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OUTCOME ANALYSIS OF OPEN ONLAY BUCCAL MUCOSA GRAFT URETEROPLASTY FOR LONG PROXIMAL URETERIC STRICTURES - A PROSPECTIVE STUDY AT TERTIARY CENTRE FROM INDIA

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ABSTRACT

Aim: To analyse the outcome of open onlay buccal mucosa graft (BMG) ureteroplasty for long-segment proximal ureteral strictures **Materials And Methods** This prospective study from August 2022 to January 2024 evaluates outcomes after BMG ureteroplasty in which patients were assessed preoperatively and followed up for 1 year postoperatively. Descriptive statistics was used.

Results

1. 4 patients with mean age 44.5 years were studied.
2. There were 3 male and 1 female patients in this study. 3 patients had left ureter and 1 patient had right ureter affected. 3 patients had normal renal function while 1 patient had chronic kidney disease.
3. 3 patients had iatrogenic etiology and one patient with unknown cause.
4. Mean length of stricture was 3.75 cm
5. No peri-operative complications were documented in 3 patients. In 1 patient with chronic kidney disease, post operative complication of surgical site infection (SSI) was reported.
6. Pre operative and post operative serum creatinine remained stable in all patients during follow up for 1 year.
7. Patients had residual minimal to mild hydronephrosis (HDN) on ultrasound KUB during 1 year follow up.

Conclusion: Open BMG ureteroplasty is a good option for long proximal ureteric strictures, with high success rate and low morbidity. Although, further studies with larger sample size and longer follow up may be required to establish the same.

KEYWORDS : Ureteral stricture, Buccal mucosa graft, ureteroplasty.

INTRODUCTION

Ureteral strictures can be classified as proximal, mid, distal and pan ureteral strictures according to the site of stricture [1]. While mid and distal ureteral strictures are more common, their repair remains rather simple, whereas proximal ureteral strictures remain rare and technically challenging to manage. Mid and distal ureteral strictures can be corrected surgically by end to end ureteroplasty , psoas bladder hitch or Boari flap. Short proximal ureteric strictures can be managed surgically by end to end ureteroplasty, but management of long proximal ureteric stricture is technically challenging [2]. BMG ureteroplasty may outweigh its alternative procedures like ileal interposition or renal auto-transplantation, but current guidelines still lack evidence [3-6].

MATERIALS AND METHODS

This prospective study from August 2022 to January 2024 at a tertiary care centre comprise of 4 patients, 30 to 55 years of age including 3 males and 1 female. 3 patients had normal renal function while 1 patient had chronic kidney disease (ckd).

This study evaluates outcomes after BMG ureteroplasty in which patients were assessed preoperatively and followed up for 1 year postoperatively.

Inclusion Criteria

- Long proximal passable benign ureteric strictures (> 2 cm) [assessed by antegrade pyelogram from per-cutaneous nephrostomy tube (pcn gram) or CT urogram] with no possibility for primary anastomosis.
- Ureteral rest by per-cutaneous nephrostomy (PCN) for minimum period of 4 weeks.
- Patient with normal renal function test (serum creatinine) or chronic kidney disease (Ckd) patients with pcn output more than 1 litre in 24 hours.

Exclusion Criteria

- Unhealthy buccal mucosa
- Oral malignancy
- Radiation history to head and neck
- Mid and distal ureteral strictures
- Patient not willing

All were referred patients who underwent ultrasound guided PCN placement for ureteric strictures with moderate to gross proximal hydroureteronephrosis.

Preoperatively ultrasound of kidney, ureter and bladder (KUB), per-cutaneous nephrostogram (pcn gram) were done. Contrast enhanced computer tomography (CECT) urography was done for 3 patients in whom creatinine were normal. Non-contrast computer tomography (NCCT) was done in 1 patient with chronic kidney disease.

Intraoperatively retrograde pyelography as well as anterograde pyelography through PCN tube was done to assess the exact location and length of stricture.

Patient underwent open onlay BMG ureteroplasty and peri-

operative outcomes and complications were assessed.

Written informed consent was given by all patients for inclusion in the study. All procedures performed were in accordance with the ethical standards of Helsinki Declaration.

Descriptive statistics was used to analyse patient demographics and perioperative outcomes.

Surgical Procedure

Patients were positioned in lithotomy position. Retrograde and anterograde pyelogram was done and location and approximate length of stricture was assessed; ureteric catheter (UC) kept distal to stricture segment and a 16 fr per-urethral foley catheter was inserted.

Patient repositioned to lateral decubitus position and retroperitonem entered after flank incision. After meticulous dissection, the ureter was identified and complete proximal ureterolysis was performed.

The stricture was identified proximal to UC. A longitudinal incision was given on the ventral side of the ureter till normal ureteral caliber was reached. The incision extended to 5 mm of healthy tissue proximal and distal to the stricture. Exact length of the defect was measured.

The BMG was harvested from the inner cheek after identification of the Stensen duct and submucosal hydro-dissection with 1% lignocaine and adrenaline. Graft was harvested with each being approximately 1.5 cm wide, and length as per the size of the ureteral defect. The graft was then defatted and washed in saline. The graft was non-fenestrated.

Anastomosis with the ureter was performed by 4-0 polyglactin as onlay patch graft over double-J stent (DJ) (5Fr/26 cm). In one case, around 2-3 mm of area had fibrosis without healthy mucosa, in which case dorsal augmentation with ventral onlay patch graft was done.

The greater omentum flap was mobilized to the retroperitoneum, facilitating quilting of ureteral onlay graft with omental flap and then a complete wrapping of omental flap around reconstructed ureter. Retroperitoneal drain was placed.

RESULTS

Between August 2022 to January 2024, 4 patients with mean age 44.5 years (age range of 30 to 55 years) who were being taken up for BMG ureteroplasty were studied.

There were 3 male (75%) and 1 female (25%) patients in this study. 3 patients had left(75%) ureter affected with only 1 patient having right side (25%) ureter affected. 3 patients had normal renal function (75%) while 1 patient had chronic kidney disease (25%).

All were referred patients and 3 had iatrogenic etiology (75%) with one patient with unknown cause (25%).

Patient demographics and pre-operative characteristics are summarised in Table 1.

Mean length of stricture was 3.75 cm (range of 3-5 cm)

Mean operative time was 143.75 minutes (range, 130 - 165 minutes). Longer strictures took longer intraoperative time.

Mean blood loss was 62.5 ml (range, 50-80 ml). The mean length of hospital stay was 4.25 days.

Operative and post-operative characteristics are summarised in Table 2.

No peri-operative complications were documented in 3 patients. In 1 patient with chronic kidney disease, post operative complication of surgical site infection (SSI) was reported on post-op day 3 in the form of superficial wound infection with serous discharge (Clavien –Dindo grade I), which was managed conservatively. No post-operative bowel dysfunction, no urinary leakage, no post-operative ileus observed. No difficulties with mouth opening, intra-oral dryness or numbness were reported. Oral fluids started on post-op day 1 to 2 after patients passed flatus.

Post-operative complications were classified according to Clavien –Dindo grading system (Table 3).

Flank pain was not reported by any patient in follow up at 3 month, 6 month and 1 year.

Pre operative and post operative serum creatinine (sr cr) remained stable in all patients during follow up at 3 month, 6 month and 1 year (Table 4).

At 3 month , 6 month and 1 year follow up, patients had residual minimal to mild hydronephrosis (HDN) on ultrasound KUB.

Table 1. – Patient demographics and pre-operative characteristics:

Patient	1	2	3	4
Age	42 years	30 yrs	54 years	52 years
Sex	female	Male	Male	Male
Diseased side	Right	Left	Left	Left
Etiology	Unknown	iatrogenic	iatrogenic	iatrogenic

Table 2. - Operative and post-operative characteristics :

Patient	1	2	3	4
Length of stricture	3 cm	4 cm	3 cm	5 cm
Operative time	130 min	140 min	140 min	165 min
Estimated blood loss	50 ml	60 ml	60 ml	80 ml
Blood transfusion	Nil	Nil	Nil	Nil
Length of hospital stay	4 days	4 days	4 days	5 days

Table 3. – Post-operative complications:

Patient	1	2	3	4
Adverse events	None	None	None	SSI
Clavien –Dindo grading	0	0	0	I

SSI- surgical site infection

Table 4. – Renal function as assessed by serum creatinine pre and post-operatively :

Patient	1	2	3	4
Pre-op cr	1.2	1.0	1.0	2.3
Post-op cr (after 3 months)	1.2	1.0	0.9	2.2
Post-op cr (after 6 months)	1.2	1.0	0.9	2.2
Post-op cr (after 1 year)	1.2	1.0	0.9	2.2

DISCUSSION

Long proximal strictures are technically challenging to manage, while small ureteric strictures can be managed endoscopically by dilatation or laser. Ileal interposition and renal autotransplantation are options for long proximal ureteral strictures.

Ileal interposition can cause early post-operative bowel movement disorders, intestinal anastomosis insufficiency, mucus obstruction and recurrent UTI [7]. Late complications include anastamotic stricture, fistula formation and small bowel obstruction [7].

Renal autotransplantation requires expertise with specialised vascular instruments and is highly morbid procedure with risk of haemorrhage and transplanted kidney failure [3]. Surgical re-intervention is needed in about 25% cases [3].

Therefore BMG ureteroplasty is a good procedure and can be

considered a viable option for long proximal ureteric strictures due to familiarity of urologists with BMG harvesting.

Moreover buccal mucosa has ease of availability, can be readily harvested, less morbid, less prone to immune reactions, tolerance to wet environment, hairless and resistant to uropathogens. It has thick epithelium and thin lamina propria which is ideal for success of graft uptake [8].

Although very few studies (Table 5) have been done on outcomes of BMG ureteroplasty, success rate of 83-100% have been reported with few to no complications [9-17]. In our study, success rate (stricture free rate) at the end of 1 year follow up was 100%.

Some of the recent studies have described a laparoscopic and robotic assisted laparoscopic approach [13,15,16]. However, many patients may not be eligible for laparoscopic surgery and worldwide still most of the surgeries are performed using an open approach.

Table 5 shows literature overview of few studies [9-17].

Author	Sample size	Surgical technique	Mean follow up time	Follow up method	Success rate
Naude	5	Open onlay or tube	47 months	AN/ IVU/RUP	100%
Kroepfl et al.	6	Open onlay	18 months	IVU/MRU	83%
Sadhu et al.	1	Open onlay	6 months	IVU	100%
Badawy et al.	5	Open tube	24 months	IVU	100%
Zhao et al.	19	Robotic onlay or augmented anastomosis	26 months	CTU/US	90%
Lee et al.	12	Robotic onlay	13 months	RUP	83%
Lukas et al.	4	Open onlay	13 months	URS/RUP /RS/US	100%
Guliev et al.	24	Laparoscopic ventral onlay	22 months	ANU/IVP/ CTU/URS	87.5%
Present study	4	Open onlay	12 months	RUP/CTU /US	100%

AN, anterograde nephrostogram; IVU, intravenous urography; RUP, retrograde ureteropyelography; MRU, magnetic resonance urography; CTU, computer tomographic urography; US, ultrasound; URS, ureterorenoscopy; RS, renal scintigraphy.

In study by Guliev et al. [16], Pcn was removed on day 5 after doing anterograde pyelography. In our study, on post op day 1, Pcn was clamped. On day 2, if drain output was less than 50 ml and ultrasound abdomen had no signs of collection/urinoma, PCN tube was removed in all patients. In our study to reduce radiation exposure and contrast exposure, we preferred monitoring drain output and ultrasound abdomen post pcn clamping instead of going for the anterograde pyelography.

In study by Lukas et al. [17] per-urethral foley was kept for median of 8 days (range 7-9 days). In our study, on post-op day 3, per-urethral foley catheter was removed for all patients. Drain was removed on day 4 for all patients. 3 patients were discharged on post-op day 4, while 1 patient with SSI was discharged on post-op day 5.

In study by Guliev et al. [16], Dj stent was removed after 6-8 weeks. And in study by Lukas et al [17], DJ stent was removed at median time of 62 days. In our study, DJ Stent was removed in all patients at 45 days follow up following which retrograde ureteropyelography was done which showed no extravasation, no obstruction and immediate excretion of contrast from pelvis and ureter. No difference in outcome was seen at earlier removal of DJ stent at 45 days in our study.

In various studies, different follow up methods and follow up period as shown in table 5 have been reported [9-17]. Follow up in our study was done at 3 month,6 month and 1 year with clinical symptoms, Usg and Sr creatinine wich showed no pain, minimal to mild HDN and stable serum creatinine in all patients. In our study, CT urography (CTU) was done in 3 patients at 1 year provided sr creatinine was normal to assess drainage of reconstructed ureter, which showed non-obstructive drainage. 1 patient with ckd could not be followed up at 1 year with CTU.

In study by Lucas et al. [17], renal scintigraphy was done at 1 year, but we couldn't follow up patient with renal scintigraphy because of non availability of the same at our centre.

CONCLUSION

Open BMG ureteroplasty is a good option for long proximal ureteric strictures, with high success rate and low morbidity. Although, further studies with larger sample size and longer follow up may be required to establish the same.

Conflicts Of Interest : None declared

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