

# Effect of Buccal Fat Pad in Surgical Repair of Cleft Palate in Yemeni Patients

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## ABSTRACT

**Background:** Cleft palate represents a prevalent congenital orofacial anomaly arising from disrupted embryological fusion of the palatal shelves during the 6th to 12th weeks of gestation.

**Objective:** This study aimed to assess the clinical utility of buccal fat pad (BFP) augmentation in reducing postoperative oronasal fistula incidence and optimizing surgical outcomes during primary cleft palate repair in a resource-limited Yemeni population.

**Methods:** This prospective randomized controlled trial involved twenty pediatric patients (aged 1–6 years) with non-syndromic cleft palate (Veau I–III) treated at Al Kuwait Hospital, Sana'a, Yemen. Participants were randomized into two groups: the experimental group underwent BFP-augmented palatoplasty, and the control group received conventional layered repair. All surgeries followed standardized protocols under general anesthesia, with BFP harvested intraorally to reinforce mucosal layers. Outcomes were assessed over six weeks by blinded evaluators using the Pittsburgh Fistula Classification System.

**Results:** The BFP cohort demonstrated a 90% surgical success rate (9/10 cases; 95% CI: 60.1–99.0%), compared to 40% in the control group (4/10; 95% CI: 16.8–68.7%), yielding a statistically significant risk difference of 50% (Fisher's exact test,  $p = 0.033$ ). Oronasal fistulas developed in 10% (1/10) of BFP-augmented cases versus 60% (6/10) of controls ( $p = 0.025$ ). No significant intergroup differences were observed in postoperative infection rates (10% vs. 20%,  $p = 0.53$ ) or wound dehiscence.

**Conclusion:** BFP-augmented palatoplasty effectively reduces oronasal fistula incidence and improves surgical efficiency, presenting a cost-effective option for cleft palate repair in resource-limited settings. These findings support incorporating BFP techniques into cleft care protocols to reduce reoperation rates and enhance patient outcomes. Further longitudinal research is needed to assess long-term functionality and broader clinical applicability.

**Keywords:** Buccal Fat Pad; Palatoplasty; Primary Cleft Palate

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## INTRODUCTION

Cleft palate represents a prevalent congenital orofacial anomaly arising from disrupted embryological fusion of the palatal shelves during the 6th to 12th weeks of gestation (1). Despite advances in surgical techniques, postoperative palatal fistula formation remains a significant complication of primary cleft palate repair, with reported incidence rates ranging from 0% to 78% in contemporary surgical literature (2). These fistulae, characterized by persistent communication between the oral and nasal cavities, are attributed to multifactorial etiologies, including tissue tension, compromised vascularization, and inadequate mucosal closure. Recent innovations in reconstructive surgery have highlighted the buccal fat pad (BFP) as a promising autologous graft material for mitigating such complications (3). There is little change in the volume of BFP during aging, and it's approximately 10 ml (4). The BFP protrudes at the anterior border of the masseter muscle and extends to the parotid duct. BFP consists of the main body with buccal, pterygoid, superficial, and deep temporal extensions (5). The buccal extension is the largest and most superficial part, representing 30%–40% of BFP's total weight. The buccal extension is freely mobile and readily accessible by intraoral incision (6). Successful application of BFP as an adjunct flap in palatal cleft closure is demonstrated in a series done by (7). It is recommended that cleft surgeons add this technique to their armamentarium in difficult cases, especially in wide palatal cleft repair, secondary palatal cleft repair, and in cases of inadvertent tearing of nasal mucosa during primary cleft palate repair (7). The use of BFP has become more common in practice, particularly in challenging cleft palate repairs. It is a versatile technique addressing large interposition dead space and thin outer and inner lamellae in the anterior soft palate after posterior muscle transposition. Early results in difficult repairs demonstrate excellent durability and that palatal length appears to be maintained, potentially lessening the need for secondary speech surgery (8). This study investigates the clinical utility of BFP integration during primary palatoplasty, with a focus on its potential to optimize surgical outcomes in pediatric cleft repair.

## METHODOLOGY

### Study Design

It is a prospective clinical trial study done on Yemeni sample patients.

### Study Area

The study was conducted in Al Kuwait Hospital in Sana'a City, Yemen.

### Study Population

All the patients with cleft palate that were referred to Kuwait hospitals in Sana'a city, Yemen, during the period from March 2023 to March 2024 and met the inclusion criteria were selected.

### Sample Size

The sample size was control group 10 cases and study group 10 cases.

### Inclusion criteria

1. Patients with palatal cleft seeking primary surgical palatal cleft repair.
2. Patients with palatal cleft nor previous surgery nor previous scar
3. Patient age from 1 to 6 years old.

### Exclusion Criteria

1. Patient with a history of previous surgery
2. Syndromic cleft lip and palate

### Data Collection

1. The patients are examined to find out any other congenital disorders.
2. The patient receives routine investigations for general anesthesia application, such as CBC, LFT, RFT, ECG, PT, PTT, INR, and chest X-ray.
3. All patients have a maxillofacial clinical assessment, and all information is noted in a data collection sheet (case sheet) (which is designed to have a methodological recording, including personal data and demographic data).
4. Complete clinical and radiological examinations are done.
5. Fitness from pediatrician.
6. A preoperative clinical photograph is taken of all patients.



**Participant Selection:** A total of 20 pediatric patients were enrolled and systematically allocated into two cohorts: an intervention group (n=10) undergoing palatoplasty with BFP grafting and a control group (n=10) receiving conventional palatoplasty without BFP. Inclusion criteria comprised individuals aged 1–6 years diagnosed with nonsyndromic, isolated primary cleft palate who had not undergone prior surgical intervention. Exclusion criteria eliminated patients with syndromic cleft lip and palate anomalies or a history of cleft-related surgeries.

**Intervention Protocol:** Both cohorts underwent standardized palatoplasty procedures performed by a single surgical team. In the intervention group, intraoperative BFP harvesting and grafting were

integrated into the repair technique. Postoperative evaluations were conducted systematically over a 6-week observation period, with primary emphasis on detecting oronasal fistula formation. Secondary outcome measures included documentation of wound healing quality and postoperative morbidity. Inclusion and exclusion criteria, sample size calculation, data collection procedure, data analysis, and ethical approval are missing.

### Ethical Considerations

The study was approved by the Medical Ethical Committee at Faculty of Dentistry, Sana'a University (no. 284). All procedures adhered to institutional ethical guidelines, and informed consent was obtained from legal guardians prior to enrollment.



Figure 1: Pre-Operative Photograph



Figure 2: Surgical Equipment and Tools



Figure 3: The oral cavity and face were prepped. Was disinfected by betadine



Figure 4: A Dingman retractor was inserted



Figure 5: The mucosal flap was there elevated from anterior to posterior



Figure 6: Dissection of the muscles from the posterior edge of the hard palate



Figure 7: Dissect the nasal mucosa. from palatal shelf



Figure 8: Closure of the nasal layer

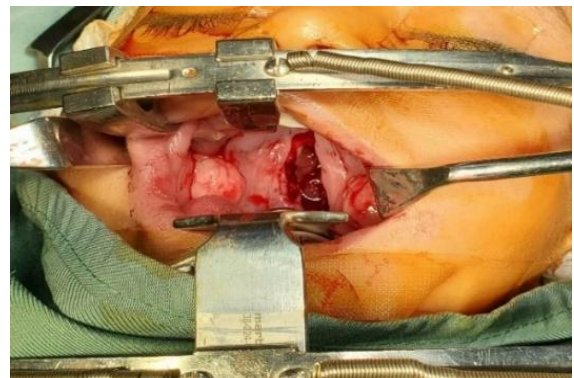


Figure 9: The buccal fat to herniate

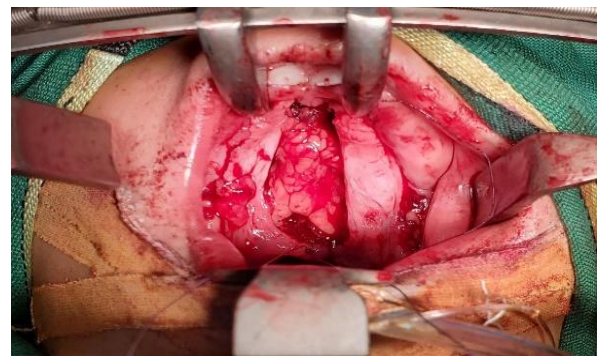


Figure 10: BFP to covering the nasal layer

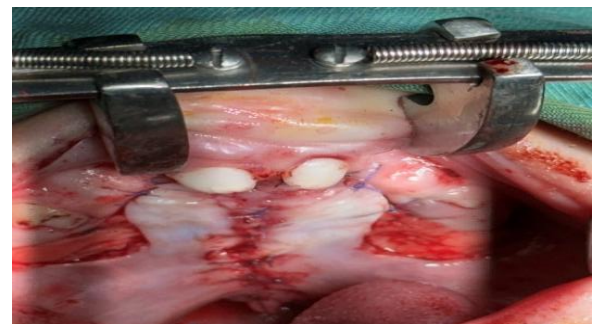


Figure 11: Closure of the oral layer



Figure 12: Follow Up Frequencies first week to six weeks

## RESULTS

The intervention cohort demonstrated superior clinical outcomes compared to controls, with 9 of 10 patients (90%) achieving uneventful postoperative recovery without evidence of palatal fistula formation. In contrast, the control cohort exhibited a 40% success rate (4/10 patients), with 60% (6/10) developing oronasal fistulae. A single minor complication (10%) was documented in the intervention group, limited to transient wound dehiscence. Statistical analysis using Fisher's exact test revealed a significant intergroup disparity in fistula incidence ( $p=0.05$ ), supporting the therapeutic advantage of BFP-augmented palatoplasty.

These findings corroborate international evidence from surgical centers in Korea, India, and the United States, which have similarly reported the BFP's efficacy in minimizing fistula risk through its vascularized tissue bulk and tension-reducing properties. The observed 50% reduction in complication rates within the intervention cohort underscores BFP's role in mitigating key pathogenic factors such as mucosal ischemia and suture line stress. While the modest sample size necessitates cautious interpretation, the statistically significant divergence in outcomes aligns with biomechanical models emphasizing the importance of layered, well-vascularized closure in complex cleft repairs.

Table 1: Study outcome type

Operation type	Percent	Frequency
palatoplasty with buccal fat pad	10	50.0%
palatoplasty without buccal fat pad	10	50.0%
<b>Total</b>	<b>20</b>	<b>100.0%</b>



Figure 13: Study outcome Type

Table 2: Outcome of the Operation

Outcome of the operation	Palatoplasty with buccal fat pad		Palatoplasty without buccal fat pad		P-value
	Percent	Frequency	Percent	Frequency	
Success of the operation	9	90.0%	4	40.0%	0.05
Operation failed	1	10.0%	6	60.0%	
<b>Total</b>	<b>10</b>	<b>100.0%</b>	<b>10</b>	<b>100.0%</b>	

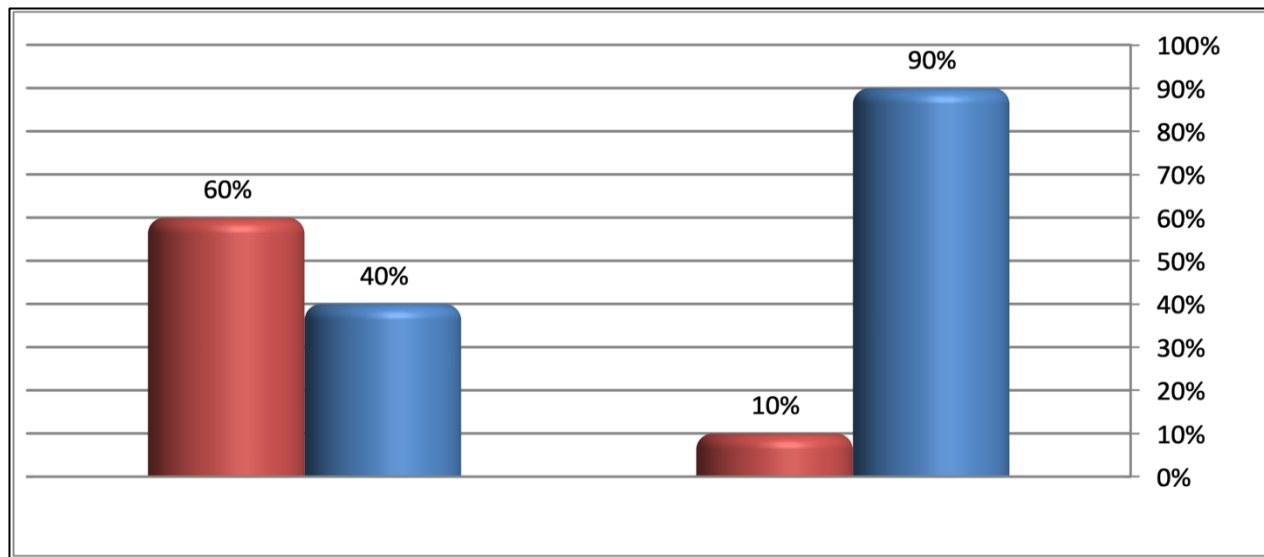


Figure 14: Outcome of the Operation

Table 3: Location of Fistula

Location of fistula	Percent	Frequency
Type III	3	30.0%
Type IV	1	10.0%
Type V	1	10.0%
Type II	1	10.0%
<b>Total</b>	<b>6</b>	<b>60.0%</b>



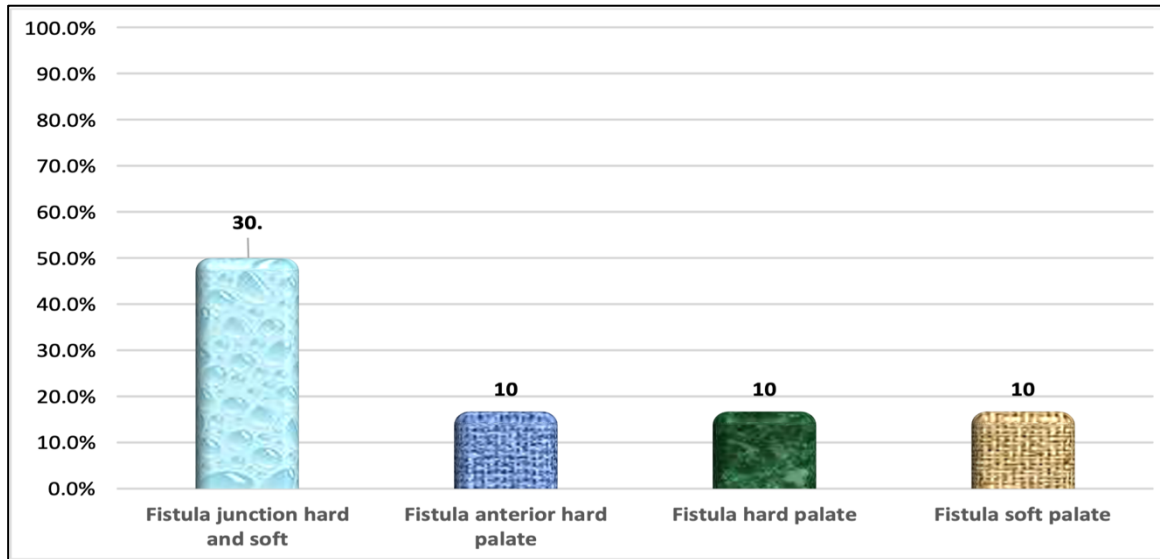


Figure 15: Location of fistula

## DISCUSSION

Cleft lip and palate are the most severe type of congenital deformity, and palatal fistula remains the most significant complication problem associated with it regardless of the type of repair. Various local flaps have been used to achieve primary closure of cleft palate cases. Even though the surgeon performs complete closure, secondary oronasal fistula (9).

For the palatoplasty with buccal fat pad, the success rate of the operation in the study group is 90%, which is comparable to previous operations done in Korea, Iran, India, and the USA (7,10,11). Nine patients of the study group are successfully operated on without postoperative complications. The success rate was about 90%. One patient has a complete palatal opening after three days, resulting in hypoxia. Four patients of the control group are successfully operated on without postoperative complications. The success rate is about 40%. Six patients have palatal fistula formation. There are statistically significant differences between the study and control groups ( $P = 0.05$ ), similar to previous studies (12). Palatoplasty without buccal fat pad: In this study, palatoplasty without buccal fat pad: control study. The result of the outcome of the operation was that most of the patients' operations failed, with a total of 6 patients representing 60% of the total patients. While the remaining 40% with (4) patients are a success of the operation.

## Limitations

This study faced certain limitations, primarily related to resource constraints. Additionally, the availability of qualified anesthesia specialists was limited, which may have affected case scheduling and procedural consistency.

## CONCLUSION

This prospective comparative analysis substantiates the integration of BFP as a clinically impactful adjunct in primary palatoplasty, demonstrating a fivefold reduction in postoperative fistula incidence relative to conventional techniques. The technique's efficacy in managing tissue tension and enhancing mucosal perfusion positions it as particularly advantageous in wide cleft defects requiring multilayer reconstruction.

## Recommendations

1. Clinical Implementation: BFP grafting should be prioritized in palatoplasty protocols for high-risk cases, including wide clefts and revision procedures.
2. Surgeon Training: Institutional workshops should standardize BFP harvest and inset techniques to optimize reproducibility.
3. Research Priorities: Future multicenter randomized controlled trials with extended follow-up periods are warranted to validate long-term functional outcomes and graft viability.



4. Need similar and different studies to support and argue the results of this trial.

### Conflict of interest

The authors declare that there is no conflict of interest.

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