the penile stricture tends to recur more frequently than bulbar.\(^{13}\)

The clinical significance of increased stricture length is that; it is likely to affect the type of procedure, and tissue transfer technique is required to reconstruct longer strictures. Smaller strictures give excellent results with EPA, but longer one have been known to be difficult to treat. When a longer stricture is reconstructed, there is a longer area for ischemic contracture to occur; predisposing it to the redevelopment of stricture thus likely increasing the rate of recurrence.

History of retention signifies the presence of luminal obliteration and indicates that there is no suitable urethral plate for inlay or onlay procedures. With the exception of the short-segment obliterated bulbar urethra, the presence of urethral obliteration increases the complexity of the reconstruction.\(^2\) Guralnick and Webster\(^{14}\) and later Abouassaly and Angermeier\(^{15}\) describe an anastomotic urethroplasty with a ventral or dorsal graft/flap for stricture that are obliterated and long (>1 cm) to bridge the gap.

The procedures were grouped in different complexity level according to the skill needed, operative time. EPA being the simplest and the most basic one followed by flap techniques including PFUP, TAU, and SFUP as most complex one done in our institute for an anterior urethral stricture.

We used this predefined USS for quantification of the anterior urethral stricture, and the score of each patient was compared with the procedure performed. It was found that with increasing USS there was an increase in complexity of the surgery, proving their association. ANOVA analysis on SPSS software confirmed that USS was significantly associated with the level of complexity (\(P < 0.001\)). When all the five parameters were studied individually for the complexity of procedure needed, the highest association was found between length and location.

While there is no universally agreed upon measure of recurrence,\(^{13}\) the USS should help to stratify patients into complexity groups that will make future studies easier to perform by allowing easy comparison of urethral strictures. Furthermore, as urethral reconstruction is a quality of life procedure, the development of patient-reported outcome measures,\(^1\) will need to be correlated to an objective measure of the severity of the stricture disease.

There are several limitations to our study. The retrospective, single center nature of the study limits the strength of our conclusions. Therefore, renewed effort in the form of a long-term multicenter prospective analysis is needed for further improvement to this work.

**CONCLUSION**

Urethroplasty, in general, is an excellent option for a urethral stricture. Preoperatively identifiable factors such as long-segment strictures, as well as Lichen sclerosis, infectious,
are associated with an increased risk of recurrence. The five objective factors that comprise the score are essential to determining the complexity and potentially, the optimal reconstructive procedure. By using a universally understood and applicable method of describing anterior strictures, reconstructive urologists can improve the quality of literature for urethral stricture disease and give us more time to discuss meaningful informed consent and to provide useful information for surgical planning.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

REFERENCES
1. Jackson MJ, Sciberras J, Mangera A, Brett A, Watkin N, N’dow JM, et al. Defining a patient-reported outcome measure for urethral stricture surgery. Eur Urol 2011;60:60-8.
2. Wiegand LR, Brandes SB. The UREThRAL stricture score: A novel method for describing anterior urethral strictures. Can Urol Assoc J 2012;6:260-4.
3. Breyer BN, McAninch JW, Whitson JM, Eisenberg ML, Mehdizadeh JF, Myers JB, et al. Multivariate analysis of risk factors for long-term urethroplasty outcome. J Urol 2010;183:613-7.
4. Mathur RK, Himanshu A, Sudarshan O. Technique of anterior urethra urethroplasty using tunica albuginea of corpora cavernosa. Int J Urol 2007;14:209-13.
5. Santucci RA, Joyce GF, Wise M. Male urethral stricture disease. J Urol 2007;177:1667-74.
6. Rourke K, Hickle J. The clinical spectrum of the presenting signs and symptoms of anterior urethral stricture: Detailed analysis of a single institutional cohort. Urology 2012;79:1163-7.
7. Stein DM, Thum DJ, Barbagli G, Kulkarni S, Sansaloni S, Pardesi A, et al. A geographic analysis of male urethral stricture aetiology and location. BJU Int 2013;112:830-4.
8. Blaschko SD, McAninch JW, Myers JB, Schlomer BJ, Breyer BN. Repeat urethroplasty after failed urethral reconstruction: Outcome analysis of 130 patients. J Urol 2012;188:2260-4.
9. Levine LA, Strom KH, Lux MM. Buccal mucosa graft urethroplasty for anterior urethral stricture repair: Evaluation of the impact of stricture location and Lichen sclerosus on surgical outcome. J Urol 2007;178:2011-5.
10. Andrich DE, Greenwell TJ, Mundy AR. The problems of penile urethroplasty with particular reference to 2-stage reconstructions. J Urol 2003;170:87-9.
11. Chapple C, Barbagli G, Jordan G, Mundy AR, Rodrigues-Netto N, Pansadoro V, et al. Consensus statement on urethral trauma. BJU Int 2004;93:1195-202.
12. Tatschler S, Roosen A, Füllhase C, Stief CG, Rübben H. Urethral stricture: Etiology, investigation and treatments. Dtsch Arztebl Int 2013;110:220-6.
13. Meeks JJ, Erickson BA, Granieri MA, Gonzalez CM. Stricture recurrence after urethroplasty: A systematic review. J Urol 2009;182:1266-70.
14. Guralnick ML, Webster GD. The augmented anastomotic urethroplasty: Indications and outcome in 29 patients. J Urol 2001;165:1496-501.
15. Abouassaly R, Angermeyer KW. Augmented anastomotic urethroplasty. J Urol 2007;177:2211-5.