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ETIOLOGY OF POSTERIOR URETHRAL STRICTURES: ANALYSIS OF 116 CASES

POSTERİOR ÜRETRAL DARLIKLARIN ETİYOLOJİSİ: 116 VAKANIN ANALİZİ

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ABSTRACT

AIM: In this study, our aim was to investigate the current etiology of posterior urethral stricture disease in our department and to observe if there have been any differences in the major causes of urethral strictures.

MATERIALS AND METHODS: We analysed 116 male patients between March 2009 and September 2019 to evaluate the etiology of posterior urethral strictures. All patients had been assesed preoperatively, including detailed medical history, physical examination, retrograde urethrogram and uroflowmetry. We examined all patients in terms of age, stricture site, the most probable cause of the stricture and stricture length. We classified the location of posterior stricture into three anatomic parts: membranous urethra, prostatic urethra and bladder neck and stricture etiologies were subcategorized into idiopathic, inflammatory, iatrogenic and traumatic.

RESULTS: The most common site of the strictures was the membranous urethra (67 patients, 57.8%) followed by the prostatic urethra (27 patients, 23.3%) and bladder neck (22 patients, 18.9%). The two main overall posterior urethral stricture causes were iatrogenic (79 patients, 68.1%) and traumatic (24 patients,20.7%). The less common causes were idiopathic (11 patients,9.5%) and urethritis (2 patients,1.7%). Of the patients in iatrogenic group, TUR-P and TUR-BT were the most common etiologic factors. (42 patients,36.2%) All urethral strictures were short(<2 cm) and treated with endourological surgery.(Optical İnternal Urethrotomy and urethral dilation)

CONCLUSION: In our instution, especially iatrogenic causes were the most seen etiologic factor of posterior urethral strictures. These findings suggested us to be more careful during the endoscopic procedure, to use suitable calibered instrumentation and avoid unnecessary urethral interventions.

Key Words: Etiology, iatrogenic disease, transurethral resection, trauma, urethral stricture

ÖZET

AMAÇ: Bu çalışmadaki amacımız, posterior üretral darlığının güncel etyolojilerini araştırmak ve üretral darlıkların ana nedenlerinde herhangi bir farklılık olup olmadığını gözlemlemektir.

GEREÇ VE YÖNTEMLER: Posterior üretral darlıkların etyolojisini değerlendirmek için Mart 2009 ile Eylül 2019 arasında 116 erkek hasta analiz edildi. Ameliyat öncesinde tüm hastalardan ayrıntılı tıbbi öykü alındı, fizik muayene yapıldı, retrograd üretrogram ve üroflovmetri tetkikleriyle değerlendirildi. Tüm hastalar yaş, striktür lokasyonları, en olası striktür nedenleri ve striktür uzunlukları açısından incelendi. Posterior darlık bölgesi membranöz üretra, prostatik üretra ve mesane boynu olmak üzere üç anatomik kısıma ayrıldı. Darlık etiyolojileri idiyopatik, inflamatuar, iyatrojenik ve travmatik olmak üzere alt kategorilere ayrıldı.

BULGULAR: Çalışmamızda striktürlerin en sık yerleşim yerleri membranöz üretra (67 hasta, % 57.8) ardından prostatik üretra (27 hasta, % 23.3) ve mesane boynu (22 hasta,% 18.9) olarak görüldü. Posterior uretra darlıklarının iki ana nedeni iyatrojenik (% 68.1) ve travmatik (% 20.7) iken, daha az yaygın nedenler ise idiyopatik (% 9.5) ve üretrit (% 1.7) idi. İyatrojenik grupta yer alan hastalarda en sık görülen üretral darlık nedeni transüretral prostat ve mesane tümörü rezeksiyonu idi. (% 36.2) ve çalışmadaki tüm üretral darlıkların uzunlukları <2 cm idi ve tedavide tüm hastalara endoürolojik cerrahi (Optik İnternal Üretrotomi ve üretral dilatasyon) uygulandı.

SONUÇ: Merkezimizde takip edilen hastalarda, posterior üretral darlığın en sık görülen etyolojik faktörü iyatrojenik nedenlerdi.Tüm bu bulgular sonucunda endoskopik işlem sırasında daha dikkatli olunmalı, uygun kalibrede aletler kullanılmalı ve gereksiz üretral müdahalelerden kaçınılmalıdır.

Anahtar Kelimeler: Etyoloji, iatrojenik hastalık, transüretral rezeksiyon, travma, üretral darlık

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INTRODUCTION

Urethral stricture is a common, recurring and a very distressed condition caused by cicatrix formation at the urethral mucosa. Narrowing of the urethra results with obstruction at the lower urinary tract and causes some micturition disturbances which distress the patient's quality of life. Urethral strictures can be seen at every part of urethra beginning from the fossa navicularis up to the bladder neck. In the past, urethritis due to sexually transmitted disease especially gonorrhea was the main cause of strictures and since the use of effective antibiotics, a noticeable reduction has been detected in urethritis. However in recent years, by using endoscopic instruments and indewelling catheters, iatrogenic urethral stricture cases have increased obviously and today they are the most largest group among the other urethral stricture etiologies accounting for about %45.5.(1)

Our aim in this article was to determine the main causes and the characteristics of posterior urethral strictures in our department and due to the limited number of publications on posterior stricture etiology, we would like to make an additional contribution to the literature with our current study.

MATERIALS AND METHODS

After obtaining approval from the Ankara Training and Research Hospital Ethics Committee and informed patients' consent, we analysed and collected a database on 116 male patients between March 2009 and September 2019 to evaluate the etiology of posterior urethral strictures. All patients had been assesed preoperatively, including medical history, physical examination, retrograde urethrogram and uroflowmetry. The collected data included age, stricture site, the most probable cause of the stricture and stricture length. Anterior urethral strictures were excluded from this study. We classified the posterior stricture location into three anatomic parts: membranous urethra, prostatic urethra and bladder neck. Stricture etiologies were subcategorized into idiopathic, inflammatory, iatrogenic and traumatic. Inflammatory subgroup included urethritis or lichen sclerosis and traumatic etiologies included pelvic fracture distraction injuries and perineal trauma.

The types of iatrogenic injury were secondary to medical procedures like traumatic urethral catheterization, urethral instrumentation (indewelling catheter, cystoscopy, urethroscopy, ureterorenoscopy, transurethral resection of prostate or bladder, transurethral cystolithotripsy) or other etiologies (radical or open prostatectomy). No identified cause were considered as idiopathic.

RESULTS

A total of 116 male patients with posterior urethral strictures were identified and treated in our department. Mean age was 55.9 years (40-77) in iatrogenic, 30.4 years (21-38) in traumatic, 40.1 years (32-49) in idiopathic and 29.5 years (22-37) in the inflammatory group. The most comm on site of the strictures was the membranous urethra (67 patients, 57.8%), the prostatic urethra (27 patients, 23.3%) and bladder neck (22 patients, 18.9%).**(Table 1)**

We evaluated several causes of posterior urethral strictures including urethral catheterization, cystoscopy, open or radical prostatectomy, ureterorenoscopy, transurethral resection of prostate and bladder tumour (TUR-P and TUR-BT), cystolithotripsy (iatrogenic factors) **(Table 2)**,

Table 1.Etiology and location of posterior urethral strictures

	Iatrogenic	Traumatic	Idiopathic	İnflammatory
Membranous urethra	45	14	6	2
Prostatic urethra	15	10	2	-
Bladder neck	19	-	3	-

Table 2.Etiology of iatrogenic posterior urethral strictures

	Membranous urethra	Prostatic urethra	Bladder neck
Number of patients,%	45 (38.8%)	15(12.9%)	19(16.3%)
TUR-P	14	4	7
TUR-BT	12	3	2
Ureterorenoscopy	5	-	1
Urethral catheterization	3	2	-
Cystoscopy	5	3	2
Radical prostatectomy	-	-	5
Open prostatectomy	2	3	2
Cystolithotripsy	4	-	-

urethritis (inflammatory), trauma (perineal trauma, pelvic fracture) and idiopathic.

The two main overall causes were iatrogenic (79 patients, 68.1%) and traumatic (24 patients, 20.7%).The less common causes were idiopathic (11 patients, 9.5%) and urethritis(2 patients, 1.7%). **(Table 1)** Of the patients in iatrogenic group, TUR-P and TUR-BT were the most common etiologic factors. (42 patients,36.2%) **(Table 2)**

The overall average stricture length was 0.95 cm in iatrogenic group, 0.73 cm in traumatic group, 0.82 cm in idiopathic and 0.9 cm in inflammatory group. Stricture lengths at the anatomic locations are listed in (**Table 3)**. All urethral strictures were short(<2 cm) and treated with endourological surgery.(Optical internal urethrotomy and urethral dilation)

DISCUSSION

Urethral stricture negatively affects human life by means of narrowing of the urethra caused by scarring and obstructing the lower urinary tract. It may cause micturition disorders and loss of renal function depending on the severity of the stricture. So diagnosis and treatment should be essential to be done quickly to prevent complications and impair patients' quality of life.

Kinds of USD etiologic factors had been defined in several studies in the last few decades in developed nations.A review in 1981 was published about the etiology of urethral stricture including 1549 cases which emphasised the most common cause as urethritis (40% of cases)(2). Since then, large series from developed nations suggested a transition to a predominance of idiopathic and iatrogenic factors (1,3–5). But today the incidence of infectious etiology is not frequently observed in the developed world. Xu et al demonstrated that in the past 30 years, China worked hard on the prevention of sexually transmitted diseases (STDs) and by using rapid and adequate treatment for urethritis, they reduced the incidence of postinflammatory stricture(6). Post-infective strictures accounted for 5.79% of the total number of urethral strictures and were far less common than traumatic (51.76%) and iatrogenic (34.49%) strictures. In the study by Lumen et al, urethritis was the cause of urethral stricture in only 3.7% of cases, comparable to the low rates in the other series in the developed world(1,7). Our findings have pointed that postinflammatory factors(gonorrheal infection or urethritis by chlamydia or ureaplasma) were less common in the etiology of urethral strictures with a rate similar to that observed in other large series from the developed world(1.7%)(1). We tought this might be related with the stricture location, conscious campaigns about the sexually transmitted diseases, frequent usage of condoms and rapid antibiotic treatment.

Iatrogenic injury has played an important role at the male urethral strictures in recent years. Most urethral strictures reported are of iatrogenic or idiopathic origin in the developed world (1,3,8,9). Lumen et al.(1) revealed approximately one-half of the cases of urethral strictures were iatrogenic causes such as a transurethral operation, urethral catheterisation, cystoscopy, prostatectomy, brachytherapy and hypospadias surgery. Palminteri et al. reported that the major cause of strictures was iatrogenic (38.6%) and of 1439 patients, catheterisation (16.3%) or transurethral surgery (9.1%) were declared the most iatrogenic cases (4). Similarly, a survey study from China demonstrated the transurethral manipulations as the largest cause of iatrogenic urethral strictures(6).Today, since a high number of elderly patients undergo TUR-P, TUR-BT and open or radical prostatectomy, we will see more iatrogenic urethral strictures due to the result of urethral instrumentation(60.9 %)(10). Obviously, careless traumatic insertion of the resectoscope with perforation of the bulbous urethra, resectoscope friction at the penoscrotal angle and performing high calibered instrumentation to the narrow urethral caliber resulted with urethral stricture(11). Therefore, during urethral catheterization and whenever performing endoscopic procedures, doctors and healthcare assistants should have paid more attention to prevent unnecessary trauma and spongiofibrosis formation(1,4,11). Urethral stricture is a major and an important complication of TUR (2.2% to 9.8% of cases), and radical (8.4%) and simple (1.9%) prostatectomy(11,12). The incidence of urethral stricture after TUR-P has been reported as 3.2%(13). In addition, various types of iatrogenic injuries of the posterior urethra have largely as a result of treatments for benign prostatic hyperplasia and prostate cancer (14). In our study, in 42 of 116 patients, TUR-P and TUR-BT were the major cause of posterior urethral strictures and we observed the most involved stricture location was membranous urethra. We tought that long procedure time,high calibered urethral instrumentations and may be unnecessary cauterizations especially to the bladder neck were three factors which could be effective in iatrogenic cases.

Idiopathic strictures are significantly more apparent in the bulbar area and mostly the exact mechanism

Table 3. Associations between stricture lengths (cm),stricture location and etiologies of the strictures

	İatrogenic	Traumatic	Idiopathic	Inflammatory
Mean overall stricture length(cm)	0.95	0.73	0.82	0.9
Membranous urethra(cm)	1.1(0.4-1.7)	0.81(0.6-1.2)	1.02(0.8-1.4)	0.9(0.8-1)
Prostatic urethra(cm)	0.91(0.7-1.4)	0.63(0.5-0.9)	0.7(0.6-0.8)	-
Bladder neck(cm)	0.62(0.4-0.8)	-	0.5(0.4-0.7)	-

remains unknown(3,7). They were seen generally in young patients. Unrecognized trauma in childhood and ischemic origin in elderly men might be the most likely causes of idiopathic strictures (15,16). But still these were uncertain reasons, further researchs are needed to find out the cause of these idiopathic strictures. Lumen et al mentioned that you could identify every causes in this area except idiopathic one (1). Nevertheless, in a study by Astolfi et al, idiopathic strictures were identified in a great number of their patients (21.7%) but they did not emphasize the site of the stricture. They found rates were comparable with the rates observed in other series (1, 4, 8) and concluded that there was a remarkable variation in idiopathic etiology of urethral stricture in some series to the developed countries (18–44%) (1,3) when compared with developing countries (4–32%) (17,18). Although there were no published studies about the idiopathic etiologic factor of posterior urethral stricture, we observed this factor in 11(9.5%) patients, aged >60 and 6 of them especially at membranous urethra in our study.

Trauma plays a very important role in the etiology of posterior urethral stricture disease. Different mechanisms of trauma like straddle injuries (4) and pelvic fracture-related urethral injuries were stated as the causes of traumatic posterior urethral strictures(4,10). The mechanism can be explained by the compression of the pelvic ring, leading to a superior bladder displacement with resulting urethral stretching and disruption at the bulbo-membranous junction (10). In a study by Alwaal et al straddle injury was shown the most common cause (19) while a study from Brazil demonstrated the most traumatic events were secondary to pelvic fracture distraction injuries (62.3%) (10). Trauma remains the most frequent cause (51.76%) of urethral strictures in China. The rate of traumatic urethral strictures was much higher in China than in the USA (14%)(3) and Italy (10.8%)(4) and was similar to the rate in India (54%)(21). Motorcyclists and bicyclists in China are at the highest risk for pelvic fracture and urethral disruption(6). In these cases, pelvic traumatic serious damages could explain why the ratio of urethral strictures from pelvic fracture urethral distraction injuries(PFUDI) (37.87%) was higher than urethral strictures from perineal straddle injuries (14.32%). In Brazil there was still high rates of PFUDI due to poor traffic conditions like in China (10). So it is essential to make all efforts to provide safer traffic in order to decrease the incidence of these traumatic urethral strictures. Of 116 patients in the current study, traumatic cause was seen in 24(20.7%) patients where the locations of the strictures were in membranous and prostatic urethra. Similar to other studies,we found perineal straddle injuries and iatrogenic injury secondary to urethral instrumentation quite often.

The treatment options for urethral strictures were optical internal urethrotomy(OIU), open urethroplasty or urethral dilation which is the old form of treatment for urethral stricture. Depending on the site of the stricture, endourological interventions decreased significantly, and the rates of open urethroplasty, mostly substitution urethroplasty, increased significantly during the last three years(6). OIU has been a widely used procedure that is simple, easy to perform, safe and characterised by a short convalescence. Bullock et al (22) found that American urologists (58%) do not regularly perform urethroplasty and frequently tend to continue palliative treatment methods of urethral dilation or OIU. We considered OIU and urethral dilation to be the main treatment method for short strictures of the posterior urethra (mean length<2cm) in our study. It is very important for the urologists to keep in mind the disadvantages of repeated urethral dilation and OIU which was the expansion of scar formation and stricture recurrence.

CONCLUSION

In our instution, iatrogenic causes especially TUR-P and TUR-BT were the most seen etiologic factor of posterior urethral stricture. These findings suggest the need of careful endoscopic manipulation and use of suitable calibered instrumentation. Traumatic causes account for about one of three cases. We also determined idiopathic causes in the etiology of posterior urethral stricture and inflammatory etiologies were still less frequently observed factor in our hospital.

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REFERENCES

1.)Lumen N, Hoebeke P, Willemsen P, et al. : Etiology of urethral stricture disease in the 21st century. J Urol. 2009; 182: 983–87.
2.)De Sy WA, Oosterlinck W, Verbaeys A. Le traitement du retrecissement de I' uretre masculine. Acta Urol Belg.1981; 49:101–2
3.)Fenton AS, Morey AF, Aviles R, et al: Anterior urethral strictures: etiology and characteristics. Urology 2005; 65: 1055-58.
4.)Palminteri E, Berdondini E, Verze P, et al. : Contemporary urethral stricture characteristics in the developed world. Urology 2013; 81: 191–96.
5.)Mathur R, Aggarwal G, Satsangi B, et al. : Comprehensive analysis of etiology on the prognosis of urethral strictures. Int Braz J Urol. 2011; 37: 362–69.
6.)Xu YM, Song LJ, Wang KJ et al. Changing Trends in the Causes and Management of Male Urethral Stricture Disease in China: An Observational Descriptive Study From 13 Centres. BJU Int. 2015; 116(6):938-44.
7.)Barbagli G, Guazzoni G, Lazzeri M: One-stage bulbar urethroplasty: retrospective analysis of the results in 375 patients. Eur Urol. 2008; 53: 828-33.
8.)Santucci RA, Joyce GF, Wise M. Male urethral stricture disease. J Urol.2007; 177: 1667–74.
9.)Santucci RA, Mario LA, McAninch JW. Anastomotic urethroplasty for bulbar urethral stricture: analysis of 168 patients. J Urol. 2002; 167: 1715–19.
10.)Astolfi RH , Lebani BR, Krebs RK et al. Specific Characteristics of Urethral Strictures in a Developing Country (Brazil).World J Urol. 2019; 37(4):661-66.
11.)Rassweiler J, Teber D, Kuntz R, et al., Complications of transurethral resection of the prostate (TURP) – incidence, management, and prevention. Eur Urol. 2006; 50: 969–79.

12.)Elliott SP, Meng MV, Elkin EP, McAninch JW, Duchane J, Carroll PR, CaPSURE Investigators : Incidence of urethral stricture after primary treatment for prostate cancer:data from CaPSURE. J Urol. 2007;178: 529-34.
13.)Tascı AI, Ilbey YO, Tugcu V, Cicekler O, Cevik C, Zoroglu F: Transurethral resection of the prostate with monopolar resectoscope: single- surgeon experience and long-term results of after 3589 procedures. Urology. 2011; 78:1151–55.
14.)Kashefi C, Messer K, Barden R, et al. : Incidence and prevention of iatrogenic urethral injuries. J Urol. 2008; 179: 2254–57.
15.)Depasquale I, Park AJ, Bracka A. The treatment of balanitis xerotica obliterans. BJU Int. 2000; 86(4):459–65.
16.)Baskin LS, McAninch JW. Childhood urethral injuries: perspectives on outcome and treatment. Br J Urol. 1993; 72(2):241–46.
17.)Stein DM, Thum DJ, Barbagli G et al . A geographic analysis of male urethral stricture aetiology and location. BJU Int. 2013; 112(6):830–34.
18.)Fall B, Sow Y, Mansouri I et al. Etiology and current clinical characteristics of male urethral stricture disease: experience from a public teaching hospital in Senegal. Int Urol Nephrol. 2011; 43(4):969–74.
19.)Alwaal A, Blaschko SD, McAninch JW, et al. Epidemiology of urethral strictures. Transl Androl Urol. 2014; 3(2):209-13.
20.)Guo FF, Lu H, Wang GJ et al. Transurethral 2-microm laser in thetreatment of urethral stricture. World J Urol. 2010; 28: 173–5.
21.)Mathur R, Aggarwal G, Satsangi B, et al. Comprehensive analysis of etiology on the prognosis of urethral strictures. Int Braz J Urol. 2011; 37: 362–9.
22.)Bullock TL, Brandes SB. Adult anterior urethral strictures: a nationalpractice patterns survey of board certified urologists in the United States. J Urol. 2007; 177: 685–90.

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