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Urethral Stricture Etiology Revisited: An Indian Scenario

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ABSTRACT

Objectives: Urethral stricture disease remains a common cause of morbidity among men. Many questions about the etiology of urethral stricture disease remains unanswered till now. This study was done in a tertiary care center along with a review of the literature to evaluate the etiology of urethral strictures and to determine the factors that may influence possible preventive or curative strategies.

Methods: This was a retrospective and prospective study of 404 patients with urethral strictures. The case records of all these cases diagnosed as urethral stricture were analyzed to determine the possible cause of the stricture, demographic profiles, and clinical presentation. Data were entered both prospectively by a careful patient questioning and retrospectively from a detailed chart review. A subanalysis of the stricture etiology of patients aged less than 40 years vs patients aged 40 or more was done. Statistical analysis with the Fisher's exact test was done, and a P value < 0.05 was considered statistically significant.

Results: The mean age of presentation was 41.2 years (range: 3 to 81 years). Overall, the iatrogenic cause was the most common (40.6%), but stricture etiology varied with age and the stricture site.

Conclusions: The etiology of urethral strictures is not uniform across the world. The iatrogenic and idiopathic strictures are surprisingly common. Avoiding unnecessary urethral catheterization and repeated urethral instrumentation can reduce iatrogenic strictures.

INTRODUCTION

Urethral stricture disease causes a great deal of morbidity among men. Specific studies of stricture etiology are scarce. A Medline search revealed only a 1% publication on the specific topic of stricture etiology. This study along with review of literature was done in a tertiary care center to evaluate the etiology of urethral strictures and to determine the common themes that may influence possible prevention or treatment strategies.

MATERIALS AND METHODS

This was a retrospective and prospective study of 404 patients with urethral strictures who were admitted from January 2001 to December 2011 to the Urology Department of the Institute of Postgraduate Medical Education and Research at SSKM Hospital in Kolkata. The case records of all the cases diagnosed as urethral strictures were analyzed to determine the possible cause of stricture, their demographic profile, and their clinical presentation. Data were entered both prospectively through careful patient interrogation and retrospectively from a detailed chart review. Subanalysis was done of patients less than 40 years of age vs patients 40 years of age or greater. Their stricture sites were also taken into account. A cutoff of 40 years was chosen, since above this age the probability of iatrogenic manipulation of the urethra increases due to the increased incidence of benign prostatic hyperplasia, prostate cancer, bladder tumor, and urethral catheterization. Four stricture sites were determined: the posterior urethra, the bulbar urethra, the penile urethra, and the pan urethra. Statistical analysis was done (with the Fisher's exact test), and a p value < 0.05 was considered statistically significant. A comprehensive electronic literature search was conducted using the keywords "etiology,

KEYWORDS: Aetiology, site, stricture, urethra

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Table 1. Showing the aetiology of strictures by site.

Cause (no.)		Site: no. penile (%)	No. bulbar (%)	No. pan urethral (%)	No. posterier (%)
idiopathic (112)		23	74	12	0
iatrogenic (164)	urethral catheterization	18	26	14	0
	TUR	11	36	7	9
	cystoscopy	3	3	4	0
	prostatectomy	0	0	0	7
	brachytherapy	0	0	0	2
	hypospadias repair	23	1	0	0
inflammatory (41)	urethritis	18	16	7	0
lichen sclerosis (39)		22	0	17	n/a
traumatic (48)	perineal trauma	0	9	0	0
	pelvic fracture	0	8	0	27
	penile fracture	4	0	0	0
total (404)		125 (30.9)	173 (42.8)	61 (15.1)	45 (11.2)

urethra, and stricture."

RESULTS

The results are shown in Table 1 and Table 2. The mean age of presentation was 41.2 years (age range: 3 to 81 years). Overall, the iatrogenic cause was the most common (40.6%), but the stricture etiology varied with age and stricture site. In the younger age group, idiopathic hypospadias surgery and pelvic fractures were more prevalent (p value: < 0.05), while in the older age group, transurethral resection and prostatectomy were the prevalent cause for strictures of the urethra. Bulbar urethra involvement (42.8%) was the most common, while penile urethral (30.9%). Iatrogenic causes (40.59%) were the most common ones for penile and pan urethral stricture. Idiopathic etiology was the most common feature with the bulbar urethra whereas the traumatic one was in the posterior urethra.

DISCUSSION

A review of literature showed considerable overall variation in the frequency distribution of etiological factors. Historically, strictures were more or less associated with gonococcal urethritis [1]. But later on, it was found that a stricture was rarely due to a single infection and it takes 20 years for a stricture to develop after a single episode of untreated gonorrhea [1]. Nowadays, the incidence of postinflammatory stricture has decreased dramatically in the developed world (less than 10%) due to prevention campaigns for sexually transmitted diseases, public awareness of these diseases, and rapid and effective antibiotic treatment for urethritis [2-4]. In our study, its incidence was 10.2% but in the developing world it remains an important cause of stricture (54% to 66.5% of cases) [5]. In the developed world, most strictures today are either iatrogenic or idiopathic [6,7]. Major iatrogenic causes include urethral catheterization, cystoscopy, TURP, and hypospadias surgery. Our study also showed a similar result. Iatrogenic strictures occur at any age, commonly involving the membranous urethra and urethral sphincter mechanism, after transurethral resection of the prostate (TURP) (so-called "sphincter strictures") [8]. The incidence of iatrogenic stricture by TURP (2.2 to 9.8%) or radical (8.4%) or simple prostatectomy (1.9%) are higher in the older group patients [9-11]. The probable causes of stricture after TURP are traumatic insertion of the resectoscope with perforation of the bulbous urethra, instrument friction at the penoscrotal angle (as the instrument moves up and down within the urethra some 800 times), and monopolar current leakage due to insufficient resectoscope insulation [9,12].

In younger patients, hypospadias surgery is the most important iatrogenic cause. Urethral stricture incidence after hypospadias surgery varies from 2.5% to 11% of patients [13,14]. Mostly these strictures develop in the distal penile urethra at the site of surgery or at the meatus. It may be apparent shortly after

Table 2. Showing the distribution of stricture aetiology with age.

		Age: 40 years or less	Age: 40 years or greater	*P* value
Cause				
idiopathic		63	49	< 0.05
iatrogenic (164)	urethral catheterization (58)	19	39	not significant
	TUR (63)	5	58	< 0.05
	cystoscopy (10)	0	10	not significant
	prostatectomy (7)	0	7	< 0.05
	brachytherapy (2)	0	7	< 0.05
	hypospadias repair (24)	22	2	< 0.05
inflammatory	urethritis (41)	20	21	not significant
lichen sclerosis (39)		12	27	not significant
traumatic (48)	perineal trauma (9)	4	5	not significant
	pelvic fracture (35)	26	9	< 0.05
	penile fracture (4)	3	1	not significant
total (404)		171	233	

the surgery, in adolescent or in early adult life [13,14]. Our study also showed the prevalence of hypospadias surgery in the younger age group and it contributed 14.5% of total iatrogenic causes.

A history of urethral catheterization is another important iatrogenic cause [6]. In this study, urethral catheterization contributed 35.9% of total iatrogenic causes in both age subgroups. It may typically occur at the junction of the bulbar and penile urethra or in the proximal bulbar urethra. But penile urethra, pan urethra, and multifocal anterior urethral involvement are also common. Improper urethral catheter insertion causes 3.2 urethral injuries per 1 000 patients [15]. Prolonged catheterization leads to urethral inflammation and ischemia, and leads ultimately to urethral stricture [6]. Leaching of toxic compounds from poor quality catheters and microvascular disease (as in smokers and in diabetics) may increase the risk [15,16]. Adequate and strict indications for urinary catheterization, skilled urethral catheter insertion, and the consideration of suprapubic catheter placement in prolonged catheterization may decrease the incidence of these iatrogenic strictures.

Idiopathic strictures or strictures without an apparent reason are surprisingly common [4,6]. In this study, idiopathic cause contributed 27.6% of total stricture cases. They were more prevalent in younger age subgroups and in bulbar urethras (42.7%). These strictures are significantly more prevalent in the bulbar area and they are significantly more common in younger patients. There are several explanations for the so-called idiopathic stricture. It may be the delayed manifestation of unrecognized (childhood) trauma [17], congenital in origin [18] (possibly due to an incomplete rupture of the urogenital membrane and related to what is called Cobb's collar [19] by some and Moorman's ring [20] by others) or mainly ischemic in origin, especially in elderly men [21].

Lichen sclerosis (LS) is still commonly known by its initials BXO [22]. It is now the most common identifiable cause of penile strictures in young and middle-aged adults. LS was detected in 9.7% of our cases across both age groups. Its exact etiology is not clear, although infective and autoimmune mechanisms have been suggested [22]. It typically starts as an itchy patch of white discoloration on the inner aspect of the foreskin or glans

and spreads proximally to involve the fossa navicularis and then to the penile urethra causing it to be strictured. It can rarely affect the bulbar urethra.

Pelvic fractures causing disruption at the bulbomembranous junction is by far the main etiology of strictures in the posterior urethra. It is more prevalent in younger patients. The high-risk group is motorcyclists and bicyclists or pedestrians struck by a car [23]. Idiopathic strictures do not exist in this area. In this study, traumatic etiology was present in 11.9% of total stricture cases, pelvic fracture was the most common cause, and posterior urethra was the most common site of involvement (60% of traumatic cases). This fact is reflected in a higher incidence of up to 31% of traumatic strictures in countries with poor vehicular conditions and traffic regulations [5,24] compared to less than 11.2% of stricture cases in developed nations. Other minor causes are prostatectomy and brachytherapy, and they are localized at the prostatic urethra or bladder neck. Brachytherapy currently accounts for only 1.8% cases however; the incidence of this type of stricture may increase due to increased use of this modality [10]. We have not seen any case of urethral stricture with penile tumor involvement after foreign body insertion or penile surgery, such as penile prosthesis implantation.

This study has few limitations as a major part of data is retrospectively collected, and a study was done in a tertiary care referral center, which may result in selection bias.

CONCLUSION

Our study and a review of the literature suggest that the distribution of urethral stricture etiology is not uniform across the world. It also varies with age and it may influence the site of stricture in urethra. Our results showed that iatrogenic and idiopathic strictures are surprisingly common. Avoiding unnecessary urethral catheterization and repeated urethral instrumentation can reduce these iatrogenic strictures. Further studies are needed to know the etiology and ways to reduce the incidence of idiopathic strictures.

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