Autologous buccal mucosa harvest under local anesthesia: Feasibility, safety, and acceptance for substitution urethroplasty

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**Abstract**

**Objective:** The objective of the study is to report our experience with buccal mucosa harvest under local anesthetic agent infiltration for urethroplasty.

**Materials and Methods:** All patients who had buccal mucosa graft harvest under local anesthesia (1% Xylocaine) for repair of their urethral stricture, from January 2007 to December 2016, were retrospectively studied from two public urologic service centers. The demographic data of the patient, length of graft harvested, complications recorded, among other things, were entered into a pro forma and the data were analyzed using IBM SPSS Statistics version 16.

**Results:** A total of 102 patients underwent urethroplasty with buccal mucosa harvested under local anesthesia; however, only 88 patients had complete data for analysis. The mean age was 55.03 years (±12.30). The mean harvested graft length was 5.41 cm (±2.62 cm). There was no need for conversion to general anesthesia. The majority of them (94.3%) reported that it was “easy” or “very easy” to maintain the mouth opened during the procedure. Over 91% do not have difficulty opening their mouth after the harvest. Only one patient had bothersome primary hemorrhage that required gauze packing. No significant oral cavity pain was experience in 69.3% of patients; among those with pain, the perineal pain was more. Over 90% of the patients will be willing to undergo the procedure again under local anesthetic infiltration again.

**Conclusion:** Buccal mucosa harvest under local anesthesia infiltration is feasible, safe, and acceptable among our patients who had urethroplasty for urethral stricture disease.

**Keywords:** Buccal mucosa harvest, local anesthesia, urethral stricture, urethroplasty

**INTRODUCTION**

Urethroplasty for the treatment of urethral stricture has evolved over the years with the different type of tissues used as either graft or flap.\(^1\) Recent consideration involves the widespread use of oral mucosa graft, either as onlay, inlay or even on the lateral aspect of the urethra, as against the popularized use of genital or extragenital skin for urethra substitution.\(^2\) The inherent properties of the...
buccal mucosa that favors early imbibition and inosculation have been thoroughly elucidated, and these have earned buccal mucosa the status of “gold standard” tissue of choice for substitution in urethroplasty.\textsuperscript{[1–5]}

The harvest of buccal mucosa has hitherto been reportedly done under general anesthesia with nasotracheal or orotracheal intubation, occasionally by the “two-surgeons” approach where an otolaryngologist assists in harvesting the buccal mucosa graft (BuMG) to shorten the operation, and thus the anesthesia time.\textsuperscript{[2,3,6–8]}

The advantages of regional anesthetic techniques are well documented and outweigh the risks that may be associated with general anesthesia.\textsuperscript{[9–11]} As much as, many techniques of urethroplasty, for urethral stricture disease, can be safely undertaken by regional anesthesia, the need for buccal mucosa harvest often make the use of general anesthesia seemingly unavoidable.

In order to avoid the risk that may be associated with general anesthesia, and at the same time benefit from the use of buccal mucosa for urethral reconstruction in our patients with urethral stricture diseases, we harvest the buccal mucosa for substitution urethroplasty under local anesthetic agent infiltration in some patients. We hereby report our experience on the feasibility, safety, and acceptance of buccal mucosal harvest for urethroplasty under local anesthesia.

**MATERIALS AND METHODS**

Following Institutional Ethical Review Committee approval, all patients who had BuMG harvested under local anesthesia (1% Xylocaine) for repair of their urethral stricture, from January 2007 to December 2016, were included in this study. The selected group of patients were identified using the “unit-book” wherein the summary of patients that were admitted and discharged were entered; the clinical record of such patient was traced out from the hospital medical record department and used to fill a pro forma that was produced for this purpose. In addition, the contact telephone number of the patient and that of the relations in some cases was used to contact the patient for further interview to complete the pro forma. Data obtained for documentation includes the demographic data of the patients, information on previous repair, location of the stricture on urethrogram, and intraoperative length of graft harvested and used. Furthermore, the intraoperative event of note, donor site complications, outcome of repair, and duration of follow-up were extracted. The data were analyzed using IBM SPSS Statistics version 16 (IBM Corp., NY, USA).

**Preoperative evaluation**

All patients were evaluated preoperatively with detailed history and physical examination; basic hematological and biochemical evaluation were carried out, urine culture and abdominopelvic ultrasound were documented. Retrograde urethrogram suffices in most of the patients to study the anatomy of the urethral stricture, however, combined study were done as appropriately indicated. Informed consent was obtained and blood grouped and kept for use when needed.

**Surgical technique**

Surgical exposure for the urethroplasty was determined based on the preference of the attending surgeon; however, all of them had buccal mucosal-harvest under local anesthesia.

The patient was placed in lithotomy position following spinal anesthesia or epidural anesthesia as it was determined by the attending anesthesiologist. A silk-0 suture on anatraumatic needle was applied to the dorsal aspect of the glans for retraction. The urethral stricture is assessed and exposure was done as previously described.\textsuperscript{[2,12]}

The preparation of the head and neck was done to expose the nose and mouth for proper access to the donor site. The patient was asked to open his mouth as wide as possible and the Stensen's duct opening was identified, noted, and avoided. After explaining the expectations to the patient once again, the donor site was marked out before infiltration; this was achieved using the maximally spread out middle and index fingers of the left hand of the assistance and very cooperative patient, adequate retraction of the cheek was achieved for graft harvest.

The cheek mucosa was infiltrated with 15–20 mL of 1% plain-xylcaine along the mapped-out line for the mucosa incision as well as the under-surface area of the mucosa to be harvested, depending on the length of stricture to be repaired, using 23-gauge needle. After waiting for about 2 min, to allow for effective anesthesia of the area, a rectangular-shaped piece of mucosa graft was excised avoiding the underlining buccal muscles [Figure 1]. It was accidentally noted that atropine helped in reducing the mucosa secretion thus assisting in the harvest after a patient with bradycardia was given atropine during the earlier part of our experience; this has since formed routine part of the procedure in our practice. The posterior aspect of the angle of the oral cavity was continuously being sucked with low-pressure suctioning machine to prevent the exuding blood and some secretions getting to the larynx to avoid aspiration. The patient was allowed to rest, by closing the mouth and swallow intermittently. Electrocautery was.
avoided to prevent thermal injury to the nerves and muscle; hemostasis was secured with pressure and suture ligation. The graft bed was closed with 4/0 vicryl suture and a gauze pack applied which was later removed after the urethroplasty. The graft was then prepared by trimming the submucosal fat of the buccal mucosal and also fenestrated before being used for the urethral reconstruction.

Exclusion criteria
1. Patients who did not consent to the procedure
2. Pediatric patients or young adult that required general anesthesia
3. Those patients with incomplete data that could not be reached on the phone or by other means to complete the pro forma.

RESULTS

A total of 102 patients had buccal mucosa harvested using local xylocaine infiltration for urethral reconstruction during the study. Of these, 88 patients had complete data thus formed the basis for further analysis. All patients were male with mean age of 55.03 years (±12.30) [Table 1].

The mean harvested graft length was 5.41 cm (±2.62 cm) [range 4 cm to 10 cm]. Majority of the urethral strictures were located in the bulbar and peno-bulbar parts of the urethra accounting for 36.4% and 46.6%, respectively, with only 17.0% in the penile region. Only four of the 88 patients had previous repair (all in our facility); three of them had penile skin flap and one had anastomotic urethroplasty [Table 2].

There was no reason for conversion to general anesthesia or adverse intraoperative event recorded.

Majority of the studied patients reported that it was “easy” or “very easy” to maintain their mouth opened during the period for the buccal mucosa harvest while few of them found it difficult to maintain the mouth opened (94.3% vs. 5.7%). Only one of the 88 patients had bothersome bleeding following the buccal mucosa harvest. Mild and moderate pain was observed from the oral cavity in 30.7% of the studied patients, but no significant pain was experienced in 69.3% of them [Table 3a].

About 91% of the patients reported not to have difficulty opening their mouth immediately after the buccal mucosa harvest, but it took more than 3 days before 4.6% of the patients were able to open their mouth properly. All of them were able to drink water a day after the procedure; it took up to 2–4 days before they could chew soft food and normal diet, respectively. More than two-third of the patients do not experience any oral/cheek swelling (72.7%) and 96.6% do not experience numbness of the oral cavity or cheeks following the oral mucosa harvest; the numbness lasted for 2 days among those that it occurred [Table 3b].

A total of 72 of the 88 patients (81.8%) did not experience change in salivation following buccal mucosa harvest but

| Table 1: The Age group of the Patients |
|-----------------------------|-----------------|-----------------|-----------------|
| Age group (year) | Frequency | Percentage | Mean±SD |
| <20 | - | 0 | 0 |
| 20-30 | 04 | 4.5 | 3.4 |
| 31-40 | 03 | 3.4 | 55.03±12.30 |
| 41-50 | 27 | 30.7 | 5.41±2.62 |
| 51-60 | 27 | 30.7 | 6.0 |
| 61-70 | 27 | 30.7 | 7.0 |
| >70 | 10 | 11.4 | 8.0 |
| Total | 88 | 100 | 10.0 |

| Table 2: The urethral stricture characteristics |
|-----------------------------|-----------------|-----------------|-----------------|
| Location of Stricture | Previous repair | Graft length (cm) | Mean±SD |
| Penile | 15 | 4.0 | 4.4 |
| Bulbar | 32 | 5.0 | 22 |
| Peno-bulbar | 41 | 6.0 | 10.5 | 5.41±2.62 |
| Previous Repair | Yes | 01 | 7.0 |
| Anastomotic | 03 | 8.0 |
| Penile skin flap | 04 | 10.0 |
| No | 84 | 07 |
eight of the patients each (9.1%) experienced increased and reduced salivation. Although none of the patients developed oral infection or required corrective oral surgery a few of them, 12.5%, occasionally experienced residual food “hang-on” at the site of the oral mucosa harvest. In addition, majority of them admitted that the perineal wound was more painful (72.7%). About 94.3% of the patients shall be willing to undergo buccal mucosa harvest under local anesthetic infiltration if the need arises but 5.7% of them will not for reasons of discomfort and painful experience [Table 4].

All patients were interviewed at follow-up and/or on phone at least a year after the procedure.

DISCUSSION

In the present study, the mean age of our patients was 55.03 years (±12.30), and the mean length of harvested graft was 5.41 cm (±2.62 cm). Ideally, any urethral stricture that is more than 2.0 cm in length should be treated with substitution urethroplasty to prevent the repair being under tension and avoid penile chordee. Several tissues have been used for urethral substitution ranging from full-thickness skin graft to nonhirsute penile skin flaps and most recently BuMG tissue. The qualities of the BuMG graft, over other tissues, have been comprehensively and extensively elucidated.[1,2] Buccal mucosa has hitherto been recommended to be harvested under general anesthesia with either nasotracheal or orotracheal intubation; only one report has documented its harvest under local anesthetic infiltration.[3]

Our result shows that 94.3% of the patients found it “easy” or “very easy” to maintain the mouth opened for the BuMG harvest with only 5.7% finding it difficult. Other investigators have reported the use of specialized intraoral retractor, such

| Table 3a: Features of feasibility and morbidity of buccal mucosa harvest under local anesthesia |
|---------------------------------------------------------------|
| Tolerability of mouth opening during mucosa harvest | Bothersome bleeding | Difficulty with opening mouth after graft harvest | Oral pain score | Duration before being able to fully open the mouth (days) | Oral/cheek swelling |
|---------------------------------------------------------------|
| Very easy | 47 | - | - | - | - |
| Easy | 36 | - | - | - | - |
| Difficult | 5 | - | - | - | - |
| No | 87 | 80 | 61 | 23 | 4 |
| Yes | 1 | 8 | - | - | - |
| No pain | - | - | - | - | - |
| Mild pain | - | - | - | - | - |
| Moderate pain | - | - | - | - | - |
| Severe pain | - | - | - | - | - |
| 2 | - | - | - | - | - |
| 3 | - | - | - | - | - |
| 4 | - | - | - | - | - |
| 5 | - | - | - | - | - |
| No swelling | - | - | - | - | - |
| Mild swelling | - | - | - | - | - |
| Moderate swelling | - | - | - | - | - |
| Severe swelling | - | - | - | - | - |

| Table 3b: Features of feasibility and morbidity of buccal mucosa harvest under local anesthesia |
|---------------------------------------------------------------|
| Duration before taking (days) | Drink | Soft food | Normal meal | Presence of numbness | Duration numbness lasted (days) | Saliva production | Oral infection | Hang-on food residue |
|---------------------------------------------------------------|
| 0 | - | - | - | - | - | - | - | - |
| 1 | - | - | - | - | - | - | - | - |
| 2 | - | - | - | - | - | - | - | - |
| 3 | - | - | - | - | - | - | - | - |
| 4 | - | - | - | - | - | - | - | - |
| Present | 03 | - | - | - | - | - | - | - |
| Absent | 85 | - | - | - | - | - | - | - |
| No change | - | - | - | - | - | - | - | - |
| Reduced salivation | 72 | - | - | - | - | - | - | - |
| Increased salivation | 08 | - | - | - | - | - | - | - |
| No infection | 08 | - | - | - | - | - | - | - |
| Infection present | 88 | - | - | - | - | - | - | - |
| Not-at-all | - | - | - | - | - | - | - | - |
| Occasionally | - | - | - | - | - | - | - | - |
as the Dingman retractor and Steinhauser mucosal stretcher with retractor;\(^\text{[8,11]}\) this will invariably require the need for general anesthesia. It is of note that opening the jaw is not necessarily required for harvesting the BuMG as the assistant surgeon’s index and middle fingers will perfectly do the work and thus reduce the discomfort that the patient may experience.\(^\text{[13]}\) Extensively widened temporomandibular joint that is only possible and achievable under general anesthesia allows for sustained strain on the muscles of the jaw that may contribute to the postoperative pain that is often associated with this procedure. Allowing the patient to intermittently close the mouth and even swallow, often afford the patient some relaxation of the jaw muscles which may ameliorate the postoperative pain and prevents the risk of aspiration of blood and some oral secretion.

Although Eppley et al. reported no donor site morbidity in their series of 12 patients;\(^\text{[8]}\) the possible complications may include parotid duct injury, limitation of oral opening, bleeding, oral infection, pain, swelling (from inflammatory reaction or hematoma), nerve injury (long buccal or mental nerves) evidenced by cheek or lower lip paresthesia or anesthesia among others.\(^\text{[11]}\)

In this study, only one patient had bothersome bleeding during the first 3 days after the procedure which was managed by gauze pressure and it resolved. There were no cases of severe primary hemorrhage that necessitated conversion to general anesthesia or abandonment of the procedure. A total of 61 patients (69.3%) reported no significant postoperative pain following buccal mucosa-harvest as against the result of Tolstunov et al. where “all patients had moderate discomfort intraorally” on the first postoperative day;\(^\text{[11]}\) however, 26.1% had mild pain with only 4.5% of them having moderate pain [Table 3a]. This result is comparable to that of Dublin and Stewart\(^\text{[14]}\) where 10% of their patients had moderate-to-severe pain on discharge; the use of oral spreader under general anesthesia might have allowed for excessive opening of the jaw and thus the pain experienced. The nonusage of such oral spreaders in our study might have accounted for the observations made in the present study. In addition, allowing for the effect of routine analgesia which is expected to reduce the pain on both the oral wound as well as the perineal wound, the latter was reported to be comparably more painful in 72.7% of our patients. This shows that the buccal mucosa-harvest under local anesthesia, without undue “extension” of the temporomandibular joint might have contributed to the reduced pain perception within the intraoral cavity [Table 4].

In the present study, all our patients were able to drink water within 24 h of the procedure and only 18.2% required 3 days or more before the resumption of normal eating habit [Table 3b]. This result is similar to the finding of Wood et al. where 90% of the patients were able to consume oral fluid within 24 h, and comparable to the 88% that were able to eat soft solid within 2 days although return to normal diet was delayed up to 3 weeks in the remainder.\(^\text{[15]}\) Kumar et al. reported resumption of oral fluid within 24 h in all their patients, eat soft solid in 48–72 h and return to normal diet after 4–5 days of surgery.\(^\text{[16]}\)

Wood et al.\(^\text{[13]}\) also reported perioral numbness in 68% of their patients, whereas Tolstunov et al.\(^\text{[11]}\) and Dublin and Stewart\(^\text{[14]}\) reported 8.3% and 16%, respectively, lasted for a duration of 3–13.6 months. Interestingly, numbness of the cheeks was present in only 3.4% of patients in the present report and lasted for just 3 days; such finding may be explained by the diligent operative technique in terms of tissue handling and the “wakefulness” of our patients. In the awake state, the patient is more likely to respond to manipulation that touches on either the long buccal nerve and/or mental nerves which are not blocked by the local anesthetic agent.

In earlier reports, 3 of 12 patients (25%) had normal salivary flow, and nine had mild reduction in the salivary flow from ipsilateral Stensen’s duct,\(^\text{[11]}\) and minimally troublesome persistent salivary changes after harvest were noted in 11% of patients.\(^\text{[13]}\) In contrast, the present study showed 81.8%
of the patients have no change in saliva production, but 9.1% each had increased and reduced saliva production.

There was no report of oral infection in the present study in agreement with other studies. This has been attributed to an infection defense layer denoted by a high concentration of IgA antibodies as a result of evolution-related qualities,[17,18] although gaping buccal wound (the suture gave-way) has been reported.[14] Interestingly, and of note is the fact that 94.3% of our clients were willing to undergo buccal mucosa harvest again, under local anesthesia, if the need arises.

CONCLUSION

Our findings have further given credence to the feasibility, safety, and acceptability of buccal mucosa harvest under local anesthetic agent infiltration for urethroplasty. A randomized prospective clinical trial may be needed to further evaluate these observations.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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