

Complications and Outcomes of Oral Mucosa Graft Urethroplasty for Anterior Urethral Strictures

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Abstract

Objective: We present our short term experience with oral mucosa grafts, placed either dorsally or ventrally with their early and late complications.

Material and Methods: We treated 50 patients of anterior urethral stricture with buccal mucosa graft urethroplasty placed either dorsally or ventrally from May 2017 to May 2019. The graft was harvested from the cheek with patient under general anesthesia. Failure was defined postoperatively if the patient had an abnormal Micturating Cystourethrogram (MCU), need for any intervention and poor flow rate ($q_{max} < 15$ mL/s). All the patients were followed up at 1, 3, 6, and 12 months postoperatively.

Results: Most common location of stricture observed intraoperatively was bulbar urethra (36%), followed by peno-bulbar (24%), pan-urethral (18%), penile in (14%), and penile with fossa navicularis (8%). The most common etiology of stricture urethra was iatrogenic (44%), followed by infective (24%), lichen sclerosis (22%), and idiopathic (05%). Four patients developed re-stricture out of which two had good flow after single attempt of direct visual internal urethrotomy and other two required re-surgery. Two patients had developed small urethra-cutaneous fistula which was managed conservatively. Graft donor site complication includes postoperative pain which was seen in most patients till 2nd post-operative day and was managed by good analgesia. Facial swelling was seen in 5 patients which resolved in a week and 2 patient reported restriction in mouth opening. The overall success rate of oral mucosa urethroplasty was 92%.

Conclusion: Oral mucosa graft urethroplasty has emerged as a most versatile surgical option which can treat urethral strictures of almost all etiologies and length but is associated with fewer short and long term complications. Furthermore, the site and etiology of the stricture did not have impact with the outcome of oral mucosa graft urethroplasty.

Key words: Urethral stricture, Oral mucosa graft urethroplasty, Complications

INTRODUCTION

The urethral stricture is a narrowing of the anterior urethra caused by scarring of the urethral epithelium and the spongy erectile tissue of corpus spongiosum. The main causes of urethral stricture in India are trauma, iatrogenic, inflammation, and lichen sclerosis. Buccal mucosa graft (BMG) has emerged as a reliable urethral substitute with long-term results comparable or superior to penile flaps. Although many attribute British surgeon Graham

Humby,^[1,2] as the first to successfully use buccal mucosa for urethral reconstruction, it was initially described by Russian urologist Kirill Sapezhko in 1894. The technique did not get wide acceptance until 1990s. It has become an ideal urethral substitute because of ease of harvest,^[3] surgical handling characteristics, hairlessness,^[4] more resistant to infection than skin, and flexible and has thin lamina propria, excellent microcirculation favorable for graft imbibition and inosculation, compatibility in a wet environment, and its early ingrowth and graft survival. Because of these unique characteristics, buccal mucosa has endeared itself to the realm of reconstructive urology. Standard urethroplasties using oral mucosa grafts have a lifetime success rate of 88–97%^[5-7] as per different studies.

Objectives

The objectives of the study were to study the efficacy, complications and long-term outcomes of oral mucosa

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graft urethroplasty in patients suffering from anterior urethral stricture.

MATERIALS AND METHODS

After approval from the ethical committee, a prospective cohort study of 50 patients was done from May 2017 to 2019, who were diagnosed to have anterior urethral strictures that were of non-traumatic origin and required oral mucosa graft urethroplasty.

The patients with inflammatory/infective stricture of any origin, stricture more than 1 cm in length, Pan urethral stricture, patients with H/O internal urethrotomy or dilatations, lichen sclerosis were only included in the study. In all the patients, the protocol of documentation was followed and a detail history, physical examination, ultrasound, uroflowmetry, and radiological investigation such as retrograde urethrogram (RGU) and micturating cystourethrogram (MCU) [Figure 1] was done to evaluate the patient. All the patients underwent either dorsal or ventral onlay buccal mucosa graft urethroplasty (Dr. Kulkarni's technique) [Figure 2] under general anesthesia with nasal intubation. We have used the Clavien Dindo system (CDS) to grade the complications of the surgery.

Patients were followed up in terms of history, physical examination, MCU at 4 weeks in post-operative period [Figure 3], uroflowmetry at 1, 3, 6, and 12 months. Failure was defined postoperatively if anyone of the following was seen:

1. Poor flow rate ($Q_{max} < 15 \text{ mL/s}$)
2. Abnormal MCU
3. Need for any intervention postoperatively.



Figure 1: Micturating Cystourethrogram showing long length penile urethral stricture

RESULTS

A total of 50 patients with mean age of 36.3 years (range 23–64 years) underwent BMG urethroplasty by dorsal or ventral graft. 45 patients underwent dorsal BMG urethroplasty and 5 patients required ventral BMG urethroplasty. All the patients were followed up for a period of 1 year.

Most common location of stricture observed intraoperatively was bulbar urethra in 18 cases (36%). The most common etiology of stricture urethra [Table 1] was iatrogenic (44%), that is, either catheterization or post-transurethral resection of prostate (TURP) or instrumentation. In the case of panurethral stricture lichen sclerosis was the most common etiology.

Four patients (08%) developed re-stricture [Table 2] out of which two had good flow after single attempt of direct visual internal urethrotomy (DVIU) (CDS Grade-3b) and other two required re-surgery (CDS Grade 3b). Two patients had developed small urethra-cutaneous fistula which were managed conservatively (CDS Grade 1). Erectile dysfunction (transient) was seen in seven patients (14%), five of which responded to PDE5 inhibitors (CDS



Figure 2: Buccal mucosa graft placed and urethroplasty were done



Figure 3: Post-operative retrograde urethrogram showing extravasation of contrast

Grade 1), and two had lost follow-up. Four patients (08%) developed febrile UTI which treated with culture specific antibiotics (CDS Grade 1). Wound infection (CDS Grade 1) was seen in 06 patients (12%) and was treated by giving pus culture specific antibiotics.

Graft donor site complication [Table 3] includes post-operative pain which was seen in most patients till 2nd post-operative day and was managed by good analgesia. Pain resolved in all patients within 2 weeks of surgery. Facial swelling was seen in 5 patients (10%) which resolved in a week and 2 patient (04%) reported restriction in mouth opening (CDS Grade 1). All complains were resolved in the first month of surgery. Peak urinary flow rates improved from

a mean of 4.2 mL/s (range 2.1–9.7 mL/s) preoperatively to 20.2 mL/s (range 18.3–28.1 mL/s) after 1 year.

DISCUSSION

There have been a myriad of different types of tissue used for the purpose of graft tissue transfer in urethral reconstructive surgery; some have been more successful than others. Oral mucosa possesses many of the ideal graft characteristics for urethral reconstruction. From a technical standpoint, it is easily harvested with minimal morbidity. In addition, its native environment is wet, similar to urethra. Buccal mucosa has endeared itself to the realm of reconstructive urology. Oral mucosa also offer an inherent resistance to lichen sclerosis.^[8,9]

In the present series, buccal mucosa graft has a success rate of 92% at a follow-up of 1 year. Elliot *et al.*^[9] in the year 2003 on 60 patients with a mean follow-up of 47 months reported 97% success rate after one attempt of DVIU. Kane *et al.*^[6] reported a success rate of 94.3% after a mean follow-up of 25 months. Iselin and Webster in their series of 29 men reported a high early success rate of 97% after a median follow-up of 19 months.

In general, the complications are less after BMG urethroplasty in experienced hands. Post-operative complications can occur in two areas, the site of harvest and the site of urethral stricture repair. In our study, the most common complication from oral graft site was facial swelling seen in 5 patients (10%) followed by pain (6%) and restriction in mouth opening (4%). However, all these symptoms resolved within 1 month of the surgery. Facial swelling was seen in patients in whom the length of the graft required was longer. In one study by Venn and Mundy,^[10] 57% of the patient had developed oral numbness after surgery, in that, in 16% the complaints tend to persist for a year. Wood *et al.*^[11] reported that closure of the harvest site was associated with more pain and suggested that this may be improved by not closing when the length of the graft required is long. Although Dublin *et al.*^[8,12] reported that patients did well with closure of the donor site, but 16% and 32% had long term complaints of numbness and mouth tightness, respectively. In a study by Barbagli *et al.*^[13] in 2010 a prospective study of 350 patients showed that, the majority of patients (85.2%) showed no pain (49.2%) or slight pain (36%) in the immediate post-operative course, and only 3.7% of patients required use of anti-inflammatory drugs for oral pain. The majority of patients (65.8%) showed slight (41.2%) or moderate (24.6%) swelling in the immediate postoperative course, but 58.6% were able to resume a normal diet 3 days after surgery. In our study, we had left the graft site open. Overall the inner cheek harvest site for BMG regardless of the management appears to heal without complications as reported in our study.

Table 1: Etiology of stricture

Serial number	Cause of stricture	Number of patients (%)
1	Iatrogenic	22 (44)
2	Infective	12 (24)
3	Idiopathic	5 (10)
4	Lichen sclerosis	11 (22)
	Total	50 (100)

Table 2: Complications of oral mucosa graft urethroplasty

Serial number	Complications Early (<4 weeks)	Number of patients (%)
1	Bleeding	0
2	Wound infection	6 (12)
3	Peri-urethral pus discharge	2 (4)
4	Urosepsis	0
5	Penile oedema	5 (10)
6	Scrotal edema	4 (8)
7	Contrast extravasation during MCU	2 (4)
8	Failure to void	0
Serial number	Complications Late (>4 weeks)	Number of patients (%)
1	UTI	4 (8)
2	Post void leak	1 (2)
3	Wound discomfort	5 (10)
4	Irritative LUTS	2 (4)
5	Stream splaying	0
6	Ejaculatory dysfunction	1 (2)
7	Erectile dysfunction	7 (14)
8	Urethro-cutaneous fistula	2 (4)
9	Recurrence	4 (8)

MCU: Micturating cystourethrogram, UTI: Urinary tract Infection, LUTS: Lower urinary tract symptoms

Table 3: Oral graft site complications

Serial number	Complication	Number of patients (%)
1	Haemorrhage	0
2	Pain	3 (6)
3	Facial swelling	5 (10)
4	Damage to stensen's duct	0
5	Paraesthesia	0
6	Restriction of mouth opening	2 (4)

Perineal complications are also less. In our study, six patients (12%) had wound infection which was managed by change of culture specific antibiotics. Erectile dysfunction was reported by 7 patients (14%) out of which 4 patients had some amount of erection but it was less than what they use to have earlier. It was seen in patients who had a long length of stricture and the mean age was more than 45 years. Six patients responded well to PDE5 inhibitors. Out of 7 patients 5 patient were eventually weaned off the drug by 6-9 months of surgery. One patient had lost the follow-up. Similarly Erickson and colleagues showed that patient greater than 50 years old had a higher decline in erectile function after urethroplasty. Sexual function in immediate post-operative period is poor and as the healing occurs, it tends to improve. Dogra and colleagues, in their study showed that erectile function is worst at 3 months after surgery and then recovers at pre-operative level in most patients at 6 months and then remains stable. Penile edema was seen in 5 patients (10%) and scrotal edema was seen in 4 patients (08%) and both were resolved within 10 days of surgery. Two patients had developed tiny urethro-cutaneous fistula which was managed conservatively and it was resolved by keeping suprapubic catheter for a longer time. In a study by Fichtner *et al.*^[5] they reported overall complication rate of 25% (8 of 32). In a study by hosam s. al-qudah in 2005 reported complications (3% early and 18% late) after urethroplasty. While all the early complications were resolved and most (97%) were minor, less than half of the late complications were resolved, although most (82%) were minor.

CONCLUSION

Reconstruction of urethra continues to be challenging for reconstructive surgeon; oral mucosa has proved to be useful alternative to skin but it is not without minimal morbidity and complications. In experienced hands, the success of oral mucosal graft for urethroplasty is similar regardless of location of stricture. BMG has been used successfully for treating all types of strictures in anterior urethra with less donor site morbidity and fewer complications. Because of its inherent

advantages oral mucosa graft has become the recommended source for tissue substitution during urethral reconstruction.

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