Management of Stricture Urethra: Our Experience at a Tertiary Care Centre

N Anil Kumar[1], S Venkata Chaitanya[2], Suraj Pinni[3], Naveen Goyal[4], Tushar Sharma[5], Sharma A Yagneshwar[6]

ABSTRACT

Introduction: Upto 300 per 100000 men are affected by urethral stricture disease. Urethral stricture is by definition a narrowing of urethra caused by scarring. Stricture disease could be induced due to a variety of causes and can be detrimental for the health and quality of life of the patient. A wide variety of interventions are performed by the practising urologist for stricture urethra including dilatation, visual internal uretherotomy (VIU) and urethroplasty. The aim of this study was to review the outcomes of various treatment modalities for stricture urethra at our centre.

Material and methods: The study was conducted in a prospective observational manner in a tertiary care centre over a period of 18 months. All cases of male urethral stricture undergoing intervention were included in this study. Treatment options included Visual internal uretherotomy (VIU), anastomotic urethroplasty and augmented urethroplasty. Patient factors, stricture factors and surgical outcomes, recurrence rates were analysed.

Results: Eighty seven cases of male stricture urethra were included in the study. Idiopathic strictures(40%) were the commonest aetiology followed by traumatic(36.7%), iatrogenic(14.9%) and inflammatory strictures(8%). Commonest site was the bulbar urethra(35.6%) followed by penile urethra. Augmented urethroplasty was done in 33 patients, while 25 patients underwent anastomotic urethroplasty. VIU was done in 29 patients. Success rate of interventions in our study was 89.7% at 12 months of follow-up (VIU-80%, augmented urethroplasty-96.6% and anastomotic urethroplasty-92.2%).

Conclusion: A reconstructive urologist must be familiar with a variety of techniques to tackle strictures of the urethra. VIU was used predominantly for single short segment bulbar strictures but showed high recurrence rates(20%). Urethroplasty had better outcomes in terms of recurrence rate(5%), proving why it is considered the gold standard for treating urethral strictures.

Keywords: Stricture Urethra, Augmented Urethroplasty, Anastomotic Urethroplasty, VIU, uroflowmetry,

INTRODUCTION

Male urethral stricture is a prevalent disease which has a substantial impact on quality of life of the sufferer. Male urethral stricture disease can affect upto 300 per 100000 men in some studies.[1,2] Urethral stricture is by definition a narrowing of urethra caused by scarring, which has the effect of obstructing the lower urinary tract. In males, the urethra lies embedded in the vascular corpus spongiosum. In stricture urethra the corpus spongiosum is also involved in the disease process causing urethral scarring. This spongiofibrosis is a reaction to various extrinsic irritants and can lead to complete replacement of the spongy tissue by scar tissue.[3]

Urethral stricture could be congenital, idiopathic or acquired. Acquired urethral strictures may arise from iatrogenic causes such as following catheterization, surgery or instrumentation; traumatic strictures from straddle injuries or pelvic fractures; and infectious or inflammatory strictures are caused by gonorrhoea or lichen sclerosis.[3] This obstruction can lead to deterioration of the patient's quality of life by causing voiding disturbances and can also damage the entire urinary tract, resulting in loss of renal function. It is therefore essential that urethral strictures, which can occur at any age are recognized early and appropriately treated.[4] Management of urethral stricture disease has been a constant challenge for reconstructive urologists. Over the years, a number of changes in surgical approach have been adopted, resulting in significant improvement in outcomes.[5]

The decision to use a specific reconstructive technique depends up on surgeon preference, patient factors and stricture factors such as length, location and etiology of stricture. Generally, the least complex procedure necessary that gives durable results is preferred. The pre- and intraoperative decision-making process is complex and prospective literature supporting one procedure over another is lacking.[5] Treatment options include Visual internal uretherotomy(VIU), anastomotic urethroplasty and augmented urethroplasty. The aim of this study was to

[1]HOD, Department of Urology, Sri Venkateswara Institute of Medical Sciences (SVIMS), Tirupati, Andhra Pradesh, [2]Consultant, Department of Urology, Prathima Hospital, Hyderabad, [3]PG resident, Department of Urology, Sri Venkateswara Institute of Medical Sciences (SVIMS), Tirupati, Andhra Pradesh, [4]PG resident, Department of Urology, Sri Venkateswara Institute of Medical Sciences (SVIMS), Tirupati, Andhra Pradesh, [5]PG Resident, Department of Urology, Sri Venkateswara Institute of Medical Sciences (SVIMS), Tirupati, Andhra Pradesh, [6]PG Resident, Department of Urology, Sri Venkateswara Institute of Medical Sciences (SVIMS), Tirupati, India

Corresponding author: Dr S Venkata Chaitanya, 6-2-966/13, Hill Colony, Opp. Dakshan Bharath Hindi Prachar Sabha, Khairatabad, Hyderabad 500009, Telangana, India

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review the outcomes of various treatment modalities for stricture urethra at our centre.

MATERIAL AND METHODS

The study was conducted in a tertiary care institute in a semi-urban setting in a prospective observational manner. The study was conducted after taking requisite institutional clearance. All the cases of male urethral stricture requiring intervention which were operated between June 2017 and December 2018 were included in this study. Patients with vesico-urethral distraction injuries, medically unfit cases, hypospadiac strictures, complicated strictures with urethrocutaneous fistula and recurrent strictures were excluded.

All cases with obstructive voiding symptoms were evaluated with an AUA symptom index questionnaire[6], detailed history for assessing possible aetiology, uroflowmetry studies (Laborie, gravimetric type), ultrasonography (USG) abdomen for post void residue(PVR) assessment, complete urine examination and a renal function test. A retrograde urethrogram (RGU) was performed if stricture was suspected clinically or on uroflowmetry. For patients presenting with acute urinary retention (AUR) a gentle attempt of urethral catheterization was done. An absence of resistance during catheterization and successful catheterization considered to be suggestive of non-stricture aetiology of AUR. If catheter could not be passed, suprapubic cystostomy (SPC) is done for retention, and the patient is evaluated further.

The length and location of the stricture were determined by doing RGU alone or in combination with micturating cystourethrogram (MCU) in cases with SPC in situ. The depth and density of the scar were deduced by physical examination, by the appearance of urethral mucosa on urethrograms and by the elasticity noted on urethroscopy. Post traumatic strictures on SPC were additionally assessed by antegrade cystoscopy to know the proximal extent of stricture in cases where MCU was inconclusive. Treatment given was based on site, size and type of stricture (Figure 1). But final treatment given was decided after thorough discussion with the patient regarding anticipated outcomes, complications, need for repeat procedures and possibility of effects on sexual function. Patients with lichen sclerosis (balanitis xerotica obliterans) or past history of urethritis were considered to have inflammatory strictures. Patients with past history of urinary manipulations and traumatic catheterization were considered to have iatrogenic strictures. When no obvious aetiology could be elucidated then those cases were categorized as idiopathic. For VIU, a cold cut with Sachse knife at 12 O clock position was the protocol.[7] Anastomotic urethroplasty involved total excision of stricture and end to end anastomosis of the spatulated urethral ends over a catheter (Figure 2). Grafts used for augmentation urethroplasty included buccal mucosa (BMG) (Figure 3) and island penile skin flaps (for e.g. O'Randis;Figure 4) and prepucial flaps. There were no cases of augmented anastomotic urethroplasty in this study.

Follow-up assessment included measurement of urine flow rate at 3 months (with peak flow Q max > 15ml/sec suggestive of satisfactory flow), PVR and AUA symptom index questionnaire. On follow up, patients with obstructive lower urinary tract symptoms were further evaluated further for recurrence of stricture by urethroscopy. Recurrences were documented up to 12 months in all cases. Successful outcome was defined as the absence of recurrence. The data was entered into an Excel™ (Microsoft, 2010, ver14, Redmond, WA) spreadsheet and analysis was performed with SPSS software (IBM, ver. window 25,Armonk, NY).

RESULTS

A total of 87 patients were treated for urethral stricture during the study period. The mean age was 38.6 years. Idiopathic strictures were the commonest stricture type in our study (40%). Traumatic stricture resulting from road traffic accident, pelvic fracture and fall astride injuries over blunt edges was the second most common cause in this study (36.7%). Iatrogenic causes were due to prior urethral catheterization injuries and endoscopic manipulations and accounted for 14.9% of the cases. Seven patients (8%)

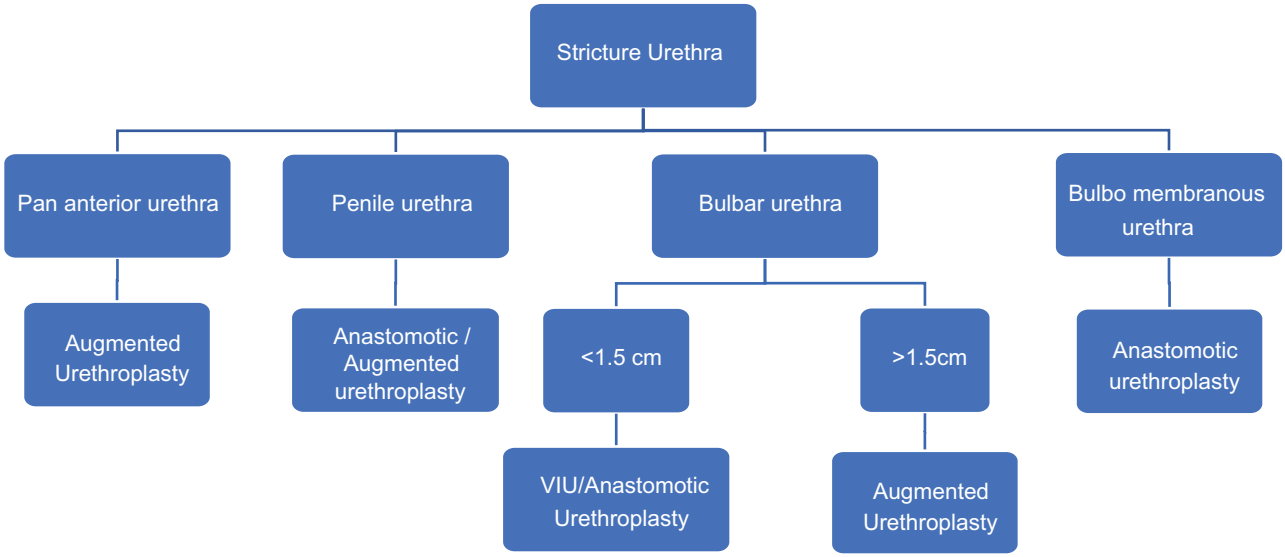

Figure-1: Flow chart depicting decision making tree for choosing appropriate treatment options.

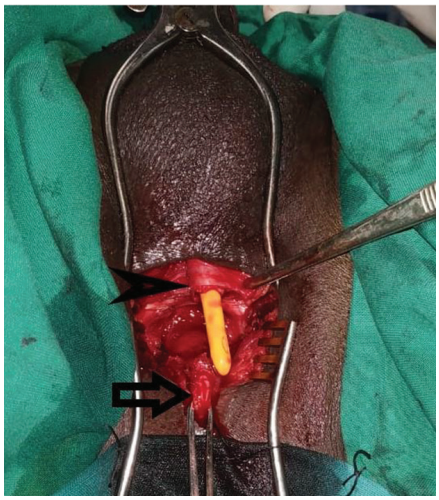

Figure-2: Anastomotic urethroplasty; Arrow head: distal urethral end; Arrow: proximal end of urethra

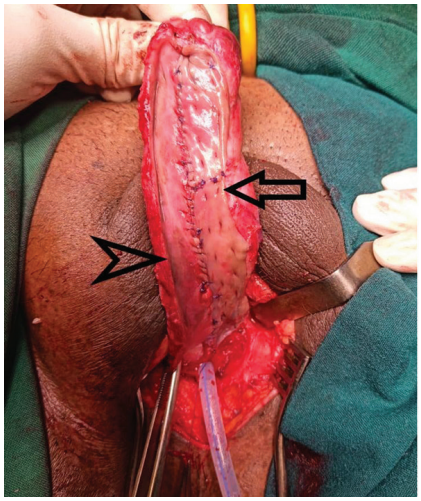

Figure-3: BMG urethroplasty showing inverted penile urethra; Arrow head: Incised stricturous urethra; Arrow: Quilted buccal mucosal grafts.

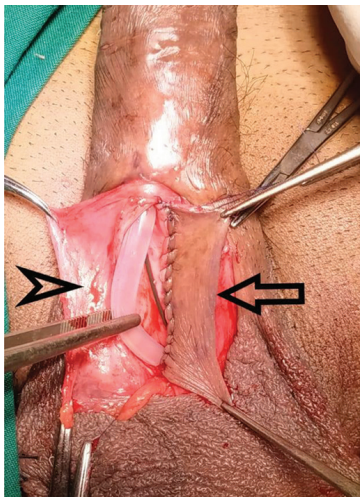

Figure-4: O Randi's augmented urethroplasty; Arrow: Penile island flap; Arrow head: Second local vascular flap for coverage.

had inflammatory cause for stricture of urethra (Table 1). Commonest site for stricture was the bulbar urethra (31 cases) followed by penile urethra and pan-anterior urethra (Table 2). Fifty-eight patients underwent urethroplasty. Out of these, augmented urethroplasty was done in 33 patients, while 25 patients underwent anastomotic urethroplasty and VIU was done in 29 patients. Eighty seven(87.3%) percent of the patients had satisfactory urine peak flows rate (Qmax) at the 3 month follow-up and Qmax was found to have significant statistical association with success rates($p < 0.05$; Chi square test). (Table 3)

Nine (10.3%) patients developed recurrent stricture. This included two patients who had undergone anastomotic urethroplasty for traumatic strictures, one patient with inflammatory pan anterior urethral stricture (managed by augmented urethroplasty) and 6 cases of short bulbar strictures which were previously managed by VIU. Overall success

Age(years)	Idiopathic	Traumatic	Iatrogenic	Inflammatory
<20	7	4	0	1
20-30	5	8	1	3
31-40	5	10	1	2
41-50	6	7	3	1
>50	12	3	8	0
Total	35(40.2%)	**32(36.7%)**	13(14.9%)	7(8%)

Table-1: Etiology and age distribution of stricture cases.

Location	No. of patients
Pan anterior urethra	18(20.6%)
Penile urethra	27(31%)
Bulbar urethra	31(35.6%)
Bulbo-membranous region	11(12.6%)

Table-2: Location of stricture

	Idiopathic	Traumatic	Iatrogenic	Inflammatory
Qmax > 15ml/sec	31	29	11	5
Qmax < 15ml/sec	4	3	2	2

Table-3: Peak urine flow rate (Q max) at 3 months.

rate of interventions in our study was 89.7% at 12 months of follow-up (VIU-80%, augmented urethroplasty-96.6% and anastomotic urethroplasty-92.2%). Transient denovo erectile dysfunction (ED) was noted in 1 patient (1.1%) who had undergone anastomotic urethroplasty for traumatic bulbar urethral stricture.

DISCUSSION

Our study showed a high success rate with urethroplasty but poor outcomes with VIU (20% recurrence). Peak urine flow rates (Qmax) correlated well with success rates ($p < 0.05$). Urethral stricture is more common in men owing to the presence of a longer urethra. Stricture urethra has been reported to be more common in ages less than 50yrs.[8,9] A similar picture was noted in our study where 79% of patients were younger than 50 years. In the developed world, gonococcal strictures have become rare and most strictures today are either iatrogenic, idiopathic or traumatic.[3] Idiopathic strictures were the leading cause of stricture followed by trauma in this study. This is in contrast to the findings of Ekeke et al, who found traumatic strictures to be the commonest aetiology.[10] With increase in minimally invasive transurethral procedures the incidence of iatrogenic urethral strictures has risen. Iatrogenic injuries are commonly caused by wrong sized, poorly lubricated urethral catheters, inexperienced personnel and improper urinary tract instrumentation.[3] These iatrogenic strictures result from blockage of urethral glands, leading to localized inflammation and subsequently behave similar to inflammatory strictures. Idiopathic strictures include those strictures occurring at any age and at any site where the cause is not known. Short, annular strictures occurring in bulbar urethra of adolescents and young adults are considered by some to be congenital. These strictures are believed to arise due to incomplete rupture of the urogenital membrane and have been labelled in literature as Cobb's collar and Moorman's ring.[11] Trauma is known to be more common in younger men owing to the fact that they are more physically active and at risk of trauma. The main cause of trauma in this study was road traffic accidents with associated pelvic fracture and fall astride over objects. Post inflammatory strictures did not play as much role in this study as has been previously reported. With wide availability of antibiotics for treatment of urethritis, progression to spongiofibriosis and stricture formation has reduced.[3]

The cause of stricture is usually linked to the patient's age and to the site of the stricture. The bulbar urethra is that part of the urethra enclosed by the bulbo-spongiosus muscle and is the commonest site for a stricture which was also noted in our study. Out of 87 patients, 76 had anterior urethral stricture whereas posterior urethral stricture (Bulbo-membranous region) was noted in 12.6% of patients. This is comparable to results in study by Nwofor and Ugezu.[8]

Although various means of reconstructing the urethra exist, best technique has not yet been clearly defined. The treatment of urethral stricture can range from the crude urethral dilation to the highly specialized reconstructive urethroplasty.[12]

VIU or dilatation are potentially curative as the first time treatment of a short bulbar stricture measuring <1 cm. The recurrence rates for patients undergoing VIU was 20% which is consistent with the findings of Buckley et al.[13] All 6 patients who developed recurrence after primary VIU underwent secondary procedures. Four of them opted for redo VIU and 2 cases underwent secondary urethroplasty. Urethroplasty is the only curative option currently available for the treatment for all anterior urethral strictures (excluding short bulbar strictures) and recurrent bulbar strictures. The choice of technique for urethroplasty for an individual case largely depends on the expertise of the surgeon, site and size of stricture.[10,12,13]

Substitution or augmented urethroplasty was the commonest surgical intervention in this study. It was performed for long segment bulbar or penile urethral strictures and showed good results with a success rate of 96.6% similar to Datta et al who had a failure rate of only 6.9%.[14] One patient who had undergone BMG augmented urethroplasty had developed stricture at the proximal graft anastomosis site and was subsequently managed with redo urethroplasty. Anastomotic urethroplasty, which was done mainly for bulbar urethral strictures and bulbo-membranous junction strictures, achieved a recurrence free rate of 92.2%. Two patients who had recurrent strictures after anastomotic urethroplasty for traumatic posterior urethral injuries were managed by urethral dilation and are presently on intermittent self-catheterization. Good urinary stream was adjudged objectively using uroflowmetry. The peak flow (Qmax) > 15 ml/sec correlated with the overall success rate(87.3% vs 89.7%).

Eighty nine percent (89.7%) patients had a satisfactory outcome with no recurrence which is similar to studies done by Ekeke et al(88.66%) and Barbagali et al (85.5%).[10,15] Denovo erectile dysfunction is a rare but known complication after urethroplasty. Blaschko et al in a meta-analysis of 36 studies found the incidence of denovo ED to be 1% in patients undergoing anterior urethroplasty which was similar to our study(1.1%).[16]

Though this study was conducted prospectively the numbers may not be adequate to make strong recommendations. Being a teaching hospital, decision making was the same in all cases, but the operating surgeon was not the same in all cases. Moreover, the training levels of surgeons varied, with VIU usually being performed by residents and the more technically demanding urethroplasties being performed by consultants. Using UFR as an objective tool to evaluate post-operative success could be misleading at times, as other causes of obstruction (such as prostatomegaly) can interfere with peak urine flow rates. In this study all cases were followed up for 12 months, a longer follow-up period might have brought out more recurrences. An objective definition of 'success' of these interventions is lacking in literature. With the definition varying from one author to another, comparison of studies becomes difficult.

CONCLUSION

The management of urethral stricture disease is continually

evolving. Although numerous strategies are available, there is still no single optimum solution suitable for all conditions. A Reconstructive urologist must be familiar with a variety of techniques, to ensure the use of the best one according to the situation. In this study, stricture occurred more commonly in younger men (<50 years) with idiopathic stricture accounting for 40% of the total cases. Bulbar urethra was the commonest site of stricture and urethroplasty was the main stay of treatment with satisfactory outcome. VIU was predominantly done for single short segment urethral strictures, but showed high recurrence rates (20%) in this study. Urethroplasty had better outcomes in terms of recurrence rate (5%), proving why it is considered the gold standard for treating urethral strictures.

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