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Urethral Stricture- A Two Year Prospective Study of Central India

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ABSTRACT

Stricture urethra affects male population most commonly and females are rarely affected. Its most common location is the bulbar urethra. The main causes are idiopathic, iatrogenic (previous catheterization), traumatic and inflammatory. Dilation, VIU, urethral reconstruction are the common methods of treating urethral stricture. Short bulbar strictures can be primarily treated by VIU or dilation as both have nearly same success rates. Long segment strictures and strictures involving penile urethra are treated by substitution urethroplasty(e.g: buccal mucosal graft). Short bulbar or bulbomemebranous strictures are treated by excision and anastomotic urethroplasty. The success rates of urethral reconstruction is very high compared to that of other methods. However where there is lack of specialists doing urethroplasty, dilation and VIU can be done as they have acceptable success rates and low complication rate compared to urethroplasty.

KEYWORDS urethral stricture, urethroplasty, urethral dilatation

INTRODUCTION

The term urethral stricture refers to anterior urethral disease, or a scarring process involving the spongy erectile tissue of the corpus spongiosum (spongiofibrosis). Spongy erectile tissue of corpus spongiosum underlies the urethral epithilium. In some cases scarring extends through the tissues of corpus spongiosum and into adjacent tissues. Contraction of this scar reduces the urethral lumen. eg – if a normal urethra measures 30 French its diameter is 10mm and area is 78 sq mm .If scarring has resulted in a urethra that measures 15 french the lumen is only 55 sq mm or 29 % reduced.[9] Therefore the the scar contraction caused by anterior urethral stricture disease can be asymptomatic for a while. It is associated with voiding symptoms if the lumen is further reduced.

Etiology of urethral stricture

Strictures due to external trauma are usually due to fall astride injuries , blow to the perineum and injury to the membranous part from fractured pelvis. In all these situations the urethra is forced hard against the inferior edge of the pubis. There is much soft tissue damage to the perineal muscle and fat and the bulbar urethra is crushed or torn usually incompletely.[1] It can take years from the time of the perineal trauma to the advent of significany stricture.[13] Iatrogenic strictures are due to instrumentation and faulty catheterization. Trans urethral resection, radical prostatectomy surgery, cystoscopy have all known to cause strictures. Trauma from faulty catheterization and prolonged catheterization appear to cause inflammatory response provoked by the catheter material or avascualr necrosis (compressive ischemia) such as from a large catheter. From animal experiments , it is clear that different catheter material result in different local tissue reactions and destruction(from best to worst: silicone, plastic, latex and rubber).[14] When a catheter lies for too long in the urethra, one can see broad white patches- unmistakable bed sores- where the catheter has pressed against the urethral mucosa. They occur where the urethra is most narrow, i.e. at the external sphincter, the peno-scrotal junction and just inside the external meatus[1] Inflammatory strictures most commonly caused by gono occal urethritis was very common in the past. They occur because of abscesses that form in the paraurethral glands of Littre which are in greatest concentration in the bulbar urethra. In the bulb these glands extend deeply into the corpus spongiosum where the abscess penetrates and later heals by fibrosis and scarring.[10] Paraurethral glands are most numerous in the distal pendulous and in the mid/proximal bulb and it is here that inflammatory strictures commonly occur.[11] However due to effective antibiotics ,it is seldom come across nowadays.[9] The place of Chlamydia and Ureaplasma urealyticum (i.e., nonspecific urethritis) in the development of anterior urethral strictures is not clear.[9] Lichen Sclerosus- Balanitis Xerotica Obliterans (LS-BXO) usually begins with inflammation of the glans and inevitably causes meatal stenosis, if not a true stricture of the fossa navicularis. The cause of this distal penile skin and urethral inflammation is not known.[9] The classical appearance of male anterior urethral stricture associated with LS is that of a saw toothed appearance throughout the involved area, with an area of perfectly normal anterior urethra proximally. At cystoscopy , the meatus is narrow and the urethral epithelium appears whitish and the existence of filamentous whitish tissue which can be easily passed with the cystoscope is usual.[12] Stricture urethra is most commonly an acquired disease than congenital. The term congenital is used when it is not an inflammatory stricture, it is a short-length stricture, and it is not associated with a history of or potential for urethral trauma. This then limits the term congenital stricture to strictures of the anterior urethra found in infants before they attempt erect ambulation[9]. Many idiopathic strictures are "idiopathic" because their cause is lost in the mists of time but many of these occur at the junction of the proximal and middle sections of the bulbar urethra in adolescents and young adults with no previous history and many believe this represents a congenital anomaly. [15] It can also be due to unrecognized childhood perineal trauma. Nicolas Lumen et al[16] in their study of etiology of stricture in patients undergoing urethroplasty found that the most common etiology was iatrogenic trauma like TUR, urethral catheterization, cystoscopy, prostatectomy, brachytherapy and hypospadias surgery. They also found that the cause was different in different age groups. In persons below 45 yrs of age the main causes were idiopathic, hypospadias surgery and pelvic fracture and in patients older than 45yrs the main causes were TUR and idiopathic. The main causes in penile urethral strictures were hypospadias surgery,idiopathic ,catheterization and lichen sclerosis where as in bulbar strictures the main causes were idiopathic followed by TUR. Pelvic fractures were the main cause in posterior urethral strictures.the main cause in pan urethral stricture was catheterization. In another study of etiology of

urethral stricture, Fenton et al[17] showed that most common etiologies were idiopathic (34%) and iatrogenic (32%). Fewer were due to inflammation (20%) and trauma (14%). Long term catheterization and TUR were the most common causes among iatrogenic trauma. The pathology of urethral stricture disease is poorly defined. A scar develops as a consequence of changes in structure and function of urethral epithelium and the sub epithelial spongy tissue resulting in a fibrotic narrowing of the urethra. Chambers and Baitera[18] in their post mortem study of urethral anatomy following gonorrhoea postulated that overstretching of the metaplastic squamous epithelium led to microscopic scars which overtime formed a urethral stricture. The primary change is metaplasia of the urethral epithelium from its normal pseudo-stratified columnar type to stratified squamous epithelium. This is a more fragile epithelium, which tends to split when distended during voiding. These small ulcers in the epithelium lead to focal extravasation of urine that leads in turn to subepithelial fibrosis. Microscopic foci of fibrosis coalesce over a period of years to form macroscopic plaques, which may then constrict the urethra if they coalesce around the circumference of the urethra to form a complete ring. Bacterial infection did not seem to play a direct role in the pathogenesis.

Stricture classification:
Devine et al[23] proposed a classification of urethral strictures based on the extent of spongiosal fibrosis into 6 groups(A-F).

- Stricture with no spongio- fibrosis and an epithelial flap
- Epithelial scar with minimal spongio-fibrosis

C-E- Progreesive spongio-fibrosis

F- Spongio-fibrosis occupies the entire corpus spongiosum and potential fistula formation.

Jordan and Devine[24] later gave a treatment algorithm based on classification stage. For class D or higher , they recommended open urethroplasty. However it is clinically not practical unless one has an accurate and reliable non invasive way to evaluate the degree of fibrosis. Ultrasonography can achieve this but it is operator dependent and hence not reproducible.

Chiou et al[25] categorized urethral stricture into five categories:

- Short stricture (<2.5cm) with minimal spongiosal tissue involvement
- Short stricture with moderate spongiosal tissue involvement
- Short stricture with extensive spongiosal tissue involvement
- Long (>2.5cm) or multiple strictures with moderate spongiosal tissue involvement
- Long (>2.5cm) or multiple strictures with extensive spongiosal tissue involvement

Barbagli[26] proposed a classification for Lichen sclerosis atrophicans(LSA) associated inflammatory strictures.

Stage I- LSA only involves the foreskin

Stage II- LSA involves the foreskin , the coronal sulcus and the meatus

Stage III- the foreskin , glans and external meatus gets affected as well as an associated stricture of the fossa navicularis and the anterior urethra

Stage IV- An associated premalignant or cancerous lesion is also present.

Wiegand and Brandes[27] proposed a new method to quantify the characteristics of anterior urethral stricture disease based on preoperative imaging and intraoperative findings. They systemized a numerical scoring system called the UREThRAL stricture score (USS), that help dictate operative decision-making: (1) (UR)ethral stricture (E)tiology; (2) (T) otal number of strictures; (3) (R)etention (luminal obliteration); (4) (A)natomic location; and (5) (L)ength. Stricture management was categorized by increasing surgical complexity: excision/primary anastomosis (EPA), buccal mucosal graft urethroplasty (BMG), augmented anastomotic urethroplasty (AAU), flap urethroplasty, and a combination of flaps and/or grafts.

MATERIAL AND METHODS
This is non randomized prospective hospital based study conducted between July 2012 to November 2014 in a tertiary care hospital .

Inclusion criteria:
All consenting patients with urethral stricture regardless of site, cause, age and gender.

Exclusion criteria:
All non consenting patients. Patients presenting to general surgery out patient department with complaints of urethral obstructive symptoms were examined by detailed history and clinical examination and those suspected of having urethral stricture were further investigated by ultrasonography, xrays , urine routine and culture ,kidney function tests, retrograde urethrogram and micturating cystourethrogram studies and diagnostic cystourethroscopy. Patients who had acute retention of urine with difficulty in passing per urethral catheter were catheterized suprapubically under local anesthesia on out patient basis. Patients diagnosed as having urethral stricture were planned for treatment based on stricture location, length of stricture (short or long segment) and prior treatment modality used. Patients were further investigated for anaesthesia fitness like chest x ray, Ecg, complete blood count, serum electrolytes, random blood sugar and were appointed for the procedure planned. Screening for STIs like HIV, HBsAg and VDRL were also done. All patients undergoing treatment were admitted in the ward. Penile urethral strictures were treated by substitution urethroplasty using buccal mucosal graft. Patients unfit for surgery or not willing for surgery,patients with partial narrowing and with soft strictures were treated by dilation or VIU. Short segment bulbar strictures were treated by VIU or end to end urethroplasty and longer bulbar strictures were either treated by end to end urethroplasty or substitution urethroplasty based on urethroscopy findings. The length of stricture was not determined due to lack of facilities. Bulbo membranous urethral strictures were treated by end to end urethroplasty. Prior written informed consent for the procedure as well as consent for the study were obtained. Patients undergoing dilation for impassable strictures or those in whom VIU was technically difficult due to many false passages or non negotiable strictures were positioned in supine position and sequential metal dilators were used for dilation under sedation or spinal anesthesia. Patients who needed dilations subsequently for passable strictures were done under local anaesthesia in the form of liberal amount of 2% lignocaine jelly. Patients were catheterized using 18 or 20 Fr Foleys catheter post procedure. Patients were discharged on the following day with catheter removal and clean intermittent self catheterization of urethra using Nelaton catheter 14 Fr was advised. Patients undergoing VIU were given spinal anaesthesia , positioned in lithotomy position and single dose inj. Cefotaxime 1g was given preoperatively.

Urethrotomy was done at 12 o'clock position. Patients were catheterized post operatively with 18 Fr Foleys catheter. Patients were discharged the following morning and called after 7 days for catheter removal. All patients were advised clean intermittent self catheterization of urethra thereafter. All patients were followed up at 1month and then after every 3 months until symptoms recurred. Patients who presented with recurrence underwent diagnostic cystourethroscopy to look for new strictures and were planned for further treatment accordingly. Patients undergoing excision and end to end urethroplasty were given epidural anesthesia and single dose of

inj. Cefotaxime 1g . All patients were catheterized using 14 Fr silicone foleys catheter. Patients received intravenous inj cefotaxim 1g 8 hourly and inj gentamycin 80mg 12 hourly for 5 days. Patients were discharged on day 8 with per urethral catheter insitu and were recalled on day 28 for post operative retrograde urethrogram. Patients were then followed up after every 3 months till symptoms recurred. Patients undergoing substitution urethroplasty were given epidural anesthesia and single dose inj cefotaxime 1g as pre operative prophylactic antibiotic. Buccal mucosal graft was harvested from the inner side of lower lip under local anesthesia in all patients. All patients were catheterized using 14Fr silicone Foleys catheter. Patients received intravenous inj cefotaxim 1g 8 hourly and inj gentamycin 80mg 12 hourly for 5 days. Patients were discharged on day 8 with per urethral catheter insitu and were recalled on day 28 for post operative retrograde urethrogram. patients were then followed up after every 3 months till symptoms recurred.

Terminologies-

Symptom persistence- patients whose symptoms did not improve upon removal of catheter post procedure

Recurrence- patients who initially had improved symptoms after removal of catheter post procedure and then presented with worsening of symptoms later on.

Success- patients who showed subjective improvement in their urine flow post procedure and had no recurrence during the follow up period.

Proforma

Name:

Age:

Sex:

Registration No:

Date of Admission:

Date of Discharge:

Address:

Phone Number:

Presenting Complaints:

Weak Stream:	Yes/No
Straining:	Yes/No
Incomplete Emptying:	Yes/No
Frequency :	Yes/No
Intermittency:	Yes/No
Urgency:	Yes/No
Retention:	Yes/No
Duration of symptoms:	
History of Trauma to Perineum:	Yes/No
History of Previous Urethral Surgery/Instrumentation/Catheterization:	Yes
If Yes Specify:	

General Physical Examination –

Pulse rate - Pallor - pedal edema-

Bp - Icterus -

RR -

Temperature -

Systemic examination -

Per abdomen -

suprapubic bulge - +/-

suprapubic catheter - +/-

External genitalia -

Periurethral abscess- +/-

Epididymo-orchitis - +/-

Urethrocutaneous fistula - +/-

Per urethral catheter- +/-

Laboratory investigations-

Hb -

RBS - Blood urea - Sr. Creatinine -

VDRL-

HIV-

HBsAg-

Urine routine -

Microscopy -

Albumin - Sugar -

Urine culture sensitivity -

Radiological imaging-

RGU-

MCU-

USG -

X RAY KUB-

Diagnostic cystoscopy -

Diagnosis-

Etiology of stricture-

Treatment-

Operative Procedure

Postoperative complication- Immediate

Bleeding –

Infection -

Discharge on postoperative day-

Urethral catheter removed on post operative day -

Follow-Up-

Date-

Date-

RESULTS

The age varied from 16 years to 72 years. The mean age was around 44.36 years.

Table No. 1: Age distribution of patients with urethral stricture disease

Age of patient	No. Of patients	Percentage (%)
11-20 years	4	7.27
21 – 30 years	10	18.18
31 – 40 years	11	20
41 – 50 years	15	27.27
51 – 60 years	5	9.09
61-70 years	13	23.63
71-80 years	1	1.81

Table No. 2. Sex distribution of patients with urethral stricture

Sex	No of patients	Percentage
Male	51	92.72
Female	4	7.28

Table No. 3: Showing percentage distribution according to site of stricture.

Site	No. of patients			
	<30 yrs	31-45 yrs	46-60 yrs	>60 yrs
Membranous	2	1	0	1
Bulbar	8	9	1	9
Penile	3	7	7	3

Table No. 4: percentage distribution of patients according to etiology of stricture.

Etiology	No. Of patients	Percentage (%)
Idiopathic	18	32.72
Iatrogenic	18	32.72
Traumatic	10	18.18
Inflammatoty	9	16.36

Table No. 5: Table showing distribution of stricture etiology among various age groups.

Causes	AGE GROUPS			
	<30YRS	31-45YRS	46-60YRS	>60YRS
Idiopathic	2(11.11%)	7(38.88%)	0	9(50%)
Iatrogenic	3(16.67%)	8(44.44%)	4(22.22%)	3(16.67%)
Traumatic	6(54.54%)	3(27.27%)	0	2(18.18%)
Inflammatory	2(22.22%)	1(11.11%)	5(55.55%)	1(11.11%)
Total	13	19	9	15

Table No. 6: Showing percentage distribution of presenting complaint of the patients

Presenting complaints	No of patients	Percentage (%)
Weak stream	47	85.45%
Straining	47	85.45%
Incomplete emptying	47	85.45%
Frequency	4	7.27%
Intermittency	47	85.45%
Urgency	5	9.09%
Retention	28	50.90%

Out of 55 patients, 8 patients were lost to follow up, 1 patient died due to complication of VIU, 1 patient required prolonged catheterization due to VUR and 3 patients had persistence of symptoms soon after the procedure. Hence only 42 patients were followed up during the study. The duration of follow up ranged from 1 month to 25 months and mean duration of follow up was 13.12 months. Mean duration of follow up for dilation, VIU, end to end urethroplasty and BMG urethroplasty were 11.33, 15.54, 9.55 and 11 months respectively.

Table No. 7: Showing mean duration of follow up in months for various procedures.

Procedure	Number of patients who were followed after treatment outcome	Months of Follow Up (Mean)
Dilation	6	11.33
VIU	22	15.54
End to end urethroplasty	9	9.55
BMG Urethroplasty	5	11
Total	42	13.12

66.66% (28 patients out of 42) of those who were followed up were symptom free, 33.33 %(14 patients) had recurrence.

Table No. 8: showing the outcome of various procedures

Primary Procedure	Number of cases	Number of cases with symptom persistence	Number of cases with recurrence	Number of cases with no recurrence during follow up	Lost to flow up/ recurrence cannot be assessed	Success rate
Dilation	10	0	3	3	4	50%
VIU	27	0	10	12	5	54.54%
End to end anastomosis	12	2	1	8	1	88.88%
Substitution Urethroplasty	6	1	0	5	0	100%
Total	55	3	14	28	10	

Table No. 9: showing recurrence rates of various procedures for urethral strictures at different stricture locations

Site of Stricture	Procedure	No. of patients treated	No. of patients who were followed up	Recurrence	Recurrence rate	Overall recurrence rate
Membranous	Dilation	1	1	1	100	75
	VIU	3	3	3	100	
	End to End anastomosis	1	1	0		
	BMG Urethroplasty	0				
Bulbar	Dilation	1	1	1	100	28.57
	VIU	13	9	4	44.44	
	End to End anastomosis	11	8	1	12.5	
	BMG Urethroplasty	3	3	0	0	
Penile	Dilation	4	3	2	66.66	40
	VIU	13	10	4	40	
	End to End anastomosis	0				
	BMG Urethroplasty	3	3	0	0	

Table No. 10: showing mean duration of hospital stay in various procedures done for stricture urethra.

PROCEDURE	NUMBER OF PATIENTS	MEAN DURATION OF HOSPITAL STAY
DILATION	10	5.5
VIU	27	5.1
END TO END URETHROPLASTY	12	11
BMG URETHROPLASTY	6	10.8

No complications were observed in patients treated with dilation.

In patients treated with VIU, one had epididymo-orchitis as post operative complication which was managed conservatively.

Four patients of end to end urethroplasty and one patient of BMG urethroplasty had small wound dehiscence which were treated by wound cleaning and dressing and antibiotics.

One patient of end to end urethroplasty had urine leak from wound site and leak on post operative RGU. He was treated by foley's catheterization for 2 weeks after which it stopped.

One patient of end to end urethroplasty complained of erectile dysfunction post operatively. It remained temporarily for 4 weeks and was managed by giving reassurance. He recovered completely.

One patient of VIU had rectal perforation intra operatively. A diversion colostomy was performed and was catheterized suprapubically. He was then operated for colostomy closure after 6 weeks. However the anastomosis leaked and patient developed septicaemia and succumbed due to it later on.

DISCUSSION

In our study, urethral stricture was found to be most common in the age group of 41-50 years(27.27%), followed by the age group 61-70 years (23.63%). Santucci et al[49] in their study showed the incidence was most common in the age group of 65- 74 years , followed by the age group 75-84 years. Mc Millan[50] et al in their study also showed that the incidence of stricture urethra was highest in the age group of above 65 years. In a country like India, people of older age groups(above 65 years) tend to bear with their symptoms and not present early in their course of disease. Also, once symptomatic they are comfortable leading their life with a supra pubic catheter rather than take definitive treatment. Hence the incidence might still be the highest among the older age groups(> 65 years) , but for the cultural characteristics of the people here which make them shy away from presenting to the physician. In our study the mean age was 44.36 years. This is comparable to those described by Palminteri et al[51] (45.1 years) and Stein et al[52](41.4 years). Urethral strictures are rare in women. This was also observed by Smith and colleagues[53] in the USA in an active search for urethral stricture in women where they found only 7 women within a period of six years. In males the urethra is long with anatomical turns and curves with mobile junctions which make it more vulnerable to disruption in pelvic trauma and during catheterization. This also explains why males are highly predisposed to urethral stricture. In our study the most common site of urethral stricture was in the bulbar urethra (52.94%), followed by penile urethra(39.21%) and membranous urethra(7.84%). Heyns et al[54] in their study, observed stricture location in bulbar urethra in 76%, penile urethra 34% and membranous urethra 22%.

Investigator	Stricture (n)	Cause			
		Idiopathic	Iatrogenic	Inflammatory	Traumatic
	40	5	12	13	10
Wessels et al	25	0	11	9	5
Andrich and Mundy	83	35	38	7	1
Santucci et al	168	64	24	12	68
Elliot et al	60	37	9	7	7
Andrich et al	162	38	84	23	17
Fenton et al	194	65	63	38	28
TOTAL	732	244(33%)	241(33%)	109(15%)	136(19%)
OUR STUDY	55	18(32.72%)	18(32.72%)	9(16.36%)	10(18.18%)

Table No. 11: showing etiology of stricture urethra in various studies from a meta-analysis(56)

In our study, out of 10 patients treated by dilation, 6 were followed up with mean duration of follow up being 11.33 months and 3 of them had recurrence with a success rate of 50%. Also, out of 27 patients treated by VIU,22 patients were followed up with mean duration of follow up being 15.54 months and 12 of them had recurrence with a success rate of 54.54%. Stormont et al[57] in their study observed that out of 101 patients who underwent urethral dilation , the success rate at 3years was 65%. In the same study, out of the 39 patients managed by direct visual internal urethrotomy, the success rate was 68%. Stone AR et al[58] in their study of 137 patients who underwent internal urethrotomy when followed for 3 years , had a success rate of 66%. Out of the 12 patients treated by end to end anastomosis, 9 were followed up with mean duration of follow up being 9.55 months and 1 of them had recurrence with a success rate of 88.88 %. Literature shows success rates in the range of 86% to 98.6% for excision and end to end anastomosis.

Table No. 12: showing results of excision and anastomosis of urethral stricture in various studies[6]

Author	No. patients	% Success	Follow-up
Eltahawy et al[59]	213	98.5	40.5 mo
Santucci et al[60]	168	95.2	72 mo
Andrich et al[61]	82	86	180 mo
Micheli et al[62]	71	93	60 mo
Martinez-Pineiro et al[63]	69	88	44.4 mo
Jakse et al[64]	60	93.3	45 mo
Lindell et al[65]	49	95.9	12-48 mo
Panagakis et al[66]	42	95.2	3-72 mo
Kessler et al[67]	40	86	72 mo
Barbagli et al[68]	20	95	54.5 mo
TOTAL	814	93	
OUR STUDY	9	88.88	9.55 mo

Out of the 6 patients treated by substitution urethroplasty by buccal mucosal graft, 5 were followed up with mean duration of follow up being 11 months and none of them had recurrence with a success rate of 100%. Barbagli et al[69] reported a success rate of 85% in 27 patients who underwent dorsal on lay BMG urethroplasty and followed upto a mean duration of 42 months. Levine et al[70] reported a success rate of 83% in 24 patients who underwent dorsal onlay BMG urethroplasty and followed upto a mean duration of 52 months.

Out of 10 patients treated by dilation, 6 were followed up with mean duration of follow up being 11.33 months. There were no complications observed. Usual complications of dilation are cystitis(3%), epididymitis(3%) and hemorrhage(2%).[57] Out of 27 patients treated by VIU, 22 patients were followed up with mean duration of follow up being 15.54 months. One patient(4.54%) of VIU had rectal perforation intra operatively. A diversion colostomy was performed and was catheterized suprapubically. He was then operated for colostomy closure after 6 weeks. However the anastomosis leaked and patient developed septicaemia and succumbed due to it later on. One another patient had epididymo-orchitis which

was treated by antibiotics and pain killers. There is a 10% rate of rectal perforation during VIU in literature, but this value is derived from a single study and therefore not significant. [71,55] Other complications in VIU are pyrexia (5%), septicemia (2%), extravasation(3%), bleeding(3%), retention(2%), scrotal abscess(0.7%), epididymo-orchitis(0.7%).[58,72,73] Out of the 12 patients treated by end to end anastomosis, 9 were followed up with mean duration of follow up being 9.55 months. Four patients(44.44%) had small wound dehiscence which were treated by wound cleaning and dressing and antibiotics. One patient(11.11%) had urine leak from wound site and leak on post operative RGU. He was treated by foley's catheterization for 2 weeks after which it stopped. One patient(11.11%) of end to end urethroplasty complained of erectile dysfunction post operatively. It remained temporarily for 4 weeks and was managed by giving reassurance. He recovered completely. Al-Qudah and Santucci[74] reported two patients(6.06%) with urine leak found on post operative RGU and 4 patients(12.12%) with erectile dysfunction out of 33 patients who underwent anastomotic urethroplasty(anterior=24, posterior=9).

Table 13: showing various complications due to anastomotic urethroplasty (adapted from the study by Al-Qudah and Santucci[74])

Complications	Number of patients	Percentage %
Scrotal swelling	1	3.03
Failure to void	2	6.06
RGU leak	2	6.06
Scrotal tenderness	1	3.03
Foley fall out	1	3.03
Scrotal ecchymosis	3	9.09
Urgency	2	6.06
Epididymitis	1	3.03
Perineal hypoesthesia	1	3.03
Post void leak	5	15.15
UTI	1	3.03
Penile pain	1	3.03
Scrotal pain scrotal scar	2 1	6.06 3.03
Wound discomfort	1	3.03
Irritative LUTS	1	3.03
Stream splaying	1	3.03
Ejaculatory dysfunction	1	3.03
Chordee	1	3.03
Erectile dysfunction	4	12.12

Out of the 6 patients treated by substitution urethroplasty by buccal mucosal graft, 5 were followed up with mean duration of follow up being 11 months. One patient(20%) had wound dehiscence which was treated by wound cleaning and dressing and antibiotics.

Al-Qudah and Santucci[74] reported only one patient(5.26%) having small wound dehiscence out of 19 patients who underwent buccal mucosal graft urethroplasty.

Table 14: showing various complications due to buccal mucosal graft urethroplasty (modified from the study by Al-Qudah and Santucci[74])

Complications	Number of patients	Percentage %
Hematuria	1	5
RGU Leak	3	16
Scrotal hematoma	1	5
Small wound dehiscence	1	5
Wound tightness	1	5
Perineal hypoesthesia	1	5
Scrotal hyperesthesia	1	5
UTI	1	5

CONCLUSIONS

A total of 55 patients were involved in the study conducted between July 2012 and November 2014.

- Stricture urethra was most common in the age group of 41- 50 years with mean age being 44.36 years.

- Stricture urethra was mainly a male disease with 92.72% of the patients being male.

- The most common site involved was bulbar urethra (52.94%), followed by penile urethra (39.21%) and membranous urethra(7.84%).

- The most common etiology were idiopathic(32.72%) and iatrogenic (32.72%), followed by traumatic (18.18%) and inflammatory cause (16.36%).

- Idiopathic urethral strictures were most common in the age group of >60 years accounting to 50%, iatrogenic being most common in the age group of 31-45 years accounting to 44.44%, traumatic in the age group of <30 years accounting to 54.54% and inflammatory being most frequent in the age group of 46-60 years accounting to 55.55%.

- Most patients (85.45%) had obstructive urinary complaints such as weak stream, straining, incomplete emptying and intermittency and 7.27% of patients complained of increased frequency of micturition and 5% complained of urgency. More than half of the patients (50.90%) had acute urine retention as the first presentation.

- Out of 55 patients, 8 patients were lost to follow up, 1 patient died due to complication of VIU, 1 patient required prolonged catheterization due to VUR and 3 patients had persistence of symptoms soon after the procedure. Hence only 42 patients were followed up during the study.

The duration of follow up ranged from 1 month to 25 months and mean duration of follow up was 13.12 months. Mean duration of follow up for dilation, VIU, end to end urethroplasty and BMG urethroplasty were 11.33, 15.54, 9.55 and 11 months respectively.

- The success rates of dilation, VIU , end to end anastomotic urethroplasty and substitution urethroplasty with buccal mucosal graft were 50%, 54.54%, 88.88% and 100% respectively.

- There were no complications observed in patients treated with dilation. Patients who underwent VIU had epididymo-orchitis and rectal perforation as complications. Patients in whom end to end anastomotic urethroplasty was done had wound dehiscence, urine leak from wound site and erectile dysfunction as complications. Patients of substitution urethroplasty had wound dehiscence as complication.

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