

# One-Stage Transperineal Repair of Pan-Urethral Stricture With Dorsally Placed Buccal Mucosal Grafts Results, Complications, and Surgical Technique

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**Purpose:** To report the surgical details and results of one-stage transperineal urethroplasty using dorsal buccal mucosal graft (BMG) in treatment of pan-urethral stricture.

**Materials and Methods:** This cohort study was carried out on 17 men with pan-urethral stricture who underwent one-stage transperineal BMG urethroplasty. Failure was defined as a need to any intervention during the follow-up period.

**Results:** The etiology of stricture was trauma in 4 (23.5%), sexually transmitted diseases in 4 (23.5%), lichen sclerosis in 2 (11.8%), and idiopathic in 7 (41.1%) patients. The mean follow-up period was 8.5 months (range, 3 to 18 months). Six (35.3%) patients developed complications; namely wound infection in 2 (11.8%), meatal stenosis in 1 (5.9%), and re-stenosis in 3 (17.6%) subjects. Complication rate in patients  $\leq 43$  and  $> 43$  years old was 25% (2/8) and 44% (4/9), respectively, which did not reach statistically significant difference ( $P = .6$ ). The final success rate was 88.2%. None of the patients needed open redo-urethroplasty during the follow-up period.

**Conclusion:** Reconstruction of pan-urethral strictures may be safely and effectively performed at a simple single operative procedure using a transperineal approach with combinations of dorsal BMG.

*Keywords: urethra, urethral stricture, urologic surgical procedures, mouth mucosa, tissue and organ harvesting*

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## INTRODUCTION

Short strictures are most commonly caused by trauma; while in developing countries, sexually transmitted diseases remain an important cause of long urethral strictures.<sup>(1)</sup> Lichen sclerosis, in which external genitalia (the glans of penis and prepuce) is involved, may be accompanied with long urethral strictures as well.<sup>(2)</sup>

Different treatments have been described for urethral strictures, including simple dilatation, internal urethrotomy, scar excision, and end-to-end anastomosis. These are all appropriate procedures for short

strictures,<sup>(3,4)</sup> while management of long anterior urethral strictures, especially pan-urethral strictures, still remains a great challenge for urologists.

The two-stage urethra-plasties, such as Johanson urethroplasty with or without use of free graft, are the conventional techniques used for the treatment of long anterior urethral strictures.<sup>(3,4)</sup> Furthermore, several one-stage techniques using grafts and different flaps have been described for the treatment of this condition.<sup>(3)</sup> Here, we present the results and also surgical details of one-stage transperineal

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urethroplasty using buccal mucosal graft (BMG) and its outcomes in the treatment of pan-urethral strictures.

## MATERIALS AND METHODS

### Study Population

This cohort study was carried out on 17 men with pan-urethral stricture (stricture beginning from the proximal of the bulb to the distal of the penile urethra), who underwent one-stage transperineal BMG urethroplasty from December 2006 to December 2009.

Pre-operative studies included retrograde urethrography, voiding cystography, and urethrosopy. All of the patients underwent one-stage transperineal repair of pan-urethral stricture with dorsally placed BMG.

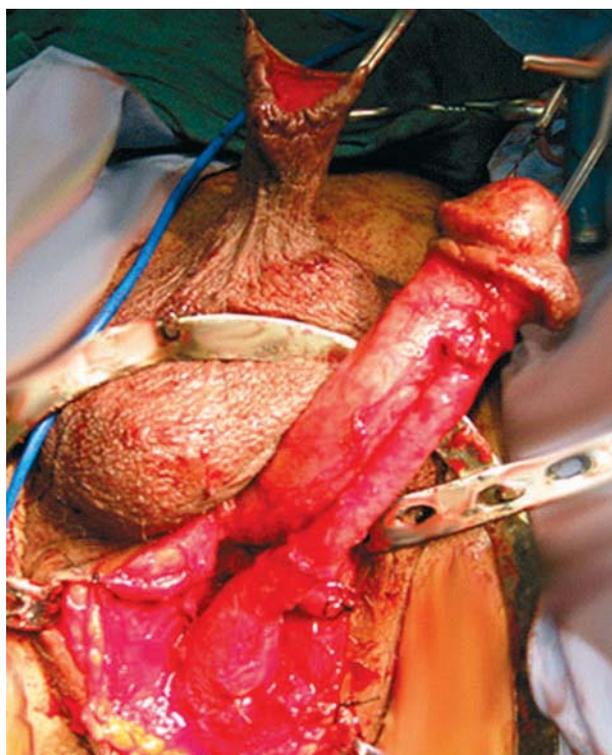
Follow-up visits were scheduled every 3 months for the first year, every 6 months thereafter, and whenever the patients had a problem. We called the patients if they did not show up for the follow-up. During each follow-up visit, a careful history taking, physical examination, and urine analysis and culture were performed. Cystoscopy was done at the end of the third months. If there were symptoms, such as poor urine flow rate, retrograde urethrography was done to rule out a stricture.

Failure was defined as a need to any intervention during the follow-up period. Complications were defined as wound infections, development of meatal stenosis, urethrocutaneous fistula formation, recurrent stricture, erectile dysfunction, penile cordee or deformity, urethral diverticula formation, urinary incontinence or other urinary dysfunctions, lower limb complications due to lithotomy position, and buccal donor site complications.

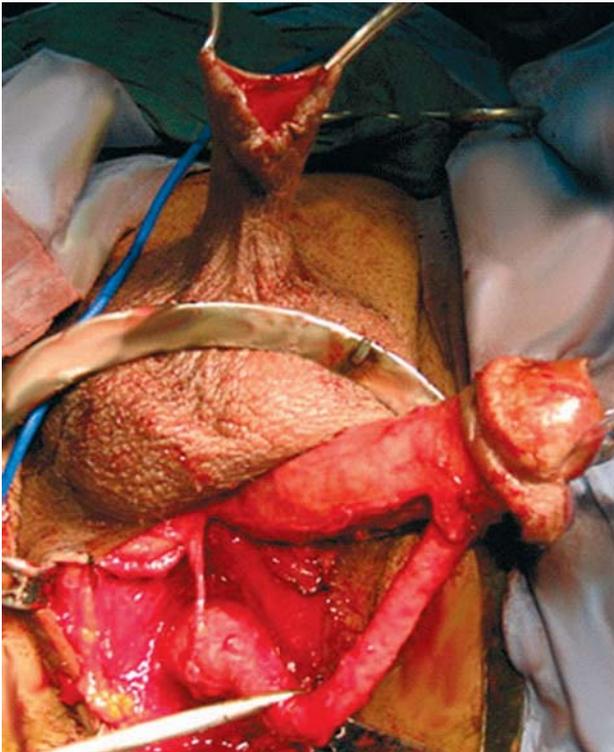
### Surgical Technique

Patients were placed in lithotomy position under general anesthesia. To prevent injury to lower limbs, they were covered with soft pad. A circumcisional incision was made and the penis was degloved under the dartos fascia. Midline of the perinea was incised and the penis was brought

to the perineal incision (Figure 1). The corpus spongiosum, from beginning at the glans of penis to the sphincter, was separated from the corpora cavernosa with special concern not to traumatize distal blood supply of the corpus spongiosum (the connection between corpus spongiosum and glans penis) (Figure 2). A longitudinal incision was made on the dorsal aspect of the urethral stricture (Figure 3). A maximal length of the buccal graft, with about 1.5 to 2 cm width, was harvested from each cheek. Because of long stricture in 5 patients, we were obligated to extend the graft to the inner mucous of the lower lip in one side for getting 4 to 5 cm more length. After harvesting graft from the cheek, the buccal incision was repaired with 4-0 Chromic sutures, but the place of the graft harvesting on the lower lip was left unsutured. After harvesting, grafts were thinned and placed on the dorsal aspect of the urethra, and fixed to the tunica albuginea of the corpora cavernosa by applying several sutures using 5-0 Vicryl sutures to prevent dead spaces (Figure 4). Thereafter, a deep incision was made on the dorsal aspect of the glans (dorsal meatotomy), the graft was advanced on it, and fixed to prevent future meatal stenosis. The urethra was retubularized by suturing



**Figure 1.** The penis was brought to the perineal incision



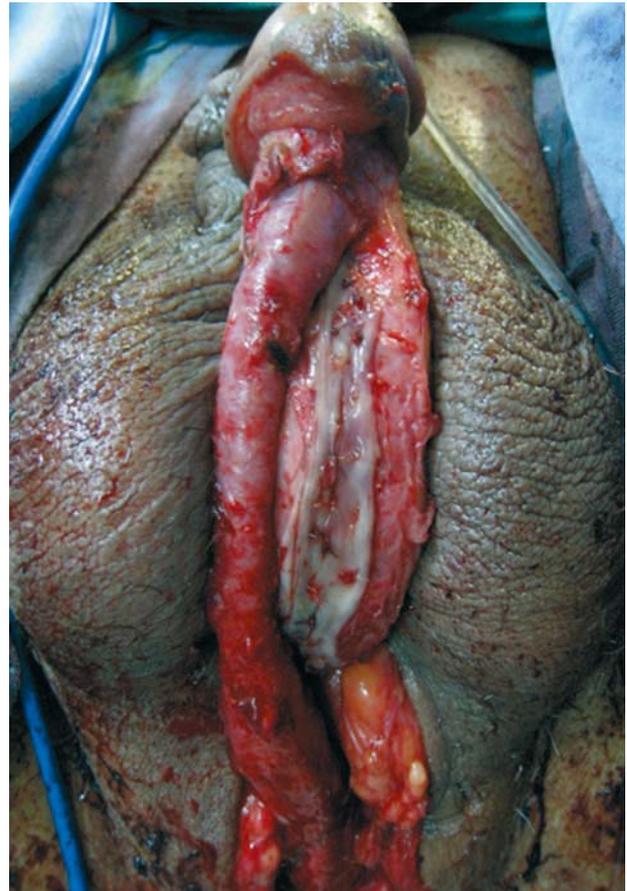
**Figure 2.** Separation of the corpus spongiosum from the corpora cavernosa



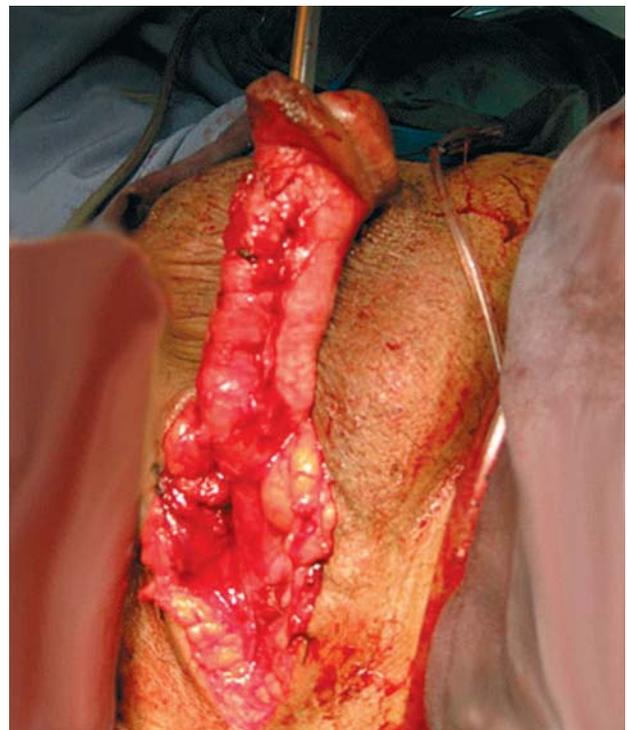
**Figure 3.** Longitudinal incision on the dorsal aspect of the urethral stricture

the edges of incised urethra to the rims of the buccal graft over an 18F silicon catheter (Figure 5). The penis was replaced in normal anatomy. After placing a drain, the perinea was closed in anatomic layers. The penile skin was placed back in circumstantial position.

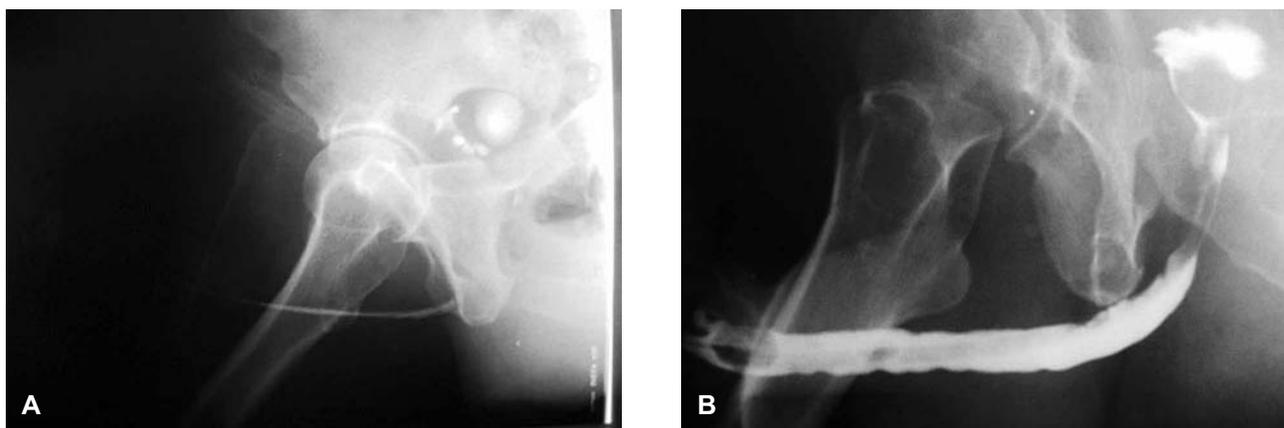
The patients remained bed rest with limited activity for 48 to 72 hours. The perineal pressure dressing was changed after 48 hours and the drain was removed after 2 to 3 days. The patient was discharged on the 5<sup>th</sup> to 7<sup>th</sup> postoperative days. The urethral catheter was kept for 21 days. At the end of the 3<sup>rd</sup> week, retrograde urethrography was



**Figure 4.** Buccal mucosal graft in place



**Figure 5.** Tubularization of the urethra



**Figure 6.** Retrograde urethrography before (A) and after (B) the operation

performed (Figure 6). If extravasation was present, which occurred only in 1 patient, the urethral catheter was remained for another 14 days, if not, the catheter was removed at that time.

### Statistical Analysis

The data were analyzed using SPSS software (the Statistical Package for the Social Sciences, Version 11.0, SPSS Inc., Chicago, Illinois, USA) with Chi-Square test. *P* values less than .05 were considered statistically significant. We analyzed the relationship between complication rate and age, history of previous surgery, and etiology of stricture.

## RESULTS

The mean age of the patients was 43 years (range, 23 to 68 years). The mean stricture length was  $20.7 \pm 4.6$  cm.

The etiology of stricture was trauma in 4 (23.5%), sexually transmitted diseases in 4 (23.5%), lichen sclerosus in 2 (11.8%), and idiopathic in 7 (41.1%) patients. Four subjects had a history of previous urethrotomy, 4 had urethral dilatation, and 1 had open urethroplasty.

The mean follow-up period was 8.5 months (range, 3 to 18 months). Six (35.3%) patients developed complications; wound infection in 2 (11.8%), meatal stenosis in 1 (5.9%), and re-stenosis in 3 (17.6%) subjects. No scrotal hematoma was noted. Re-stenosis was ring-shaped at the site of the attachment of BMG, which was treated by simple urethral dilatation in 2

and by internal urethrotomy in another patient, three months after the primary reconstructive surgery. Neither of these patients had re-stenosis again during the follow-up period. In one patient, wound infection was associated with circumcisional dehiscence, which did not respond to antibiotic therapy and needed surgical debridement. Meatal stenosis was treated by simple dilatation.

Five patients suffered from lower limbs pain during the first 24 to 48 hours after the surgery because of lithotomy position; but severe injuries were not seen. Other complications, such as erectile dysfunction, penile cordee or deformity, urinary incontinence, urethral diverticula formation, or other urinary dysfunctions were not seen in any patient.

Complication rate in patients  $\leq 43$  and  $> 43$  years was 25% (2/8) and 44% (4/9), respectively; there was not a statistically significant difference ( $P = .6$ ). The primary etiology of pan-urethral stricture and history of previous surgery for stricture did not predict postoperative complication rate.

The discomfort at the buccal donor site was mild in all of our subjects in the first 1 to 2 days after the operation, and normal diet was started on the 2<sup>nd</sup> postoperative day. Furthermore, there were no aesthetic or functional complications at the oral donor site during the follow-up period. The ultimate success rate was 88.2%. None of the patients needed open redo-urethroplasty during the follow-up period.

## DISCUSSION

Management of pan-urethral strictures is challenging for urologists. Several different surgical methods have been described for treatment of urethral strictures, to increase success rate and avoid the stepped procedures. The selected surgical technique depends mainly on the stricture length, but the stricture etiology should be considered as well.<sup>(5)</sup>

Formal perineal urethrostomy is a reasonable option for patients who are not good candidate for surgical treatments. Several techniques were introduced for urethral reconstruction, using different free grafts and flaps. The traditional two-stage urethroplasties, including Johanson and scrotal or penile skin grafts, are used for treatment of complex and extremely narrow pan-urethral strictures or strictures associated with local adverse conditions, such as fistula, abscess, or tumor.<sup>(5,6)</sup>

Joseph and colleagues suggested that re-stenosis may occur due to local factors, such as poor tissue condition and compromised blood supply in multi-stage procedures.<sup>(7)</sup>

In 1968, Orandi, a new surgical technique was introduced for the repair of urethral strictures, which was a one-stage urethroplasty technique, using the principles of pedicled skin grafting.<sup>(8)</sup> Over time, Quartey popularized a new and original one-stage flap urethroplasty, based on Orandi's original suggestions.<sup>(9)</sup>

Another recent technique, which is used more frequently and has been the gold standard in the past decade, is using BMG in urethral surgery for hypospadias and urethral strictures.<sup>(6)</sup>

The oral mucosa is architecturally similar to the squamous epithelium of the penile and glanular urethra, making it a suitable substitute material for the urethra.<sup>(5)</sup> Buccal mucosal graft has several advantages over other grafts. The tissue is tough and resilient, compatible with wet environment, and has a thick epithelium, high potential of tensile strength, rapid healing time, and a higher density of elastic fibers in comparison with the skin. Therefore, it provides better revascularization and inosculation.<sup>(10-12)</sup> Furthermore, the process of harvesting is simple and does not create a visible donor site scar.<sup>(10)</sup>

Additionally, the tendency of fluid collection, hematoma formation, and lifting the graft from the bed as the result of shear forces can be decreased by quilting of BMG well onto its bed.<sup>(11)</sup>

In 1996, Morey and McAninch described the ventral onlay BMG urethroplasty, and Barbagli and colleagues described the dorsal free graft urethroplasty.<sup>(13,14)</sup> Ventral BMG accompanies better visualization of stricture, but carries risk for urethral diverticulum formation while dorsal placement of BMG provides better mechanical support and blood supply to the graft.<sup>(6)</sup> In 2005, Barbagli and associates showed the same success rates (83% to 85%) for using BMG that was placed on the ventral, dorsal, or lateral surface of the urethra; mentioning that the surgical technique does not affect the outcome.<sup>(15)</sup> On the other hand, Patterson and Chapple reported that in experienced hands, the outcomes of both dorsal and ventral onlay grafts in bulbar urethroplasty are similar. However, the dorsal onlay technique is less dependent on surgical expertise and therefore is more suitable for surgeons new to the practice of urethroplasty. In general, ventral onlay of BMG and tube graft procedures in the management of penile strictures are associated with much higher rates of recurrence and should therefore be avoided.<sup>(16)</sup> In our technique, the BMG was placed dorsally to reduce the complication rate. No urethral diverticulum or fistula occurred in our patients.

In the study by Barbagli and colleagues, the success rate was higher in patients who underwent prior urethroplasty (88.9% versus 88.7%) and there was no relationship between age and success rate. They suggested that one-stage urethroplasty should not be withheld due to the patients' age.<sup>(5)</sup> In our study, the success rate was 88.2%, which is comparable with other methods. Furthermore, complication rate was higher in older age group, but success rate was the same in older and younger groups of patients.

Mild lower extremity complications resulting from extended time in the high lithotomy position may occur in 10% of patients, which are time-related.<sup>(17)</sup> In our study, lower extremity pain occurred in 5 (29.5%) patients, but no severe complication occurred. By decreasing time in the

high lithotomy position, related complications may be eliminated.

Dubey and coworkers reported excellent results in one-stage dorsal onlay buccal mucosal urethroplasty for balanitis xerotica obliterans-related strictures.<sup>(18)</sup> Langston and associates reported reconstruction of synchronous urethral strictures by scrotal disassembly maneuver. In this technique, the scrotum was completely bisected in midline down to the deep perineum.<sup>(19)</sup>

In this study, by degloving the penis and bringing it to the perineum, anterior urethra was accessible to repair in one stage and there was no need to incise the scrotum. This technique is easy to perform with satisfactory results and low complication rate. The advantages of one-stage transperineal urethroplasty method are as follows: a single-stage procedure, no need for incision of the scrotum, direct visualization of the stricture segment, low postoperative resticture rate, no postoperative cordee formation, and low possibility of scare formation in the skin. Although a long-term follow-up period was unavailable for all the patients in the present study, the results are expected to be similar to those of other extensive urethral reconstruction procedures.

## CONCLUSION

Reconstruction of pan-urethral strictures may be effectively performed in a single operative procedure using a transperineal approach with combinations of dorsal BMG. The results are comparable to those of published series using the dorsal BMG through the standard dorsal two-stage urethroplasties, in which there is a good and direct exposure of the stricture segment.

## CONFLICT OF INTEREST

None declared.

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