Visual internal urethrotomy in short segment bulbar stricture

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Abstract

Background: Visual internal urethrotomy (VIU) is a quiet, smooth and popular treatment for male short segment bulbar stricture. The success rates are not promising compared to urethroplasty. Among distinct factors, the percentage of narrowing at the maximum stricture point on a retrograde urethrogram is least studied. This study aimed to evaluate the outcome of VIU in the management of patients with short segment bulbar urethral stricture.

Methods: A total of 40 male patients with short segment bulbar urethral stricture who underwent VIU from May 2018 to February 2020 were studied. We used retrograde urethrogram to assess the stricture site narrowing and Percentage of narrowing was measured. The patients were then subjected to visual internal urethrotomy using a standard 21fr Sachse’s cold knife urethrotome. The preoperative and postoperative uroflowmetry, mean voided volumes were measured at 3rd and 6th months respectively to evaluate the effect of VIU.

Results: The majority of the patients were in the age group of 31-40 years. The mean bulbar urethral stricture length was 1.3 cm. Idiopathic was the commonest cause of stricture in 22 (55%) patients. The postoperative uroflowmetry changes and mean voided volume were improved significantly at the 3rd and 6th months. The recurrence rate was 25% for length ≥ 2cm and 8.33% for length <2cm. Patients with mild to moderate spongiofibrosis have got 100% success rate. Those patients who had severe spongiofibrosis have got a recurrence rate of 36.4%. In the failure patients most of the recurrences occurred in the first year.

Conclusion: Visual Internal Urethrotomy is a safe and time effective procedure for the treatment of short segment bulbar urethral strictures with mild to moderate spongiofibrosis in male patients as a short term treatment. Percentage narrowing of the urethral lumen at the stricture site is a useful predictor of visual internal urethrotomy outcome.

Keywords: Stricture urethra, visual internal urethrotomy, uroflowmetry

Introduction

A urologist’s regular practice includes treatment of urethral strictures, a frequent urological disease. Urethral stricture is the narrowing of the urethra and is described as a scar of the sub-epithelial tissue of the corpus spongiosum that narrows the urethral lumen. As the narrowing progresses, obstruction develops which leads to the symptoms. Stricture disease can have a profound impact on quality of life. It may lead to urinary tract infection, bladder calculi, urethrocystaneous fistula, sepsis and renal failure gradually if unattended. A major contributing factor in developed countries is idiopathic and in developing countries, it is trauma to the peritoneum, pelvis, or instrumentation. Iatrogenic injuries, such as transurethral surgery and traumatic catheterization, account for 45 percent of these injuries. The stricture urethra can happen for a variety of reasons, including infection, skin conditions (most commonly lichen sclerosis), trauma, carcinoma, and even radiation therapy. The condition has a wide range of symptoms and signs that require a definitive treatment from time to time. Similarly, the treatment of stricture urethra has also evolved. From lubricated reed, in the times of Sushruta, the treatment has increased in complexity to urethroplasty. There are different treatment modalities available for stricture urethra but among them, the internal urethrotomy gained a significant level of approach among urologists because of its simplicity, safety and shorter learning curve. Civiale and Ottis developed the first blind internal urethrotome in the 18th century, but without much success due to complications and poor results. Their improvements were enhanced by the development of endoscopic optical systems by Hopkins in 1960 and later Sachse in 1970. It is possible to establish a diagnosis of bulbar urethral stricture and estimate its severity based on physical examination, retrograde urethrogram, cystourethroscopy, and most

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recently sonourethrography. An appropriate treatment plan must take into account the location, length, depth, and density of the stricture. Surgical treatments for urethral strictures include dilatation, visual internal urethrotomy (VIU), stent, and reconstructive techniques. VIU which is also termed as Direct visual internal urethrotomy (DVIU), refers to the procedure that opens the stricture by incising or ablating it transurethrally. The urethrotomy method includes incising scar tissue to permit the stricture portion to extend and the lumen to broaden. VIU proceed to be the foremost commonly utilized procedure and the objective is for the resultant bigger luminal calibre to be kept up after healing. In India, considering the financial foundation urethrotomy is considered compelling for the beginning administration of brief section bulbar urethral stricture in guys. The purpose of this study is to visualize the degree of luminal narrowing at the stricture site on a retrograde urethrogram and to predict the results of visual internal urethrotomy for short segment bulbar urethral strictures.

**Materials and Methods**

It is a prospective study carried out on 40 patients with bulbar short segment stricture from May 2018 to February 2020 at our institute. Inclusion criteria were patients with primary short segment bulbar stricture. Exclusion criteria were patients with a history of prior intervention, consummate urethral lumen narrowing, stricture more preponderant than 2 cm. All the patients experienced a institutionalized preoperative assessment counting essential urine and blood reports, uroflowmetry and a retrograde urethrogram. We utilized retrograde urethrography (RGU) to survey the narrowing at the stricture location, which in turn depends on the degree of spongiosfibrosis, and we related the degree of stenosis with the VIU result for brief portion bulbar urethral stricture. On the retrograde urethrogram film, Percentage narrowing was quantified by comparing urethral diameter at the area of maximum stenosis with that of the normal urethra distal to the stricture [Figure 1]. Quantification for normal urethral lumen was taken distal to the stricture since this component is distended to the maximum due to contrast instillation. Contrast visually perceived in the urethra proximal to the stricture and the bladder ascertained felicitous filling of the distal urethra. With digital x-ray, it was possible to quantify the narrowing on the console in our study [Figure 2].

The patients were then subjected to Visual Internal Urethrotomy utilizing a standard 21fr Sachse’s cold knife urethrotome and an 18Fr Foley catheter was placed [Figure 3]. Foleys was removed on the 7th post-op day. Following removal of the catheter, patients were exhorted to self-dilate with 14fr nelaton’s catheter starting from the 3rd day of removal of Foleys. The patients were exhorted to self dilate once daily for the first month and then once 3 days later. uroflowmetry and mean voided volume was quantified at 3rd and 6th months respectively. Symptom

**Figure 1:** Diagrammatic representation of calculating percentage narrowing of urethral stricture.

**Figure 2:** Retrograde urethrogram stricture length measuring 1.7cm on the console

**Figure 3:** In the same patient VIU being done with sasche’s cold knife with guide wire insitu.

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\text{Percentage Narrowing} = \left[ \frac{(x-y)}{x} \right] \times 100\%
\]
recurrence, inability to pass the nelaton’s catheter and the essentiality for reiterate Visual Internal Urethrotomy were taken as treatment failures.

**Statistical Analysis**

Logistic regression analysis was done to assess the impacts of percentage narrowing, length of the stricture and aetiology on the outcome of VIU. Variables were assessed systematically. After meticulous checking, data were compiled and statistical analyses were done using the computer, based on statistical software (SPSS-Statistical Package for Social Science, version-20). Paired student t-test, one-way ANOVA test and chi-square tests were used for statistical analysis and p-value <0.05 was considered as significant and results were obtained as per parameters.

**Results**

Age distribution: In our study of 40 patients, the majority of the patients, i.e., 42% of them were in the age group of 31 – 40 years, 28% more than 50 years; 25 % in 41 – 50 years and 5 % patients in the age group 21 – 30 years. Mean patient age was 36.98 ± 13.21 years (range 21 to 65) [Table 1].

Aetiology: In the present study, the most common aetiology was found to be idiopathic (55%) followed by iatrogenic (30%), and inflammatory(15%). Iatrogenic causes include traumatic catheterization or instrumentation [Table 2].

Stricture length: In our study, 12 patients (30 %) had a stricture length below 1 cm and 28 patients (70%) had a stricture length between 1 and 2 cm. The mean stricture length on urethrogram film was 1.3 cm [Table 3].

**Table 1: Age distribution**

| Age in years | Number of patients | Percentage |
|--------------|--------------------|------------|
| 21 – 30      | 2                  | 5%         |
| 31 – 40      | 17                 | 42%        |
| 41 – 50      | 10                 | 25%        |
| >50          | 11                 | 28%        |

**Table 2: Etiology**

| Etiology    | Number of patients | Percentage |
|-------------|--------------------|------------|
| Idiopathic  | 22                 | 55%        |
| Iatrogenic  | 12                 | 30%        |
| Inflammatory| 6                  | 15%        |

**Table 3: Length of the stricture**

| Stricture length | Number of patients | Percentage |
|------------------|--------------------|------------|
| < 1cm            | 12                 | 30%        |
| 1 – 2 cm         | 28                 | 70%        |

Percentage narrowing on retrograde urethrogram: The percentage narrowing was calculated from the retrograde urethrogram as described antecedently with the avail of a scale. It was found that out of the 40 cases, 24 patients had a narrowing in the range of 71–80%, 10 patients in the range of 61–70%; 4 patients in the range of 40 – 50%; 2 patients in the range of 51 – 60% [Table 4].

**Table 4: Percentage narrowing on retrograde urethrogram**

| Percentage narrowing | Number of patients | Percentage |
|----------------------|--------------------|------------|
| 40 – 50 %            | 4                  | 10%        |
| 51 – 60 %            | 2                  | 5%         |
| 61 – 70 %            | 10                 | 25%        |
| 71 – 80 %            | 24                 | 60%        |

Uroflowmetry parameters: Among the uroflowmetry parameters there was a significant change in the maximum flow rate (Qmax) from 7.40 ± 3.32 ml/s preoperatively to 18.73 ± 6.60 ml/s and 20.88 ± 7.23 ml/s postoperatively at 3rd and 6th months respectively (p<0.0001) [Table 5].

Mean voided volume: The mean voided volume of patients who underwent was found to have 216.67 ± 88.66 ml preoperatively, whereas at 3rd and 6th months postoperatively it was 275.12 ± 101.34 ml and 365.38 ± 106.55 ml respectively. P-value was found to be <0.0001 which was significant [Table 6].

Treatment result according to percentage narrowing on the retrograde urethrogram: Out of 24 patients who had a narrowing in the range of 71–80%, 6 patients had a recurrence. In 10 patients in the range of 61–70%, 2 patients had a recurrence. There was no recurrence in patients with
40–50% and 51–60% [Table 7]. According to the length of the stricture, 1 patient out of 12 with < 1 cm of stricture urethra and 7 patients out of 28 with 1–2 cm of stricture urethra had recurrence [Table 8].

Time of recurrence in failure cases: Most of the recurrences in the failure patients occurred in the first year. In our study, out of the 8 recurrences, around 5 patients failed in the first year. And 3 patients had recurrence after a year [Table 9].

Of all the 8 recurrent cases, 5 patients underwent second VIU and are in follow-up and 3 patients underwent BMG urethroplasty.

Discussion
Visual internal urethrotomy is an extremely safe procedure and relatively easy to perform and learn. Though the safety and facilitate of the procedure make VIU the treatment of the first choice for short segment bulbar urethral strictures, the success rate of urethrotomy at 5 years is less than that of urethroplasty (50% compared with 83%) and at 10 years it is just 33%.13,14,15 The most common imaging done to evaluate a patient with stricture urethra is retrograde urethrogram. But a slight drawback is that it may sometimes underestimate the true length of the stricture. Despite the minor drawbacks mentioned above, in normal urological practice it is the most common imaging modality performed to decide on visual internal urethrotomy as a management option for stenosis of the short bulbar segment.16,17 Only retrograde urethrogram was used to assess stricture length in our study since good proximal urethral and bladder filling was seen in all cases.

The wall of a normal urethra is relatively thin, smooth, and elastic, as indicated by the diagram of a normal retrograde urethra. But in cases of diseases of the urethra such as stricture, where there is often fibrosis of the corpus spongiosum, it can be objectively assessed by the extent of the stenosis of the lumen of the urethra on the retrograde urethrogram. Thus, the degree of spongiosfibrosis is a critical parameter influencing the appropriate choice of treatment. Although urethral sonography is a good investigation to assess the degree of spongiosfibrosis, it is hampered by the fact that it is not widely available, is more operator-dependent and has a relatively low sensitivity and specificity.

Our current study using the technique of measuring the percentage of stenosis at the site of the maximal stricture on the retrograde urethrogram is an extension of the scientific principle of evaluating spongiosfibrosis on the sonourethrogram.

Uroflowmetry is a useful objective test to follow up patients postoperatively. In studies, it has been found that a maximum flow rate (Qmax) of < 15 ml/sec is considered as recurrence in an operated case of stricture urethra. In the present study, the mean preoperative Qmax was 7.40 ± 3.3 ml/sec and the mean Qmax was 18.73 ± 6.60 ml/sec and 20.88 ± 7.23 ml/sec postoperatively at 3rd and 6th months respectively. By using paired t-test the p-value was < 0.0001, which is statistically significant. In a study by Ankur Jhanwar et al the preoperative Qmax in the VIU group was 5.3 ± 1.96 ml/sec and postoperative Qmax at 3 months was 23.4 ± 2.71 ml/sec.18 In a study, Kenan I et al the mean preoperative Qmax was 7.9 ml/sec and after VIU, the mean Qmax was 19.4 ml/sec at the third month of postoperative period19 and these results are similar to the present study. Pansadoro et al showed that recurrence could be diagnosed in 84% of patients who had stricture recurrence in their series by using a peak flow rate of < 15 ml/sec.13

In the present study, the mean stricture length of patients who underwent VIU was 1.3 cm and the recurrence rate was 25% for length 1-2 cm and 8% for length < 1 cm of stricture urethra. Stricture length more than 1 cm is a highly suggestive predictor of recurrence after VIU, as strictures 1–2 cm in length were associated with increased recurrence rates (25%) compared with those of less than 1 cm (8%) in the present study. There is in agreement with the findings of Al-Ali and Al-Shukry20 who reported that there is clear evidence that stricture length determines the success rate of IU. Santhosh Kumar et al., in his study, has got recurrence rate of 14.5% if length < 2 cm and for 2-4 cm with a recurrence rate of 23.52% for VIU.21 In a study by Shah JV et al, the results of visual internal urethrotomy were excellent in 60 (75%) patients who did not require any other treatment.22 Ramyil et al2 in his study reported a success rate of 80% after internal urethrotomy and these
results were similar to the present study. A review study by Jackson et al concluded that performing intermittent self-dilatation may confer a reduced risk of recurrent urethral stricture after endoscopic treatment. 24

In our study, the degree of stenosis, to determine the percentage of stenosis at the site of the maximal stricture on the retrograde urethra, was found to correlate with the outcome of visual internal urethrotomy. Among the 40 patients who underwent visual internal urethrotomy in our study, 16 patients with stenosis <70% had good outcomes. In particular, all six patients who experienced stenosis in the 40-60% range had good results without recurrence to date. On the other hand, out of the remaining 34 patients who had a narrowing of more than 60% on the Retrograde Urethrogram 8 patients had treatment failure and required reiterate treatment during the follow-up. Thus this method of utilizing the percentage narrowing at the stricture site on a good retrograde urethrogram is a very utilizable method of judging the degree of spongiosis at the stricture site which in turn can be habituated to presage the outcome of VIU. Based on our present study, though the sample size is not great, there is a rough indication that those patients with a percentage narrowing of less than 60% on the retrograde urethrogram had a better outcome with optical internal urethrotomy than those with a percentage narrowing of more than 60%. This result was found to be statistically significant with a p-value of <0.001.

Though there is nothing in the literature to verbally express that multiple VIUs may influence the outcome of a future urethroplasty, it would be prudent to refrain from doing multiple VIUs in a particular patient as there is a chance of worsening the fibrosis and incrementing the length of the stricture thereby precluding the possibility of an anastomotic urethroplasty and necessitating a supersession urethroplasty. 25

The success rate was 80% in the present study, which is much higher than that reported by Al Taweel and Seyam who published that the overall stricture-free rate at the end of 36-month follow-up was 8.3%. This may be due to the inclusion of strictures till 3 cm and the strict success criteria in their study in addition to the small sample size and the short period of follow-up in our study (mean follow-up period was 12 ± 3 months). 26

One of the circumscriptions which we had encountered in our study was in the follow-up of the patients and the compliance of the patients to our ordinant dictations. Though we had given explicit ordinant dictations to the patient concerning the follow-up timetable, many patients turned up tardy and a few did not turn up at all and were omitted from the study. In the same way, though the patients were felicitously authoritatively mandated and demonstrated on the Clean Intermittent Self Catheterisation technique, a few patients had not performed it. Another issue would be the implement used to quantify the degree of narrowing on the Retrograde Urethrogram. With digital x-rays, it was possible to quantify the narrowing on the console in our study [Figure 2].

The limitation of the present study is that the duration of the study was short, which limits us in the evaluation of long term results of visual internal urethrotomy.

VIU is a safe, minimally invasive, facile and time efficacious procedure for the treatment of short segment urethral strictures in male patients as short term management. A facile way to assess the degree of spongiosis is by calculating the percentage narrowing at the maximal site of stricture on a retrograde urethrogram. This may be acclimated to predict the outcome after VIU. In our study, patients with a percentage narrowing of less than 60% on Retrograde Urethrogram had a better outcome than patients who had a percentage narrowing of more than 60%. Thus alternate treatment may be considered for such patients who have a high degree of narrowing on the retrograde urethrogram. In short segment stricture urethra patients with mild spongiosis, a single attempt of VIU can be considered as an initial procedure for short term management. Clean intermittent self catheterization is to be adviced to the patients for a further efficacious outcome of urethrotomy. Urethroplasty has been recommended in patients with recurrent strictures after internal urethrotomy.

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