e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2024; 16(3); 206-215

Original Research Article

Management of Anterior Urethral Strictures using Non Transecting Dorsolateral Buccal Graft Urethroplasty: A Single Centre Experience

T. Gnanasekaran[1], Induja[2], Prabhakaran[3], Anbalagan[4], E. Balaji[5]

[1]Associate Professor, Department of Urology, Madurai Medical College
[2,3,4]Assistant Professor, Department of Urology, Madurai Medical College
[5]Post Graduate, Department of Urology, Madurai Medical College

Received: 25-12-2023 / Revised: 23-01-2023 / Accepted: 26-02-2024
Corresponding Author: Dr. E. Balaji
Conflict of interest: Nil

Abstract:

Objective: To study the outcomes of buccal mucosal graft urethroplasty in anterior urethral strictures in a tertiary care centre.

Materials and Methods: A prospective observational study was performed in patients undergoing urethroplasty in Madurai medical college in the Department of Urology for a period of one year (2022-2023). Patients with anterior urethral stricture planned for non-transecting dorsolateral (one-sided) augmentation urethroplasty using BMG were included in this study. All the cases were operated by a team of urologists. The intraoperative findings, type of graft used and outcomes of surgical intervention were observed.

Results: With urethroplasty, surgical reconstruction has higher long-term success rates; most studies report success rates between 85 and 90 percent. Various methods have been employed for urethroplasty, contingent on the stricture's kind, length, and location. The commonest cause of stricture in our study is iatrogenic (40%) followed by trauma (25%) and the commonest site of urethral stricture is penile urethra. The success rate in our study is 66 to 88 % which is on par with the literature.

Keywords: Stricture, Urethra, Urethroplasty, Buccal Mucosal Graft.

Introduction

Male urethral stricture disease has a devastating impact on the quality of life and the consequences of untreated urethral stricture can damage the entire urinary tract and can lead to significant impairment of renal function [1].

Urethral stricture disease is characterised by narrowing of the urethra and can occur anywhere along the length of urethra, thereby causing obstructive voiding symptoms. The etiology of stricture is complex and multifactorial. Diagnosing urethral stricture requires a detailed history and a multitude of investigations.

Management of urethral stricture has evolved in past decades and the treatment options vary from endoscopic approaches to urethroplasty. A detailed knowledge about the anatomy of urethra is warranted for successful treatment of stricture urethra. Inspite of all the advancements in this disease background, there is still disagreement on the effectiveness of the interventions.

Etiopathogenesis:

Anatomically, the male urethra has been divided into anterior (extending from the meatus up to the membranous urethra) and posterior (extending from membranous urethra up to bladder neck). The arterial supply to the urethra is the urethral artery, which is a branch of internal pudendal artery. The urethra is also supplied by the circumflex branches of dorsal penile artery. The abundant blood supply of corpus spongiosum ensures that the urethra can be divided without compromising its vascular supply.

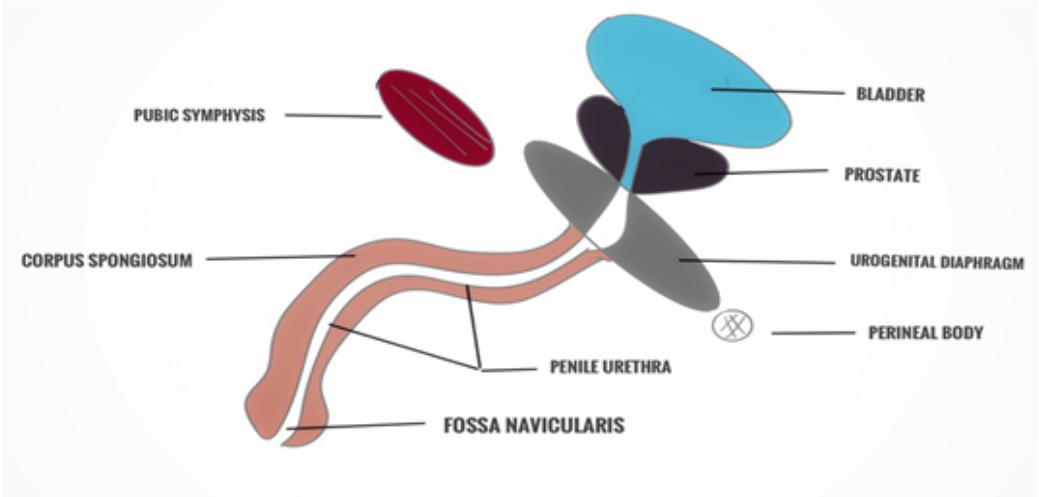
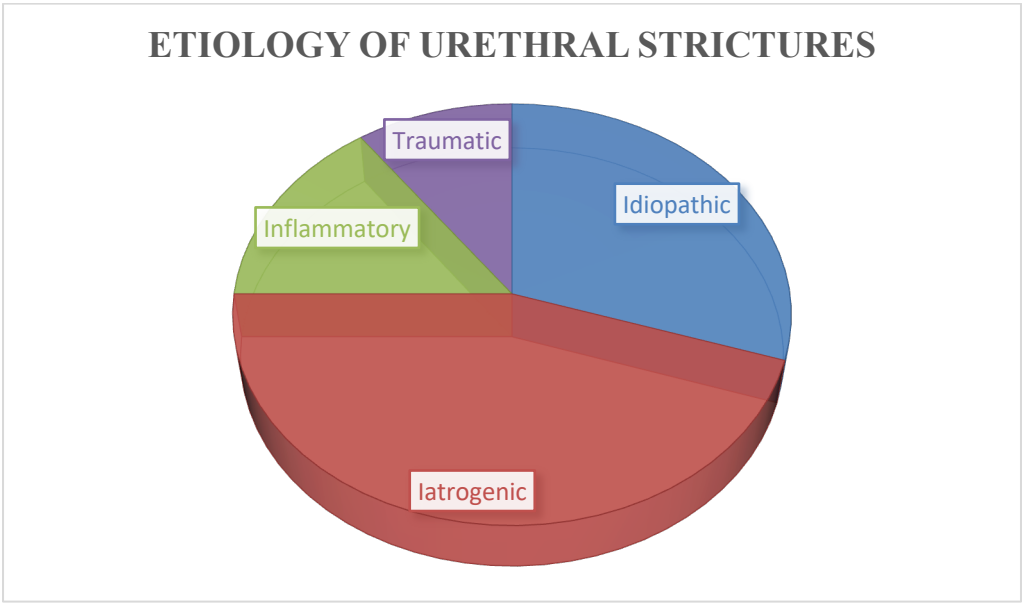


Figure 1: schematic representation of anatomy of male urethra



Graph 1: Etiology of urethral strictures

The commonest causes attributed to urethral stricture are idiopathic, inflammatory, traumatic, and iatrogenic and lichen sclerosus [5]. The commonest cause being iatrogenic, which accounts for 33-40% of the cases [2] (traumatic catheterisation, transurethral procedures, prior hypospadias repairs).

In southern part of India, the most common cause of stricture urethra is iatrogenic followed by trauma. Sometimes the etiology frequently remains unknown despite a comprehensive evaluation. Catheterisation is one of the iatrogenic reasons. Endourological operations can induce mucosal damage and the subsequent formation of strictures.

Stricture can develop in elderly patients after radiation therapy and radical prostatectomy. A subgroup of patients with pelvic fractures that result in partial or total urethral damage, are known as pelvic fracture urethral distraction defects. Straddle injuries to the perineum can cause bulbar necrosis and stricture formation at the site of injury. Injury to the urethral mucosa or underlying corpus spongiosum leads to fibrosis and subsequent formation of strictures. The normal pseudo stratified columnar epithelium is replaced by squamous epithelium.

Clinical Presentation

Most patients present with a history of catheterisation or instrumentation followed by subsequent weakening of urinary stream. The other obstructive voiding symptoms include hesitancy, intermittency, straining to void, and incomplete emptying of urine and post void dribbling of urine. Clinical examination should focus on inspection to identify skin changes like lichen sclerosus atrophicus, periurethral abscess, urethrocutaneous fistula and palpation of urethra to look for fibrotic tissue. Surgical scars may give a clue to the

previous surgical interventions done. A digital rectal examination should be done to assess the prostatic enlargement. Careful assessment of the preputial skin must be done as it may help in future reconstruction. Complications resulting from stricture include acute urinary retention, vesicoureteral reflux, recurrent UTI, vesical calculi, periurethral abscess and urethrocutaneous fistula [2].

Investigations:

Uroflowmetry:

Uroflowmetry serves as a valuable tool in the initial assessment of obstructive LUTS [2]. It also provides a reference for comparison in evaluating the outcome of intervention [6]. The maximal urinary flow rate of a healthy male should be more than 15ml/sec. In addition the shape of the curve gives an idea about the pathology. The voided volume should be more than 150ml for a valuable interpretation.

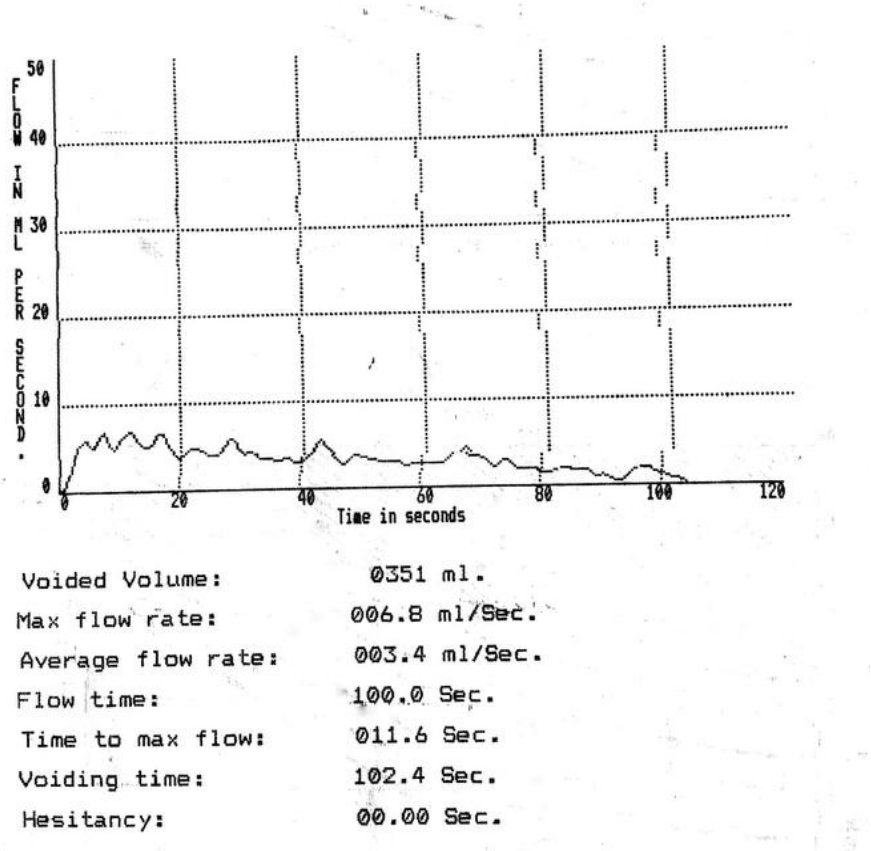


Figure 2: Picture showing Uroflowmetry suggestive of stricture urethra

Retrograde Urethrogram:

A retrograde urethrogram (RGU) is done by injecting the contrast into the urethral meatus and opacification of entire urethra can be seen. In urethral stricture, there will be narrowing or complete obliteration and the contrast may not be seen entering the bladder [2][3].

However, even in sphincter spasm the contrast may not be seen entering the bladder. In cases where RGU is inconclusive, additional information can be obtained by opposing urethrogram via suprapubic catheter. The pilot film aids in the detection of pubic bone fractures and radio-opaque calculi in the bladder or urethra. A proper RGU depends upon patient position, penile traction, amount of contrast used and meatal stenosis. The length of stricture should be estimated carefully since most often they do not correlate with the intraoperative stricture length.

A combination of RGU and VCUG provides detailed information about the entire urethra. An RGU should be interpreted carefully since the dilatation proximal to the narrowed segment can misguide a treatment plan.

A major limitation of RGU is that it does not provide any information regarding spongiofibrosis.

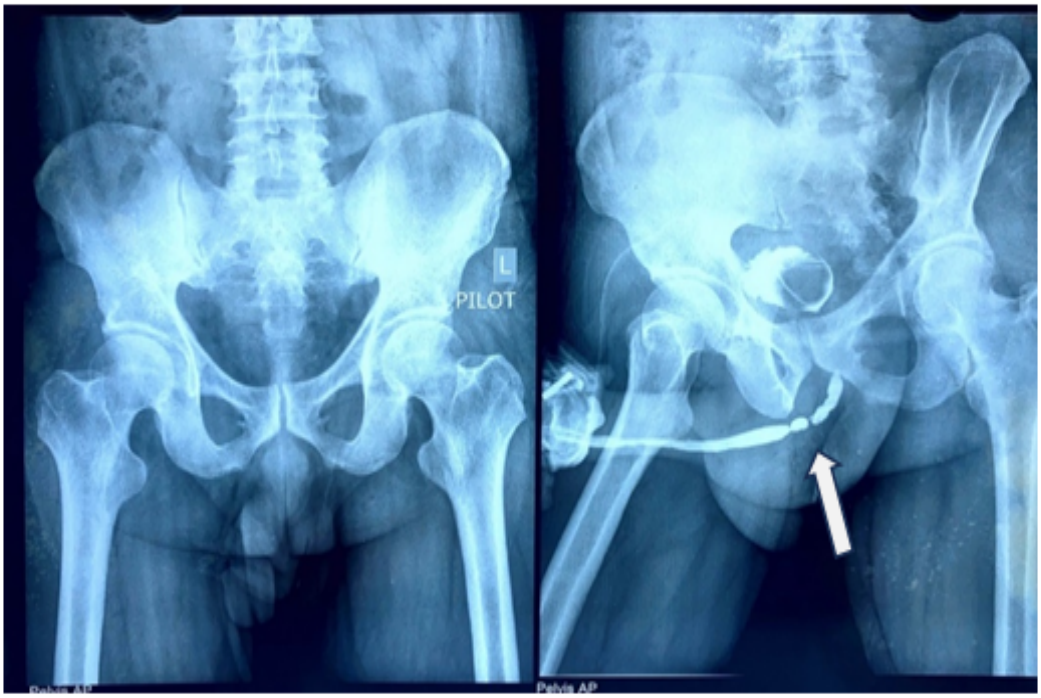


Figure 3: A Retrograde urethrogram (RGU) showing a stricture involving the bulbar urethra

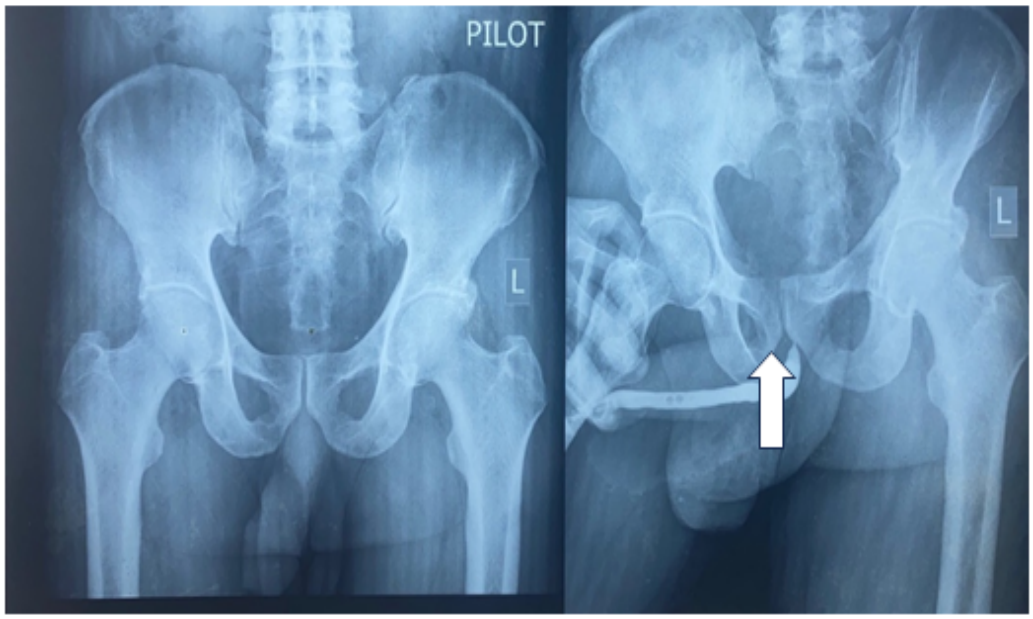


Figure 4: A Retrograde urethrogram (RGU) showing a obliterative stricture involving the bulbar urethra

Urthroscopy:

Urethroscopy is mostly performed using a cystoscope (17Fr). If the stricture segment is too narrow to pass a cystoscope and assess the entire urethra, a small ureteroscope can pass through a strictured segment and help in visualising the proximal segment.

MRI:

Magnetic resonance imaging can demonstrate the urethra which is non opacified in RGU and can provide an extent of spongiofibrosis [7]. MRI is invaluable in completely obliterated posterior urethra and in cases of PFUDD (Pelvic fracture urethral distraction defect).

Types of Graft Reconstruction:

Dorsal BMG onlay technique (Barbagli) [10]: If the penile urethra is narrow, ventral onlay grafts on the corpus spongiosum are generally discouraged, since they prevent spongioplasty movements to maintain and maximize graft take.

The urethra can be exposed via a ventral midline incision. Using a soft 20F Nelaton catheter or Bougie-a-Boule, the obstruction is located, and then the urethra is mobilized circumferentially off

of the corpora cavernosa along the stricture length. The graft is quilted to the corpora cavernosa, and the edges of the graft and urethrotomy are sewn together.

Dorsal OMG inlay through a ventral sagittal urethrotomy (Asopa): in 2001, Asopa described the technique of dorsal BMG inlay through a ventral sagittal urethrotomy approach as an alternative to the Barbagli technique for the repair of penile strictures. Penile inversion and the Kulkarni method of one-sided dorsolateral BMG grafting: The method of reconstructing panurethral strictures without making a penile incision was initially presented by Kulkarni [8][9]. It involved using a perineal approach combined with penile inversion to expose the entire length of the anterior urethra.

He disclosed and made widely known a minor but significant alteration to his initial method, which entailed urethral dissection on one side, in 2009. Preserving the whole muscular and neurogenic support of the urethra along with its one-sided vascular supply should be a small but important step toward improving the minimally invasive urethral reconstruction surgical procedure. Functional results were greatly impacted by the maintenance of the vascular blood supply and the neuronal and muscular support of one side of the urethra.

Materials and Methods

A prospective observational study was performed in patients undergoing urethroplasty in Madurai medical college in the Department of Urology for a period of one year.

Patients with anterior urethral stricture planned for non-transecting dorsolateral (one-sided) augmentation urethroplasty using BMG were included in this study. All the cases were operated by a team of urologists. The cases were subjected to thorough oral cavity examination preoperatively. The stricture characteristics were recorded. The patients were preoperatively given chlorhexidine mouth wash.

Description of the Procedure:

The cases were performed under general anaesthesia through nasal intubation. After intubation, patients were placed in lithotomy and a urethrocystoscopy was done using semi rigid 6/7.5 Fr ureteroscope. The findings were noted and a guidewire was placed. A midline perineal incision was made, urethra identified and stricture segment was laid open posteriorly and the length is measured using a sterile ruler. One side dissection was done to preserve opposite side circumflex vessels to urethra [8].

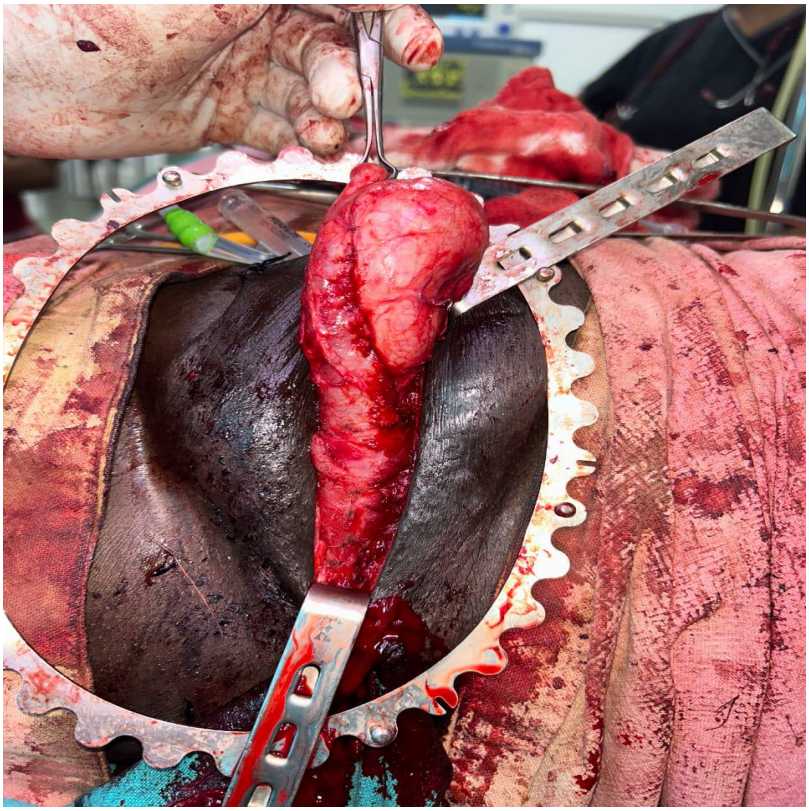


Figure 5: Intraoperative picture showing penile invagination

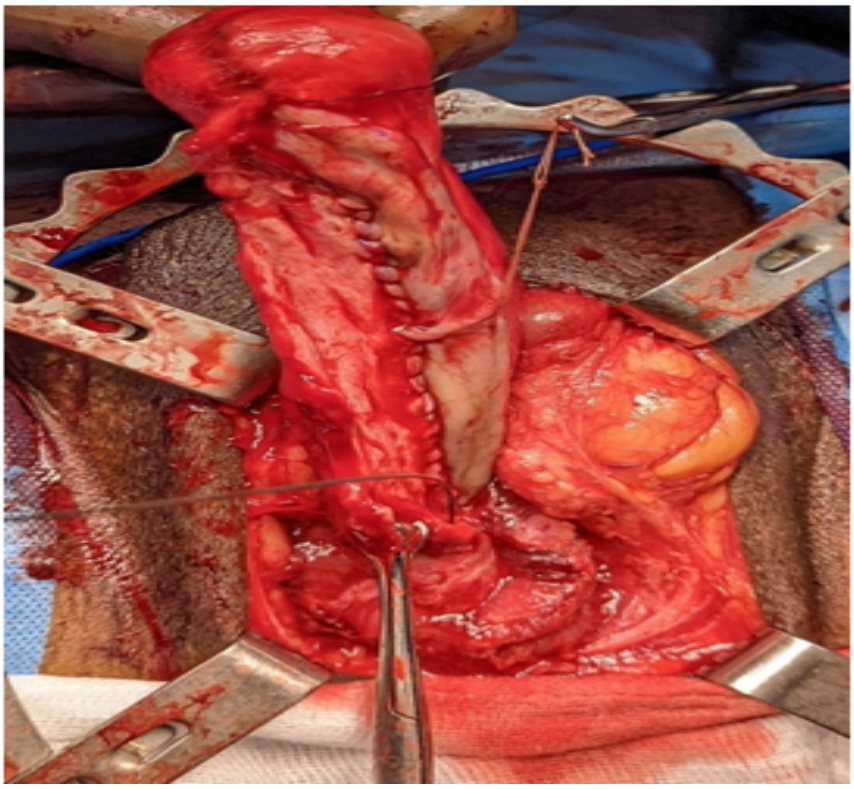


Figure 6: Picture showing buccal graft quilted to the corporal body

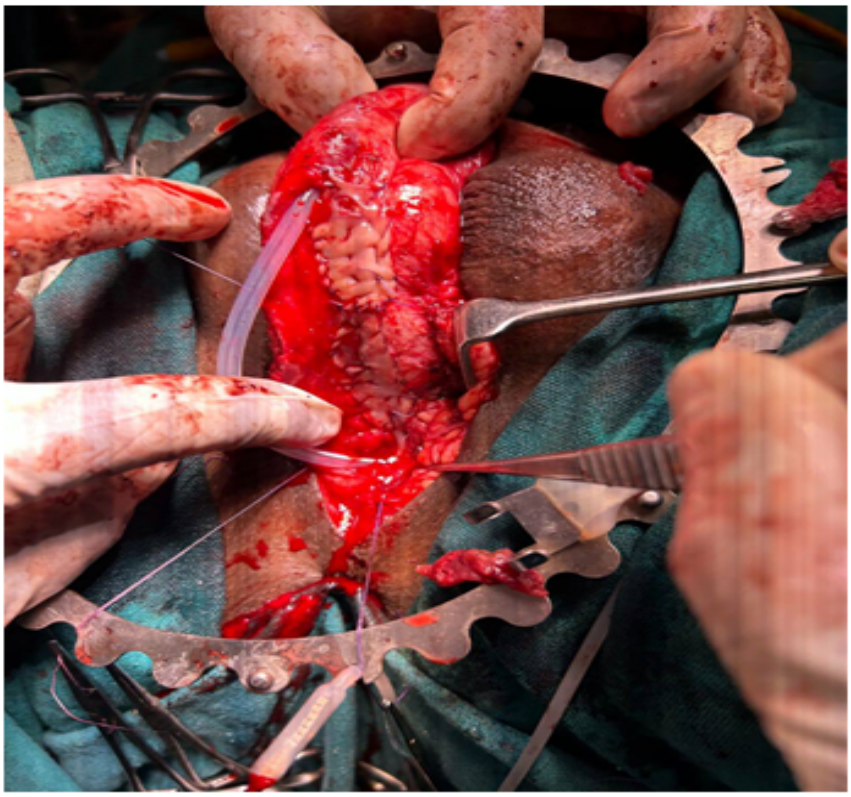


Figure 7: Intraoperative photograph showing dorsal onlay buccal graft placement

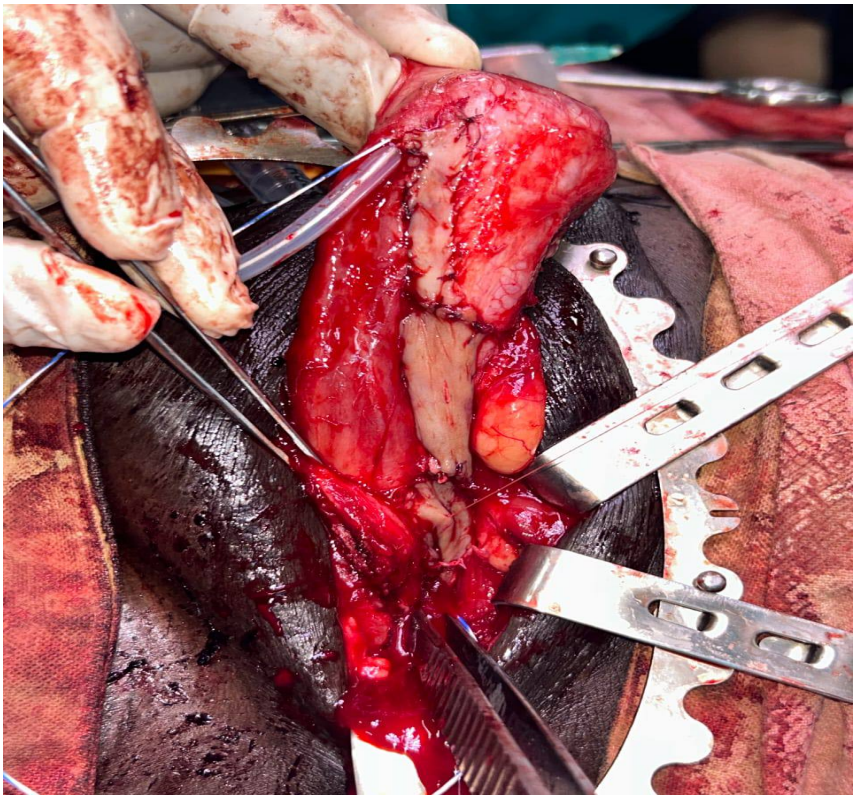


Figure 8: Intraoperative picture showing three islands of buccal graft placed in a case of pan urethral stricture

Buccal graft harvesting was done in rose position. The graft to be harvested is marked and outlined one centimetre more than the stricture length. Metzenbaum scissors were used to dissect the desired buccal mucosa off the buccinator muscle and graft harvesting done. BMG defatting done retaining only mucosa and lamina propria [4].

A lone star ring retractor is placed and secured. After adequate exposure, the strictured segment of urethra laid open and the harvested buccal graft is placed dorsally.

The proximal sutures were taken using 4-0 monocryl and the BMG is quilted to the corporal bodies. The graft is sutured around the 14Fr foleys catheter in a continuous fashion. Bulbospongiosum closed and a suction drain in placed in all the cases.

Postoperative Course:

A14 Fr transurethral catheter is routinely left in place to avoid prolapse of the graft into the urethral lumen and to allow close contact between the graft and its vascular bed.

Most patients are discharged from the hospital on the third or fourth postoperative day with the indwelling catheter in place. At that moment, instructions for wound care are provided, which are specifically important in patients with a perineal wound. These wounds need to be kept dry and clean. Routine use of the antibiotic treatment regimen must be limited to those patients in which a preoperative urinary tract infection has been established. In these cases, appropriate antibiotics (according to the antibiogram) are continued for a maximum of 5 days since any longer use will only contribute to the problem of resistant microorganisms.

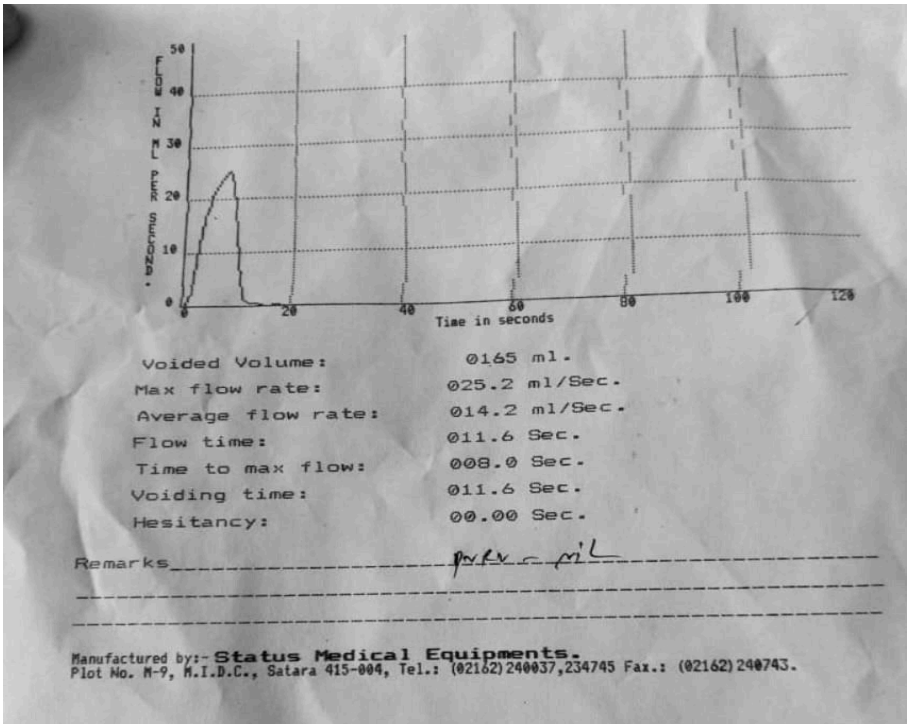


Figure 9: Post-operative Uroflowmetry showing normal flow pattern and Qmax of 25ml/sec

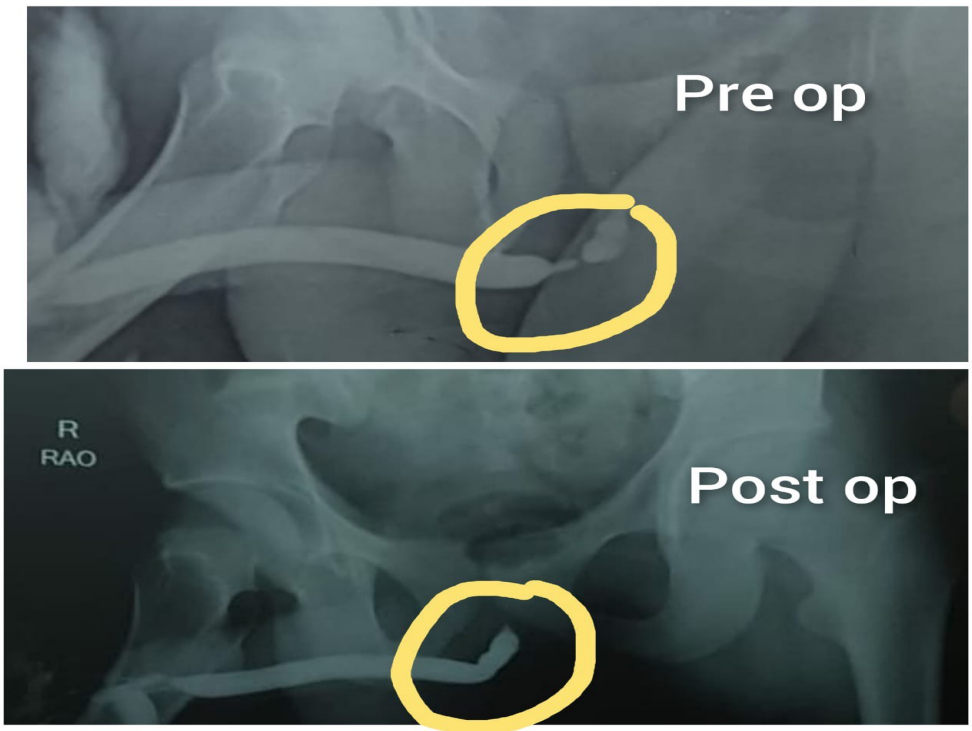


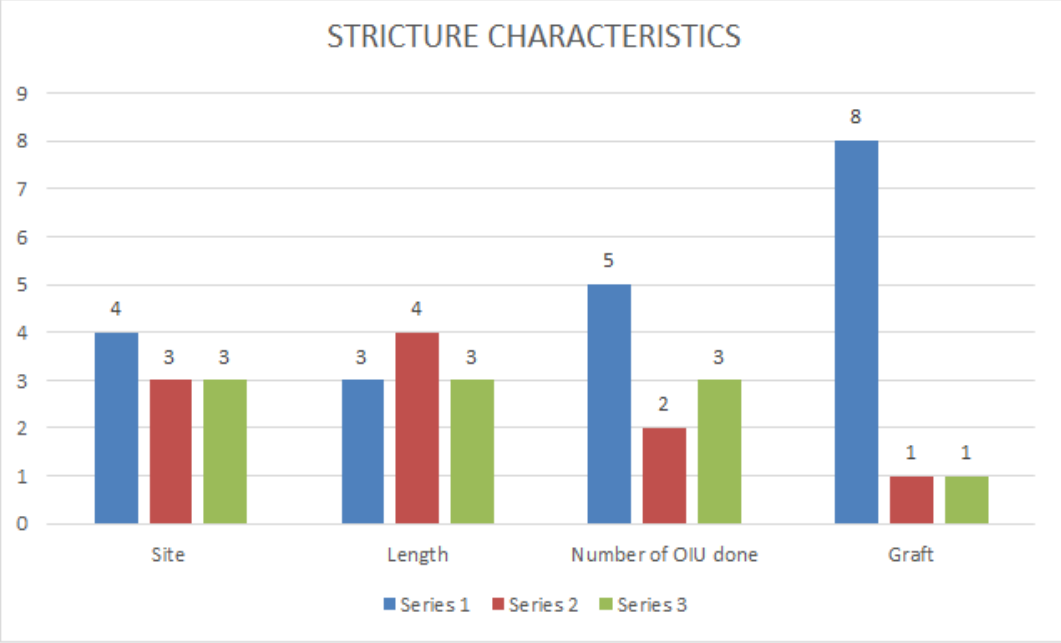
Figure 10: Retrograde urethrogram showing pre-op and post-op images with normal contrast opacification after surgery

Results:

Table 1:

Etiology	Number of Cases
Site of stricture:	
Penile	4
Penobulbar	3
Bulbar	3

Length of stricture:	
<1cms	3
1-2cms	4
>2cms	3
Number of OIU done:	
None	5
Once	2
Twice	3
Graft:	
Dorsal onlay	8
Ventral inlay	1
Double face	1



Graph 1:

Complications

One of the patient in the study developed urethrocutaneous fistula and two patients required OIU. The success rate of urethroplasty historically has been documented between 66 to 99%. We had a success rate of 80% which was quite comparable to the literature.

Conclusion

Male urethral stricture disease embodies a very heterogeneous condition in which thorough knowledge about anatomy, etiology, symptoms, diagnosis, and treatment aspects is crucial in optimizing care of these patients. Future prospective research will be warranted to gain further evidence and to refine the current practice of managing male urethral stricture disease.

References

1. Verla W, Oosterlinck W, Spinoit AF, Waterloos M. A Comprehensive Review Emphasizing Anatomy, Etiology, Diagnosis, and Treatment of Male Urethral Stricture Disease. BioMed Research International [Internet]. 2019 Apr 18; 2019. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6500724/
2. Hampson LA, McAninch JW, Breyer BN. Male urethral strictures and their management. Nature reviews Urology [Internet]. 2014 Jan 1 [cited 2020 Oct 22]; 11(1):43–50. Available from: https://www.ncbi.nlm. nih.gov/pmc/ articles/PMC4123447/
3. Appiah KAA, Gyasi-Sarpong CK, Yenli EMT, Maison POM, Adofo CK, Amoah G, et al. Dorsal Onlay Oral Mucosa Graft Urethroplasty: A Case Report and Review of Literature. Carmignani G, editor. Case Reports in Urology. 2020 Oct 5; 2020:1–6.
4. Song L, Zhang R, Lu C, Chen Y. Factors to Consider in Augmentation Urethroplasty with Oral Mucosa Graft or Penile Skin Flap for Anterior Urethral Stricture: A Systematic Review and Meta-analysis. European Urology Open Science. 2023 Apr 1; 50:113–22.
5. Liu JS, Walker K, Stein D, Prabhu S, Hofer MD, Han J, et al. Lichen Sclerosus and Isolat-

ed Bulbar Urethral Stricture Disease. 2014 Sep 1; 192(3):775–9.
6. Erickson B, Breyer BN, McAninch JW. The Use of Uroflowmetry to Diagnose Recurrent Stricture after Urethral Reconstructive Surgery. The Journal of Urology. 2010 Oct 1; 184(4):1386–90.
7. Oh MM, Jin MH, Sung DJ, Yoon DK, Kim JJ, Moon DG. Magnetic Resonance Urethrography to Assess Obliterative Posterior Urethral Stricture: Comparison to Conventional Retrograde Urethrography with Voiding Cystourethrography. Journal of Urology. 2010 Feb; 183(2):603–7.
8. Lainie Friedman Ross, Joshi PS, Venkatesan K. Management of Panurethral Stricture Disease in India. The Journal of Urology. 2012 Sep 1; 188(3):824–30.
9. Kulkarni S, Barbagli G, Sansalone S, Lazzeri M. One-sided anterior urethroplasty: a new dorsal onlay graft technique. BJU International. 2009 Oct; 104(8):1150–5.
10. Guido Barbagli, Sansalone S, Rados Djinovic, Romano G, Lazzeri M. Current controversies in reconstructive surgery of the anterior urethra: a clinical overview. International Braz J Urol. 2012 Jun 1; 38(3):307–16.
11. Vasudeva P, Nanda B, Kumar A, Kumar N, Singh H, Kumar R. Dorsal versus ventral onlay buccal mucosal graft urethroplasty for long-segment bulbar urethral stricture: A prospective randomized study. International Journal of Urology. 2015 Jul 2; 22(10):967–71.
12. Soliman MG, Abo Farha M, El Abd AS, Abdel Hameed H, El Gamal S. Dorsal onlay urethroplasty using buccal mucosa graft versus penile skin flap for management of long anterior urethral strictures: a prospective randomized study. Scandinavian Journal of Urology. 2014 Mar 3; 48(5):466–73.