

## Buccal mucosa graft urethroplasty for anterior urethral stricture: A single-centre experience

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### Abstract

**Background** :To evaluate the outcome and complications after using BMG for anterior urethral stricture.

**Procedure:** This is a retrospective evaluation of prospectively maintained database. A total of 78 patients were operated from August 2012 to September 2019. Patients were evaluated by using IPSS score, uroflometry, post void residual urine and radiological studies. All patients were operated by using combined regional and general anaesthesia. Buccal mucosa was used in all except three where lingual mucosa was also harvested. The catheter was removed at 3-4 weeks after surgery and patients were followed up at one, three and six months, and then three monthly thereafter. The procedure was considered successful if no intervention was required after surgery.

**Conclusion:** In 78 patient's total of 89 procedures have been done over seven years. The procedure was successful in 84.93%, and it failed in 11 patients over a mean follow up of 45 months (7-59 months). In three patients, single DVIU was sufficient whereas in four regular CIC was required after DVIU. In four patients redo surgery was done after six months. Two patients required staged procedure and in three permanent perineal urethrostomy were made due to poor urethral condition, all in older patients. These five patients were excluded from the study. Anastomotic narrowing was most common finding. Redo urethroplasty was successful in all patients. Buccal mucosa as a free graft provides excellent functional outcome in anterior urethral stricture.

**Keywords:** urethral stricture, substitution urethroplasty, buccal mucosa.

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### Introduction

Stricture urethra is not an uncommon entity and its management poses a significant challenge to the urologist, owing to organic as well as psychological impact of the disease on the patient. Stricture urethra is a complex disease and its management has seen many swings in last two, three decades, from using genital flaps, genital and extra genital full thickness and split thickness skin grafts to oral mucosa.[1,2,3,4]. Oral mucosa, particularly buccal mucosa, has been the graft material of choice to substitute the urethra for more than two decades.

Long term results are available now and they are very encouraging. So, nowadays, buccal mucosa is the material of choice to substitute the urethra because in comparison to other graft material it has got thick epithelium (makes it tough and resilient) and a highly vascularized thin lamina propria, which helps in quick and efficient imbibition and inosculation[5]. Other advantages are that it is easily available, easy to harvest, considerable lengths can be harvested, compatible in wet environment and immunological properties are similar to bladder mucosa[6]. Treatment options for anterior urethral stricture are dilatation, DVIU, non-transecting anastomotic urethroplasty and substitution urethroplasty. Usually substitution urethroplasty is used in strictures more than 1.5-2.0cm in length. Graft patch can be applied on ventral, lateral and dorsal surface depending on the stricture

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characteristics and surgeon's preference. In literature, no technique is superior but the general consensus is that for proximal and mid bulbar ventral onlay and for distal bulbar and penile urethra, dorsal onlay technique should be used.[ 7]

### Procedure

This is a retrospective evaluation of 78 patients. Mean age was 27.29 yrs (22-68.2yrs). Patients were evaluated by IPSS score, urine routine, culture and sensitivity, uroflometry, post void residual urine and by contrast studies. Mean IPSS score was 18.7 and mean Q max was 6.29 ml/sec. Mean stricture length was 4.29 cm. (3-17.2 cm.). If there was evidence of active infection or a long and very narrow segment could be seen on contrast study, consideration was given for preoperative urinary diversion by suprapubic cystostomy at least for two weeks before definitive surgery. This helped not only in better and quick resolution of infection but also to better delineate the proximal extent of stricture, which if missed could have resulted in failure. Preoperative diversion was needed in seven patients, all of whom had panurethral stricture.

All patients started chlorhexidine mouth wash day before surgery and continued in post-operative period. All patients received intravenous antibiotics just before incision. Combined epidural and general anaesthesia used with nasal intubation, two teams started surgery simultaneously, this approach not only saved time but

### Conclusion

Total 78 patients operated, two patients were managed by staged urethroplasty and three patients were considered for permanent perineal urethrostomy owing to very unhealthy urethral mucosa. These five patients were excluded from the study. Most common etiology of stricture was iatrogenic followed by idiopathic, infective and post-traumatic(Table 1). The commonest site of stricture seen was at the bulbar urethra with penile urethra as the second most common site (Table 2). Mean age was 27.29 yrs (22-68.2yrs), mean IPSS and Q max improved from 18.7 and 6.29 ml/sec to 2.9 and 19.69 ml/sec respectively. Mean follow up was 45 months (7-59 months). Complications at donor site included facial swelling, edema and pain in the immediate post-operative period, which subsided significantly in the second week. Difficulty in mouth opening and oral numbness improved significantly in all at three months. Edema at perineal wound was the most common finding followed by hematoma. Wound dehiscence was seen in two patients (both were

also prevented cross infection from oral cavity to perineum and vice versa.Midline perineal incision was used and for penile,penobulbar and panurethral strictures, penis inverted completely for better exposure of the stricture segment. Ventral onlay was used for proximal and mid bulbar stricture whereas for penile, penobulbar and for panurethral stricture dorsal onlay was used. For ventral onlay,bulbospongiosus muscle and corpus spongiosum was incised in midline ventrally[8] and for dorsal onlay we used Barbagli's[9] technique of dorsal stricturotomy. While for panurethral stricture we mobilized only one side of the urethra[7] to gain access to the stricture segment. Stricturous segment was incised along whole of its length and incision extended into the healthy urethra for 1-1.5 cm both proximally and distally to cover up the grey areas not identified by contrast studies. The wound was closed in layers without putting a drain, and compressive bandage applied. We did not close the donor site; instead, it was packed with wet gauze after proper hemostasis. Pericatheter RGU done at 3 weeks and if showed any leakage catheter removal postponed for another 1-2 weeks. Patients were followed one month after catheter removal and then at three, six and then three monthly afterward by symptom score, uroflometry and by residual urine estimation. If there was any change in flow or symptoms of obstructive voiding present and if Q max was <15 ml/sec. contrast study was considered. Surgery was labelled a failure if any procedure was required in post-operative period.

diabetic), perineal abscess developed in one patient, all improved by conservative measures. Re-stricture developed in 11 patients, all noted within one year of surgery.In three patients anastomotic narrowing was seen at the proximal junction, and in 4 patients it was at the distal junction, in three patients single DVIU was successful whereas in four DVIU followed by regular CIC rendered stricture free interval longer. Redo urethroplasty was required in four patients at 6 months interval, in two patient's whole graft necrosed and in other two multiple strictures developed. In these cases suprapubic cystostomy was kept longer.In three patients, one stage urethroplasty could achieve success, whereas in one patient two-stage urethroplasty was required. All four patients rendered stricture free after redo surgery.

Use of buccal mucosa for urethral reconstruction was first described by Humby in 1941 for correction of urethrocutaneous fistula [10] and later, was popularized by Barbagli [9], buccal mucosa has got unique results of dorsal on lay were also demonstrated by Barbagli et

al[17], characteristics which makes it most suitable material to be used in urethral reconstruction for anterior urethral stricture[5,6]. Substitution urethroplasty is the procedure of choice if stricture length is more than 1.5-2 cm or after failed DVIU for smaller strictures. DVIU seems to be logical, as it is less invasive, quick to perform, has less hospital stay and is more cost-effective, but long term success rate is 50 % or even less [11], and the patient requires multiple DVIU to remain stricture free. Better understanding of anatomy and judicious use of buccal mucosa have made substitution urethroplasty more cost-effective even if we compare with DVIU [12-13]. Our strategy is to use internal urethrotomy first if the stricture is single and length is less than 1.5-2 cm, without dense spongiofibrosis. In our series, all patients had received urethrotomies and multiple dilatations before performing urethroplasty, mostly done outside of our center. Buccal mucosa can be applied over dorsal, ventral and lateral surface depending on surgeon's preference and stricture characteristics, although the best position has been a subject of debate. In their study [14] Barbagli et al have shown equal

results for all three locations. They used ventral onlay in 17, dorsal in 27 and lateral onlay in 6 patients and found 83%, 85% and 83% success respectively; they also concluded that the recurrence rate was distributed uniformly in all at a mean follow up of 42 months.

Proponents of ventral onlay have also demonstrated good long term results [15]. In a study of 60 patients, done by Sean P et al[16] they have shown 90% long term success rate for ventral onlay, they also concluded that with the judicious use of internal urethrostomy this success rate can be increased to 97%. Encouraging with the results of dorsal onlay were also demonstrated by Barbagli et al[17]. Mundy et al[18] compared outcomes of ventral onlay and dorsal onlay substitution urethroplasty using Barbagli's technique and found at 5 yrs follow up, 5% of patients with dorsal onlay and 14% patients with ventral onlay developed resticture. Another important finding was that postmicturition dribbling was seen in 17% of dorsal onlay and 21% of ventral group, although outpouching of graft was not seen in either group on contrast study. They found better success rate with Barbagli's procedure in comparison to traditional ventral onlay group.

**Table1: Etiology**

Idiopathic	25
Iatrogenic	45
Infective	5
Trauma	3

**Table 2:Site of stricture**

Bulbar	37
Penile	29
Peno -bulbar	9
Pan-urethral	13
Meatus and fossa navicularis involvement	9

In the literature, we found that both ventral and dorsal onlay techniques have their merits and demerits. Ventral onlay is technically less demanding, there is direct access to urethra, need minimal dissection, precise placement of apical sutures for more proximal stricture under direct vision[ 8].But as there is no support ventrally especially for distal stricture, theoretically, there are more chances of graft sacculation and development of post micturition dribbling and semen sequestration in post operative period[19].Although this finding was refuted by Mundy[18]who found no sacculation in both techniques and post micturition dribbling was equally common in both. In contrast, Dubey et al [20] in their study of 109 patients found more incidence of post micturition dribbling, ejaculatory disturbance and pseudodiverticula formation in the ventral onlay group.

For placement of graft dorsally greater dissection required if you are using barbagli's technique. But the dorsal side offers good cavernosal bed where graft can be spread, fixed and quilted, to prevent contracture later on. Margin of the graft and urethra can be quilted together to the tunica albugenia, so even in case of graft loss urethra is kept wide open [21]. In addition, the graft also stretches during erection which also prevents graft contracture [9]. Placing graft on dorsal side for a more proximal stricture is difficult and no cavernosal bed is available. Our approach for placing the graft is similar to the Kulkarni and Barbagli approach [7], ventral onlay for proximal and mid bulbar urethra and dorsal approach for distal bulbar, penile and for panurethral stricture. Regarding donor site morbidity, Greenwell et al [22] retrospectively reviewed data in 110 patients and found immediate postoperative pain in 82%, but 89% resumed normal diet after one week; difficulty in mouth opening was

seen in 66% initially but seen in only 7% after 6 months. Donor site morbidity in our series is also similar and we found no long term morbidity in any patient after three month period. Recurrence was seen in 11 patients, most common finding was anastomotic ring stricture both proximally and distally, which necessitates, extending stricturotomy incision in healthy urethra for 1-1.5 cm both proximally and distally as well as precisely placement of apical suture under direct vision, which is difficult in proximal bulbar, for this reason author always uses 2.5 X magnification lens for all types of urethroplasty. Three patients were managed by single DVIU, and in four additional CIC were needed. This fibrous ring stricture responds better with DVIU and endoscopic dilatation [23].

Risk factor for recurrence was found to be, age at surgery, stricture length, site and etiology on univariate analysis but on multivariate analysis penile site was only risk factor [24]. Another study done by murthy et al [25] showed several variables including stricture site, length, number, amount of spongiofibrosis and presence of BXO upon which success rate depends. Complete graft loss was seen in two patients and similar to their findings [24,25] all had history of very long stricture, history of multiple urethrotomies, dense spongiofibrosis and very unhealthy urethral plate. All four patients managed were successfully after redo surgery at 6 months or later. Reported success rate for BMGU is excellent in both short [26] and long term, Barbagli and Kulkarni [27] reported 80.2% long term success rate for BMGU. In our series with mean follow up of 45 months success rate is 84.93%.

Buccal mucosa has been used successfully for the management of anterior urethral stricture for the last more than two decades, long term results are available now and are very encouraging. Donor site is concealed and there is minimal long term morbidity. We strongly recommend the use of buccal mucosa as a substitution material for anterior urethral stricture.

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