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Original Research Article

A study of types of urethral stricture and their management

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ABSTRACT

Background: Surgical treatment of urethral stricture includes various techniques like endoscopic, excision and anastomosis and various reconstructive methods using grafts. The aim of the present study was to study the various types of urethral stricture and their management.
Methods: Fifty cases of urethral stricture were studied over a period of two years in Katihar Medical College with emphasis on various aspects of urethral stricture.
Results: Maximum 24% of the cases were in the age group of 31 to 40 years followed by age group 41 to 50 years (20%). All the patients in this study were males. Bulbomembranous urethra was the most common site in 34% of cases followed by bulbar urethra in 20% cases. Urethrography was the main method employed for diagnosis of stricture urethra in maximum cases. Various forms of surgical treatment were, meatotomy, meatoplasty, excision and anastomosis, urethroplasty with grafts such as buccal mucosa and lingual graft.
Conclusions: Various types of complications are associated with urethral stricture and is quite troublesome disease for the patients. The surgeon should be familiar with the various techniques in the management of the urethral stricture disease and the treatment should be individualized, taking into account of the location, extent and length of the stricture.

Keywords: Buccal mucosa urethroplasty, Dilatation, meatoplasty, Urethra, Urethral stricture

INTRODUCTION

A urethral stricture is defined as a scar of the subepithelial tissue of the corpus spongiosum, which constricts the urethral lumen.[1] With a reported prevalence of 10 per 100000 men in their youth, 20 per 100000 by the age of 55, rising up to 100 per 100000 in men over the age of 65 years, urethral stricture appears to be relatively common disease.[2]

The urethral stricture mainly arises from an insult for example, infective, inflammatory or a local traumatic process leading to ischemic spongiofibrosis that is ischemia of spongy tissue of corpus spongiosum. This leads to loss of underlying vascular spongy tissue, and as it heals by fibrosis, it causes scar formation resulting in a stricture. Pelvic fracture urethral injury (PFUI) is also encountered that is mainly a consequence of direct trauma leading to disruption of posterior urethra.[3] Diagnosing a urethral stricture requires a lot of factors which includes a proper suggestive history, physical examination findings, radiographic and endoscopic methods of assessment.[4] Extent and location of the stricture along with any prior treatment for the same is important and there has to be accurate documentation of that to offer proper and effective treatment to the patient by treating doctor. The general condition of the patient along with any co morbidity has to be taken into consideration for urethral stricture surgery as there are

various modalities of treatment which can be offered to the patient.[5] Since ages, the simplest form of treatment advised for patients with an epithelial stricture (limited to epithelium) without spongiofibrosis is urethral dilatation by metal bogies. The advantage of being fracturing of scar tissue of the stricture and enlargement of lumen temporarily, bringing relief to patients though it is not curative. Nowadays, visual internal urethrotomy (VIU) is also done which involves incising the stricture transurethrally using endoscopic equipment.[6] One other form of treatment, meatoplasty is technique of widening of the stricturous part of the external urethral meatus by raising the urethral flap and suturing it to glans penis. While doing urethroplasty, urethra is reconstructed by using primary graft such as buccal mucosa, penile skin or even bladder epithelium after opening the stricturous area of urethra by urethrotomy. Primary anastomosis of urethra can be done in short segment uncomplicated stricture which can be completely excised while longer strictures are managed using augmented roof strip anastomosis or substitution on lay graft urethroplasty. A two stage urethroplasty can be performed in those strictures which are associated with local adverse conditions.[7,8] A large number of operative technique are available for urethral stricture disease and the superiority of one technique over other is not clearly defined. So the urologist must be familiar with each and every technique as each technique has its own advantages and disadvantages. This study aims to provide a better understanding of the types of urethral stricture and their management in this kosi region of bihar.

METHODS

In the present series a prospective study was carried out on fifty patients suffering from urethral strictures attending the outpatient department and emergency in the upgraded Department of surgery, Katihar Medical College and Hospital, Katihar. Preoperative assessment consisted of a detailed history to establish the cause of stricture and preoperative status of the individual with respect to continence and potency. Uroflowmetry was done in each case, pre and post operatively. This was used as a major yardstick for determining the success of any modality of treatment, offered to the patient. External genitalia were examined and urethra palpated in all the patients. Culture and sensitivity of urine sample was done in patients of urinary tract infections. The upper urinary tract was assessed by ultrasound and in some cases by intravenous urography. Retrograde and voiding urethrography were performed to assess location, severity and length of stricture. Various modalities of treatment given was recorded and patients were asked to follow-up on regular basis.

RESULTS

In the present study, a series of 50 cases of urethral stricture were studied. Following tables show the results of observation.

Table 1: Age incidence of urethral stricture.

Age group in years	No. of cases	Percentage
1-10	05	10%
11-20	03	6%
21-30	09	18%
31-40	12	24%
41-50	10	20%
51-60	06	12%
61-70	05	10%

In the age incidence of the present study, the highest incidence was recorded in the age group 31-40 years (24.0%), followed by age group 41-50 years (20.0%), the age of youngest patient was 5 years and eldest was 70 years.

Table 2: Incidence of various sites of stricture.

Site of stricture	No. of cases	Percentage
Meatal	08	16%
Penile	07	14%
Peno-bulbar	06	12%
Bulbar	10	20%
Bublomembranous	17	34%
Prostatic	02	04%

The most common site was bulbomembranous in 34% of cases followed by bulbar urethra in 20% cases. Least cases were present in prostatic urethra (4%).

Table 3: Sites of stricture as shown by urethrography.

Site of stricture	No. of cases	Percentage
Penile	06	15.4%
Peno-bulbar	06	15.4%
Bulbar	10	25.6%
Bulbomembranous	17	43.6%

The most common site of stricture was found in the bulbomembranous part of urethra (43.6%) followed by bulbous urethra (25.6%).

Urethrography was the main method employed for diagnosis of stricture urethra in 39 cases (78%). In remaining 11(22%) cases, 8 cases were of pin-hole meatus and 2 cases were due to prostatectomy and one case was of partial amputation of penis. Culture and sensitivity of urine samples were done in patients of urinary tract infection in which Escherichia coli was the microorganism found in maximum number of samples.

Table 4: Sites of stricture in traumatic group.

Site of stricture	No. of cases	Percentage
Penile	04	19.05%
Bulbomembranous	17	80.95%

The maximum number of stricture due to trauma were found in bulbomembranous part of urethra (80.95%), followed by penile urethra (19.04%) (Table 4).

Table 5: Sites of urethra involved in infectious (gonococcal) group of stricture.

Site of stricture	No. of cases	Percentage
Penile	01	14.3%
Peno bulbar	01	14.3%
Bulbar	04	57.1%
Penile upto membranous	01	14.3%

The post gonococcal group of stricture were most common in bulbar part (57.1%) followed by penile, penile bulbous and penile upto membranous (14.3% each) (Table 5).

Table 6: Stricture in post-operative group.

Site of stricture	No. of cases	Percentage
Prostatic	02	28.6%
Penile	05	71.4%

In post-operative group of patients, 71.4% of patients developed penile stricture while 28.6% patients developed prostatic urethra stricture (Table 6).

Table 7: Nature of previous treatment received

Nature of previous treatment	No. of cases	Percentage
Intermittent dilatation	26	86.7%
Suprapubic cystostomy	04	13.3%

30 patients had received previous treatment. 26 (86.7%) of them had undergone intermittent dilatation and four (13.3%) had suprapubic catheterization (Table 7).

Out of 16 emergency patients admitted in this series, in all cases suprapubic cystostomy (SPC) was done to relieve urinary obstruction.

Table 8: Results of visual internal urethrotomy (VIU).

Results of VIU	No. of cases	Percentage
Successful	8	61.5%
Unsuccessful	5	38.5%

Out of 13 cases of VIU, 61.5% were successful while 38.5 cases were unsuccessful (Table 8). In these 13 cases, complications developed in 6 cases, 5 patients had bleeding per urethra, 1 patient developed false passage while 7 cases developed no complications. Those cases of VIU 5 (38.5%) in whom it was unsuccessful, surgeries were performed.

Table 9: Types of operation performed in this series.

Types of operation	No. of cases	Percentage
Meatoplasty	1	2.38%
Meatotomy	7	16.67%
Excision and reanastomosis	8	19.05%
Dorsal onlay buccal mucosa graft urethroplasty	11	26.19%
Combined ventral plus Dorsal onlay urethroplasty	5	11.9%
Urethroplasty with post auricular (Wolf) graft	6	14.29%
Lingual graft urethroplasty	4	9.52%

Table 10: Results of operation.

Types of Operation	Total. no. of operations	Successful	Unsuccessful
Meatoplasty	1	1 (100%)	
Meatotomy	7	6 (85.71%)	1(14.29%)
Excision and reanastomosis	8	8 (100%)	
Dorsal onlay buccal mucosa graft urethroplasty	11	9 (81.82%)	2 (18.18%)
Combined ventral plus dorsal onlay urethroplasty	5	4 (80%)	1 (20%)
Urethroplasty with post auricular (wolf) graft	6	5 (83.33%)	1 (16.67%)
Lingual graft urethroplasty	4	4 (100%)	

In 42 cases, different type of surgery was performed. In maximum 26.19% of cases, dorsal onlay buccal mucosa urethroplasty was performed, followed by excision of strictured segment and reanastomosis in 19.05% of cases. Meatotomy was done in 16.67% of cases. Meatoplasty was performed in only one case (Table 9). Following the results of different types of operations, it was totally successful where meatoplasty, excision and reanastomosis and lingual graft urethroplasty was performed. While more than 80% of the surgeries were successful in cases where urethroplasty was done using buccal mucosa and post auricular graft. Even meatotomy was successful in 85.71% of cases (Table 10).

DISCUSSION

In the present series, fifty cases of stricture urethra have been studied. The observation and detailed analysis have been compared with works of other on the subject. The highest incidence was observed in the age group 31-40 years which comprised 24.0% of the whole series studied. Followed by this was age group 41-50 years 20.0% and 21-30 years 18.0% of total cases. The incidence of age group in this series is in agreement with observation made by Beard DE et al.[9] In their series highest incidence were in the age group of 31-40 years followed by 41-50 years which is similar to the present series. Extreme of age in this series was 5 years and 70 years. Also in a study conducted by Sudarshan BKG et al, the peak incidence was observed in age group 31 to 40 years which constituted 43% of cases.[10]

In the present series maximum number of strictures were found in bulbomembranous 34%, followed by bulbar in 20%, meatal in 16%, penile in 14%, peno-bulbar in 12% and prostatic in 4% cases respectively. Overall bulbar urethra was involved in 66% of the cases, either alone or combined. In a study conducted by Sudarshan et al, the commonest site of stricture was at bulbar urethra (50%).[10] This was followed by penile urethra (30%) and meatal urethra (13%) which is very similar to our study. Various other studies have also reported bulbar urethra being the commonest site of urethral stricture.[11,12] In the gonococcal group, bulbar urethra was the most common site.

This can be explained by the study of Singh et al, who came to the conclusion that the well known sites of stricture after gonococcal infection are explained by anatomical distribution of mucosal glands in the paraurethral tissues of man.[13] The bulb is the commonest site, for it harbours the largest number of paraurethral glands. Apart from thorough clinical examination, urethrography was done to establish the diagnosis in this series. Urethrography could not be done in 11 cases as 8 cases had pinhole meatus, so catheter could not be passed. In remaining 3 cases one had abnormally placed urinary meatus (stricture after partial amputation of penis) and two were post-prostatectomy strictures. An earlier observation was that urethral calibraton is of diagnostic value as it gives an idea of site of lesion and its distensibility. However, the calibration method did not give the idea of false passage or extent of stricture. For this whenever possible urethrography is a method of choice.

In the impassable strictures with severe stenosis if dye is given from the distal end of urethra as well as from the proximal side through bladder it will delineate the exact extent of stricture. Cases presenting with urinary tract infections had their urinary sample sent for culture and sensitivity and appropriate antibiotics were given based on the sensitivity reports. Escherichia coli was the commonest microorganism found in patients of urinary tract infection. In the present series 30 cases had received previous treatment, out of which 26 had undergone intermittent dilatation previously and 4 had undergone suprapubic cystostomy.

Management of cases were influenced by nature of presentation, whether it was acute or chronic. In this series 16 cases presented as emergency with acute retention of urine and in all of them suprapubic cystostomy was done to relieve obstruction. Visual internal urethrotomy (VIU) was done in 13 cases in which it was successful in 8 (61.5%) of cases and unsuccessful in 5 (38.5%) cases. In a study conducted by Sudarshan et al the success rate VIU procedure alone was 59%.[10] The unsuccessful cases of VIU were posted for various types of reconstructive surgeries. In this series, 5 cases developed bleeding per urethra and false passage was met with one case following visual internal urethrotomy. Dilatation had been a method of treatment for 3000 years. Even in Sushruta period it was practiced in application of medicine in urethra in urethral stricture.[14] It has been treated by dilatation as early as 600 BC. Petrene et al was of opinion that urethral dilation is the initial treatment of choice for urethral stricture.[15] However, it is agreed that almost gentleness and caution must be employed during dilatation otherwise false passage may be made as stated by Attawater et al long ago.[14,15]

Table 11: Pecentage of graft onlay urethroplasty as done by different authors.

Author	Year	Total no. of cases	Percentage of cases in which dorsal onlay graft was carried out
Caldamone AA et al[16]	1991-96	22	30%
Morey AF. Mc Aninch [17] JW	1993-96	75	16%
Barbagli G et al[18]	1997-2002	50	54%
Dubey D et al[19]	1998-2003	92	81%
Present Series	2013-2014	50	32%

Out of 42 operated patients in this series, in maximum 26.19% of cases, dorsal onlay buccal mucosa urethroplasty was performed, followed by excision of strictured segment and reanastomosis in 19.05% of cases. Meatotomy was done in 16.67% of cases. Meatoplasty was performed in only one case. Post auricular graft and lingual graft reconstruction urethroplasty was performed in 14.29% and 9. 52% of cases respectively. Now because of advancement in reconstructive surgeries, grafts especially buccal mucosa, lingual graft and post auricular graft of the patient for the management of strictures are widely used with great success. Because of its readily availability, easily accessibility and physical properties beneficial to free graft survival characteristic, buccal mucosa grafts are now widely accepted at many centres. The following table shows graft onlay urethroplasty as accepted method in their series by various authors.

Dubey D et al was of opinion that a one-stage dorsal onlay buccal mucosa graft urethroplasty provides excellent results for stricture involving any segment of the anterior urethra. The buccal mucosa graft appears to be the most versatile urethral substitute, as it can be successfully used for both one or two stage reconstruction of the entire anterior urethra (Table 11).

Regarding complications, there was none following meatoplasty. Following dorsal onlay buccal mucosa graft urethroplasty, 2 patients developed recurrence of stricture requiring revision of surgery.

CONCLUSION

Urethral stricture is complicated by recurrent urinary tract infections, hematuria and difficulty in micturition and is very troublesome to the patient resulting in repeated visit to the surgeon. The treatment of stricture should be individualized and location and length of the stricture has to be taken into account for management of these cases.

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