Original Research Article

Morbidity of Closure Versus Non-Closure of Oral Mucosal Graft Harvest Site During Urethroplasty

ABSTRACT

Background: *Technique of harvesting oral mucosa is straightforward and its efficacy in urethroplasty is beyond question. But the optimal method for managing the intraoral defect is yet to be determined. Regarding closure versus non-closure of the oral mucosal graft harvest site, there are various published articles worldwide. In Bangladesh, there are limited study regarding the issue though now a day's buccal mucosal graft urethroplasty has become one of the routine operation of the urologist of Bangladesh.* ***Objective:*** *The objective of the study is to determine the effect of closure versus non-closure of the oral mucosal graft harvest site in men undergoing urethroplasty for urethral stricture disease. In this hospital based Quasi experimental study, a total of 37 patients were allocated into two groups by purposive sampling technique where the donor site was either closed or left open. Baseline demographic and clinical data were recorded. Postoperatively, questionnaires assessing pain, resumption of diet, perioral sensation, mouth opening, salivary disturbance and facial deformity were completed at postoperative Day 1, 5 at 3 and 6 months. All the collected data were compiled. Further Statistical analyses of the results were obtained by using Microsoft Xcel, 2010 and web based computer software -Graph Pad Software, 2017. The baseline characteristics like age, stricture length and site of graft harvesting of the study subjects were potentially comparable. The early postoperative pain scores demonstrated a trend favoring the non-closure group until day 5. Regarding difficulty in mouth opening, the result also favored the non-closure group (44.44%, 11.11% vs 78.94%, 63.15%, $p<0.05$ in Day1 and Day5) as did the appearance of postoperative facial deformity (5.56%, 0% vs 21.05%, 15.78%, $p<0.05$ in Day1 and Day5). Non-closure resulted in early return to regular diet (88.88% vs 78.94% in Day1 and 94.44% vs 73.68% in Day5). More perioral numbness was in non-closure group. (61.11% vs 52.63% in Day1 and 50.00% vs 42.10% in Day5), but these differences were not statistically significant ($p>0.05$). Dry mouth was higher in closure group than non-closure group patients (day 1 21% vs 16%, day 5 15.78% vs 11%, 3 months 10% vs 5%). The difference was not statistically significant ($p>0.05$). However, at 6 months, no difference was found in the above mentioned parameters between the two groups. The results of the present study suggest that closure of the oral mucosa graft harvest site may lead to a significantly increased early postoperative pain perception, difficulty in mouth opening and facial deformity although long term results are the same. So keeping the donor area unsutured may be a better option of dealing the graft harvest site in terms of early postoperative recovery.*

Key word: Urethral strictures, urethroplasty, Oral Mucosal Graft

INTRODUCTION

"Urethral strictures are difficult to manage. Some treatment modalities for urethral strictures are fraught with high patient's morbidity and stricture recurrence rates. As free graft surgeons have used many tissues such as posterior auricular skin, full thickness hairless abdominal wall skin and bladder mucosa. The irresistible majority of cases are most easily treated with buccal grafts. For urethral reconstruction, Buccal mucosa graft (BMG) was first described". [1] "Currently, buccal mucosal grafts represent the gold standard graft material for urethroplasty because of its thick epithelium and a thin lamina propria for maximal graft uptake" (Alwaal et al, 2015). [2] "For BMG urethroplasty success rates range from 87% to 96%". [3] Buccal mucosal urethroplasty is an ideally acceptable allograft transplant material which has found a wider application area in the field of substitution urethroplasty. [4] "Buccal mucosal urethroplasty has been more popular in the last few years, after recognition of its feasibility and very good outcome as well as its low morbidity at the reconstruction site". [4] "Buccal mucosal graft can be harvested from the inner

cheek(s) or lip with minimal morbidity. Although the technique of harvesting buccal mucosa is straightforward and its efficacy in urethroplasty is beyond question, the optimal method for managing the intraoral defect is yet to be determined. Options include primary closure, closure by secondary intent, and defect coverage by some artificial means." [3] "Conventionally the donor areas were used to be closed after the graft harvesting mainly because of concerns about the hemostasis and adequate healing of the raw area. Due to the stretching of the mucosal edges and poor cosmesis especially in lower lip closure of the donor area may result in increased pain". [6] The main question is whether close the harvest site or not. Wood et al. (2004) [7] reported that "closure of the harvest site was associated with worse pain and suggested that this may be improved by not closing. The main question is whether close the harvest site or not". Although Dublin & Stewart (2004) [8] reported that "patients did well with closure of the mouth, but 16% and 32% had long-term complaints of numbness and mouth tightness respectively". [9] For these reasons, many centers now routinely keep buccal mucosal graft donor area open and allow healing by secondary intention. The aim of this study is to compare the morbidity of non-closure of oral mucosal graft harvest site with that of primary closure.

OBJECTIVE

General Objective

To compare the morbidity of non-closure of buccal mucosal graft harvest site with that of primary closure.

Specific Objectives

To assess postoperative pain sensation after closure and non-closure of graft harvest site. To identify difficulty in resuming normal regular diet postoperatively in case of closure and non-closure harvest site. To observe the interval to full mouth opening, perioral numbness, salivary disturbance and any facial deformity after operation in both cases.

METHODS AND MATERIELS

This was a Quasi experimental study by using purposive sampling method. The study was conducted in patients who were admitted in the Urology ward with a diagnosis of stricture urethra and who underwent buccal mucosal graft urethroplasty during the period April 2017 to September 2018 in Dhaka Medical College Hospital (DMCH) Dhaka, Bangladesh. Forty patients of stricture urethra were selected according to predefined inclusion and exclusion criteria and then allocated into two groups with alternate patient in each group. In group-1 the graft harvest site was closed and it was left open in group-2. Buccal mucosa was harvested from inner cheeks and lower lip depending upon the length required.

Inclusion criteria

Male patient. Stricture urethra length 3-6 cm. Post inflammatory urethral stricture.

Statistical analysis of data

All the collected data were compiled. Percentages were calculated to find out proportion of the findings. Further Statistical analyses of the results were obtained by using Microsoft Xcel, 2010 (Microsoft Corporation, Washington, U.S.) and web based computer software - Graph Pad Software, 2017 (Graph Pad Software, Inc, USA). The results were presented in tables, figures and diagrams. Quantitative data were expressed as mean and standard deviation and compared by Student "t" test. Qualitative data were expressed as frequency and percentage, compared by Fisher's exact test. A probability value (p) of less than 0.05 was considered to indicate statistical significance. The summarized findings were then presented in the form of tables and graphs.

RESULTS

A Total of 37 patients were selected from the patients of urethral stricture that were admitted into the Department of Urology, DMCH. They were equally allocated into group-1 and group-2 and underwent BMG urethroplasty where in Group-1 the graft harvest site was closed and it was left open in Group-2. One patient from Group-1 and two from Group-2 were dropped out during follow up period.

Table 1: Distribution of the patients by age and stricture length. (N=37)

Characteristics	Group-1 (Closure) n(19)	Group-2 (Non- closure) n(18)	p value
Mean (± SD) age (year)	42.36 ± 10.53	41.62 ± 13.03	0.850
Mean (± SD) stricture length (cm)	3.90 ± 1.19	3.67 ± 1.31	0.616

Table 1 showed that the mean age of the patients was 42.36 (±10.53) year and 41.62(±13.03) year in Group-1 and Group-2 respectively. The difference was not statistically significant (p>0.05). There was also statistically no significant difference regarding the stricture length; it was 3.9(±1.19) cm and 3.67(±1.31) cm in group-1 and group-2 respectively.

Table 2: Comparison of postoperative pain scores among the two groups. (N=37)

Point of time	Pain score (Mean ± SD)		P value
	Group-1 (Closure) n(19)	Group-2 (Non- closure) n(18)	
Day 1	6.5 ± 1.147	4.1 ± 1.586	0.0001
Day 5	5.05 ± 1.316	3.05 ± 0.944	0.0001
3 month	0.51 ± 0.470	0.25 ± 0.444	0.0691
6 month	0.00	0.00	0.000

Table 2 showed that in day 1 mean postoperative pain scores was 6.5 in closure group and 4.1 in non -closure group. In day 5 mean postoperative pain scores was 5.05 in closure group and 3.05 in non -closure group. In 3 months mean postoperative pain scores was 0.51 in closure group and 0.25 in non -closure group. All patients had maximum pain at the first post-operative day with pain score falling gradually on subsequent days. The postoperative pain scores on day 1 and day 5 among the patients of group1 were significantly higher than that of group2. But on late postoperative period, at 3 and 6month, it was a no significant difference.

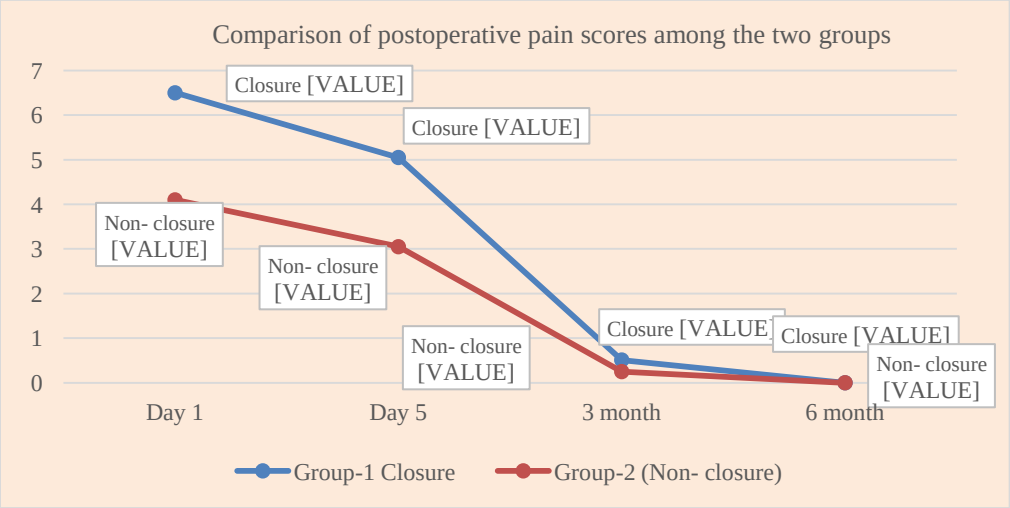

Figure 1: *groups wise Comparison of postoperative pain scores*

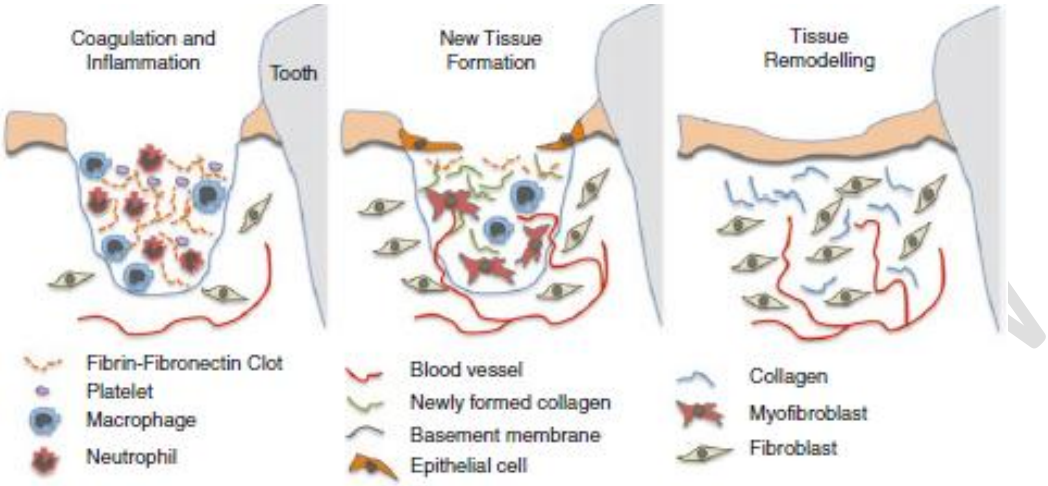

Figure 2: *Wound healing stages in the oral mucosa.*

The three main phases of the wound healing process are represented along with the main cellular components involved (Bergmeier, 2018). [10]

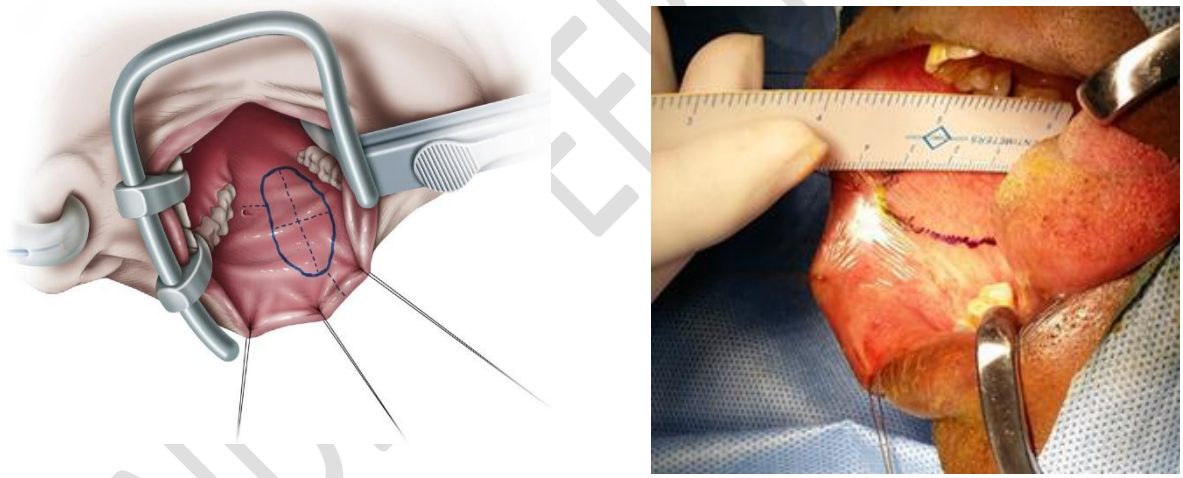

Figure 3: *Marking graft to be taken on the Buccal Mucosa (Barbagli et al, 2014)*

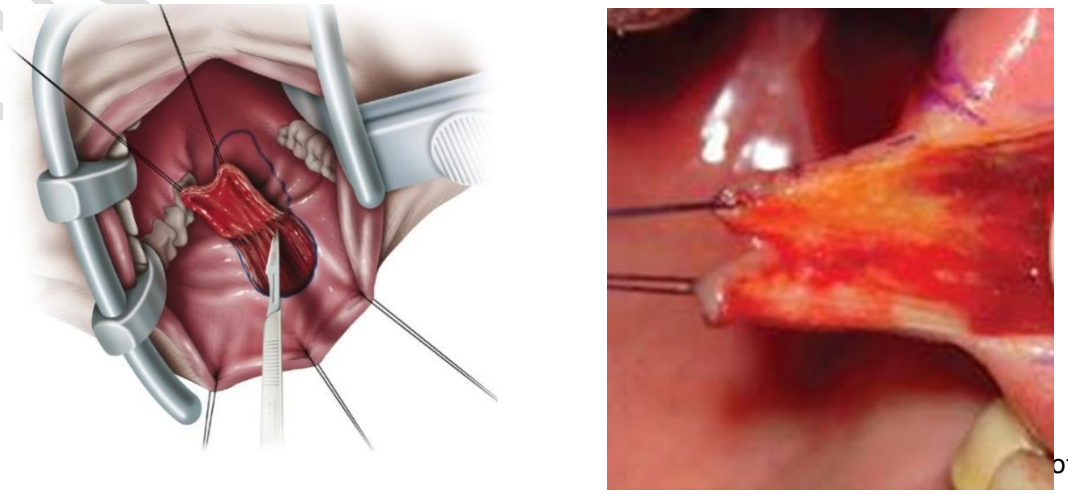

Figure 4: *Outlined graft is dissected in plane between mucosa and muscle* ***(****Barbagli et al, 2014) [11]*

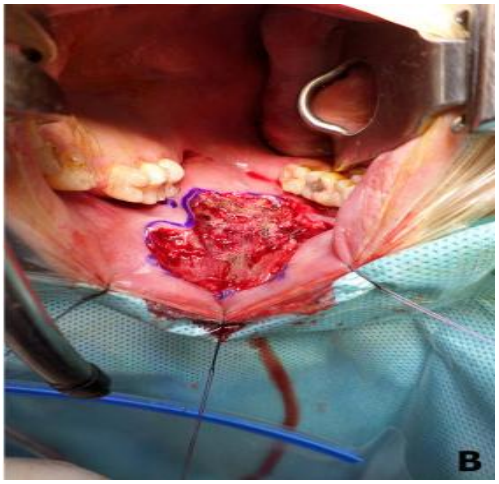

Figure 5: *Closure and non-closure of buccal mucosa donor s* ***(****Barbagli et al, 2014) [11]*

Table 3: Comparison of postoperative resumption to regular diet. (N=37)

Point of time	Group		P-value
	Group-1 (Closure) n (19)	Group-2 (Non -closure) n (18)	
Tolerates liquid diet at Day 1	15(78.94%)	16(88.88%)	0.672
Tolerates semi solid diet at Day 5	14(73.68%)	17(94.44%)	0.086

In postoperative day 1, 15 patients among closure group and 16 patients among non-closure group could tolerate liquid diet (P value 0.672). In postoperative day 5, 14 patients among closure group and 17 patients among non-closure group could tolerate semi solid diet (P value 0.086).

Table 4: Comparison of difficulty in postoperative mouth opening. (N=37)

Time period	Group		P- value
	Group-1 (Closure) n(19)	Group-2 (Non -closure) n(18)	
Day 1	15(78.94%)	8(44.44%)	0.013
Day 5	12(63.15%)	2(11.11%)	0.001
3 months	5(26.31%)	0.00	0.0193
6 months	1(5.26%)	0.00	0.323

Table 4 showed that, on postoperative day 1, 78.94% of the patients in the closure group reported some difficulty in mouth opening compared with 44.44% of patients in the non -closure group. In postoperative day 5, 63.15% and 11.11% patients reported the problem in the closure and non -closure group respectively. This morbidity was also

observed at 3 months and 6 months in 26.31% and 5.26% cases in closure group; whereas it was absent in non - closure during this time period.

Table 5: Comparison of perioral numbness in postoperative period. (N=37)

Time period	Group		P- value
	Group-1 (Closure) n(19)	Group-2 (Non -closure) n(18)	
Day 1	10(52.63%)	11(61.11%)	0.602
Day 5	8(42.10%)	9(50.00%)	0.630
3 months	5(26.31%)	3(16.67%)	0.476
6 months	2(10.52%)	0.00	0.157

Table 5 showed that, on postoperative Day 1, 52.63% in the non-closure group versus 61.11% in the closure group reported perioral numbness (p= 0.602). Although from postoperative day-5 more patients in the non-closure group complained of perioral numbness (50.0% vs 42.10%), this did not reach statistical significance (p=0.63). At 3 months of follow-up, 16.67%in the non-closure group versus 26.31% in the closure group reported perioral numbness (p= 0.476). At 6 months of follow-up, a trend was seen toward decreased perioral numbness in the non-closure group where it was nil, while 2 patients in closure group still complained of numbness.

Table 6: Comparison of dry mouth in postoperative period. (N=37)

Time period	Group		P- value
	Group-1 (Closure) n(19)	Group-2 (Non -closure) n(18)	
Day 1	4(21.05%)	3(16.67%)	0.55
Day 5	3(15.78%)	2(11.11%)	0.54
3 months	2(10.52%)	1(5.55%)	0.53
6 months	0.00	0.00	0.00

Table 6 showed that the dry mouth was 4(21.05%) patients in day 1, 3(15.78%) patients in day 5 and 2(10.52%) after 3 months in closure group. Dry mouth was significantly higher in group1 in day 1 and gradually decreased in frequency and was nil at 6 months. In group 2, 3(16.67%) patients in day 1, 2(11.11%) patients in day 5, 1(5.55%) patient after 3 months and gradually decreased in frequency and was nil at 6 months.

Table 7: Comparison of facial deformity in postoperative period. (N=37)

Time period	Group		P- value
	Group-1 (Closure) n(19)	Group-2 (Non -closure) n(18)	
Day 1	4(21.05%)	1(5.56%)	0.016
Day 5	3(15.78%)	0.00	0.048
3 months	1(5.26%)	0.00	0.476
6 months	0.00	0.00	0.323

Table 7 showed that the facial deformity was 4(21.05%) patients in day 1, 3(15.78%) in day 5 and only one (5.26%) after 3 months in closure group. Facial deformity was significantly higher in group1 in day 1. But in the subsequent postoperative days it gradually decreased in frequency and was nil at 6 months. In group 2, only one patient (5.56%) developed this morbidity in day 1

DISCUSSION

In this study, the outcomes of the oral mucosa graft harvesting were compared in terms of postoperative pain and other morbidities. This series shows that keeping the donor area unsutured and allowing it to heal by secondary intention is better option of dealing the oral mucosal graft harvest site. In the current study, the baseline demographic and clinical characteristics of the study subjects were apparently similar, rendering them comparable in terms of the outcome variables. The mean age of the patients was 42.36(±10.53) year and 41.62(±13.03) year in group-1 and group-2 respectively. The difference was not statistically significant ($p>0.05$). There was also statistically non-significant difference regarding the stricture length; it was 3.9(±1.19) cm and 3.67(±1.31) cm in group-1 and group-2 respectively. Predominant graft harvest site was single cheek and lower lip in both the groups. Some literature showed data about graft surface area. Barbagli and Lazzeri (2012) [12] stated in an editorial comment given in response to a report by Rourke, Mc Kinny &Martin (2012) [13] regarding a randomized controlled trial about the effect of wound closure on buccal mucosal graft harvest site morbidity, that study results may be greatly influenced by graft shape and surface area rather than by closure vs non-closure. On answering to such comment, Rourke (2012) [14] argued for absence of any comparative evidence that conclusively demonstrated graft shape and surface area influencing perioperative morbidity after buccal mucosal graft harvest. Making agreement with Rourke, we did not measure graft surface area. While assessing postoperative pain, the present series showed the maximum pain at the first post-operative day in both the groups with pain score falling gradually on subsequent days. But the pain scores on day 1 and day 5 among the patients of group1 were significantly higher than that of group 2. Theoretically, owing to the edema and inflammation incited by wound closure the closed wound placed under tension might become painful sooner. On late postoperative period, at 3 and 6month, no difference was found in the pain scores between the two study groups. In fact after graft harvest pain from the donor site is generally not a concern by 6 months. A study by Muruganandam, Dubey & Gulia, (2009) [15] found a similar outcome in the early and late postoperative period. In the prospective study by Wood et al, "the mean pain score for patients with donor site closure was significantly higher than that for patients without donor site closure ($P<0.01$)". [6] "But in that study the improved pain scores experienced by the non-closure group in the early postoperative period were followed by an increase in pain midway through the first week and became statistically greater than the closure group until day 7 postoperatively. They explained that in patients with non-closure of the donor area might require more time to accumulate the wound tension necessary to incite significant pain. Like ours, they also found no difference in the pain scores between the 2 study groups at 6 months". Joseph, Deepak & Shet (2017) [9] found that "in most patients had mild-moderate pain 59(85.5%) in the immediate post-operative period. Twenty were from the donor site open group & 39 from the donor site closed group. 10(14.4%) patients had severe pain, 7 were from the donor site open group and 3 from the donor site closed group". On the contrary, Barbagli et al. (2010) [16] in a "prospective study of 350 patients who underwent oral mucosa harvest from single cheek concluded that harvesting oral graft from a cheek with wound closure is a safe procedure with a high patient satisfaction rate". "The most frequent sensory pain varied between the closure and non-closure groups on postoperative day 5, as well as at 3 and 6 months postoperatively. This may be due to differences in uncovered surface and variable tension of the wound following closure versus non-closure of the donor site at the inner cheek. In addition, the absorbable suture may have an effect on sensory pain and thus contribute to differences in patients with closure versus non-closures of the harvest site". [17] "Steinhauser had observed that techniques involving full-thickness mucosal grafts leave a defect that can cause scarring and contraction with decreased mouth opening". [18] Restriction of mouth opening seems to be a common problem in the early postoperative period. In this series, the majority of patients in both groups had difficulty in opening the mouth at post-operative day 1. On postoperative day 1, 78.94% of the patients in the closure group reported some difficulty in mouth opening compared with 44.44% of patients in the non-closure

group. In postoperative day 5, 63.15% and 11.11% patients reported the problem in the closure and non-closure group respectively. This morbidity was also observed at 3 months and 6 months in 26.31% and 5.26% cases in closure group; whereas it was absent in non-closure during this time period. Tolstunov, Pogrel, & Mc. Aninch (1997) [19] measured "the preoperative mouth opening preoperatively, and then after 1week, 2-3-6 weeks and 6 months. Almost all patients had difficulties with mouth opening in the first week postoperatively, but by the third month, no patients had restriction of mouth opening". Joseph, Deepak & Shet (2017) [9] found that "difficulty while opening mouth was noted by 5(18%) of 27 from donor site open group, 3(7.1%) of 42 from the donor site closed group. (p-value is 0.149). With respect to diet, immediate resumption to liquid diet was seen in all except 4 patients in closure group and 2 patients in non-closure group. Regarding resuming semi solid diet 5 patients in closure group and 1 patient in non-closure group tolerated semi solid diet by the end of fifth post-operative day. These differences were not statistically significant. Similar observations have been reported by others". In a study by Wood et al. (2004) [7] showed that "after oral mucosal graft harvest for urethroplasty, irrespective of closure or non-closure 90% patients were able to consume oral fluids within 24 hours and 88% were able to eat soft solids within 2 days and 100% within 2 weeks". In another study by Joseph, Deepak & Shet (2017) [9] showed that "58 (84%) of 69 patients were able to resume a normal diet by 2 days.9(33.3%) of 27 from the donor site open group and 2(4.7%) of 42 from the donor site closed group took more than 2 days to resume a normal diet". Perioral numbness is related to a reduction in sensation in the region of the graft harvest site and is an unavoidable consequence of excision of mucosa. In our study perioral numbness occurred in almost equal proportion in both the groups. On postoperative Day 1, 52.63% in the non-closure group versus 61.11% in the closure group reported perioral numbness (p=0.602). Although from postoperative day-5 more patients in the non-closure group complained of perioral numbness, this did not reach statistical significance (p=0.63). At 6 months of follow-up, a trend was seen toward decreased perioral numbness in the non-closure group where it was nil, while 2 patients in closure group still complained of numbness. In contrary to our study, Rourke, McKinny & Martin (2012), [13] found perioral numbness more frequently occurring in closure group. It may be due to the difference of graft harvest site of the two studies. Predominant graft harvest site in our study was both lip and cheek, whereas Rouke, McKinny& Martin chose only cheek for graft. In another study by Joseph, Deepak & Shet (2017) [9] showed that "perioral numbness more frequently occurring in closure group within one week". "The region around the mental foramen where mental nerve leaves the mandible is crucial point for lesions that can lead to a long lasting neuropathy of the mental nerve". [20] "Neurosensory deficit of the long buccal and mental nerves occurs if the incision extends too far posteriorly in the cheek and too far anteriorly in the lip". [19] In this study, there were no cases of severe or permanent damage to the parotid duct with resulting salivary flow obstruction. Dry mouth was higher in closure group than non-closure group patients. The difference was not statistically significant ($p>0.05$). None of the patients complained of excess salivation. A study by Wood et al (2004) [7] found that "minimally troublesome persistent salivary changes after harvest were noted in 11% patients". Another study by Muruganandam, Dubey & Gulia, (2009) [15] found that three patients in closure group among twenty-five patients had transient salivatory problems on ipsilateral side. Barbagli et al. (2010) [16] in a prospective study of 350 patients who underwent oral mucosa harvest from single cheek concluded that 97.1% of patients showed no changes in salivary function. Facial deformity, although less commonly occurs following buccal mucosal graft harvest, causes significant long term morbidity. We found facial deformity significantly higher in group-1 in day 1($p<0.05$). But in the subsequent postoperative days it gradually decreased in frequency and was nil at 06 months. In group-2, only one patient developed this morbidity in Day 1 that resolved subsequently. Kumar et al. (2013), [21] in a study of 40 patients, found no incidence of facial deformity following BMG urethroplasty. However, they did not examine the effect of closure and non-closure of graft harvest site. Joseph, Deepak & Shet (2017) [9] found that "Problem in smiling was noted by 8(29.6%) of 27 patients from the donor site open group. 8(19%) of 42 patients from the donor site closed group. (p-value is 0.30)".

CONCLUSIONS AND RECOMMENDATION

Oral mucosa graft has some morbidity like pain, perioral numbness, difficulty in mouth opening, salivary disturbance and facial deformity. Primary closure of the donor area can lead to more incidence of early postoperative pain perception, difficulty in mouth opening and facial deformity than non -closure but later this morbidity is same in both cases. After analyzing the result of the study it can be concluded that keeping the donor area uncultured is associated with less morbidity. There is no difference in long term post-operative morbidity whether the oral mucosal graft site is closed or left open. It may be better to leave oral mucosal harvest site uncultured which lead to a better early postoperative outcome. A large multicenter comparative study is required for further evaluation.

Ethical Approval

The study was approved by Ethical Clearance Committee of Dhaka Medical College.

Consent

As per international standard or university standard, patient(s) written consent has been collected and preserved by the author(s).

LIMITATIONS OF THE STUDY

Small sample size was a limitation of the present study. The study conducted in a single center in Dhaka city which might not be representative to the whole population. Size of graft (surface area) is not considered. Perfusion and oxygenation of the graft harvest site were not measured. Pain was not measured by McGill pain questionnaire.

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