

OUTCOME OF DORSOLATERAL ONLAY OMG URETHROPLASTY FOR ANTERIOR URETHRAL STRICTURE

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Abstract

Objective: To determine the feasibility, safety, efficacy and short term outcome of using new surgical technique for repair of anterior urethral stricture

Introduction: The conventional approach for management of long segment anterior urethral stricture is a two stage Johansons repair along with the use of free grafts if required. Now a days the preferred management of urethral stricture involving long segments of anterior urethra is dorsal only oral mucosa Augmentation urethroplasty which requires circumferential mobilization of urthera that might cause ischaemia of urethra in addition of chordee. For that we adopted new technique (kulkarnis) of dorsolateral onlay buccal mucosal graft one sided anterior urethroplasty in which only unilateral urethral mobilization done through perineal approach.

Materials and Methods: A total of 50 patients underwent urethroplasty for anterior urethral strictures using dorsolateral onlay BMG from April 2010 to December 2012 at NIKDU, JBFH, BSMMU and BDM Hospital. We selected 16 to 70 years old male (mean age 39 years) underwent a one-sided dorsolateral oral mucosal graft urethroplasty. The mean (range) stricture length was 6.5 (4.5-9) cm in patients with single bulbar urethral involvement and 10.5 (8.5–15.0) cm in patients with panurethral strictures. Free graft was taken from oral mucosa either lower lip or cheeks. Follow up was done by uroflowmetry at 3rd week, after removal of penile catheter and repeat at 3rd and at 6th month. In addition to uroflowmetry – RGU & MCU was done at 3rd month and Urethroscopy was done at 6th month follow up. The results were classified into the following outcomes. Success was defined as a maximum flow rate of >10 ml/sec, normal RGU, and/or urethroscopy (with a 19 Fr. sheath). Failure was defined as the presence of obstructive urinary tract symptoms, Qmax <10 ml/sec, stricture diagnosed on retrograde urethrogram/ urethroscopy, and the need for any postoperative urethral intervention.

Result: The overall follow up was 12-30 months. Of the 50 patients 45 (90%) had a successful outcome and 5(12%) had failure. 3 failure treated by OIU and 2 by meatal dilatation. No significant donor site defect was observed.

Conclusions: Dorsolateral OMG onlay urethroplasty is feasible, tolerable, and safe for any length of anterior urethral stricture with good short term success.

Bangladesh J. Urol. 2013; 16(2): 37-42

Introduction:

Urethral stricture is one of the oldest known urological diseases and remains a common problem with high morbidity. The conventional approach for management of long segment anterior urethral stricture is a two stage Johansons repair along with the use of free grafts if required¹⁻³. In 1880, Duplay described a method for urethral construction in hypospadias that was based on one of the basic principles in urethral reconstruction, consisting of the formation of an epithelialized tube from a buried strip of skin⁴. In 1996, Morey and McAninch described the ventral onlay graft technique and, in the same year, Barbagli et al. described the dorsal onlay graft technique⁵. These two new surgical techniques, suggested mainly for repair of bulbar urethral strictures, represent a development of the Duplay-Denis Browne principle, showing that a buried, ventral or dorsal, strip of oral mucosa becomes an epithelialized tube⁴. Recently, new surgical techniques have been developed based on the dorsal onlay graft urethroplasty first described by Barbagli et al.⁵. In 2000, Kulkarni et al. described a new, full length (penile and bulbar), one-stage oral mucosal graft urethroplasty in patients with panurethral strictures due to lichen sclerosis⁶. In 2001, Asopa et al. described an original dorsal inlay technique⁷. These techniques represent an interesting development of the dorsal graft urethroplasty⁶⁻⁸. Recently, Barbagli et al.⁹ developed a muscle and nerve-sparing bulbar urethroplasty, to preserve the bulbospongiosum muscle and its perineal innervations, thus suggesting a new minimally invasive alternative to traditional ventral or dorsal bulbar urethroplasty¹⁰. We combined the use of muscle- and nerve sparing bulbar urethroplasty from the technique of Barbagli et al.⁹ with the full length dorsal urethral opening from the technique of Kulkarni et al.⁶, and described a surgical technique for the repair of anterior urethral strictures, so as to preserve the lateral vascular supply to the urethra, the central tendon of the perineum, the bulbospongiosum muscle and its perineal innervation, and report the preliminary results in a limited series of patients.

Materials and Methods:

This was a prospective interventional study from April 2010 to December 2012, 50 patients mean age 39 years, (range 16–70 years) underwent a one-sided anterior

dorsal oral mucosal graft urethroplasty. Preoperative evaluation included clinical history, physical examination, urine culture, residual urine measurement, uroflowmetry, and retrograde and voiding cystourethrography. The patient is placed in a simple lithotomy position. General anesthesia and nasotracheal intubation was done in all cases. An intra-operative urethroscopy/ ureteroscopy (in case of meatal stenosis) was performed to evaluate

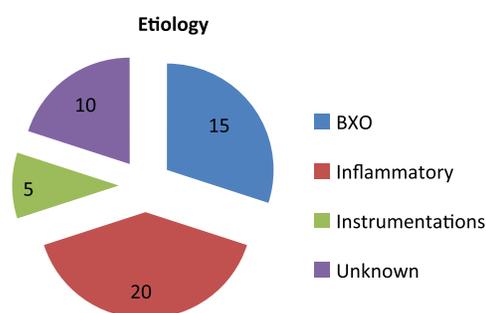


Fig.- 1 : Etiology of stricture

the caliber of the narrow urethra and the remaining urethra. The skin of the suprapubic region, scrotum and perineum was shaved and this region was prepared and draped appropriately. The oral mucosal graft was harvested from the lower lip or the cheek according to the standard technique. We performed the dorsolateral onlay procedure only when a guide wire could be negotiated through the non obliterative stricture segment.

A midline perineal incision was made (Fig. 3A). The bulbar urethra was dissected from the corpora cavernosa only along the left side, starting from the distal tract where muscles are absent, leaving the bulbospongiosum muscle and the central tendon of the perineum intact. Along the right side, the urethra remains attached to the corpora cavernosa for its full length, thus preserving its lateral vascular blood supply (Fig. 3B).

On the left side, the urethra was partially rotated and the lateral urethral surface was underlined. The distal extent of the stenosis was identified, the dorsal urethral surface was incised along the midline and the urethral lumen was exposed. The stricture was then incised along its entire length by extending the urethrotomy distally and proximally (Fig. 3C). Once the entire stricture has been incised, the length and width of the remaining urethral plate was measured. Appropriate sized buccal mucosal grafts were harvested from lower lip or one or both cheeks (Fig.3D). Graft sizing was appropriate by

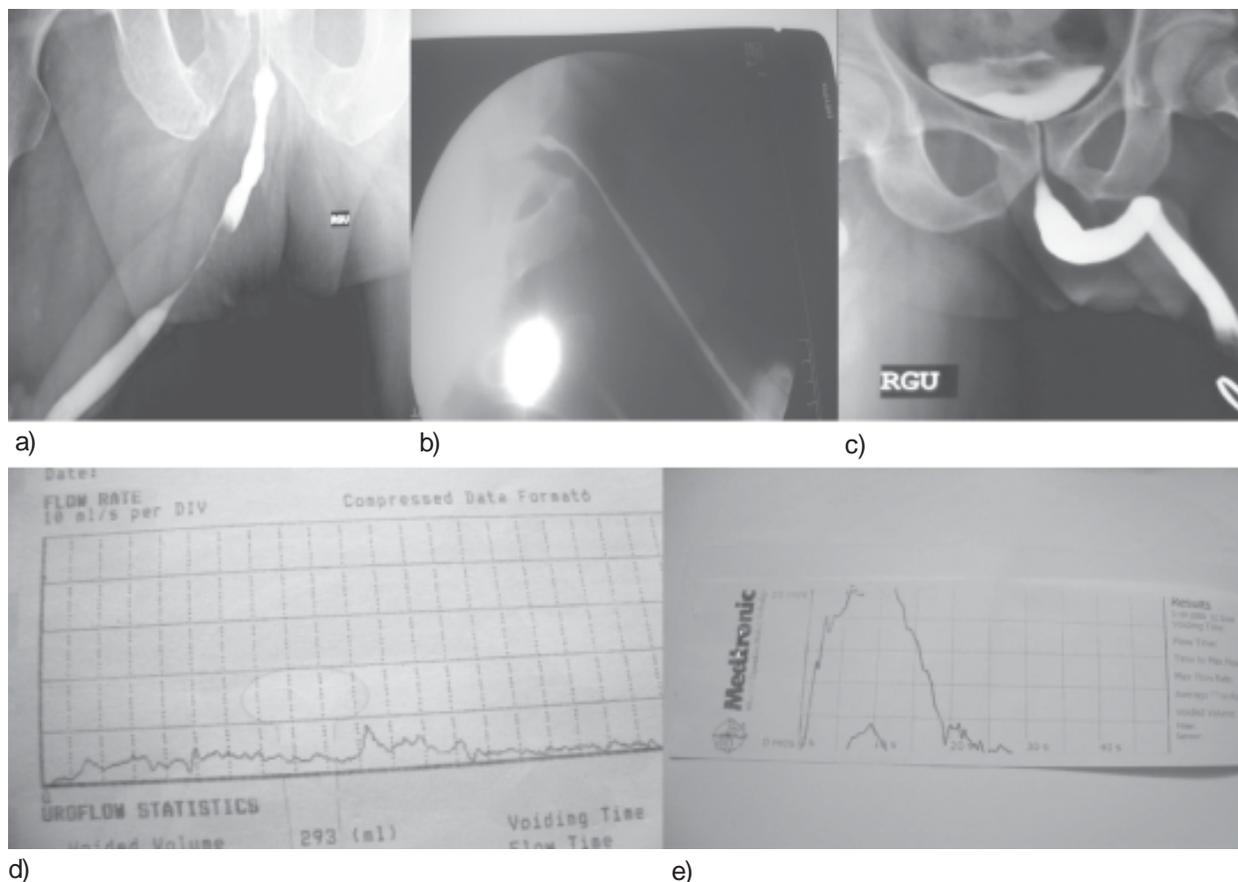


Fig.-2: A) RGU before Urethroplasty. B) Panurethral stricture C) RGU after Urethroplasty. D) Uroflometry before Urethroplasty. E) Uroflometry after Urethroplasty

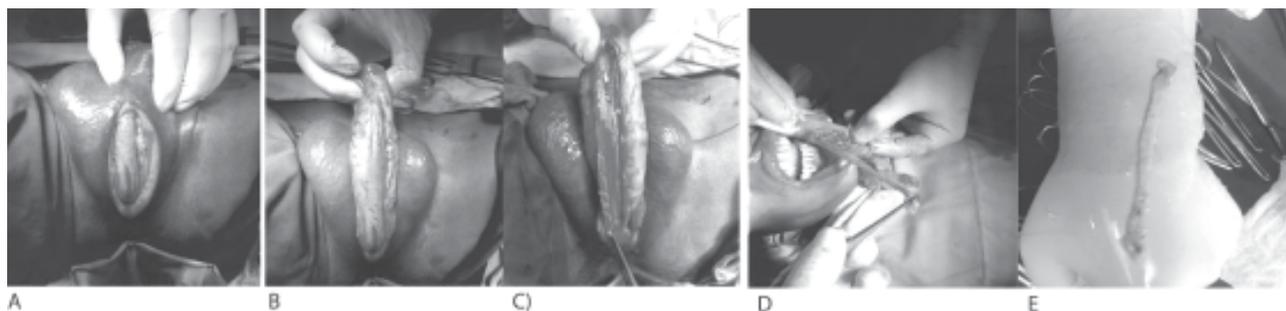


Fig.-3: A) Midline perineal Incision. B) The penis was everted through the perineal incision. C) Dorsal urethral surface was incised along the midline and the urethral lumen is exposed over guide wire. D) OMG harvesting from lower lip. E) Large OMG

this method; hence, preventing chordee. After defatting, the graft was sutured proximally to the open urethra by a few interrupted sutures at the apex and at the medial urethral margin. Then, one edge of the graft was sutured to the medial urethral margin, which was in place and fixed to the corpora. This was performed by continuous suturing using 5/0 polyglactin sutures until the distal apex. At the distal apex, few interrupted sutures were taken. Quilting sutures were applied to keep the

graft apposed to the tunica. A 14 Fr Foleys catheter was kept. The other margin of the graft was sutured to the lateral margin of the urethra and the tunica of corpora (Fig.4C). These three tissues were taken together while approximating the lateral edge, there by anchoring both graft and urethral margin to the corporal tunica. During the entire procedure, care was taken to prevent stretching of the graft, which might result in chordee. A gloves drain was kept. The bulbospongiosus muscle was

approximated in the midline (Fig.4D). Subcutaneous tissues and skin were closed with interrupted absorbable sutures. The catheter was left in situ for 3 weeks.

In patients with penile and panurethral strictures, a midline perineal incision was made and the bulbar urethra was dissected, only on the left side, from the corpora cavernosa starting from the distal tract where muscles are absent, leaving the bulbospongiosum muscle and the central tendon of the perineum intact. On the right side, the urethra remains attached to the corpora cavernosa for its full length, thus preserving its lateral vascular blood supply dissected from the corpora cavernosa. By invaginating the penis into the perineal incision, the penile urethra was similarly dissected, only along the left side, from the corpora cavernosa up to the coronal sulcus (Fig. 3BA). On the left side, the urethra

was partially rotated, the dorsal urethral surface was incised along the midline and the bulbar and penile urethra was opened along the dorsal surface. A wide meatotomy was performed dorsally from the meatus through the urethra inside the glans. The first oral mucosa graft was sutured to the dorsal edge of the meatus and pushed inside the opened penile urethra and fixed to the corpora cavernosa. Another oral mucosa graft was applied to the corpora cavernosa opposite the bulbar urethra. Continuous upward traction was applied to the inverted penis while applying the penile portion of the graft to prevent chordee. Quilting sutures were used to spread and fix the graft to the corpora.

The right side of the oral graft was sutured to the left side of the urethral mucosal plate (Fig.4C). A Foley 14 F catheter was inserted. The full length of the urethra,

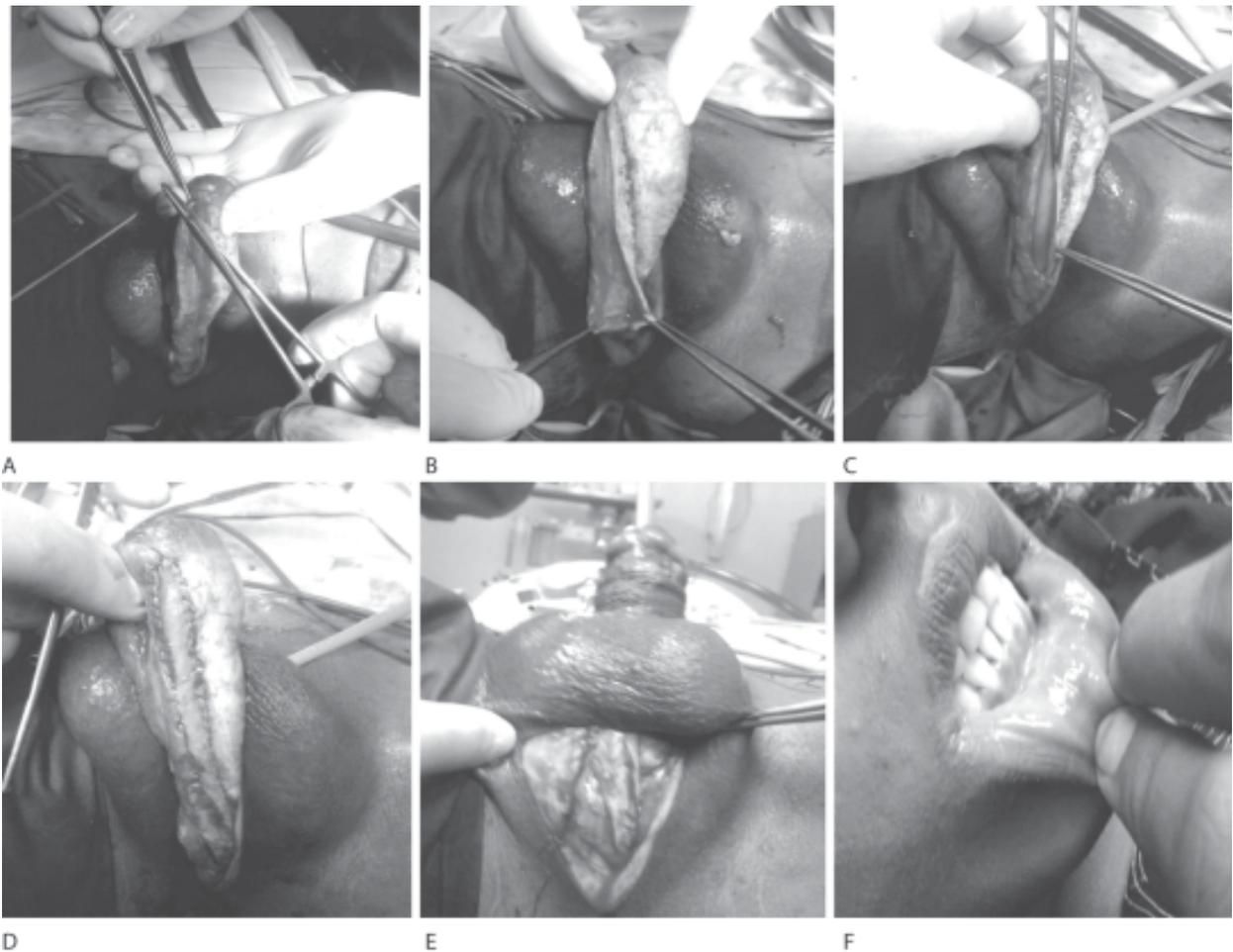


Fig.-4: A) OMG pushed inside the opened penile urethra from the meatus. B) One edge of the graft was sutured to the medial urethral margin. C) The other margin of the graft was sutured to the lateral margin of the urethra and the tunica of corpora over 14 F catheter. D) The bulbospongiosus muscle was approximated in the midline. E) After the bulbospongiosus muscle was approximated and proper haemostasis. F) No significant donor site defect was observed.

with the intact bulbospongiosum muscle, was rotated to its original position over the graft. Interrupted 5/0 polyglactin sutures were used to stabilize the urethral margins onto the corpora cavernosa over the graft on the left side. At the end of the procedure, the graft was completely covered by the urethra. The catheter was left in situ for 3 weeks.

The patient ambulates on the first postoperative day and was discharged from the hospital 5 days after surgery. All patients were receive broad-spectrum antibiotics and were maintained on oral antibiotics until the catheter was removed. At 3 weeks after surgery, the bladder was filled with contrast medium, the Foley catheter was removed and voiding cystourethrography was obtained. The results were classified into the following outcomes. Success was defined as a maximum flow rate of >10 ml/sec, normal RGU, and/or urethroscopy (with a 19 fr. sheath). Failure was defined as the presence of obstructive urinary tract symptoms, Qmax <10 ml/sec, stricture diagnosed on retrograde urethrogram/ urethroscopy, and the need for any postoperative urethral intervention.

Result:

The overall mean (range) follow-up was 18 (12–30) months. The cause of stricture was BXO 15 (30%), inflammatory 20 (40%), instrumentation 05 (10%), unknown 10 (20%) and the site of stricture –penile 12 (24%), panurethral 26 (52%), and bulbar 12 (24%).

The mean (range) stricture length was 6.5 (4.5-9) cm in patients with single bulbar urethral involvement and 10.5 (8.5–15.0) cm in patients with panurethral strictures.

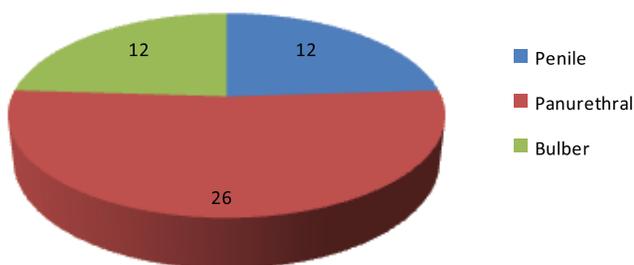


Fig-4: Site of Stricture

Of the 50 patients, 42 patients (84%) had received previous treatments: internal urethrotomy, 12 (24%); dilatation, seven (14%); urethroplasty, fifteen (30%); multiple treatments, eight (16%). Clinical outcome was considered a failure when any postoperative instrumentation was needed, including dilatation. In all

patients, postoperative Uroflometry was performed 3 weeks after surgery. On the basis of results of uroflowmetry done at 3rd week, after removal of penile catheter and repeat at 3rd and 6th month success rate were 96%, 94% and 90.0% respectively. When symptoms of decreased force of stream were present and uroflowmetry was <10 mL/s, urethrography, and urethroscopy were performed. In RGU and MCU, at 3rd month follow up stricture was found in 03 case and normal caliber urethra was found in 47 cases, revealed success rate of 94% and at 6th month follow up stricture was found in 03 cases, meatal stenosis was found in 02 cases and normal caliber urethra was found in 45 cases, revealed success rate of 90.0%. During urethroscopy at 6th month stricture was found in 3 cases and had a successful outcome by OIU, meatal stenosis was found in 02 cases and had a successful outcome by meatal dilatation. Two patients developed wound infection. Urethral diverticulum was not found in

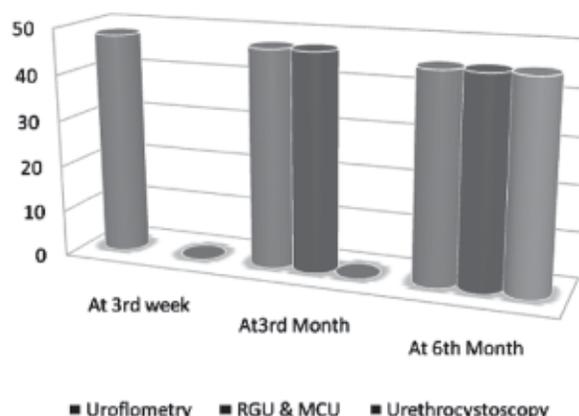


Fig-6: Follow Up.

any of the patients. Operative time was 2.15 hours to 3.5 hours. No significant donor site defect was observed (Fig.5F)

Discussion:

In the dorsal onlay techniques the urethra was circumferentially mobilized from the corpora cavernosa to better expose its dorsal surface and to spread fix the graft over the underlying albuginea^{6,11}. A circumferential dissection of the whole anterior urethra risks the vascularity of the urethra, which may be more important if the meatus was involved with disease and the distal-most urethra was extensively dissected, such as was seen with concomitant lichen sclerosis. The Barbagli procedure with circumferential mobilization of the urethra for dorsal onlay patch has a success rate of 99% and

66% in the short- and long-term, respectively¹⁰. In long segment anterior urethral strictures, circumferential urethral mobilization may jeopardize the lateral vascularity of the urethra.

Inlay patch by ventral urethrotomy for the management of anterior stricture urethra was described by Asopa. His procedure preserves lateral vascular supply. But there are difficulties in placement of long wider grafts which may become folded⁷. Kulkarni et al. have shown 92% success result with dorsal onlay technique through dorsolateral mobilization of urethra¹².

We adopted the technique to maintain the urethral vascularity on one side of the urethra while keeping the graft in a dorsolateral onlay fashion; technically, it is as easy as the Barbagli procedure. It also preserves the one-sided bulbar artery in addition to maintaining the native lateral vascularity at the meatus and the distal urethra. We kept the grafts of up to 2.3 cm in width with a maximum length from the proximal bulbar up to the meatus (up to 15cms).

In this series of patients using a new vascular, muscle and nerve-sparing procedure, the success rate was 90%. The factors currently reported as influencing the success rate of any kind of urethroplasty are: patient age, cause of stricture, length and previous treatments^{13,14}. Our reports have shown that these factors have no effect on the success rate, suggesting that other factors (possibly vascular and neurogenic urethral injury) may play an important role in determining stricture recurrence.

Conclusion:

Dorsolateral OMG onlay urethroplasty is feasible, tolerable, and safe for any length of anterior urethral stricture with good short term success.

Conflict of Interest : None Declared

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Abbreviations:

- OMG : Oral Mucosal Graft
 BMG : Buccal Mucosal Graft.
 NIKDU : National Institute of Kidney Diseases and Urology
 BSMMU : Bangobandhu Sheikh Mujib Medical University
 JBFH : Japan Bangladesh Friendship Hospital.
 URS : Ureterorenoscopy.
 RGU : Retrograde Urethrogram
 MCU : Micturating Cystourethrogram.