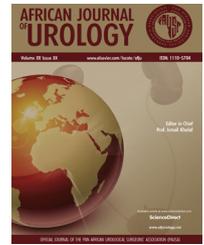




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### Original article

# Clinical presentation and treatment of urethral stricture: Experience from a tertiary hospital in Port Harcourt, Nigeria



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#### KEYWORDS

Urethral stricture disease;  
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#### Abstract

**Introduction:** Urethral stricture disease (USD) is a common urological problem. The aetiology of strictures has been changing. Different treatment modalities are available.

**Objectives:** To present the pattern and management of USD in Port Harcourt.

**Subjects and methods:** This was a retrospective study of all cases of USD treated in Port Harcourt Teaching Hospital between 2005 and 2015. All the case notes of patients treated for USD were retrieved. Data on demography, aetiology, site, treatment and outcome of treatment of USD were collated and analyzed using SPSS 20.0.

**Results:** Within the period, 194 patients with urethral stricture were treated. There were 188 males (96.9%) and 6 females (3.1%). The mean age was  $48 \pm 9.24$  SD years. One hundred and forty four strictures (74.22%) were due to trauma. Of these, 37 (19.07%) were iatrogenic and 107 (55.15%) resulted from road traffic accidents, fall astride, etc. Forty eight (24.75%) and 2(1.03%) had post inflammatory and malignant urethral strictures respectively.

Eighty two patients (42.27%) had anterior urethral stricture; while 78 (40.20%) had posterior urethral strictures. Twenty eight (14.43%) patients had long segment stricture involving both anterior and posterior segments. Twenty four and 71 patients had substitution and anastomotic urethroplasties respectively. One patient had penectomy for malignant stricture while 61 had endoscopic surgery. Twenty two percent had complications including: bleeding, wound infection and re-stricture. The stricture recurrence rate was 11.34%.

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*Conclusion:* Trauma is the leading cause of USD in Port Harcourt. Iatrogenic strictures were common. Urethroplasty gives satisfactory outcome. Efforts should be made to reduce urethral injuries.

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## Introduction

Urethral stricture is the narrowing of the calibre of the urethra caused by the presence of a scar consequent on infection or injury [1]. It is one of the commonest complications of urethral injuries. It is one of the oldest known urological diseases [2]. Ancient Egyptians treated stricture diseases 4000 years ago [3]. It is a common problem worldwide affecting mainly the male urethra [4]. Stricture disease can have profound impact on quality of life. It may lead to urinary tract infection, bladder calculi, fistulae, sepsis, and ultimately renal failure [5].

Urethral stricture could be congenital/idiopathic or acquired [6]. Acquired urethral strictures may arise from iatrogenic cases following catheterization, surgery or instrumentation; traumatic strictures from straddle injuries or pelvic fractures and infectious or inflammatory strictures caused by gonorrhoea or lichen sclerosis [6–8].

A multitude of treatment modalities have evolved aiming to cure these patients but none has proven to be suitable for all types of strictures [9]. Repeated urethral bouginage was the predominant modality in Africa. Direct visual internal urethrotomy (DVIU) is increasingly being performed with the advent of endoscopy [4]. Urethroplasty is the most effective method for definitive correction of urethral stricture disease and this approach is generally considered to be the gold-standard of treatment [6,10,11].

The cause of urethral stricture disease varies with geographical location. The most common cause of urethral stricture in Nigeria is inflammatory. This picture has remained so in Zaria [12]. The aetiology was later discovered to be mostly traumatic in Nnewi and Lagos [13,14]. The traumatic urethral strictures are becoming increasingly important on our environment due to increase in civil violence especially cult activities and accidents following boat mishap in Niger Delta region in Nigeria. Endoscopic urological procedures are increasingly performed in Port Harcourt, hence the possibility of increase in iatrogenic strictures. The pattern of urethral stricture disease in Port Harcourt is yet to be determined. This study is to highlight the aetiology, treatment and outcome of urethral stricture disease in Port Harcourt, Niger Delta region of Nigeria.

## Subjects and methods

This was a retrospectively study of all patients who had urethral stricture disease in University of Port Harcourt Teaching Hospital between January 2005 and June 2015. The total number of patients who had surgical interventions for urethral stricture surgeries were obtained from the theatre and wards records. Their case notes were retrieved from medical records department. Information about patient's demographic characteristics, clinical presentation, investigations, treatment, complications and outcome of treatment were extracted.

Following trauma, the patients who had urethral injuries had diversion of the urine via suprapubic catheters except in cases that we considered the injuries minimal; in such instances we made single attempts at urethral catheterisations. Results of the full blood count, serum electrolytes, urea and creatinine, urinalysis, urine culture and sensitivity were checked for each patient before and after surgery. Also, the patients' voiding cystourethrogram (VCUG), retrograde urethrogram (RUG) or cystoscopy results were evaluated. We also checked patients' clinical conditions before corrective surgeries were performed. All patients had definitive surgical correction after six months or more following trauma. The choice of treatment modality was individualized. Patients with short segment strictures had urethral dilatation, direct visual internal urethrotomy or anastomotic urethroplasty. Patients who had long segment strictures had a form of substitution urethroplasty in one or 2 stages as the case may be.

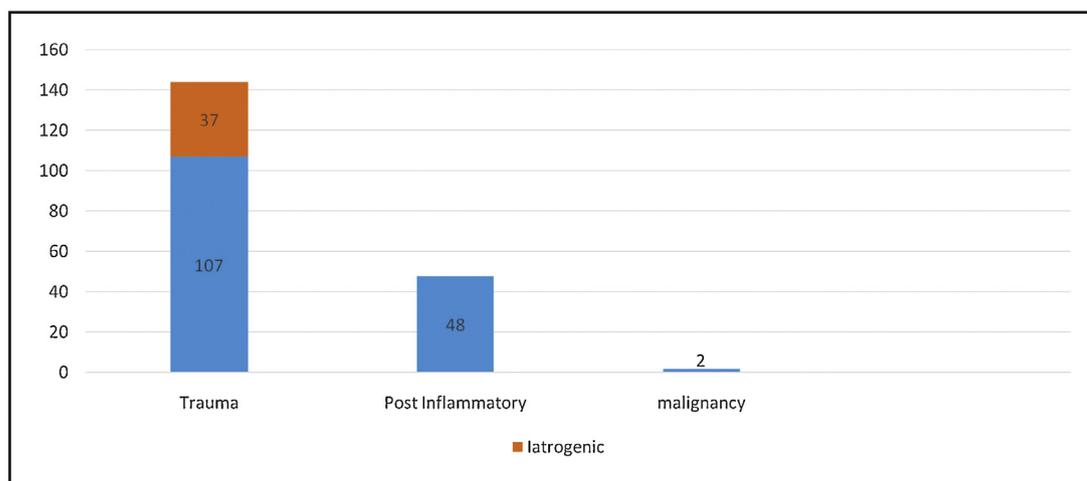
The various treatment modalities performed for the patients were recorded. Silicone coated Foley's catheter for patients post-operatively initially, later silastic catheters were routinely used for all patients after surgery. These catheters were retained for six weeks after surgery before they are removed. We routinely use peri-operative antibiotics. Usually fluoroquinolones were given for about a week and then continued with urinary antiseptics such as nitrofurantoin until the urethral catheter was removed. The outcome of treatment was determined by clinical improvement. Results of post-operative pericatheter imaging studies were recorded.

Post-management complications were sought for and recorded. Initially, subjective assessment of urinary flow using visual assessment and patients' report were adopted, but lately objective assessment with uroflowmetry was being used for follow-up. The data obtained from the above records was analyzed using SPSS version 20.00 and presented as charts, tables and figures.

## Results

There were 194 patients treated for urethral stricture within the study period. The youngest patient was 4 years while the oldest was 82 years. The mean age of the patients was  $48 \pm 9.24$  years. As shown in Table 1, the peak age incidence was between 20 and 39 years ( $n = 78$ ; 40.2%). There was a male preponderance with a male-to-female ratio 31.3:1.

Trauma constituted the commonest aetiological factor for urethral stricture ( $n = 144$ ; 74.22%). Of this, 37 patients' stricture (19.07%) were due to iatrogenic causes from poor techniques of urethral catheterization and endoscopy while the remaining 107 patients' stricture (55.15%) resulted from road traffic accident, pelvic fracture and fall astride injuries over blunt edges, including the edge of canoes. Forty-eight patients (24.75%) had post inflammatory urethral



**Figure 1** Aetiological factor of urethral stricture.

**Table 1** Age and sex distribution of urethral stricture.

Age (years)	Number (%)	Sex
0–19	14 (7.22)	Male
20–39	78 (40.20)	Male
40–59	54 (27.84)	Male
60–79	41 (23.71)	Male
	5 (2.57)	Female
>80	1 (0.51)	Male
	1 (0.51)	Female
Total	194 (100)	Male – 188 Female – 6

**Table 3** Treatment modalities for urethral stricture.

Procedure	Number	%
Urethroplasty substitution	24	12.37
Anastomotic	71	36.61
Penectomy	1	0.51
Dilatation	37	19.07
Endoscopy (DVIU)	61	31.44
Total	194	100.0

**Table 2** Sites of urethral stricture.

Site	Number (%)
Bulbar	78 (40.20)
Prostatic	9 (4.63)
Membranous	69 (35.57)
Fossa navicularis	4 (2.07)
Female Urethral	6 (3.10)
Long segment	28 (14.43)
Total	194 (100)

stricture while 2 patients (1.03%) had malignant urethral stricture as shown in Fig. 1.

Four patients (2.07%) had associated fistulae. Three patients (1.54%) had urethro-cutaneous fistula and 1 (0.51%) patient had vesico-cutaneous fistula with fracture head of the femur.

Table 2 showed the site of stricture, 78 patients (40.20%) had stricture at bulbar urethra, this was closely followed by stricture at membranous urethra ( $n=69$ ; 35.57%), 28 patients (14.43%) had long segment urethral stricture, 9 patients (4.63%) had prostatic urethral stricture. Also, 4 patients (2.07%) presented with stricture at fossa navicularis, 6 patients (3.10%) were female with short segment urethral stricture.

Ninety five patients (48.98%) had urethroplasty. Out of these substitution urethroplasty was done in 24 patients (penile skin island flap  $n=22$ , buccal mucosal  $n=2$ ), while 71 patients had anastomotic urethroplasty. Direct vision internal urethrotomy (DVIU) was done for 61 patients (31.44%), 37 patients (19.07%) had serial urethral dilatation and 1 patient with malignant urethral stricture had total penectomy. The type of treatment administered is shown in Table 3.

Forty two patients (21.64%) had various types of post-operative complications. Twenty two patients (11.3%) had re-stricture and 7 patients (3.6%) had infection. The infections were due to epididymo-orchitis in 2 patients who had DVIU while 5 patients had surgical site infection following urethroplasty. Direct vision internal urethrotomy had the highest complication rate. Out of 61 patients who had this procedure 8 patients had bleeding while 13 patients had re-stricture that warranted repeated procedure and urethroplasty. Bleeding occurred in 13 patients (6.70%), this occurred in 8 patients (4.12%) who had DVIU; the procedure was abandoned in 4 patients due to false passage and significant urethral bleeding, though none of the patient had blood transfusion. Also 4 patients had bleeding after urethral dilatation though these were minimal and 4 patients had re-stricture due to poor compliance with dilatation schedule (Table 4).

One hundred and seventy two patients (88.7%) had satisfactory outcome in their treatment. There was no mortality recorded in the course of treatment.

**Table 4** Post-management complications of urethral stricture.

Procedure	Complications		
	Bleeding ( <i>n</i> )	Infection ( <i>n</i> )	Re-stricture ( <i>n</i> )
Substitution urethroplasty	1	2	1
Anastomotic urethroplasty	2	3	4
Urethral dilatation	2	0	4
DVIU	8	2	13
Penectomy	0	0	0
Total	13	7	22

## Discussion

Urethral stricture is a common disease in men [15]; it is rare in women [16,17]. Since men have a longer urethra than women, urethral stricture is more common in men than women [18]. In this study, there was male preponderance with male to female ratio of 31.3:1. Among the female, it is commoner in the elderly [19], and all female urethral strictures in this study occurred above the age of 60 years. In elderly menopausal women, lack of oestrogen causes atrophic vaginitis and urethral stenosis with poor urinary flow and urinary retention [20].

Stricture of the urethra has been reported to be more common in men less than 45 years [21]. This was also the picture in our study where 92 patients (47.42%) were below 40 years. Forty one patients within the age range of 60–69 years had urethral stricture while above 80 years only 2 patients (1.02%) had stricture disease. This observation may be attributed to the fact that trauma is the leading cause of the stricture in the study. Trauma is known to be more common in active highly mobile young men.

All strictures in this study were acquired as has been reported elsewhere [22,23]. At present, trauma is the leading cause of stricture worldwide [24,25]. Inflammatory conditions have been implicated in some arrears of Africa [7,12]. More than 74% of patients in this study had post-traumatic urethra stricture disease, this distantly followed by inflammatory causes in 48 patients. The main causes of trauma in this study were road traffic accidents with associated pelvic fracture, fall astride objects, and gunshot injuries to the perineum. Militancy, cult-related violence, and the use of motor cycles as a means of transport also contributed to urethral injuries in our region. Since our city is in the riverine Niger Delta, canoe is used very often for fishing as well as a means of transport. Fall astride over the edge of a canoe is not an uncommon cause of urethral injuries and subsequent urethral stricture in our centre.

Iatrogenic causes of urethral stricture are rising [26]. This picture differed from a report in Nnewi [13]. Iatrogenic injuries caused by wrong sized, poorly lubricated urethral catheters; inexperienced health personnel, and urinary tract instrumentation occurred in almost a quarter of the traumatic cases. Recent introduction of endourology in this centre may have contributed to these cases of iatrogenic strictures. Learning curve and use of inappropriate sized instruments as well as failure of adequate lubrication of endoscopes may contribute to the observed iatrogenic strictures. Iatrogenic strictures have also been caused by inexperienced interns who pass wrong sized and inadequately lubricated urethral catheters. The balloons of some of these catheters were sometimes inflated within the urethral lumen. All these lead to injuries to the urethral with the

resultant strictures. Three patients had catheter associated urethral strictures following prostatectomy. All had silicone coated catheters after prostatectomy. We now routinely used silastic catheters.

Post-inflammatory strictures did not play as much role in this study as has been previously reported [12]. Use of antibiotics for treatment of urethritis reduces that progression to spongiofibrosis and strictures. This may be responsible for the observed low contribution of inflammation as a major cause of USD in this study.

Malignant urethral stricture is rare [27]. This may explain the fact that only 2 patients were seen in this study.

Stricture can be divided into two main types, anterior and posterior which differ not only in the location but also in their underlying pathogenesis [28]. In this study, 56% of the stricture occurred in anterior urethra, this is similar to report in Nnewi [13] where 51.6% of traumatic strictures were in anterior urethra. Distraction defects are processes of membranous urethra associated with pelvic fracture [29]. About 40% of our patients had posterior urethral stricture membranous (35.5%), prostatic (4.6%). This is comparable to 37% reported by Nwofor and Ugezu [13].

Although various means of reconstructing the urethra exist, the best technique has not yet been clearly defined [30]. The treatment of urethral stricture includes urethral dilatation [10,17,19]. Several methods for urethral dilation exist, including dilation with a balloon, filiform and followers, urethral sounds, or self-dilation with catheters [28]. Urethral sounds were commonly used in this centre. Bougienage (dilatation) of the urethral stricture is the oldest form of treatment and was used even in the pre-Christian era [31]. Thirty seven patients (19.07%) had this procedure. The indication included patients with short-segment USD; who did not accept definitive surgical treatment or who were not suitable for major surgery [31].

Direct vision internal urethrotomy (DVIU) is performed by making a cold-knife transurethral incision to release scar tissue, allowing the tissue to heal by secondary intention at a larger calibre and thereby increasing the size of the urethral lumen [28]. Overall, studies have shown no difference in recurrence rates following urethral dilation versus internal urethrotomy [32,33]. Many studies have evaluated the benefit of placing a urethral catheter after urethrotomy, although no consensus has been reached to date on whether to leave a catheter and, if so, for what duration [34,4,35–37] in this series, 61 patients (31.44%) had DVIU with all patients had urethral catheterization after the procedure. Some studies have evaluated the efficacy of injectable agents such as mitomycin C [28] and triamcinolone [38,39] into the scar tissue at the time of DVIU to decrease the recurrence rate. Some patients were given triamci-

nolone in this series; this practice is new in our centre, therefore no preliminary results available for comparison. We usually decide to do urethroplasty if DVIU is not fully satisfactory after 3 attempts.

Urethroplasty is the gold standard for the treatment of urethral stricture disease [6,40,41]. The choice of technique for urethroplasty for an individual case largely depends on the expertise of the surgeon, size and site [29]. Anastomotic urethroplasty was the commonest surgical intervention in this study, 71 patients (36.61%) had the procedure, while 24 patients (12.37%) had substitution urethroplasty. Anastomotic urethroplasty was done for mainly short segment bulbar urethral stricture. It involves total excision of the stricture, spatulation of the two ends and end to end anastomotic [29].

Substitution urethroplasty is performed for long segment bulbar, or penile urethral stricture. Most of our urethroplasties were done at one stage as had been reported elsewhere [42–44]. Flaps or grafts can be used. Penile skin island axial was used in 22 patients while 2 patients had buccal mucosal as graft.

The treatment of urethral stricture is associated with complications [45–48]. The complications depend on the modality of treatment. Bleeding either haematuria or haematoma formation, in 25 patients, wound infection in 7 patients and re-stricture in 22 patients were the commonest complications. DVIU had the highest complication rate, 54% of patients who had DVIU had associated complication.

Most patients were follow-up for at least 18 months after surgery. For some patients, good urinary stream were adjudged using patients' report and occasionally, visual assessment of the urinary flow. Recently, uroflowmetry has been incorporated into the evaluation of patients. This gave objective assessment of the urinary flow.

Over 88% patients had satisfactory outcome. Those with complications were treated accordingly. Infections were treated with appropriate antibiotics. The causes of re-stricture in this study were: wrong choice of appropriate method treatment method especially DVIU and dilatation, excessive spongiofibrosis from gunshot injuries and difficult anastomoses especially in membranous urethral strictures. Re-stricture was treated with either open urethroplasty or dilatation depending on initial treatment and extent of stricture.

## Conclusion

Urethral stricture occurred in all age groups. Trauma was the leading cause in our environment. Iatrogenic strictures were significant. Bulbar urethra was mostly affected and urethroplasty was the mainstay of treatment with satisfactory outcome. Direct vision internal urethrotomy is relatively new, and has been gaining acceptance for single, short segment urethral stricture. Post-operative follow-up record has been poor in the past. The use of uroflowmetry has provided objective assessment of the success rate recently.

Enforcement of traffic rules will reduce road traffic accidents. Positive engagements of youths will reduce civilian violence and militancy. Improved skills will reduce iatrogenic urethral injuries.

## Contribution to knowledge

The aetiology, treatment and outcome of treatment of urethral stricture in our subregion presented for the first time. This study has shown that civilian violence, militancy and disregard to traffic rules contribute significantly to urethral injuries with attendant urethral strictures. Introduction of endourologic procedures to our sub region has increased the contribution of iatrogenic component of urethral stricture in this part of the world.

## Authors' Contribution

O.N. Ekeke – conception of study, manuscript preparation, data collection, final write up (60%)

O.E. Amusan – Data collection, statistical analysis, manuscript preparation (40%).

## Conflict of interest

None declared.

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None declared.

## Ethical approval

Obtained.

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