

LONG URETERIC STRICTURES MANAGED BY USING BUCCAL MUCOSAL GRAFTS

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ABSTRACT

Objective: This study aims to describe the reconstruction of long ureteric strictures using buccal mucosal patch grafts and to report the short term outcome. **Material & Methods:** We retrospectively looked at our hospital inpatient and outpatient records of all patients who underwent surgical treatment for benign ureteric strictures. Imaging records and films, histopathological reports were reanalysed. The short term outcomes were also noted. **Results:** During this 10 years' study period 8 patients (six Males and two Females) underwent 10 buccal mucosal grafts procedures. The mean age of the patients was 36.25 ± 10.48 years and the mean length of the stricture was 7.1 ± 3.41 cm. There were intraoperative complications noted and none of the patients needed either intra or post-operative blood transfusions. Serum creatinine remained stable at 6 and 12 weeks after surgery. Radioisotope renograms done 12-16 weeks after surgery showed improvement in function on the affected sides in all patients with adequate drainage. **Conclusions:** Buccal mucosal patch grafting and omental wrapping is feasible, effective, less complicated and associated with good outcomes at short term follow-up.

Keywords: Reconstruction, ureteric stricture, buccal mucosa.

ABSTRAK

Tujuan: Penelitian ini bertujuan untuk menggambarkan rekonstruksi striktur ureter panjang menggunakan cangkok patch mukosa bukal dan untuk melaporkan hasil jangka pendek. **Bahan & Cara:** Kami secara retrospektif melihat catatan rawat inap dan rawat jalan rumah sakit kami dari semua pasien yang menjalani perawatan bedah untuk striktur ureter jinak. Catatan pencitraan dan film, laporan histopatologis dianalisis ulang. Hasil jangka pendek juga dicatat. **Hasil:** Selama masa studi 10 tahun ini 8 pasien (enam laki-laki dan dua perempuan) menjalani 10 prosedur cangkok mukosa bukal. Usia rata-rata pasien adalah 36.25 ± 10.48 tahun dan rata-rata panjang striktur adalah 7.1 ± 3.41 cm. Ada komplikasi intraoperatif yang dicatat dan tidak ada pasien yang membutuhkan transfusi darah intra atau pasca operasi. Kreatinin serum tetap stabil pada 6 dan 12 minggu setelah operasi. Renogram radioisotop dilakukan 12-16 minggu setelah operasi menunjukkan peningkatan fungsi pada sisi yang terkena pada semua pasien dengan drainase yang memadai. **Simpulan:** Pencangkokan patch mukosa bukal dan pembungkus omentum dapat dilakukan, efektif, tidak rumit, dan terkait dengan hasil yang baik pada tindak lanjut jangka pendek.

Kata kunci: Rekonstruksi, striktur ureter, mukosa bukal.

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INTRODUCTION

Ureteral strictures are uncommon and usually result following ischemia, surgical and nonsurgical trauma, periureteral fibrosis, malignancy, and other congenital factors.¹ It is essential to preserve renal function by properly evaluating and treating ureteral strictures and at the same time to rule out the possibility of malignancy.¹ The incidence of ureteral strictures in the general population is unknown, however it is clear that the

presence of ureteral calculi and associated treatment of stones are definite risk factors. Roberts et al.² reported that impaction of ureteral stones for more than 2 months duration was associated with a 24% incidence of stricture formation. Ureteral instrumentation may lead to stricture formation. Smaller sized ureteroscopes and advances in technology have made the procedure of ureteroscopy less traumatic with a long-term complication rate of less than 5%.³⁻⁴ Radiation; abdominal aortic aneurysm; infections such as tuberculosis and

schistosomiasis; endometriosis; and trauma including iatrogenic injury from previous abdominal or pelvic surgery or post-renal ablation injury is known to be some other causes of benign ureteral strictures.¹

It is very challenging to repair complex, long, or re-operative stricture disease at any position in the ureter, as evidenced by the fact that a variety of approaches have been described to tackle them. Success with the use of buccal mucosa to repair complex urethral strictures has led reconstructive surgeons to explore the use of buccal mucosa to repair long and complex ureteral strictures. Naude was the first to report on a small case series using this technique in open and minimally invasive approaches, most commonly as an “onlay” similar to urethral repair.⁵ Encouraged by their good results a number of authors have reported their experience with this technique in patients who would otherwise have needed ureteric replacement with intestinal segments or kidney auto-transplantation.⁶⁻⁷

OBJECTIVE

This study aims to describe the reconstruction of long ureteric strictures using buccal mucosal patch grafts and to report the short term outcome. In this paper we report our experience with the use of buccal mucosal grafts in patients with long ureteric strictures.

MATERIAL & METHODS

We retrospectively looked at our hospital inpatient and outpatient records of all patients who underwent surgical treatment for benign ureteric strictures during the period Jan 2010 to Dec 2019. This study was taken up with permission granted

from the Institutional/University ethical committee. The age, gender, symptoms and physical findings of the patients was noted. Imaging records (Figure 1) and films, histopathological reports were reanalyzed. The long term outcomes were also noted.

The patient was positioned in supine position with an upward tilt on the side of the stricture and opposite leg flexed and tucked behind the ipsilateral lower limb. A midline incision was made depending on the exact site of the stricture and the ureter approached extra-peritoneally. The ureteric stricture ureteric portions were identified and the stricture was incised in their entire length with extension of the incision into the normal width ureter for 1 cm caudally and proximally to the stricture.

A buccal mucosal graft of roughly the same dimension was harvested by an assisting surgeon and thinned and shaped to appropriate size. The reconstructed ureter was stented with 6 Fr double J stent. The buccal mucosal graft was sutured into position with continuous 5/0 polyglactin (Vicryl). The omentum was mobilized and wrapped around the reconstructed ureteric segment and tacked in place with absorbable sutures. The wound was drained with drainage tubes and the urinary bladder catheterized with a Foley catheter. The drain was removed 24 hours after the drain was nil for 24 hours. The catheter was removed after 10 days. The double J stent was removed after 6 weeks.

RESULTS

During this 10 years study period, 8 patients (six Males and two Females) underwent 10 buccal mucosal graft procedures. The mean age was 36.25 ± 10.48 years (27-54) and the causes of the ureteral strictures were impacted stones undergoing

Table 1. Demographics of the patients.

Sl. No.	Age	Gender			Length of the Stricture	Follow-up (Months)
1	27	M	L	Stone	7	36
2	32	M	R	Stone	5	36
3	44	M	L	Sone	6	36
4	47	M	R	Stone	8	36
5	30	M	Bil	GU Tb	6,9	30
6	54	M	R	Stone	8	28
7	28	F	Bil	Endomet	8.6	24
8	28	F	L	Stone	8	14
Mean	36.25				7.1	30
Std	10.4847				3.4122	7.9282

ureteroscopy in 6 patients, strictures following treatment for endometriosis in 1 patient and genitourinary tuberculosis in 1 patient (Table 1). Two of the patients had bilateral ureteric strictures (a woman treated for endometriosis and a man undergoing treatment for genito-urinary tuberculosis). The mean length of the strictures was 7.1 ± 3.41 cm (5 - 9). All these strictures were involving the mid portion of the ureters extending on either side, making it difficult for either trans-uretero-ureterostomy or Boari's flap to bridge the gap. Serum creatinine was within normal range in all. Radionuclide renograms showed poor function on the affected side in all patients. The two patients with bilateral strictures had a GFR of 86 and 82 ml/min, with serum creatinine being on the higher side of normal.

The buccal mucosal grafts were harvested from healthy areas and were of sufficient length to

bridge the gap in all the patients. Omental wrapping was performed in all. This was further strengthened by using retroperitoneal fat. There were intraoperative complications noted and none of the patients needed either intra or post-operative blood transfusions. Patients having strictures secondary to tuberculosis or endometriosis showed increased intra-operative bleeding however none needed transfusions.

Immediate post-operative period was uneventful in all and all patients voided well after removal of urethral catheters. Serum creatinine remained stable at 6 and 12 weeks after surgery. Radioisotope renograms done 12-16 weeks after surgery showed improvement in function (Figure 2) on the affected sides in all patients with adequate drainage. Urine cultures remained sterile. All patients have shown stable serum creatinine levels, sterile urine cultures at 12 months follow-up. The mean follow-up was 30 ± 7.92 months.

Table 2. Clinical series reports of ureteroplasty using oral mucosa grafts.

Sl. No.	Authors and year	Patients (n)	Type of graft	Length of repair	Follow-up (months)	Donor site complications	Recipient site complications	Success rate (%)
1	Present series	8 with 2 being bilateral	BMG (open)	5-9 (mean=7.1)	30	Nil	None	100
2	Pandey et al. ¹⁷	3	BMG (open)	4-6	26-50	Not determined	None	100
3	Tsaturyan et al. ¹⁸	5	BMG (open)	2.5-5.0	26-52	Not determined	None	100
4	Hefermehl et al. ¹⁹	4	BMG (open)	3-5	12-14	Difficulties to whistle in 1	None	100
5	Li et al. ²⁰	1	LMG (laparoscopic)	4	9	None	None	100
6	Lee et al. ²¹	12	BMG (robotic)	2-5	4-30	Not determined	Stricture recurrence	83.3(10/12)
7	Alin et al. ²²	3	BMG (robotic)	2.5-6	5-26	None	None	100
8	Zhao et al. ¹⁵	19	BMG (robotic)	2-8	13-44	Not determined	Restenosis in 2 (one occurred 1 year later, another 6 weeks)	89.4(17/19)

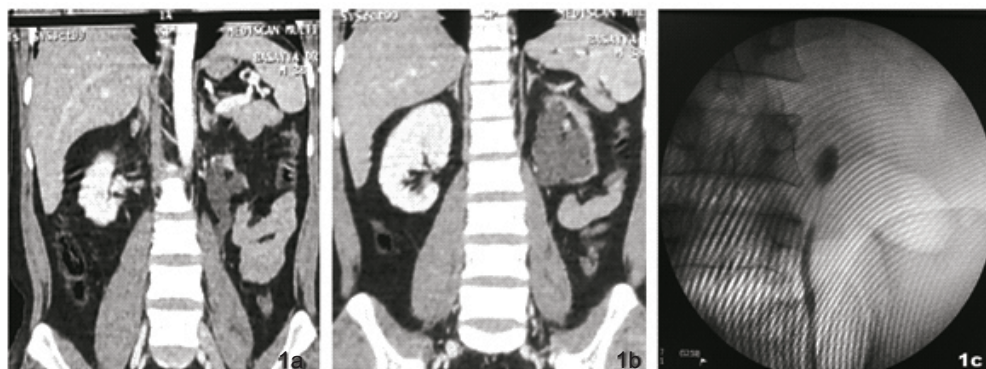


Figure 1. (a & b) Shows CT images of Lt. Kidney which appears obstructed and parenchyma is thinned out. The Lt. upper ureter is dilated uptill mid-lumbar region. (c) Retrograde pyelogram shows obstruction at the level of L3-4 vertebrate.

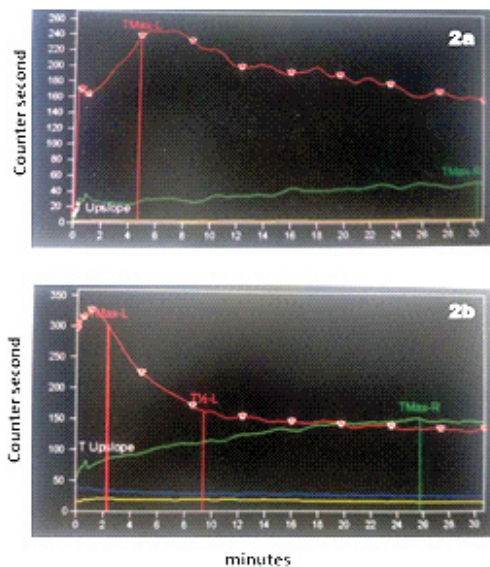


Figure 2. Shows Preoperative (a) post-operative (b) renograms. There is improvement in the renal function on the Rt. Side following surgery.

DISCUSSION

Several endourologic procedures have been suggested for the management of ureteric strictures that include, ureteral stent insertion, balloon dilatation and endoureterotomy. A short defect involving the upper ureter or mid ureter, either in the form of stricture or as a consequence of recent injury, is best treated with excision of the stricture site and end to end anastomosis (ureteroureterostomy).¹ However lower ureteric strictures can be managed easily with ureteroneocystostomy with or without a psoas hitch or Boari flap. Renal mobilization does provide additional length to bridge a defect in the upper ureter or decrease tension on a ureteral repair.⁸ A transureteroureterostomy (TUU) is useful whenever the ureteral length is insufficient for anastomosis to the bladder. Insufficient length of the donor ureter to reach the contralateral recipient ureter in a tension-free manner is an absolute contraindication for TUU. Any disease process that may affect both ureters represents a relative contraindication.

Management of long ureteral defects or loss, especially the upper and mid-ureter, is particularly challenging.⁹ It is preferable to reconstruct the ureter with tissue lined with urothelium as urothelium is not absorptive and is resistant to the inflammatory and potentially carcinogenic effects of urine.¹⁰ An ileal

interposition is a satisfactory option when it comes to replacing a segment/whole of the ureter. The appendix and fallopian tube have been found to be unreliable ureteral substitutes.¹ Baseline renal insufficiency with a serum creatinine of greater than 2 mg/dL, bladder dysfunction or outlet obstruction, inflammatory bowel disease, or radiation enteritis are contraindications to the use of an ileal substitution.¹

Auto-transplantation is generally considered when the contralateral kidney is absent or poorly functioning or when other methods for ureteral substitution or repair are not feasible. The kidney is harvested with maximal vessel length as in a typical live donor nephrectomy for allotransplantation, and the renal vessels are anastomosed to the iliac vessels to re-establish renal perfusion. A healthy segment of the proximal ureter is anastomosed to the bladder.¹¹ However, these procedures of ileal interposition and auto-transplantation are elaborate, time consuming and carry the risk of serious complications.¹²⁻¹³ Somerville & Naude¹⁴ substituted excised segments of ureter with tubularized buccal mucosal grafts in baboons. The graft take was excellent and the upper tracts drained well, although the excretory urogram was not completely normal. Naude used this technique in six patients over a period of 6 years.⁵ Ureteric patency was established and maintained in all patients, there were no complications and urine was sterile in all patients at follow-up.

Kroepfl et al.⁶ reported on the intermediate-term functional outcome in six patients who underwent reconstruction of seven long ureteric strictures using buccal mucosal patch grafts and omental wrapping. With a median follow-up of 18 months five of the seven strictures were recurrence-free. Graft take was good in all patients. In one asymptomatic patient, there was impaired ureteric drainage on the reconstructed side, and in one patient with reconstruction of both ureters prolonged JJ stenting of one side was necessary. In both patients, the impaired drainage was caused by persistent stricture below the reconstructed ureteric segments. The authors concluded that at intermediate-term follow-up in a small group of patients with long ureteric strictures, treatment with buccal mucosal patch grafts and omental wrapping showed good functional outcome.

Minimally invasive approaches toward buccal mucosal grafting have also been reported. Zhao et al.¹⁵ reported on Robot-assisted buccal

mucosa graft ureteroplasty in 19 patients. The onlay technique was used for 79%, while repair was carried out using the augmented anastomotic technique for the remaining cases. The reconstruction was reinforced with omentum in 95% of cases. The ureteral stricture location was proximal in 74% and mid in 26% of cases. A prior failed ureteral reconstruction was present in 53% of patients. The median stricture length was 4.0 cm (range 2.0-8.0), operative time was 200 min (range 136-397), estimated blood loss was 95 ml (range 25-420), and length of stay was 2 d (range 1-15). There were no intraoperative complications. At median follow-up of 26 months, the overall success rate was 90%.

Xiong et al.¹⁶ reviewing the technique of onlay repair opined that ureteroplasty using onlay grafts or flaps has emerged as an innovative procedure for the management of proximal and mid ureteral strictures. Autologous grafts or flaps that are used commonly in ureteroplasty include the oral mucosa, bladder mucosa, ileal mucosa, and appendiceal mucosa. The authors opined that oral mucosal grafts, especially buccal mucosa grafts (BMGs), had gained wide acceptance as a graft choice for ureteroplasty. The reported length of BMG ureteroplasty ranged from 1.5 to 11 cm with success rates of 71.4%-100%. However, several studies have demonstrated that ureteroplasty using lingual mucosa grafts yielded better recipient site outcomes and fewer donor site complications.

Table 2 shows some of the recently published articles, wherein ureteric strictures were managed using buccal mucosal grafts. The table includes all three forms of approaches namely, open, laparoscopic and robot assisted. The success rates have been uniformly good with minimal complications.

The limitations of our study include the retrospective nature of our data, small patient pool and the short follow-up in most of our patients. We believe that this procedure should be considered in any patient with a long ureteric stricture, who is not suitable for any bridging procedure like ureteroureterostomy/trans-ureteroureterostomy/ureteroneocystostomy and who would otherwise need a ureteric replacement with intestinal segments or kidney auto-transplantation.

CONCLUSION

In conclusion, buccal mucosal graft repair with omental wrapping of long ureteric strictures is

feasible, effective, less complicated and associated with good outcomes at short term follow-up.

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