



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

Paul Eberechukwu Ngwu¹, Ifeanyichukwu Emmanuel Ihedoro², Francis Uchenna Agu³, Enyinna Onyemachi⁴

¹Federal Medical Centre and Eleos Specialist Hospital/ Gregory University Umuahia/Uturu, Nigeria.

²NCIC NHS Foundation Trust, United Kingdom

³Department Of Physiology, College Of Medicine and Health Sciences, Gregory University, Uturu

⁴Department of Surgery, Federal Medical Centre, Umuahia

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 uroflometry.

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 ± 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 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 spongiofibrosis.¹

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

Corresponding Author:

Dr Paul Eberechukwu Ngwu

Consultant Urologist/ Senior Lecturer, Federal Medical Centre and Eleos Specialist Hospital/Gregory University Umuahia/ Uturu, Nigeria

paulngwu66@gmail.com

DOI: 10.61386/imj.v19i1.921

United States of America is 0.9%.² Urethral Stricture rarely affects females.³

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.⁴

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

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.⁵ 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 uroflometry 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.

Uroflometry 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 urethrotomy is presented below. The mean body mass index (BMI) of respondents was 26.4 ± 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 ± 3.2 . This is as

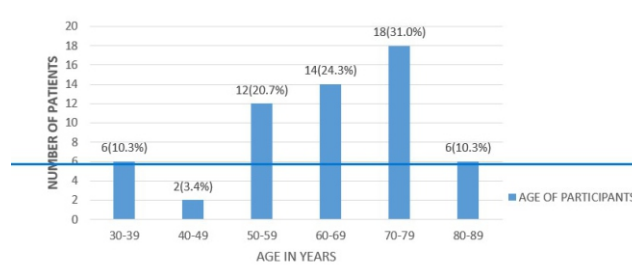


Fig.1. Percentage age distribution of male patients with urethral stricture

Table 1: Socio demographic characteristics of participants

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

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 22.8ml/sec (95% CI 22.0 -17.5), with a p value <0.0001 which was statistically significant. The maximum flow rate at

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

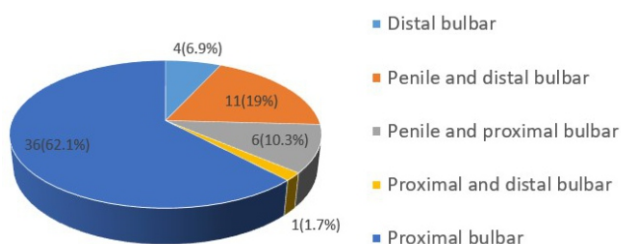


Fig.1: Distribution of location of male urethra strictures in Umuahia

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

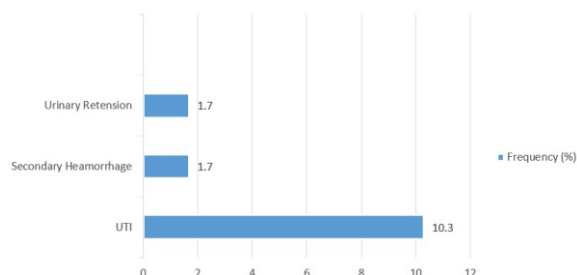


Fig 2: Percentage Distribution of Complications

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.⁷ 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.^{2,8} 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.² However, Salako AA et al in Ile Ife reported a mean age of 49-years⁶ while Oyewole in Zaria reported a mean age of 44.19 years¹⁸, 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.^{1,3} Similar studies in our environment have also shown iatrogenic cause as most predominant.^{7,8} 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.² 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.⁸

In our study, most of the strictures were bulbar, followed by penile strictures. This is in tandem with findings in related researches.^{7,8} 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.⁸

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.^{7,9}

We noted a mean maximum flow rate (QMax) of 32.4 + 6.4 at 3 weeks, declining to 29.3 ± 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.¹¹

Another study by Shittu showed an improvement in Qmax to 23ml/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.¹⁰ 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.^{13,14,15}

Globally, related studies have showed a short-term success rates of 60–80% but recurrence rates of 30–50% within 1–2 years.⁴

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.¹¹ 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.^{11,16,17} 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.^{15,16}

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.⁷ This is consistent with global rates of 5–15%.⁵ Post operative infection may be explained by longstanding urethral catheterization after surgery.⁷ 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.¹ Salako AA reported that 16.7% of patients had mild hematuria following DVIU while 8.3% developed clot retention.⁶

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.

References

1. Lumen N, Campos-Juanatey F, Greenwell T, Martins FE, Osman NI, Riechardt S, Waterloos M, Barratt R, Chan G, Esperto F, Ploumidis A. European Association of Urology guidelines on urethral stricture disease (part 1): management of male urethral stricture disease. *European Urology*. 2021 Aug 1; 80(2):190-200.
2. Abdeen BM, Badreldin AM. Urethral Strictures. *StatPearls [Internet]* 2021 Jul 28. StatPearls Publishing.
3. Riechardt S, Waterloos M, Nicolaas L, Campos-Juanatey F, Dimitropoulos K, Martins F et al. European Association of Urology Guidelines on Urethral Stricture Disease Part 3: Management of Strictures in Females and Transgender Patients. *Eur Urol Focus*, 2021.
4. Mundy AR, Daniela EA. Urethral strictures. *British Journal of Urology International* 2011;107:6-26.
5. Naudé AM, Heyns CF. What is the place of internal urethrotomy in the treatment of urethral stricture disease? *Nat Clin Pract Urol*. 2005;2:538–45. doi: 10.1038/ncpuro0320.
6. Salako AA, Badmus TA, David RA, Isola OJ, Laoye A, Akinbola IA, et al. Management of bulbar urethral strictures by direct vision internal urethrotomy: Experience from a Nigerian teaching hospital. *Niger J Health Sci* 2017;17:35-7
7. Amu, OC, Affusim, EA; Anyimba, SK, Eneje, CL, Nwachukwu, CD, Iwenofu, CA. Direct visual internal urethrotomy in management of short segment urethral strictures in an African black population: Our preliminary experience. *International Journal of Medicine and Health Development* 29(2):p 151-156, April-June 2024.
8. Irekpita E. A 10-year review of urethral stricture management in Irrua, Nigeria. *Niger J Surg* 2017;23:119-24
9. Smith TG 3rd. Current management of urethral stricture disease. *Indian J Urol*. 2016 Jan-Mar;32(1):27-33. doi: 10.4103/0970-1591.173108. PMID: 26941491; PMCID: PMC4756546.
10. Das SK, Jana D, Ghosh B, Pal DK. A comparative study between the outcomes of visual internal urethrotomy for short segment anterior urethral strictures done under spinal anesthesia and local anesthesia. *Turk J Urol*. 2019 Nov 1;45(6):431-436. doi: 10.5152/tud.2019.49354. PMID: 31603417; PMCID: PMC6788561.
11. Okpani CP, Eke N. Short Term Effects of Direct Vision Internal Urethrotomy on Uroflowmetry Parameters in Male Anterior Urethral Stricture Treatment in Port Harcourt. *Asian Journal of Research and Reports in Urology*. 2024 Apr 9;7(1):10-9.
12. Shittu OB. Internal optical urethrotomy in the management of urethral strictures in Nigerians: Technique and outcome. *African Journal of Urology*. 2001; 7:62-65
13. Pansadoro V, Emilliozi A. Internal urethrotomy in the management of anterior urethral strictures. Long Term follow up. *Journal of Urology*. 1996;156:73-76.
14. Smith PJ, Dunn M, Dounis A. The early results of treatment of stricture of the male urethra using the Sachse optical urethrotome. *British Journal of Urology*. 1979;51:224-228.
15. Holm-Nielsen A, Schultz A, Møller-Pedersen V. Direct vision internal urethrotomy. A critical review of 365 operations. *British Journal of Urology*
16. Tritschler S, Roosen A, Fulhase C, Steif CG, Rubben H. Urethral stricture: etiology, investigation and treatments. *Dtsch Arztebl Int*. 2013;110:220-226
17. Dubey D. The current role of direct vision internal urethrotomy and self-catheterization for anterior urethral strictures. *Indian J Urol*. 2011 Jul;27(3):392-6.
18. Oyelowo N, Ahmed M, Bello A, Lawal AT, Lawal BB, Olagunju J, et al. Have our strictures changed: A study of the current characteristics and management of urethral stricture disease in Zaria, Nigeria. *Sahel Med J* 2021;24:160-4.