ORIGINAL ARTICLE

# Pedicled Buccal Fat Pad versus Conventional Gelfoam in Management of Lateral Palatal Defect Healing After Primary Palatoplasty

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ABSTRACT

Introduction: Delayed mucosalization of lateral palatal defects following palatoplasty may increase postoperative pain, discomfort, and risk of complications. The pedicled buccal fat pad has been used as a biological dressing to enhance intraoral wound healing; however, systematic evaluation following palatoplasty remains limited. This study aimed to evaluate mucosalization time of buccal fat pad-covered lateral palatal defects and compare outcomes with conventional management.

Methods: An observational study was conducted at Kirtipur Hospital, Nepal, from August 2025 to January 2026. Thirty non-syndromic cleft palate patients undergoing primary palatoplasty were enrolled consecutively and divided into two groups: Group A (n=15), managed with purified gelatin (Gelfoam), and Group B (n=15), managed with pedicled buccal fat pad coverage. Postoperative pain, cheek swelling, operative duration, and time to complete mucosalization were assessed. Data were analyzed using descriptive statistics, chi-square test, and independent t-test.

Results: Baseline demographic characteristics, defect size, and operative duration were comparable between groups. Mean time to complete mucosalization was significantly shorter in the BFP group (2.20 ± 0.41 weeks) than the conventional group (4.00 ± 1.07 weeks; $p<0.05$). Postoperative pain on the day of surgery was significantly lower in the BFP group, while no postoperative bleeding was observed. Transient cheek swelling in some BFP cases resolved spontaneously.

Conclusion: The pedicled buccal fat pad significantly accelerates mucosalization of lateral palatal defects and reduces early postoperative pain without adding substantial operative time. It is a safe and effective adjunct in cleft palate reconstruction.

Keywords: Buccal fat pad, cleft palate, mucosalization, palatoplasty, wound healing

## INTRODUCTION

Cleft lip and/or palate are among the most common congenital craniofacial anomalies worldwide. The prevalence of cleft lip with or without cleft palate ranges from 0.2 to 2.3 per 1,000 live births, while isolated cleft palate occurs in 0.1–1.1 per 1,000 births.[1,2] Palatoplasty is usually performed between 9 and 18 months of age to restore speech function and separate the oral and nasal cavities; however, complications such as palatal fistula formation and impaired maxillary growth remain challenges.[1,3] The pedicled buccal fat pad (BFP) has been shown to promote rapid mucosal healing and reduce postoperative morbidity without adversely affecting palatal or maxillary growth.[4,5] Although epithelialization of exposed BFP reportedly

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occurs within two to four weeks, systematic evaluation following palatoplasty is limited.[6-8] This study aimed to evaluate BFP mucosalization time and compare it with conventional management of lateral palatal defects.

## METHODS

An observational study was conducted on non-syndromic cleft lip and/or cleft palate patients undergoing primary palatoplasty at Kirtipur Hospital, Nepal, from 27 August 2025 to 17 January 2026. Ethical approval for the study was obtained from the Institutional Review Committee of the Public Health Concern Trust, Nepal (IRC No: 208-2025). Written informed consent was obtained from the parents or legal guardians of all participants. In cases involving illiterate guardians, the consent form was read aloud by the investigator in the presence of an independent witness, and consent was documented using a thumbprint along with the name and signature of the witness. The sample size was calculated using a superiority design based on the proportion of complete mucosalization at two weeks. Assuming complete mucosalization rates of 4.8% in the conventional group and 95.2% in the buccal fat pad (BFP) group, as reported in a previous study,[8] with a superiority margin of 75%, a 95% confidence level, and 80% power, the minimum required sample size was 15 participants per group.

The inclusion criteria comprised non-syndromic cleft palate patients undergoing primary palatoplasty, while syndromic patients and revision palatoplasty cases were excluded. To minimize selection bias, eligible patients were enrolled consecutively during the study period, and baseline demographic and clinical characteristics were comparable between the two groups. A total of 30 eligible patients were included; 15 consecutive patients underwent palatoplasty with conventional management using purified gelatin (Gelfoam) to cover the lateral palatal defect (Group A), and 15 patients underwent palatoplasty with pedicled buccal fat pad (BFP) coverage (Group B). Preoperative demographic characteristics and clinical diagnoses were recorded. On the day of surgery, the palatoplasty technique employed (Langenbeck or hybrid technique) was documented, and the size of the lateral palatal defect was measured following palatal mucosal closure (Figure 1A–B)

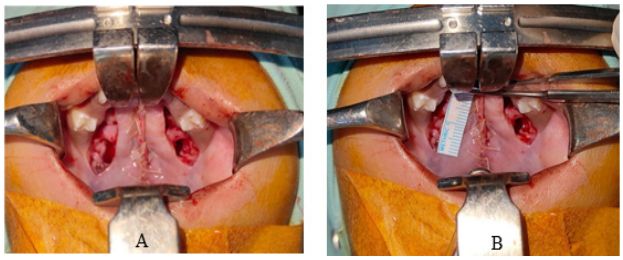


**Figure 1: (A) Lateral palatal defect after mucosal closure. (B) Measurement of the lateral palatal defect.**

Gelfoam was used to cover the lateral palatal defect in group A. For group B buccal fat pad was harvested and used to cover the lateral defect. (Figure 2A–B)

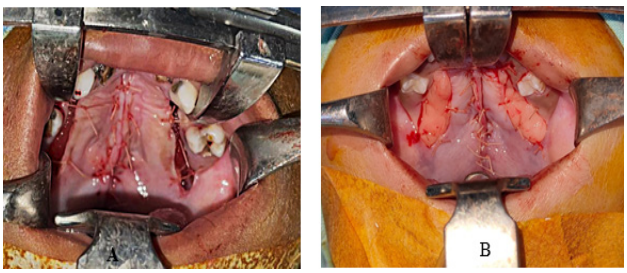


**Figure 2: (A) Gelfoam used to cover the lateral palatal defect (Group A). (B) Pedicled buccal fat pad used to cover the lateral palatal defect (Group B).**

The duration of harvesting the buccal fat pad was recorded for group B, and the total duration of surgery was recorded for both groups. All the patients were evaluated daily for pain, swelling, and hemorrhage during the first two postoperative days. Pain was evaluated using the FLACC (face, leg, activity, cry, consolability) score. Mucosalization of the wound was evaluated weekly until complete mucosalization occured. Data were collected and entered into Microsoft Excel for analysis. Statistical analysis was performed using IBM SPSS version 29, employing descriptive statistics, the chi-square test, and the independent t-test. A p-value <0.05 was considered statistically significant. The study was reported in accordance with the STROBE guidelines for observational studies.


**Figure 3: (A) Complete mucosalization of the lateral palatal defect after four weeks with Gelfoam (Group A). (B) Complete mucosalization of the lateral palatal defect after three weeks with a pedicled buccal fat pad (Group B).**

## RESULTS

This study consisted of 30 non-syndromic cleft lip/palate or cleft palate patients who underwent palatoplasty without using BFP (Group A, n=15) and with BFP (Group B, n=15) in Kirtipur Hospital. Group A consisted of 8 males and 7 females from 12 months to 12 years of age, with an average of 3.87±3.52 years. Group B consists of 10 males and 5 females from 12 months to 10 years of age, with an average of 4.21±3.13 years. There is no significant difference in the age of these two groups (P=0.778). The Diagnosis and Technique of Palatoplasty is listed in Table I.

Duration of Surgery was 128.87±26.73 minutes and 131.93±31.84 minutes for Group A and Group B, respectively, which is not statistically significant (p=0.777). The area of lateral defect of Group A was 396.5 ± 143.7mm$^2$ and Group B was 385.6 ± 157.6 mm$^{2,}$ which is also not statistically significant (p=0.84). In Group A, Gelfoam was used in all patients. The average time to harvest the buccal fat pad for both sides in Group B was 8.33 ± 3.54 minutes.

**Table 1: Diagnosis and Technique of Palatoplasty of Group A (gelfoam) and Group B (pedicled buccal fat pad)**

| Variables | Category | Group A (Number/%) | Group B (Number/%) | P Value |
|---|---|---|---|---|
| **Diagnosis** | Bilateral Complete cleft lip alveolus and palate (Status post lip repaired) | 0 (0) | 1(6.7) | **0.786** |
| | Incomplete Cleft palate | 7 (46.7) | 7(46.7) | |
| | Left Complete Cleft lip alveolus and palate (Status post lip repaired) | 2(13.3) | 1(6.7) | |
| | Right Complete Cleft lip alveolus and palate (Status post lip repaired) | 5(33.3) | 5(33.3) | |
| | Asymmetric bilateral cleft lip and left complete Cleft alveolus and palate (Status post lip repaired) | 1(6.7) | 1(6.7) | |
| **Technique** | Hybrid technique (One side unipedical, other side bipedical flap) | 6 (40) | 7(46.7) | **0.713** |
| | Langenbeck technique | 9 (60) | 8(53.3) | |

**Table 2: Postoperative pain scores (FLACC) in Groups A (gelfoam) and group B (pedicled buccal fat pad)**

| Variables | Group A | Group B | P Value |
|---|---|---|---|
| Pain on the day of surgery<br>FLACC (face, leg, activity, cry, consolability) score | 4.33±1.11 | 3.13±0.64 | <0.05 |
| Pain on the first postoperative day<br>FLACC (face, leg, activity, cry, consolability) score | 2.2±1.26 | 1.53±1.06 | 0.129 |
| Pain on the second postoperative day<br>FLACC (face, leg, activity, cry, consolability) score | 0.53±0.83 | 0.2±0.56 | 0.211 |

There was no postoperative bleeding in any group. Postoperative pain was significantly less in day of surgery in the Buccal pad of fat group (Group B) as shown in Table II. Postoperative cheek swelling was present in 4 (26.6%), 5 (33.3%), and 4 (26.6%) of Group B cases on the day of surgery, the first postoperative day, and the second postoperative day, respectively. There is no postoperative cheek swelling in group A.

The time taken for complete mucosalization in Group A ranges from 2 weeks to 6 weeks with an average of 4±1.07 weeks. The time taken for complete mucosalization in Group B ranges from 2 weeks to 3 weeks with an average of 2.20±0.41 weeks. The average duration of healing in Group B was significantly shorter compared with Group A ($P<0.05$).

There was no complete mucosalization of lateral palatal defect in any group in the first post-operative week. In the second postoperative week, there was complete mucosalization in 1 (6.67%) patient in Group A, and 10 patients (66.67%) had complete mucosalization in Group B, which is statistically significant ($P<0.05$). In the third postoperative week, 5 patients (33.3%) in Group A had completed mucosalization, whereas all patients (100%) of Group B had complete mucosalization, which is also significantly higher ($P<0.05$). In Group A, 12 patients ( 80%), 13 patients (86.6%), and 15 patients (100%) completed mucosalization in the 4th postoperative week, 5th and 6th postoperative weeks, respectively (Figure 4).

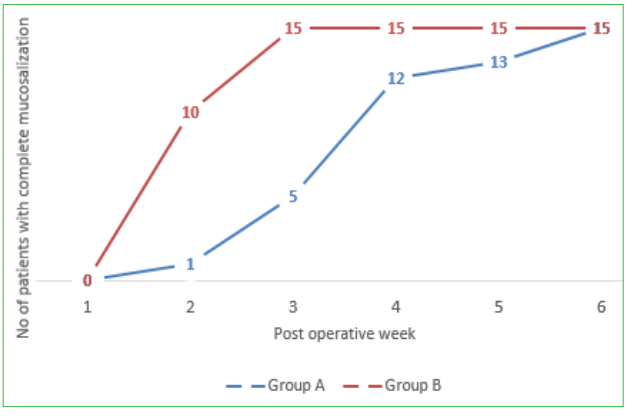


**Figure 4: Comparison of Completion of mucosalization in the postoperative period between Groups A (gelfoam) and group B (pedicled buccal fat pad).**

## DISCUSSION

The buccal fat pad (BFP) was first described by Heister in 1732 as the *glandula molaris* and later identified as adipose tissue by Bichat in 1801.[6,9,10] Neder first reported its clinical use as a free graft for intraoral defects in 1983. The application of BFP in primary cleft palate repair was subsequently described by Zhao et al. in 1998.[6,11-13]

Management of lateral palatal defects following palatoplasty remains challenging, particularly when large raw areas are left to heal by secondary intention. This study evaluated the pedicled buccal fat pad (BFP) for enhancing mucosalization and compared outcomes with conventional management without BFP. Recent literature also highlights BFP as an interpositional layer in cleft repair, promoting tissue stability and favorable outcomes.[4,14]

In our study, both groups (A and B) were comparable in age, sex distribution, diagnosis, palatoplasty technique, defect size, and surgery duration, indicating that differences in healing were attributable to BFP use. These findings support previous reports emphasizing the reliability and safety of BFP in cleft palate surgery.[1,7]

The most notable finding of the present study was the significantly shorter time to complete mucosalization in the BFP group. Patients managed with BFP achieved complete mucosalization within 2–3 weeks (mean 2.20 ± 0.41 weeks), whereas healing in the non-BFP group (Group A) was delayed, extending up to 6 weeks (mean 4.0 ± 1.07 weeks). Week-wise analysis demonstrated that 66.7% (n=10) of patients in the BFP group achieved complete mucosalization by the second postoperative week and 100% (n=15) by the third week, compared with only 33.3% (n=5) in the non-BFP group. The accelerated healing observed in the BFP group in the present study aligns with previously published observations describing rapid epithelialization of exposed buccal fat pad tissue. Earlier clinical reports have documented spontaneous surface epithelialization within two to three weeks, with some studies noting completion by the fourth postoperative week.[6,12] The findings of the current study further substantiate these observations in the context of primary palatoplasty.

When utilized to cover lateral palatal defects, the pedicled buccal fat pad undergoes healing primarily through secondary epithelialization. Its abundant vascularity supports early granulation tissue formation over the exposed surface, which subsequently facilitates epithelial migration from the surrounding oral mucosa. Over time, part of the adipose tissue is replaced by fibrous connective tissue, resulting in a stable mucosal surface. This biological behavior contributes to predictable defect closure and may lower the risk of fistula development following palatoplasty.[9,15,16]

Postoperative pain was significantly lower in the BFP group on the day of surgery, likely due to early coverage of exposed bone and nerve endings, reducing inflammation and nociceptive stimulation. This aligns with findings by Ruslin et al, who also reported minimal discomfort and donor-site morbidity. [17] Transient cheek swelling occurred in some BFP cases but resolved spontaneously, and no bleeding was observed, consistent with reports by Adeyemo et al, and Saralaya et al.[7,18]

In the present study, the mean time required for bilateral buccal fat pad (BFP) harvest was 8.33 ± 3.54 minutes. This is comparable to previously published data: Kim et al. reported that the harvest and inset of the BFP required approximately 9 minutes per flap, while Levi et al. documented an average duration of 10 minutes per side for BFP harvest and inset during congenital cleft palate repair. [15,16] These findings collectively demonstrate that the BFP flap can be harvested and inset rapidly with minimal additional operative time, supporting its practicality in palatoplasty. Limitations include the relatively small sample size and absence of long-term functional assessment. Nevertheless, the findings support pedicled buccal fat pad as a safe, effective, and biologically advantageous adjunct for early mucosalization of lateral palatal defects following palatoplasty.

## CONCLUSION

The pedicled buccal fat pad is a safe, effective, and biologically advantageous adjunct for covering lateral palatal defects following palatoplasty. Its use reduces early postoperative pain and significantly accelerates mucosalization, potentially leading to shorter overall recovery times while adding minimal operative time. Clinically, these findings support the incorporation of buccal fat pad in cleft palate reconstruction, with its benefits carefully balanced against the risk of temporary swelling, which is generally mild and manageable with conventional postoperative care.

## CONFLICT OF INTEREST

The authors declare no conflict of interest

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