

Buccal mucosal graft urethroplasty for proximal bulbar urethral stricture: A revisit of the surgical technique and analysis of eleven consecutive cases

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ABSTRACT

Background: Urethral stricture disease is prevalent, and many surgical techniques have been developed to treat it. Currently, urethroplasty for bulbar strictures implies ventral or dorsal stricturotomy and a buccal mucosa graft (BMG) patch. **Objective:** To describe the surgical approach of the ventral patch BMG urethroplasty for proximal bulbar urethral stricture and to analyze 11 consecutive cases for whom the technique was used. **Patients and Methods:** The diagnosis of urethral stricture was confirmed with a combined retrograde urethrography and micturating cystourethrography. A single team exposed the urethra, harvested, and planted the BMG in the lithotomy position under general anesthesia. The oral preoperative preparation was done with oraldene (hexetidine) mouth wash three times daily beginning from the 2nd preoperative day. The buccal mucosa was harvested from the left inner cheek in all the patients. The donor site was left unclosed but packed with wet gauze. Data related to age, preoperative adverse conditions, stricture length, urine culture result, perineal/oral wound complications, postoperative residual urine volume, and duration of hospital stay were recorded. **Results:** Eleven patients with proximal bulbar urethral stricture had BMG urethroplasty from August 2013 to October 2015. Stricture length ranged from 2 to 5 cm. In six (54%) of the men, the stricture resulted from urethritis thereby constituting the most common etiology of urethral stricture in this study. The preoperative adverse conditions were age above 70 in three, diabetes mellitus in two, severe dental caries in one, and recurrent stricture in two. All of them were able to resume reasonable oral intake 72 h postoperatively. One (9.2%) had perineal wound infection, while two (18.2%) still had mild pain at donor site 4 weeks postoperatively. Ten (90.9%) of the 11 patients had <30 ml residual urine volume at 2 months of follow-up. **Conclusion:** Urethritis is still a common cause of urethral stricture in this rural community. Ventral onlay buccal mucosal graft urethroplasty for proximal bulbar urethral stricture is safe, even in certain adverse preoperative conditions. Buccal mucosa from the cheek is however now preferred.

Key words: Buccal mucosal graft, etiology, proximal bulbar, urethroplasty

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INTRODUCTION

The adult male urethra measures averagely 20 cm in length.¹ Anatomically, it is divided into anterior and

posterior urethra. The posterior urethra is made up of the 1 cm membranous and the 3 cm prostatic urethra which

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together are equivalent in length to the female urethra. The anterior urethra is made up of the bulbar urethra, which is in continuity with the membranous urethra, and the penile urethra which lies ventral to the corpora cavernosa of the penis. It is surrounded by the corpus spongiosum, through which the blood vessels reach the urethra. In men, the urethra serves the dual purpose of being a conduit for urine and semen.

Narrowing of the male urethra is a common cause of presentation at the accident and emergency and the urology clinic. According to the World Health Organization consensus,² stricture refers to such disease of the anterior urethra. Following pelvic fracture, there may be associated distraction injury of the urethra, the ensuing gap of which is usually replaced by fibrous tissue (posterior pelvic fracture urethral distraction defect). Other types of posterior urethral disease are referred to as stenosis. In the past, sexually transmitted diseases were most commonly responsible for urethral stricture disease, but this has been surpassed by trauma, instrumentation, catheterization, transurethral resection of the prostate, prostatectomy, posthypospadias repair, and lichen sclerosis.³ Independent of the etiology, these men usually present with lower urinary tract symptom (LUTS) and in late cases, progressive upper tract involvement, renal impairment, recurrent urinary tract infection and rarely, a watering can perineum. Confirmation of the diagnosis is with a retrograde urethrography, sometimes in combination with a micturating cystourethrography.

Surgical methods of treating urethral stricture have been emerging over the years. Aghaji and Odoemene⁴ in their work opined that a good urethroplasty technique should produce a compliant urethra with an adequate caliber. According to Barbagli,⁵ such a technique should be simple and reproducible in the hands of any surgeon. Overall, surgical techniques involved either resection of the strictured part and spatulated end-to-end anastomosis or substitution of the strictured segment. The latter may be done in one or two stages. The aim currently is to reconstruct the urethra in one stage except there are adverse conditions. The bulbar urethra is amenable to both anastomotic and substitution urethroplasty as it is easily mobilized. Reconstructive urologists currently avoid anastomotic urethroplasty because of the concern about erectile dysfunction and interruption of the blood supply to the urethra. According to Mundy and Andrich today, bulbar urethroplasty means stricturotomy and buccal mucosal graft patch.⁶

We revisit the surgical technique and present here 11 consecutive cases of ventral onlay buccal mucosa graft (BMG) urethroplasty for proximal bulbar urethral stricture done in Irrua Teaching Hospital from August 2013 to October 2015 with a particular reference to the adverse preoperative conditions.

PATIENTS AND METHODS

This is a retrospective study, and Ethical Approval was deemed not necessary. However, the patient whose photographs were used was sought for and consent obtained from him though he was de-identified. A thorough history had been obtained from all the men who presented within the study period with LUTS with particular reference to urethral stricture. The historical evaluation was aimed at detecting the etiological factors such as instrumentation, prostatectomy, urethral catheterization, TURP, trauma, and urethritis. Those suspected to have a urethral stricture were further evaluated with a combined retrograde urethrography and micturating cystourethrography. This allowed the determination of the length, site, and multiplicity of the stricture. Urethroscopy was done preoperatively in all to shorten the operation time as we use a one team approach currently. An abdominal ultrasonography was used to assess for upper tract involvement, while the renal function was evaluated with serum urea and creatinine. A urine microscopy, culture, and sensitivity (MCS) were done in all to determine the antibiotic needed for prophylaxis. Further evaluation depended on the presence of comorbidities such as diabetes mellitus (DM).

Data related to age, length, and site of the stricture on retrograde urethrogram (RUG); etiology; associated comorbidities; organism grown from urine MCS; values of serum urea; and creatinine were then assembled and the records indicate that the anesthetists were invited to review the patient on the 2nd preoperative day. In the elderly patient, they routinely did a chest radiograph and electrocardiography. Shaving of the operation site was done on the operation day while the oral preparation was commenced on the 2nd preoperative day using oraldene (hexetidine) mouthwash three times a day. Records indicate that prophylactic antibiotic was given parenterally, usually in combination with metronidazole, at induction of anesthesia. Those with DM had their glucose-potassium-insulin solution set up on the morning of the operation.

Surgical technique

The lithotomy position with a mild head down tilt was used [Figure 1]. All the patients had general anesthesia with endotracheal intubation following which prophylactic antibiotic was given.

Skin preparation was done by washing thoroughly with savlon (a solution of cetrimide and chlorhexidine gluconate) and then scrubbed with alcohol and followed by draping. A midline (median raphe) skin incision measuring about 4 cm marked the beginning of the operation proper [Figure 2]. The skin, subcutaneous tissue, and fats were dissected off the corpus spongiosus muscle on either side of the incision. A perineal ring retractor was then

positioned to maximize exposure. A midline incision similar to that of the skin was made on the corpus spongiosus muscle which was then dissected away from the underlying urethra and the retractor repositioned deeply [Figure 3].

Hemostasis was essentially achieved using the coagulating mode of a unipolar diathermy. A ventral stricturotomy was done and after adequate hemostasis, the retractor was removed and the wound was pressure packed, and the surgeons changed their gloves. The authors usually requested for photographs to be taken at certain important parts of his operative procedures.

The buccal mucosal was harvested from the left cheek in all the patients though this was not by convention but by the convenience of movement and the position of the



Figure 1: Lithotomy position



Figure 2: Skin incision



Figure 3: Exposed urethra

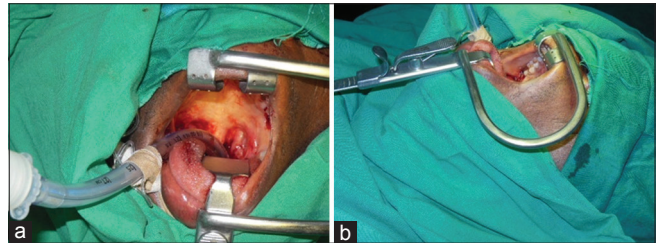


Figure 4: (a) Direct view, oral cavity (b) side view, left cheek after retraction



Figure 5: After skin closure



Figure 6: Final outcome

endotracheal tube which the anesthetist usually placed toward the right cheek [Figure 4a and b].

The perineal and oral parts, in this center, are currently done by the same team though two teams are conventionally recommended. The face was draped, with only the mouth exposed, the cavity of which was widely opened using a jaw retractor [Figure 4a and b]. An indelible marker was then used to outline the margin of the intended graft which was usually about 2 cm in width to create about 26–30 gauge neourethra [Figure 5]. Infiltration of the submucosal tissue with normal saline allowed the mucosa to be dissected off the buccal muscles with ease. The raw area was packed with wet gauze. The surgeons then changed their gloves and the ring retractor was repositioned. The graft was thereafter defatted and used to patch the ventral stricturotomy followed by reconstitution of the corpus spongiosus to which the buccal mucosa was squinted using vicryl 4/0. The corpus spongiosus muscle was meticulously reapposed to prevent pooling of semen and urine using the same vicryl 4/0. The remaining wound was closed in three layers with vicryl 2/0 [Figure 6] and covered with a firm occlusive dressing.

Postoperatively, intravenous fluid, antibiotics, and wet gauze pressure packing of the oral wound were continued for 48 h after which oral intake and oraldene (hexetidine) mouthwash were resumed. The antibiotic was continued orally for 10 days. The dressing was changed on the 3rd postoperative day while on the average, hospital stay was 11.5 days. Hexetidine mouthwash was resumed 48 h postoperative and was done following each meal. A pericatheter RUG was done on the 21 postoperative day, and if there was no extravasation of contrast, the catheter was removed or delayed for 1 week if there was extravasation. Pelvic ultrasonography was done 2 weeks after removal of the suprapubic catheter and 2 months postoperatively to assess the residual urine volume. Follow-up is still ongoing.

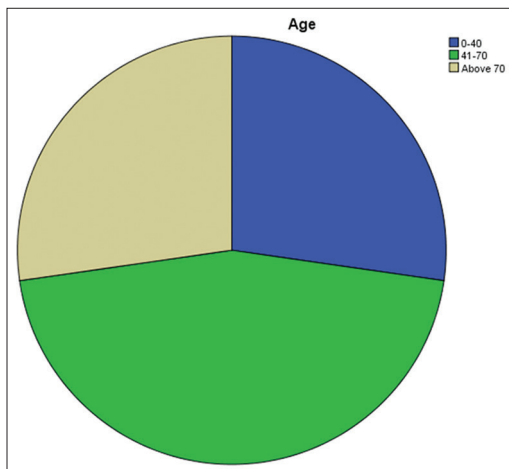


Figure 7: Age distribution of patients

RESULTS

A total of 11 patients with proximal bulbar urethral stricture had BMG urethroplasty. Table 1 shows their demographics and other features. Two (18.2%) were diabetic, two (18.2%) were redo, two (18.2%) were above 70 years [Figure 7], two (18.2%) had an enlarged prostate, and one (9.1%) had severe dental caries.

None of the patients had donor site infection; the wounds healed uneventfully though two (18.2%) complained of mild pain up to 4 weeks postoperatively. One (9.1%) had perineal wound infection (not the one with dental caries) with stricture recurrence at 2 months. This meant an immediate success rate of 90.9%. There was no record of fistula formation, penile chordee, or sexual dysfunction. Of the 11 cases, 6 (54.5%) were postinfective, 3 (27.3%) were catheter induced, while 2 (18.2%) were postprostatectomy [Figure 8].

The mean age was 54.4 years while the organisms cultured from the urine were *E. coli* in one (9.2%), *Staphylococcus aureus* in one (9.2%), *Citrobacter* in one (9.2%), *Enterobacter* in one (9.2%), Coliform in one (9.2), *Proteus* in one (9.2), *Pseudomonas* in two (18.4%), and *Morganella morganii* in one (9.2%). There was no growth in two (18.4%). The duration of hospital stay ranged from 7 to 18 days with a mean of 12.8 days. Table 1 shows the existing preoperative comorbidities and adverse conditions.

The residual urine volume as determined on ultrasonography at 2 months was <30 ml in the ten patients who were available for follow-up. This meant a 90.9% immediate success rate.

DISCUSSION

Urethral stricture disease is prevalent.⁷ The number of available surgical techniques for the treatment of urethral

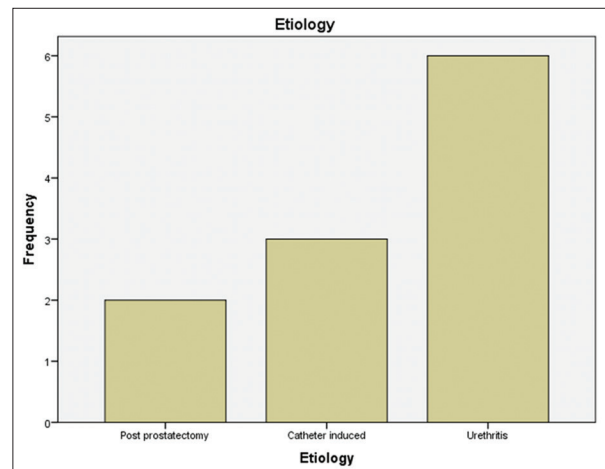


Figure 8: Distribution of etiology

Table 1: Adverse preoperative conditions or comorbidities

Valid	APOC			
	Frequency	Percentage	Valid percentage	Cumulative percentage
Age >70 years	2	18.2	18.2	18.2
DM	1	9.1	9.1	27.3
Dental caries	1	9.1	9.1	36.4
Recurrent stricture	1	9.1	9.1	45.5
Nil	4	36.4	36.4	81.8
DM, repeat, BPH	1	9.1	9.1	90.9
BPH	1	9.1	9.1	100.0
Total	11	100.0	100.0	

APOC: Adverse preoperative conditions or comorbidities, DM: Diabetes mellitus, BPH: Benign prostatic hyperplasia

stricture shows the ingenuity with which the subject has been approached over the years. According to Hampson *et al.*,⁸ many techniques utilized for urethroplasty depends on the location, length, and character of the stricture. However, many of the modalities are fraught with high patient morbidity and stricture recurrence.⁹ Resection and spatulated end-to-end anastomosis is being gradually disfavored by many reconstructive urologists, while the lip is no longer regarded as a good donor site.¹⁰

The buccal mucosal graft was first described by Humby in 1941.¹¹ It has favorable characteristics of being hairless, compactable with wetness, and has early growth and graft survival. It is commonly used in strictures after childhood hypospadias repair, inadequate urethral plate during the first stage Johansson for penile stricture and bulbar onlay urethroplasty, the later with 92% success.¹² It is therefore an extremely useful tool to the reconstructive urologist independent of the etiology of the stricture. There is however controversy on the positioning of the graft in various segments of the urethra. The advice is that in the bulbar urethra, the graft can be dorsal, ventral, or lateral depending on the clinical situation.⁵

There are several other modalities of treating urethral stricture. The choice of method depends on the experience of the surgeon and the choice of the patient which should be considered before the final decision. According to the National Practice Survey Board of Certified Urologists in the USA, roughly half of the urologists do not perform urethroplasty implying that this modality is underutilized. BMG urethroplasty is likely to be far less utilized.¹³ We currently offer BMG urethroplasty to men with bulbar urethral stricture as the first line because procedures such as dilatation and urethrotomy may worsen the stricture. According to Kulkarni and Barbagli¹⁴ in the distal bulbar urethra, the graft should be placed dorsally, while in the proximal part where the spongiosa is abundant, ventral onlay is preferred. The success rate of 90.9% in this study gives credence to this approach. The ideology of climbing the treatment ladder is today considered unnecessary as

it is less cost effective.¹⁵ This position is well supported by this study though the number of patients is too low to allow for a reasonable conclusion. In spite of this shortcoming, the findings are in agreement with that of many authors who perform BMG urethroplasty.¹⁶ This outcome is in spite of the adverse preoperative conditions in about 50% of the patients.

The choice of antibiotic for prophylaxis is fundamental to this success as graft infection can be a disaster and a cause of failure. This was based on urine culture and sensitivity, while metronidazole was added to the antibiotic of choice because of the oral cavity. The antibiotics were deployed intravenously for the first 72 h and thereafter, orally for 10 days to cover the critical period. There may however be a need for a longer duration of antibiotic use or a change, if there is wound infection. While 1 of the 11 men (9.2%) had perineal wound infection, there was no record of donor site infection. Another possible cofounder is the presence of an obstructive benign prostatic hyperplasia (BPH). Traditionally, this is resolved by dilating the stricture and doing a prostatectomy at the same setting. The two patients in this study with BPH had impassable strictures either because of the stricture length (5 cm) or distraction at the previous anastomotic site. While the postoperative period in the later was uneventful, the former developed persistent urine leakage from the suprapubic stoma. This was however resolved by repassing the urethral catheter and placing him on an alpha blocker. He voided freely when the catheter was removed 3 weeks later. Formulation of opinion on such patients in our care is currently ongoing.

Many authors have documented a decline in urethritis as a prominent etiology of urethral stricture, giving figures as low as 3%⁶ for infective causes. In Nigeria, for instance, a recent study¹⁶ documented trauma as the most common etiology of stricture urethra in its survey of the practice of reconstructive urology in Nigeria. This study with a 54.5% however indicates that infective etiology of urethral stricture is still prevalent in the rural areas where access to health care is poor, awareness is low, and care is in the hands of quacks. Although the sample size in this study is low, the results probably mirror the true situation in the rural areas as most studies mentioned above which documented trauma as the current leading cause of urethral stricture were done in developed nations or urban centers of developing countries.

The management of the oral wound has been a subject of discussion and opinion varies as to whether the wound should be closed or not.¹⁷ The oral wound was left open and packed with wet gauze in the authors' practice. The maximum duration of packing (compression) in this study was 48 h and thereafter, hexethidine mouth wash¹⁸ was done after each meal. In spite of this, there was no incident of oral sepsis or parotid gland infection. However, two (18.2%) of the patients still had mild donor site pain

4 weeks postoperatively. This outcome is comparable with the findings of some of the authors mentioned earlier.

Following BMG urethroplasty, many urologists discharge their patients anytime from the 2nd day postoperative.^{9,14} The long duration of hospital stay was as a result of the adverse preoperative conditions such as DM and dental caries in this study. Some of the patients, particularly the older men, requested for a longer hospital stay because of anticipated inability to care for their oral and perineal wounds at home. The limitation of this study is the small sample size. It is however very revealing about the usefulness of BMG even in certain adverse preoperative conditions in our environment.

CONCLUSION

Urethritis is still a common cause of urethral stricture in rural Nigeria. BMG urethroplasty appears to be safe even in adverse preoperative conditions such as advanced age, dental caries, and DM. Buccal mucosa from the inner cheek is currently preferred over that of the lower lip.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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