



# Factors Affecting Recurrence Rate of Urethral Stricture Following Internal Urethrotomy

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## Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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## ABSTRACT

**Background:** Urethral stricture (post-scarring contraction in the urethral mucosa) is among the most challenging clinical conditions in urology. In Pakistan, Urethral stricture is a high-volume disease and constitutes 4-5% of urology workload (majority of them being in the 3rd to 5th decade of life). Different urethral strictures have different management option depending upon site, size and number of recurrences. OIU is indicated for urethral stricture for small (1.5 cm) bulbar and membranous urethral stricture. However, recurrence of strictures after OIU is quite common (4 to 5%). It has been proposed that duration and size of catheter after OIU effects the recurrence rate. The foremost management choice is internal urethrotomy, but recurrences are common, and many believe that the duration and size of catheterization post internal urethrotomy may affect the recurrence rate.

**Objective:** To determine the factors affecting recurrence rates of urethral stricture after internal urethrotomy.

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**Methodology:** It was Quasi Experimental Study conducted in Urology ward of Dr. Ziauddin University Hospital, Karachi from 10<sup>th</sup> March 2020 to 31 december 2021. Total 60 patients were included; all of the patients were divided into four equal groups. All the patients were followed quarterly for 12 months and data was recorded for urinary flow, retention, burning sensation during urination. UFM, Cystoscopy and urethrogram were done once indicated. Symptomatic patients or patients with UFM 15ml/sec were checked for recurrence followed by cystoscopy if needed. The data analysis was obtained using SPSS v. 21.0.

**Results:** The mean age of the sample stood at 27 (SD  $\pm$  4) years (range: 20 to 40) years were enrolled in the study. Urethral stricture disease recurred cumulatively in 24 (40%) patients within 12 months. Mean duration of catheterization was  $8.71 \pm 1.1$  and  $2.97 \pm 0.91$  days in patients with and without recurrences, respectively ( $p=0.001$ ). Catheter dwell times for  $\geq 7$  days was associated with increased recurrence ( $p=0.039$ ). Of the patients with recurrent strictures, increased catheter diameter was also associated with higher recurrence rates ( $p=0.041$ ).

**Conclusion:** After careful consideration, it can be concluded that longer catheter in-dwell time and greater catheter diameter lead to a greater probability of stricture recurrence and hence the indwell time should be limited to  $\leq 3$  days and the catheter size chosen to be no more than 16Fr.

**Keywords:** *Urethral stricture; stricture recurrence; internal urethrotomy; catheter diameter; catheter indwell time.*

## 1. INTRODUCTION

A urethral stricture manifests as a contraction cause by scaring and fibrosis of mucosa of urethra and or adjacent tissue of spongiosum in the urethral cavity [1]. Urethral strictures are still the most challenging problem for urologist [2]. The urethral strictures greatly ruin the patient's QOL (quality of life) by causing urinary disorders and also destroy the entire urinary tract leading to loss of function of kidneys [3].

Urethral strictures prevalence in industrial countries is predicted to be around 0.9% with an estimated incidence of 0.6% [4]. Approximately more than 5,000 medical consultations per year are affected by urethral strictures [5]. Almost all strictures that can determine the cause can be obtained. A recent meta-analysis of etiology found that most common causes are idiopathic (33%) and iatrogenic (33%), followed by post-traumatic (19%) and inflammatory (15%) [6]. The management of urethral stricture depends upon the location, length and characteristics of the stricture due to its complexity [7]. It also depends on the anatomy, pathophysiology and specific reconstruction technique for each patient [8].

Cochrane review carried out in 2012 reported that there are four main procedures accessible and convenient for the management of urethral stricture: periodic dilatation, endoscopic urethrotomy (Optical Internal Urethrotomy), indwelling ureteral stent or urethroplasty each having its own indications [9]. The technique of Opening stricture through transurethral incision with cold knife under direct visualization-DVIU (direct visualization internal urethrotomy) is

known as internal urethrotomy [10]. For a urethral stricture which is single, short (< 1 cm), flimsy and not treated previously, optical internal urethrotomy remains first line of treatment [11].

Leaving indwelling transurethral catheters after optical internal urethrotomy is a routine practice. However, the duration and French(fr) size of indwelling urethral catheter after OIU is debatable [12]. Several studies have proven its efficacy in smooth recovery post OIU and decreasing recurrence rate [13]. No evidence has been reported to have difference in the recurrence rate with varying indwelling catheter size 14fr-24fr [14]. Various authors suggest that the time duration of catheterization should be modified according to the features of the stricture [15]. A US urologist survey found that 51% of patients placed the catheter for 2-7 days [16]. Dutch urologists reported that catheters were removed only one day after DVIU in 81% of patients who underwent OIU in Holland [17].

Major limitations of OIU are high recurrence rate. Wang et al, in there study reported that recurrence rate after OIU within 1 year is around 50%. Multiple techniques have been used by different surgeons to minimize the fibrosis and subsequent contraction of wound in order to prevent the stricture [18]. Unfortunately no technique has been proven successful in preventing the urethral stricture recurrence [19]. Since there is no consensus on optimum duration and size of post OIU indwelling catheter internationally as well as locally. We designed this study to reach a conclusion that what duration and size of post OIU indwelling per

urethral catheterization is optimum in order to minimize the rate of recurrence of urethral strictures.

## 2. OBJECTIVE

To determine the factors affecting recurrence rates of urethral stricture after internal urethrotomy.

## 3. METHODS AND MATERIALS

This quasi-experimental study was conducted upon a sample of 60 patients (after taking written informed consent), divided into 4 groups of 15 each (aged 20 to 40 years, presenting with a urethral stricture from 10th March 2020 to 31st Dec 2021 at Dept. of Urology – Dr. Ziauddin University Hospital, Karachi. Primary endpoint (success) was achieved if patient was asymptomatic and the flow rate > 15 mL / sec on UFM. Symptomatic patients were checked for recurrence. The data obtained was analyzed using SPSS v. 21.0.

### Inclusion Criteria:

- ❖ Patients aged 20-40 years
- ❖ Stricture less than 1.5 cm
- ❖ Patients presenting with single stricture

### Exclusion Criteria:

- ❖ Post Radiation strictures or failure of Direct visualization internal urethrotomy surgery, and use of urethral stent instead of a catheter
- ❖ Patients with prostate enlargement on urethroscopic examination or medication
- ❖ Patients' post-hypospadias surgery

All cases were performed under the supervision of 2 consultant urologists, a two way silicon

urethral catheters (16 Fr-18Fr) was placed for at the end of DVIUs. Patients were grouped as:

- Group A had post op indwelling catheter of 16 Fr size for < 3 days.
- Group B had post op indwelling catheter of 16 Fr size for > 7 days.
- Group C had post op indwelling catheter of 18 Fr size for < 3 days.
- Group D had post op indwelling catheter of 18 Fr size for >7 days.

Patients with urethral catheters were sent home on their first postoperative day. After removal of the catheter, on the operating day depending on the groups in which they are allocated, patients were followed up on 12 weekly interval at 1, 3, 6, 9, and 12 months postoperatively. Symptoms associated with recurrence were noted, including reduced urinary flow, urinary retention, and burning sensation during urination. On followup if the patient is asymptomatic and the flow rate is > 15 mL / sec on UFM, the procedure considered successful. Patient with cystoscopy and Retrograde urethrography were followed and checked for recurrence if the patient was symptomatic or experienced a significant decrease in flow rate.

## 4. RESULTS

The mean age of the sample stood at 27 (SD ± 4) years (range: 20 to 40) years were enrolled in the study. Urethral stricture disease recurred cumulatively in 24 (40%) patients within 12 months. Mean duration of catheterization was 8.71 ± 1.1 and 2.97 ± 0.91 days in patients with and without recurrences, respectively (p=0.001). Catheter dwell times for ≥7 days was associated with increased recurrence (p=0.039). Of the patients with recurrent strictures, increased catheter diameter was also associated with higher recurrence rates (p=0.041).

**Table 1. Summary of descriptive statistics**

Variable	Mean	Statistic – n (%)
		<b>27 (SD ± 05)</b>
Age (Years)	Range	20 to 40
Duration of post operative catheterization (Days)	Mean in Recurrence	8.71 ± 1.1
	Mean in Without Recurrence	2.97 ± 0.91
Age Groups categorized according to 5 year bracket	Up to 25	9 (15%)
	26 to 30	17 (28.3%)
	31 to 35	20 (33.3%)
	36 to 40	14 (23.4%)
Recurrence	Yes	24 (40%)
	No	36 (60%)



develop urethral stricture, according to both of them. This can be explained as current study included the patients' up to the 40 years of age. Due to this limitation mean age differs with the other studies mean.

In the current study, we found that 24 (40%) of patients in both groups had urethral stricture recurrence at multiple follow-up intervals within 12 months with the mean duration of catheterization was  $8.71 \pm 1.1$  and  $2.97 \pm 0.91$  days in patients with and without recurrences, respectively. Our results are strengthened by study done in 2016, Emrah Yuruk found the similar result that urethral stricture disease recurred in 45 (23.31 percent) of patients during the first year after DVIU. According to him patients with and without recurrences had a mean catheterization duration of  $7.47 \pm 4.03$  and  $4.79 \pm 1.94$  days, respectively ( $p=0.0001$ ). Catheter stay durations of less than 5 days were likewise linked to higher recurrence ( $p=0.0001$ ). 16.18, 22Fr, and 22Fr catheters were inserted in 22.22 percent, 20 percent, and 57.78 percent of the patients with recurrent strictures, respectively. Higher recurrence rates were also linked to larger catheter diameters ( $p=0.004$ ) [23].

Because the observation intervals and recurrence criteria were not constant, comparing stricture series was problematic. Recurrence rates range from 10% to 58% of the time [24]. Because most patients treated with optical urethrotomy still have major abnormalities following urethrotomy, this reflects the nature of the urethral strictures, which certainly do not cure fully but stable after urethrotomy [25]. Even after several years, some of them begin to improve. Nonetheless, as previously documented, the majority of recurrences occurred during the first year, emphasizing the significance of vigilant follow-up during this time [26].

Our research also discovered that membranous and bulbar urethral strictures were the most common types of strictures in those who had been catheterized for more than 7 days, with the membranous urethra coming in second. A substantial relationship between the location and recurrent urethral strictures was seen in all groups ( $p$ -value 0.021).

Cheng Li, in 2018 discovered in his research that the bulbar urethra is responsible for 46.9% of urethral strictures, followed by penile urethral strictures (30.5%) [27]. The likelihood of sigmoid

curvature and reactive fixity of the urethra are the most common causes of urethral stricture at the bulbar level [28]. This is because of the anatomical curve, which predisposes to bulbar urethral injury in, iatrogenic and straddle urethral injury [29].

In addition, we discovered that urethral stricture recurrence occurred between 6 and 9 months following the procedure, and that the rate of recurrence declined with time until no new instances were reported at 1 year. Naude and Heyns found almost identical findings, stating that if recurrence occurs, it usually happens 3 to 12 months following OIU [30]. This could be due to the use of toxic latex catheters for prolonged periods of time likely aggravated the local mechanical injuries to the urethra by speeding up local cell loss and inflammation while delaying the healing process in the affected areas [31].

Furthermore, in our study we found a statistically significant relationship between the size and length of catheterization kept in all groups. The size and duration (or length) of the catheter remained inside increases the chances of recurring stricture. Desmond et al. suggested that patients with few previous treatments keep the urethral catheter for at least three days, and that patients with poor detrusor function keep it for up to four weeks [32]. Lipsky and Hubmer published the results of a study involving 32 individuals who underwent DVIU. They used a silicon catheter for about 7 days and suggested a 6-month hydraulic self-dilation protocol. After the operation, 25 (83%) of these individuals voided well and required no additional therapy [33]. One reason for the higher recurrence rate of the strictures noticed over time could be the use of "toxic" catheters during optical urethrotomy [34].

Another retrospective study evaluated the recurrence rates of 798 strictures in relation to the postoperative catheter drainage [35]. In 89.7% of the instances, a silicone catheter was employed, with a mean length of 5.5 days. With 1–3, 4–7, and more than 7 days of catheterization, 34 percent, 43 percent, and 65 percent of patients, respectively, suffered recurrence. According to the authors, postoperative catheter drainage for fewer than 3 days appears to reduce the likelihood of recurrence. They didn't say how they came up with the duration of catheterization or the size of the silicone catheter they utilized [30].

There is a scarcity of information on the implications of catheter size on the outcome of IU. In most cases of recurrent urethral stricture, however, ischemia is recognized to have a role in the establishment of the stricture [36]. Larger bore catheters may reduce blood flow and obstruct the re-epithelization process, which will eventually result in the healing of the incised urethra with fibrosis, due to the pressure they exert on the urethral wall [37]. Karakus et al. evaluated meatal stenosis rates in patients who had tabularized incised plate urethroplasty and found that tubularization of the urethral plate over a small-sized (6Fr) catheter prevented meatal stenosis regardless of the patients' age [38].

## 6. CONCLUSIONS

After careful consideration, it can be concluded that longer catheter in-dwell time and greater catheter diameter lead to a greater probability of stricture recurrence and hence the indwell time should be limited to  $\leq 3$  days and the catheter size chosen to be no more than 16Fr.

## CONSENT

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

## ETHICAL APPROVAL

It is not applicable.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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