



## Direct Visual Internal Urethrotomy for the Management of Partial Urethral Strictures: Is it a Viable Treatment Option?

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### Abstract

**Context:** Direct Visual Internal Urethrotomy (DVIU) has been a useful tool in the management of partial urethral strictures. There is limited data on its success rates in black populations. A successful DVIU will spare the patient the stress and rigours of undergoing a urethroplasty. This study intends to look at the outcomes of DVIU in our setting using uroflowmetry.

**Materials and Methods:** This is an observational prospective study of 58 patients that underwent DVIU for short segment anterior Urethral strictures between January 2020 and January 2024 recruited using a consecutive sampling technique.. Patients were monitored after discharge through phone calls and post operative visits.

**Results:** A total of 58 patients were involved in the study with a mean age of 65 years and mean BMI of  $26.4 \pm 3.2$ . Stricture of unknown aetiology (idiopathic) accounted for majority of the cases 31 (53.4%) followed by iatrogenic stricture, 11(19.0%) of all strictures. Traumatic stricture was responsible for (7) 12.1%, inflammatory (6) 10.3% while stricture due to malignancy accounted for 3(5.2%) of all cases. The commonest stricture location was the proximal bulbar 36 (62.1%) followed by penile and distal bulbar representing (19%) of the strictures. Most of the patients 39 (67.2%) had a single stricture. The mean maximum flow rate pre DVIU was  $9.6 \text{ ml/sec} \pm 1.5$  and the maximum flow rate at 6 months post DVIU was  $29.3 \text{ ml/sec} \pm 6.1$  representing an increase by  $19.7 \text{ ml/sec}$  (95% CI 0.7 - 5.3) compared to the pre-intervention period ( $p=0.0059$ ).

**Conclusion:** DVIU seems to be a viable treatment option for patients with partial urethral strictures in our environment. Longer follow up of these patients may be required to substantiate our findings.

Keywords: Urethral Stricture, DVIU, Urethroplasty

### Introduction:

Urethral stricture disease(USD) refers to the narrowing and loss of distensibility of the anterior urethral due to spongiosis.<sup>1</sup>

USD is common, incidence in Nigeria is not clear, its prevalence in the United States is around 200/100,000 in younger men and more than 600/100,000 in men older than 65. The estimated annual incidence rate in the

United States of America is 0.9%.<sup>2</sup> Urethral Stricture rarely affects females.<sup>3</sup>

USD reduces the quality of life of the affected individuals with its attendant psychological effect on the individual as well as the financial burden on the individual and his family at large.<sup>4</sup>

USD can be partial or complete. While complete USD will compulsorily require a urethroplasty, patients

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with short segment partial strictures can benefit from DVIU. DVIU being an endoscopic procedure takes lesser time to carry out, requires a shorter hospital stay and faster return to work than urethroplasty.<sup>5</sup> Many studies in other climes have shown DVIU to be beneficial especially in the short term. Our study set out to look at the outcomes of DVIU in our environment by assessing the uroflowmetry parameters of our patients.

## Materials and Methods

This prospective study was carried out between January 2019 and January 2023. Ethical clearance was obtained and all consenting patients with a suspicion of partial urethral stricture were sent for retrograde urethrogram to confirm the diagnosis. Patients with 1 to 3 short segment partial strictures (each stricture segment less than 2cm in length) as shown on their Retrograde Urethrogram were selected for the study. Exclusion criteria includes patients with complex urethral strictures and patients that have had a previous DVIU.

Pre-operative work up investigations were done including urinalysis, urine culture, full blood count, kidney function test, viral markers and abdominopelvic ultrasound scan. Stricture length, number and aetiology were also recorded. Patients with urinary tract infection (UTI) were treated before proceeding with the procedure.

Patients on Low dose aspirin or clopidogrel were advised to stop at least 10 days to the procedure.

All patients had spinal anaesthesia. DVIU was done with a cold knife using a 21Fr Sheath and a CV-170 combined image processing unit and light source from Olympus, Germany. A guide wire was passed and a single cut made in all patients at the 12 o'clock position sufficient enough to allow the free passage of the 21Fr sheath with its catheter guide. Catheter was then passed and its balloon inflated with 20mls of water for injection. Ceftriaxone was given for 48 hours for each patient and catheter spigotted on the 2nd post-operative day. Patients were then sent home to come for catheter removal in 3 weeks and at 3 weeks follow up advised to return to the hospital if there is a noticeable decline in their urinary stream. Complications were recorded where present.

Uroflowmetry was repeated at 3 weeks post intervention as well as 6 months post intervention. Patients were also contacted at 1 year post intervention to find out if they are still urinating well at that point.

Patients with failed procedure as evidenced by maximum flow rate less than 10mls/s were subjected to a repeat DVIU.

Data was analyzed using statistical package for the social sciences(SPSS) version 21 (IBM, USA). Student's t test was done to compare means between more the 2 groups at a level of significance set at  $p<0.05$ .

## Results

### Sociodemographic characteristics of participants

The socio-demographic characteristics of the 58 patients that received direct visual internal urotherotomy is presented below. The mean body mass index (BMI) of respondents was  $26.4 \pm 3.2$  while the age were within the range of 30 – 39 years (6%), 40 -49 years (2%), 50 – 59 years (12%), 60 - 69 years (14%), 70 – 79 years (18%) and 80 – 89 (6%). The education levels of participants indicated that 3 (5.2%) had no formal education, 12 (20.7%) had primary education, 18 (31.0%) attained secondary education and majority, 25 (43.1%) had tertiary education. The occupation of participants showed that 13 (22.4%) were artisans, 9 (15.5%) were businessmen, 23 (39.7%) civil servants, 7 (12.1%) farmers and 6 (10.3%) professionals. The mean  $\pm$  standard deviation, SD BMI was  $26.4 \pm 3.2$ . This is as

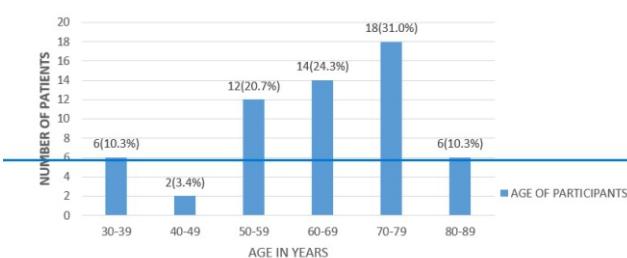


Fig.1. Percentage age distribution of male patients with urethral stricture

Table 1: Socio demographic characteristics of participants

Variables	Frequencies (n=58)	Percentage (%)
<b>Level of education</b>		
None	3	5.2
Primary	12	20.7
Secondary	18	31.0
Tertiary	25	43.1
<b>Occupation</b>		
Artisan	13	22.4
Business	9	15.5
Civil servant	23	39.7
Farmer	7	12.1
Professional	6	10.3
<b>BMI</b>	<b>Mean</b>	<b>SD</b>
	26.4	3.2

shown in Table 1 below.

### Commonest causes of partial urethral strictures in the participants

Stricture of unknown aetiology (idiopathic) accounted for majority of the cases 31 (53.4%) followed by iatrogenic stricture (11) representing 19.0% of all strictures. Traumatic stricture was responsible for (7) 12.1%, inflammatory (6) 10.3% while stricture due to malignancy accounted for (3) 5.2%.

### Common location of partial urethral strictures in our environment

The strictures were mainly located at the proximal bulbar 36 (62.1%) followed by penile and distal

Table 2: Distribution of partial urethral stricture aetiology

Stricture Aetiology	Frequencies (n=58)	Percentage (%)
Iatrogenic	11	19.0
Idiopathic	31	53.4
Inflammatory	6	10.3
Malignant	3	5.2
Traumatic	7	12.1

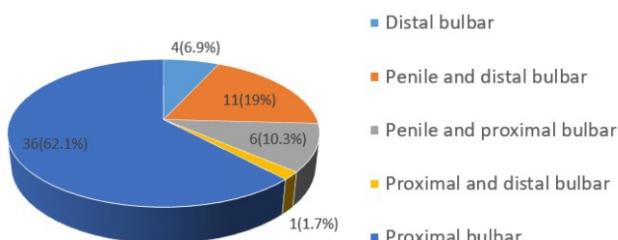


Fig.1: Distribution of location of male urethra strictures in Umuahia

Table 3: Number of strictures

Number of strictures	Frequencies (n=58)	Percentage (%)
1	39	67.2
2	7	12.1
3	7	12.1
4	2	3.4
5	3	5.2

Table 4: Uroflowmetry measurements done during the study

	Pre-intervention mean $\pm$ SD	3 weeks Post Intervention Mean $\pm$ SD	6 months Post Intervention Mean $\pm$ SD
Maximum flow rate(mls/s)	9.6 $\pm$ 1.5	32.4 $\pm$ 6.4	29.3 $\pm$ 6.1
Mean diff Post vs Pre-intervention		22.8 (95% ci -22.0 to -17.5)	19.7 (95% ci 0.7 to 5.3)
P value	<0.0001	<0.0001	0.0059
Average flow rate(mls/s)	4.2 $\pm$ 0.8	11.9 $\pm$ 2.2	11.0 $\pm$ 2.4
Mean diff Post vs Pre-intervention		7.7 (95% ci -7.7 to -6.0)	6.8 (95% ci 0.1 to 1.8)
P value	<0.0001	<0.0001	0.0332

bulbar representing 19% stricture location as shown in figure 1.

### Number of strictures

Most of the patients (39) accounting for 67.2%, had a single stricture. Two strictures were observed in 7 patients (12.1%), while the highest number of strictures, five, was found in 3 patients (5.2%).

### Effectiveness of DVIU in patients with partial urethral strictures using maximum and average flow rates

The uroflowmetry measurements were performed prior to intervention, at 3 weeks and 6 months post-surgical intervention. The mean maximum flow rate (QMax) pre DVIU was 9.6 ml/sec  $\pm$  1.5 pre-intervention. There was a significant increase in the maximum flow rate at 3 weeks and 6 months post DVIU intervention. The maximum flow rate at 3 weeks post DVIU increased by 22.8.ml/sec (95% CI 22.0 -17.5), with a p value <0.0001 which was statistically significant. The maximum flow rate at

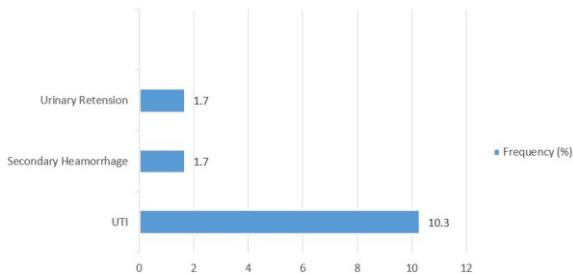


Fig 2: Percentage Distribution of Complications

6 months post DVIU increased by 19.7ml/sec (95% CI 0.7 - 5.3)) compared to the pre-intervention period (p=0.0059). The study revealed a decrease of 3.1ml/sec in the maximum flow rate between the 3 weeks post DVIU period and six months post DVIU as shown in table 4.

The mean average flow rate pre - DVIU intervention was 4.2ml/sec  $\pm$  0.8. There was an increase in the average flow rate 3 weeks post DVIU period. The average flow rate at 3 weeks post DVIU increased by 7.7ml/sec (95% CI 7.7 - 6.0), and the difference was statistically significant(p<0.0001). The average flow rate at 6 months post - DVIU increased by 6.8ml/sec (95% CI 0.1-1.8) compared to the pre-intervention period (p=0.0332) as presented in Table 4. This

indicates a decline of 0.9 ml/sec between the 3 weeks post- DVIU period and 6 months post- DVIU. Complications observed after DVIU included urinary tract infection (UTI) in six patients (10.3%), secondary hemorrhage in one patient (1.7%) and urinary retention after catheter removal in one patient (1.7%) as shown in Figure 2.

## Discussion

Our study had a mean age of 65 years, which is very similar to that reported by Amu et al, who reported a mean age of 65.2 years.<sup>7</sup> With idiopathic etiology being the most predominant in our study, the age of presentation may be explained by relatively insignificant urethral trauma to the perineum, resulting in stricture over time.<sup>2,8</sup> An older presentation could also be explained by the higher incidence of endoscopic procedures and urethral catheterization in this age group. This is also similar to data from the United States, where the incidence of the disease rises with advancing age.<sup>2</sup> However, Salako AA et al in Ile Ife reported a mean age of 49-years<sup>6</sup> while Oyewole in Zaria reported a mean age of 44.19 years<sup>18</sup>, reflecting younger mean ages.

Globally, iatrogenic injuries (e.g., catheterization, transurethral surgery) account for 30–40% of urethral stricture disease cases, followed by idiopathic (20–30%) and traumatic (10–20%) causes.<sup>1,3</sup> Similar studies in our environment have also shown iatrogenic cause as most predominant.<sup>7,8</sup> However, in our study, idiopathic strictures were the most predominant (53.4%), followed by iatrogenic causes (19%). Malignant strictures, rare globally (1–3%), were reported in 5.2% of Nigerian cases, suggesting potential regional variations in disease burden.<sup>2</sup> Studies have shown that idiopathic urethral strictures generally represent about 30% of urethral strictures and may have been caused by minor urethral injuries which were overlooked and forgotten.<sup>8</sup>

In our study, most of the strictures were bulbar, followed by penile strictures. This is in tandem with findings in related researches.<sup>7,8</sup> The location of the bulbar inferior to the pubic bone makes it susceptible to fall astride injuries and its characteristic shape makes the flow of urine more sluggish, thereby allowing infection to get established in this area and cause stricture eventually.<sup>8</sup>

Urethroplasty remains the gold standard for complex or recurrent strictures, but DVIU is preferred for short (<2 cm), single strictures (5).

About 67% of the patients from our study had single

strictures, while the others had multiple strictures. Single, short segment strictures respond better to DVIU.<sup>7,9</sup>

We noted a mean maximum flow rate (QMax) of  $32.4 \pm 6.4$  at 3 weeks, declining to  $29.3 \pm 6.1$  at 6 months after surgery. A similar finding was noted by Okpani et al who reported an immediate mean Qmax of 20.1ml/s, which later declined to 15.0ml/s after 6 months when compared to pre-operative values.<sup>11</sup> Another study by Shittu showed an improvement in Qmax to 23mls/s. Das SK reported a mean Qmax of 20.8ml/s and 19ml/s after a period of one month in patients who had DVIU under spinal anaesthesia and under local anaesthesia respectively.<sup>10</sup> It is important to note that published data has showed good immediate improvement in symptoms as evidenced by significant increase in Qmax following DVIU. This is consistent with local as well as international studies.<sup>13,14,15</sup> Globally, related studies have showed a short-term success rates of 60–80% but recurrence rates of 30–50% within 1–2 years.<sup>4</sup>

Recurrence following DVIU has been reported in literature. In our study, at 6 months follow up, there was reduction in Qmax, compared to earlier post operative Qmax records. This is similar to the findings of Okpani et al who reported a decrease of 4.9ml/s in Qmax within a 6 month interval.<sup>11</sup> The slight reduction in Qmax did not affect the overall outcome in our study as patients could still void satisfactorily. Several factors have been postulated to increase the risk of recurrence following DVIU, including, multiple strictures, long segment strictures, old age, presence of infection, stricture diameter.<sup>11,16,17</sup> In our study 12.1% of the patients had 2 strictures and same percentage of patients(12.1%) also had 3 strictures and most of them still did well in terms of flow rate at 6 months post op visit. This is in contrast to what is reported in most other studies.<sup>15,16</sup>

Our study reported a 10.3% urinary tract infection (UTI) rate post-DVIU. This is similar to the findings of Amu et al. who reported UTI in 12.5% of patients.<sup>7</sup> This is consistent with global rates of 5–15%.<sup>5</sup> Post operative infection may be explained by longstanding urethral catheterization after surgery.<sup>7</sup> Only 1.7% of the study population had secondary hemorrhage and retention. These findings align with guidelines endorsing DVIU as a low-risk intervention for select patients.<sup>1</sup> Salako AA reported that 16.7% of patients had mild hematuria following DVIU while 8.3% developed clot retention.<sup>6</sup>

**Conclusion:** Our study has shown that DVIU is a good treatment option for patients with partial strictures even when it is up to 2 or 3 strictured segments when followed up for a period of up to 6 months. A follow up and or a wider study in the long term may help validate this finding.

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