Feasibility, Safety and Acceptance of Buccal Mucosa Harvest Under Local Anesthesia for Substitution Urethroplasty: Prospective Observational Study in a Tertiary Centre

Pandey A, Shrestha PM, Shrestha A, Basnet RB, Adhikari B, Shah AK, Mishra U

Department of Urology,

Bir Hospital, National Academy of Medical Sciences,

Kathmandu, Nepal.

Corresponding Author

Arun Pandey

Department of Urology,

Bir Hospital, National Academy of Medical Sciences,

Kathmandu, Nepal.

E-mail: arunpandey743@gmail.com

Citation

Pandey A, Shrestha PM, Shrestha A, Basnet RB, Adhikari B, Shah AK, et al. Feasibility, Safety and Acceptance of Buccal Mucosa Harvest Under Local Anesthesia for Substitution Urethroplasty: Prospective Observational Study in a Tertiary Centre. *Kathmandu Univ Med J.* 2024;86(2):197-201.

ABSTRACT

Background

Urethral stricture is a challenging condition with significant socioeconomic impacts, often requiring surgical intervention such as urethroplasty. Buccal mucosa grafts (BMG) are a popular choice for substitution urethroplasty due to their favorable outcomes. This study evaluates the feasibility, safety, and acceptance of harvesting buccal mucosa grafts under local anesthesia.

Objective

To assess feasibility, safety and acceptance of Buccal mucosa harvest under local anesthesia.

Method

A prospective observational hospital based study to evaluate outcomes of substitution urethroplasty using buccal mucosa grafts (BMG) under local anesthesia.

Result

Of the 40 patients, 28 had unilateral graft harvests, while 12 had bilateral procedures. The mean graft length obtained was 5.65 cm. Postoperatively, patients experienced a quick recovery, with full mouth opening achieved within an average of 2.78 days and resumption of normal eating within 2.6 days. Minor complications included oral swelling in 15% of cases and food residue in 12.5%. Although 87.5% of patients reported pain at the perineal wound site, the overall pain score averaged 3.58, indicating manageable discomfort. Importantly, 92.5% of patients expressed a willingness to undergo the procedure again if necessary.

Conclusion

These findings suggest that buccal mucosa graft harvest under local anesthesia is both feasible and well-tolerated. The procedure appears to be a safe alternative to regional or general anesthesia, with minimal complications and a high level of patient acceptance. Future randomized controlled trials comparing local anesthesia to regional or general anesthesia could provide additional insights and further validate these findings. This study contributes to the growing body of evidence supporting the use of local anesthesia in urethral stricture surgery, offering a practical approach to managing this condition effectively.

KEY WORDS

Buccal mucosa graft, Feasibility study, Local anesthesia, Substitution urethroplasty, Urethral stricture

INTRODUCTION

Urethral stricture is a disease with high socioeconomic burden. Various techniques have been described for the management of urethral stricture (urethroplasty) using grafts, flaps.[1] Buccal mucosa has been remained the first choice after its first description in 1894, due to its various qualities such as early imbibition, inosculation and versatilitis with widespread use either as onlay, inlay or even on the lateral aspect of the urethra.[1-6]

Harvesting of buccal mucosa is associated with donor site morbidities, such as perioral numbness, difficulty in opening the mouth and less commonly, dry mouth, and scarring and has been reportedly done under general anesthesia (GA) with nasotracheal or orotracheal intubation.[7] A surgeon assists in harvesting the graft to decrease the operative duration, along with anesthesia time.[2,4,6,8,9] Extensively widened temporomandibular joint under GA causes sustained strain on the muscles of the jaw that may contribute to the postoperative pain-considered as drawback of GA. The advantages of regional anesthetic techniques are well documented and outweigh the risks that may be associated with general anesthesia.[10-12] This technique of assessing feasibility, safety, and acceptance has not been reported in our setting and literature is sparse.

Long segment urethral strictures are one of the common referrals in tertiary institutes. Urethroplasty can be safely done under regional anesthesia, but the need for buccal mucosa harvest often makes the use of GA seemingly unavoidable. In order to avoid the risk that may be associated with GA and decrease operative duration, buccal mucosa for substitution urethroplasty is harvested under local anesthesia; thus making this study reasonable and important at our setting.

METHODS

A descriptive study (prospective observational study) was conducted. The study was carried out at the Department of Urology, Bir Hospital, National Academy of Medical Sciences (NAMS) from March 2023 until December 2023, following IRB approval. The sample size was determined using the formula Sample size and sampling method

$n = Z^2P (1-P)/ d^2$

$= (1.96)^2 \times 0.00627 (1-0.00627)/ (0.03)^2$

$= 26.55 = 27$

Where, n = sample size, Z = confidence interval (1.96 for 95% confidence interval),

P=prevalence of urethral stricture disease 229-627 per 100,000 males, or 0.6%*

d=margin of error =3% (0.03)

Sample size was 27

Preoperative evaluations were conducted on an outpatient basis, including retrograde urethrogram/vesico-cystourethrogram and routine cystoscopy. During the procedure, the patient was placed in a lithotomy position after receiving a subarachnoid block (SAB). The buccal mucosa was harvested under local anesthesia using a specific protocol for marking, infiltration, retraction, and excision. The harvested graft was trimmed, and hemostasis was secured with pressure and suture ligation.

Informed consent was obtained from all patients before their participation. Patients were informed of their right to withdraw from the study at any time. Confidentiality of patient names and personal information was maintained throughout the study. Approval was granted by the National Academy of Medical Sciences Institutional Review Board (NAMS-IRB).

Inclusion Criteria

Patients of urethral stricture disease undergoing substitution urethroplasty using BMG harvest under local anesthesia (1% Xylocaine) who consented were included.

Exclusion criteria

1. Patients who did not give consent

2. Patients requiring GA conversion or any contraindication for spinal anesthesia (SAB)

3. Pediatric patients

4. Allergic/sensitive to LA

5.Patients not eligible for BMG harvest (eg: Oral submucosal fibrosis OSMF, oral lesions like carcinoma, history of radiation)

Specific protocols for the harvest of buccal mucosa grafts included marking the donor site, infiltration with local anesthesia, retraction, excision, and securing hemostasis.

Preoperative evaluation was done in outpatient basis. Retrograde urethrogram/vesico-cystourethrogram was done in all patients. Routine cystoscopy was done intra-operatively. Patient placed in Lithotomy position after instillation of Sub Arachnoid Block (SAB) for urethroplasty. Proper exposure of mouth was done for proper access to the donor site. Patient was asked to wide open the mouth. The Stensen's duct opening identified and marked. Donor site marked before infiltration of LA. Using maximally spread out middle and index fingers of the left hand of the assistant, adequate retraction of the cheek was achieved for graft harvest. Buccal mucosa was then infiltrated with 15-20 mL of 1% plain xylocaine along the mapped outline (depending on the length of stricture to be repaired). After 2 minutes (to allow for effective anesthesia of the area)-the desired piece of mucosa graft was excised avoiding the underlining buccal muscles. Continuous suction done to prevent aspiration of blood and secretions. Patient was allowed to close mouth and swallow intermittently. Point electrocautery was used to prevent thermal injury to the

nerves and muscles; hemostasis secured with pressure and suture ligation. Graft bed was left open and a gauze pack applied (later removed). It was closed with 4/0 catgut if bleeding was not controlled with gauze pack. Graft was prepared by trimming the submucosal fat of the harvested buccal mucosa.

The collected data was recorded in proforma and later entered into Microsoft Excel. The Statistical Package for Social Sciences (SPSS) 21, student version software was used for the analysis of data.

The data was presented in the form of descriptive studies such as frequencies, percentage and proportion.

RESULTS

Out of the 40 patients included in the study, 39 were male. Of all the patients, minimum age was 22 years and maximum age was 75 years. Mean age 48.9 ± 15.805. In the previous repair history, out of 40 instances, 39 (97.5%) had no previous repair, while 1 (2.5%) had a history of previous repair. In the distribution of stricture locations among 40 cases, the majority were pan bulbar, accounting for 21 cases or 52.5% of the total. Pan urethral stricture was the next most common, with 9 cases representing 22.5%. Penile urethral stricture was observed in 6 cases, which is 15.0% of the total. The least common were bulbomembranous strictures, found in 4 cases or 10.0%.

Table 1. Age group, Previous repair history and Location of stricture

Age group	Frequency	Percent
20-30	6	15.0
31-40	7	17.5
41-50	13	32.5
51-60	3	7.5
61-70	2	5.0
> 70	9	22.5
Total	40	100.0
Previous repair history		
No	39	97.5
Yes	1	2.5
Total	40	100.0
Location of stricture		
Bulbomembranous	4	10.0
Pan bulbar	21	52.5
Pan urethral	9	22.5
Penile	6	15.0
Total	40	100.0

In the study, mean graft length of buccal mucosa harvest was 5.65 cm; 28 patients underwent unilateral harvest and 12 required bilateral buccal mucosa harvest.

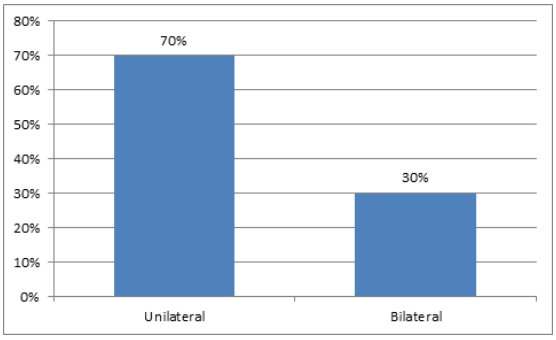

Figure 1. Laterality

Table 2. Bothersome bleeding, Pain score

Mouth opening	Frequency	Percent
Difficult	2	5.0
Easy	38	95.0
Total	40	100.0
Bothersome bleeding		
No	38	95.0
Yes	2	5.0
Total	40	100.0
Pain score		
2	1	2.5
3	18	45.0
4	18	45.0
5	3	7.5
Total	40	100.0

Table 3. Duration before being able to fully open mouth. Oral/ Cheek swelling, Most painful wound

Duration before being able to fully open the mouth		
2	11	27.5
3	27	67.5
4	2	5.0
Total	40	100.0
Oral/ cheek swelling		
No	34	85.0
Yes	6	15.0
Total	40	100.0
Most painful wound		
Oral	5	12.5
Perineal	35	87.5
Total	40	100.0

The majority of patients (38) found mouth opening during the harvest easy, while only 2 patients experienced difficulty. Bleeding was minimal, with 38 patients having no bothersome bleeding and 2 experiencing it- which was managed conservatively. The average pain score at the graft harvest site was 3.58 (in the 1 to 10 pain scale). Patients generally recovered quickly, with a mean duration

of 2.78 days before being able to fully open their mouths and 2.6 days before resuming normal eating. There was no difficulty reported with mouth opening after graft harvest for all patients. Oral or cheek swelling occurred in 15% of patients (which resolved spontaneously), while 85% did not experience swelling. All patients reported no numbness or oral infection, though 12.5% had issues with food residue in the mouth. None of the patients required corrective operation for the mouth.

The most painful wound was noted to be perineal in 87.5% of cases, while oral pain was reported by 12.5%. Overall, 92.5% of patients expressed acceptance of the procedure, with 37 willing to undergo it again (if required). The 7.5% who were not willing cited reasons including discomfort and previous operations.

DISCUSSION

This study on buccal mucosal urethroplasty primarily included male patients, which is reflective of the higher incidence of urethral strictures in men. This observation aligns with the findings of Dubey et al. who also reported a higher prevalence of strictures in male patients.[4] This suggests that buccal mucosal urethroplasty is a relevant and effective treatment option for the male population suffering from urethral strictures.

The study found that the average length of the buccal mucosal graft used was 5.68 cm. This measurement was consistent with previous research, including the studies by Dubey et al. and Barbagli et al.[4,5] The similarity in graft length indicates a standard approach in the preparation and use of grafts for this procedure. This consistency supports the reliability and effectiveness of using buccal mucosa as a graft material in urethroplasty.

Postoperative recovery was notably swift for the majority of patients in this study. Most individuals were able to resume their normal activities relatively quickly. This rapid recovery was accompanied by manageable mouth opening for most patients. There was a low incidence of oral swelling, and none of the patients experienced numbness or infections, which is consistent with the findings reported by Wood et al.[7] These outcomes highlight the overall effectiveness of buccal mucosal urethroplasty in terms of postoperative recovery and patient comfort. However, this study's positive outcomes contrast with those reported by Tolstunov et al. Tolstunov et al. noted cases of oral numbness and tightness following the harvest of buccal mucosa.[12]

Bleeding during the procedure was minimal for most patients in this study. This finding was supported by Bhargava and Chapple, who also reported that bleeding was generally well controlled during the harvest of buccal mucosa grafts.[6]

The recovery time after buccal mucosa graft harvest for urethroplasty was typically very less in this study. Most patients were able to return to normal eating and speaking within a few days. This finding aligns with the results reported by Bhargava and Chapple, who also noted that recovery from buccal mucosa harvest was usually quick.[6] This brief recovery time had been beneficial for patients, as it allowed them to resume their daily activities and normal functions without prolonged disruption.

Overall, the study evaluated the feasibility, safety, and patient acceptance of buccal mucosa harvest under local anesthesia for urethroplasty. Among the 40 participants, predominantly male, the procedure was generally well-tolerated with minimal complications. This positive outcome is consistent with the findings of Ajape et al., who also assessed the feasibility, safety, and patient acceptance of using autologous buccal mucosa under local anesthesia for substitution urethroplasty. Ajape et al. reported promising results, particularly in terms of patient acceptance and immediate postoperative outcomes.[13]

Despite the generally positive results, some oral complications were reported by Dublin and Stewart.[14] These complications included swelling, pain, and issues with food residue. However, few of these complications only resulted in this study.

In summary, the study provides strong evidence supporting the use of buccal mucosal urethroplasty as a feasible and effective treatment for urethral strictures. The minimal complications, swift recovery, and high patient acceptance highlight the procedure's benefits. While some studies have reported complications such as oral numbness and swelling, these were not prevalent in this study, suggesting that buccal mucosal urethroplasty is generally well-tolerated. The consistency of findings across multiple studies reinforces the reliability of this technique as a treatment option, with positive outcomes in terms of both surgical results and patient satisfaction.

This study was conducted at a single tertiary center, which may limit the generalizability of the findings to other settings and populations. Additionally, the sample size of 40 patients may not capture the full range of potential outcomes and complications associated with buccal mucosa graft (BMG) harvest under local anesthesia. The study lacked a control group of patients undergoing BMG harvest under general anesthesia, which would have provided a direct comparison of outcomes between the two anesthesia methods. Furthermore, the focus was on immediate postoperative outcomes, without long-term follow-up data on the durability of the grafts and any delayed complications. The exclusion of patients with contraindications for local anesthesia, pediatric patients, and those with certain oral conditions may limit the applicability of the findings to these groups. Lastly, pain levels were self-reported by patients, which can introduce variability and bias in the assessment of postoperative pain.

CONCLUSION

The findings of this prospective observational study indicate that buccal mucosa graft (BMG) harvest under local anesthesia is a feasible, safe, and acceptable method for substitution urethroplasty in patients with urethral stricture disease. The procedure resulted in minimal postoperative complications, with most patients experiencing manageable pain and quick recovery times, and a high level of acceptance, with 92.5% of patients willing to undergo the procedure again. Given these positive outcomes, local anesthesia appears to be a viable alternative to general anesthesia for BMG harvest, potentially reducing operative time and avoiding the associated risks of general anesthesia. However, further research, including randomized controlled trials comparing regional and general anesthesia, is recommended to validate these observations and to evaluate long-term outcomes.

REFERENCES

1. Mungadi IA, Ugboko VI. Oral mucosa grafts for urethral reconstruction. *Ann Afr Med.* 2009 Oct-Dec;8(4):203-9. doi: 10.4103/1596-3519.59572. PMID: 20139540.
2. Barbagli G. Buccal mucosal graft urethroplasty. *Ureth Recons Surg.* 2008:119-35.
3. Sievert KD, Seibold J, Schultheiss D, Feil G, Sperling H, Fisch M, et al. Rekonstruktive Urologie im Wandel. Von ihren Ursprüngen in die allzu nahe Zukunft [Reconstructive urology in transition. From its origin into the all too near future]. Urologe A. 2006 Sep;45 Suppl 4:52-8. German. doi: 10.1007/s00120-006-1153-0. PMID: 16933123.
4. Dubey D, Kumar A, Mandhani A, Srivastava A, Kapoor R, Bhandari M. Buccal mucosal urethroplasty: a versatile technique for all urethral segments. *BJU Int.* 2005 Mar;95(4):625-9. doi: 10.1111/j.1464-410X.2005.05352.x. PMID: 15705092.
5. Barbagli G, Palminteri E, Guazzoni G, Montorsi F, Turini D, Lazzeri M. Bulbar urethroplasty using buccal mucosa grafts placed on the ventral, dorsal or lateral surface of the urethra: are results affected by the surgical technique? *J Urol.* 2005 Sep;174(3):955-7; discussion 957-8. doi: 10.1097/01.ju.0000169422.46721.d7. PMID: 16094007.
6. Bhargava S, Chapple CR. Buccal mucosal urethroplasty: Is it the new gold standard? *BJU Int*. 2004;93:1191 3. doi: 10.1111/j.1464-410X.2003.04860.x. PMID: 15180603
7. Wood DN, Allen SE, Andrich DE, Greenwell TJ, Mundy AR. The morbidity of buccal mucosal graft harvest for urethroplasty and the effect of nonclosure of the graft harvest site on postoperative pain. *J Urol*. 2004;172:580 3. doi: 10.1097/01.ju.0000132846.01144.9f PMID: 15247736
8. Kane CJ, Tarman GJ, Summerton DJ, Buchmann CE, Ward JF, O'Reilly KJ, et al. Multi-institutional experience with buccal mucosa onlay urethroplasty for bulbar urethral reconstruction. *J Urol.* 2002 Mar;167(3):1314-7. PMID: 11832721.
9. Morey AF, McAninch JW. Technique of harvesting buccal mucosa for urethral reconstruction. *J Urol.* 1996;155:16967. PMID: 8627856
10. Gulur P, Nishimori M, Ballantyne JC. Regional anaesthesia versus general anaesthesia, morbidity and mortality. *Best Pract Res Clin Anaesthesiol*. 2006;20:249 63. doi:10.1016/j.bpa.2005.10.002. PMID: 16850776
11. Longo S. Regional versus general anesthesia. *Curr Opin Anaesthesiol.* 2000;13:539 43. doi: 10.1097/00001503-200010000-00009. PMID: 17016354
12. Tolstunov L, Pogrel MA, McAninch JW. Intraoral morbidity following free buccal mucosal graft harvesting for urethroplasty. *Oral Surg Oral Med Oral Pathol Oral RadiolEndod.* 1997;84:480 2. doi: 10.1016/s1079-2104(97)90261-4. PMID: 9394377
13. Ajape AA, Kuranga SA, Kura MM, Olanipekun HB. Autologous buccal mucosa harvest under local anesthesia: Feasibility, safety, and acceptance for substitution urethroplasty. *Urol Ann.* 2019;11:298-303.
14. Dublin N, Stewart LH. Oral complications after buccal mucosal graft harvest for urethroplasty. *BJU Int*. 2004;94:867-9. doi: 10.1111/j.1464-410X.2004.05048.x. PMID: 15476524