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CLINICAL PAPER

Buccal Fat Pad: A Useful Adjunct Flap in Cleft Palate Repair

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Abstract
Aim The aim of the study is to describe the technique and also the outcome of using buccal fat pad (BFP) as an adjunct flap in cleft palate repair and to report the surgical outcome.
Materials and Methods All the surgical repairs with BFP were done under general anaesthesia. The use of BFP was indicated in patients who needed a secondary palatal cleft repair, those with wide palatal clefts or patients whose primary palatal cleft repair was complicated intraoperatively by inadvertent tearing of the nasal mucosa. The raw wound surfaces were dressed with Vaseline gauze instilled with Framycetin. All subjects 4 years of age and below had oral toileting with warm saline-soaked gauze after each meal. The other patients had oral toileting with warm saline mouth bath in addition to conventional toothbrushing.
Results Eight patients were included in this study with an age range of 1–26 years (mean ± SD = 6.1 ± 8.6 years). Three patients presented with wide palatal clefts, another three presented with dehiscence after a primary repair which necessitated a secondary repair, while the remaining two patients had inadvertent iatrogenic tear of the nasal mucosa during the primary surgical repair. For the latter set of patients, repair was completed by the use of BFP as an adjunct at the same surgery. Post-operative evaluation was satisfactory in all cases, with healing of the flaps and complete epithelialization of the BFP in 1 month. All the patients experienced post-operative cheek swelling, signifying the post-operative oedema due to BFP harvest. However, this was usually resolved within 48 h. Healing was satisfactory with full epithelialization, and no complications were observed.
Conclusions Successful application of BFP as an adjunct flap in palatal cleft closure is demonstrated in these series. 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.

Keywords Buccal fat pad · Cleft palate · Repair

Introduction

Orofacial clefts are common congenital defects of head and neck region [1]. The overall incidence of cleft lip, cleft palate or both ranges from 1 to 2 per thousand live births [2]. The psychosocial and functional effects of this defects are profound; therefore, the need for intervention is paramount [3]. Closure of palatal clefts has been done by a range of surgical techniques, which include von Langenbeck, Veau/Wardill/Kilner and Furlow techniques [4–6]. Despite these myriad of surgical techniques aimed at repair, dehiscence or flap necrosis with consequent development of fistulae may occur [4]. Taiwo et al. [4] observed the occurrence of these fistulae in as much as 29.8% of the cleft palate repairs reviewed. In addition, secondary repairs of these defects are quite challenging [8]. Furthermore, to allow for satisfactory speech, the palatal mechanism must be reconstructed adequately without undue tension [8]. Therefore, the use of adjunctive flaps was introduced and

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has gained popularity in both primary and secondary cleft palate repairs [6, 7]. Flaps that have been utilized include the buccal mucosa flap, vomer flap and tongue flap [6, 7]. More recently, the utilization of the buccal fat pad (BFP) was introduced and has gained some popularity [8]. The buccal pad of fat is an encapsulated aggregate of fatty tissue, which consists of a central body and four projections: buccal, pterygoid, pterygopalatine and temporal [9]. Its use in oral reconstruction was first reported by Egyedi [10]. It was demonstrated by Tiedman et al. [11] that when used intraorally, it does not require a skin graft covering as it possesses the ability to epithelialize. Aside from its use as a pedicled graft, it has also gained importance in aesthetic facial surgery [9]. There is limited information on the utilization of BFP for palatal cleft repair in Africa and especially in sub-Saharan Africa. This report aims to describe a technique and also the outcome of using BFP as an adjunct flap in cleft palate repair and to report the surgical outcome.

Materials and Methods

Eight patients with palatal clefts were included in this study. All the surgical repairs were done under general anaesthesia. The age, sex, type of palatal cleft and outcome were recorded. The use of BFP was indicated in patients who needed a secondary palatal cleft repair, those with wide palatal clefts or patients whose primary palatal cleft repair was complicated intraoperatively by inadvertent tearing of the nasal mucosa (Figs. 1, 2, 3). Intravenous ceftriaxone, 28 mg/kg and intravenous metronidazole, 7 mg/kg were administered preoperatively as prophylactic antibiotics. The raw wound surfaces were dressed with Vaseline gauze instilled with Framycetin. All subjects 4 years of age and below had oral toileting with warm saline-soaked gauze after each meal. The other patients had oral toileting with warm saline mouth bath in addition to conventional toothbrushing.

Fig. 1 Wide palatal cleft

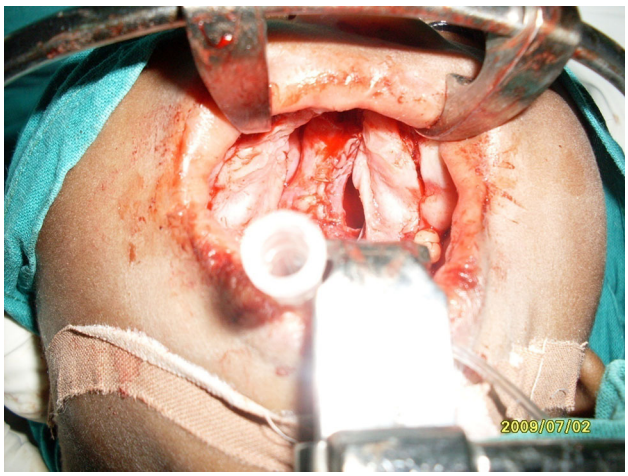

Fig. 2 Nasal mucosa tearing

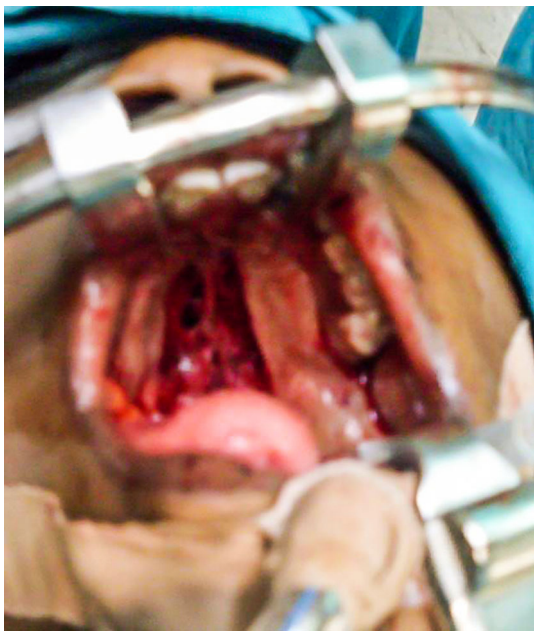

Fig. 3 Wide palatal cleft

Surgical Technique

All operations were done with orotracheal intubation under general anaesthesia. Infiltration 1:200,000 adrenaline was done along the cleft margins and proposed incision lines. Incisions were made from just posterior to the maxillary tuberosities bilaterally, to divide the alveolar mucosa from the palatal mucosa with a size 15 surgical blade. These incisions (lateral incision) were made down to the

underlying bone and at 90° to it, to avoid undermining the soft tissues. The incisions extend as far as 1 cm anterior to the anterior limit of the cleft. Where alveolar clefts were present, it terminated about 0.5 cm short of the alveolar cleft. An L-shaped periosteal elevator is then introduced through the incision, and with firm pressure against the underlying bone, the mucoperiosteal flap is raised. Care is taken to avoid blind dissection medial to the maxillary tuberosity in order to prevent damage to the greater palatine neurovascular bundle as it emerges from the pterygopalatine foramen. Thereafter, a No. 11 surgical blade was used to incise the cleft mucosal margins to delineate the oral and nasal mucosa. This medial incision extended from the anterior extent of the cleft to the tip of the uvula posteriorly. This incision is carried anteriorly in a gentle curve to link with the lateral incision on one side, while the anterior attachment on the contralateral side is left intact. These flaps are pedicled posteriorly on the greater palatine artery. Skin hooks are used to approximate the flaps so as to determine adequate mobilization.

The BFP is then harvested by making an upper, horizontal, vestibular incision adjacent to the upper second molar. The incision extends for about 2 cm posteriorly from the mesial aspect of the upper second molar. Blunt dissection in a superior and lateral direction is made to expose the BFP (Fig. 4). The BFP was carefully mobilized and tunnelled beneath the flap that was detached from its anterior attachment to appear on the contralateral side (Fig. 5). Midline apposition of the palatal flaps and suturing of the BFP as inset were done with 3/0 Vicryl suture (Fig. 6).

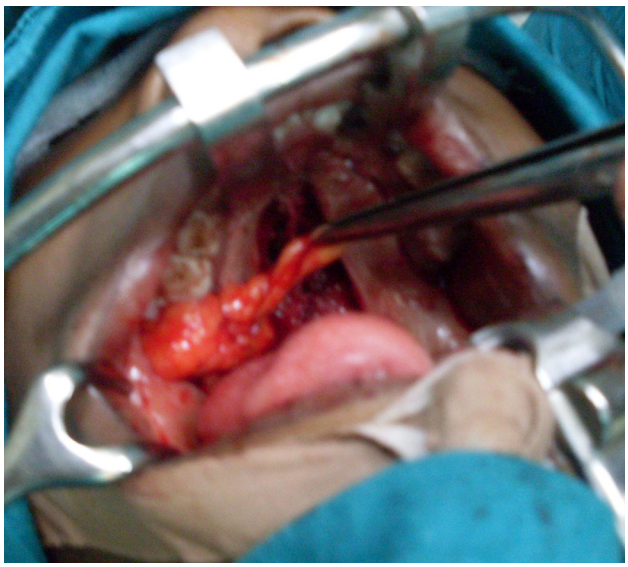

Fig. 4 Exposed BFP

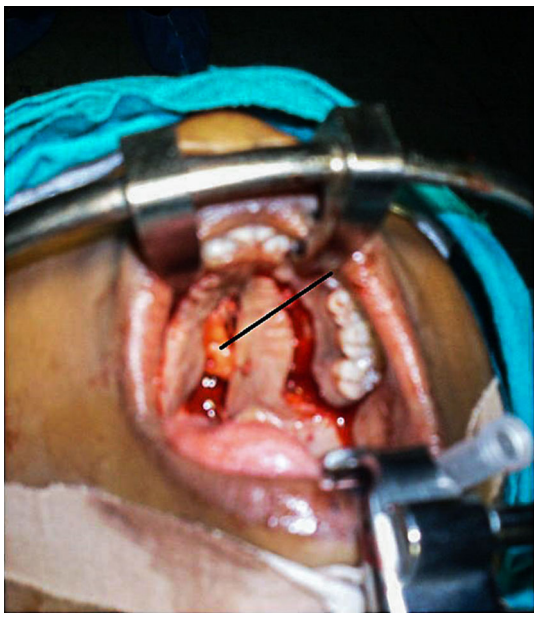

Fig. 5 Tunnelled BFP

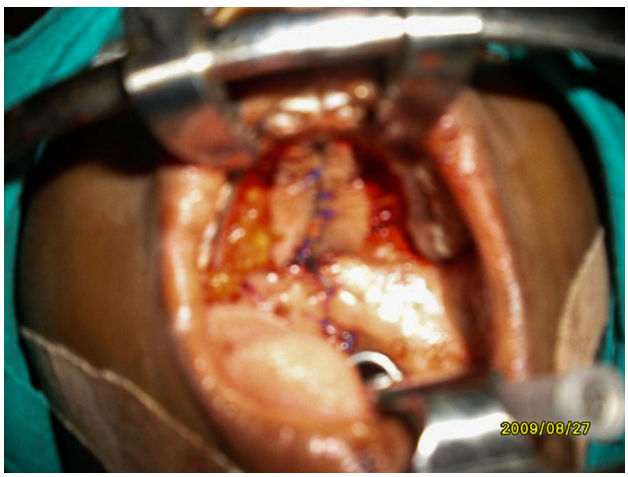

Fig. 6 Midline apposition of flaps

Results

Eight patients were included in this study with an age range of 1–26 years, five of the patients were aged 3 years or below with a mean (± SD) of 6.1 (± 8.6). The male/female ratio was 1:1. Three patients presented with wide palatal clefts, another three presented with dehiscence after a primary repair which necessitated a secondary repair, while the remaining two patients had inadvertent iatrogenic tear of the nasal mucosa during the primary surgical repair (Table 1). For the latter set of patients, repair was completed by the use of BFP as an adjunct at the same surgery. Post-operative evaluation was satisfactory in all cases, with healing of the flaps and complete epithelialization of the BFP in 1 month. All the patients experienced post-

Table 1 Shows the age and sex distribution, type of defect, type of flap and outcome

Age (years)	Sex	Defects	Flaps	Outcome
1	F	Primary hard and soft palate cleft	2PF + BFP	Satisfactory
1	M	Primary hard and soft palate cleft	2PF + BFP	Satisfactory
26	F	Secondary soft palatal cleft	2PF + BFP	Satisfactory
7	F	Primary hard and soft palate cleft	2PF + BFP	Satisfactory
3	M	Secondary hard and soft palate cleft	2PF + BFP	Satisfactory
9	F	Secondary hard and soft palate cleft	2PF + BFP	Satisfactory
1	M	Primary hard and soft palate cleft	2PF + BFP	Satisfactory
1	M	Primary hard and soft palate cleft	2PF + BFP	Satisfactory

PF palatal flap

operative cheek swelling, signifying the post-operative oedema due to BFP harvest (Fig. 7). However, this was usually resolved within 48 h (Fig. 8). Healing was satisfactory with full epithelialization, and no complications were observed (Fig. 9).

Discussion

Surgical repair of palatal clefts can be challenging because of the relative paucity of tissues at the time of repair. Most palatal cleft repairs are done in patients between 6 months and 2 years of age; therefore, tissue availability is low, compared with clefts done in adults [6–8]. Furthermore, secondary repair of palatal clefts is exigent because of the periosteal stripping and consequent fibrosis that occur following the primary attempt at repair [12]. This has a detrimental effect on maxillary growth and makes elevation of the palatal flaps difficult at subsequent repairs [12].

The aim of surgical repair of palatal clefts includes achieving velopharyngeal competence, normal growth of the maxilla, closure of the palatal defect to achieve a partition between the nasal and oral cavities and good speech

Fig. 7 Post-operative oedema

Fig. 8 Resolved post-operative oedema

Fig. 9 Full epithelialization at the 1-month post-operative review

[12, 13]. Oronasal fistulae (ONF) are said to be one of the most common post-operative complications of palatal cleft repair with incidence rates as high as 60% [14]. They are often a consequence of inadequate repair or dehiscence [13]. Several techniques and surgical protocols to achieve the goals of repair as well as to prevent ONF have been

proposed. These include the use of two-stage palatal repair with delayed hard palate closure, avoidance of dissection in the space of Ernst and the use of various flaps [14, 15].

BFP utilization as a pedicled flap for repair of maxillary defects was first reported by Egyedi [10]. Since its introduction, its successful use in the closure of oroantral fistulae has been reported by several authors [16–18]. Although its use as an adjunct flap in the repair of palatal clefts has been reported by few authors, it has shown encouraging results [18]. The BFP is an encapsulated vascularized fat tissue of the syssarcosis type, with ability to epithelialize [16]. Bauman and Ewers [19] stressed the importance of keeping its capsule intact in order to improve success. The use of BFP may be limited by the size of the defect, and it has been proposed that its use in maxillary defects greater than 4 × 4 × 3 cm may be associated with higher incidence of dehiscence [9, 16]. In the present case series, BFP was used as an adjunct to the two-flap palatoplasty technique as described; therefore, the residual maxillary defects were adequately filled by the BFP.

The success rate recorded in this study is similar to the findings of other authors, who used BFP in the repair of various intraoral defects [16, 17, 19]. The horizontal buccal sulcus incision approach was used in this series instead of the sub-periosteal approach in order to avoid any detrimental effect the latter may have on subsequent maxillary growth.

BFP was used successfully in both primary and secondary repairs. The primary repairs selected were wide palatal clefts, which are associated with a higher incidence of post-operative ONF. Cases of secondary repairs were also selected; secondary repairs are particularly challenging because of the post-primary surgery fibrosis that would have occurred, making the raising and advancement of palatal flaps difficult. Adjunctive use of BFP in these cases ameliorated tissue availability, thus aiding in the achievement of the various aims of repair. In other cases, iatrogenic tearing of nasal mucosa necessitated the application of BFP in addition to the palatal flaps.

The age of the patients ranged from 1 to 26 years, reflecting the trend in delayed treatment in our environment where access to health care may be a challenge. Although the hospital protocol is to have primary cleft repair in patients between 12 and 18 months of age, some patients present much later due to a myriad of reasons including lack of awareness and poor socio-economic status. Three of the four patients older than 18 months of age, who were included in this study, had secondary cleft repairs. The treatment of palatal cleft fistulae is often difficult [18]. These palatal fistulae are epithelialized communications between the oral and nasal cavities. They often result from tension due to insufficient tissue or tissue mobility, single-layer repair and poor wound healing [18]. The use of adjunctive BFP may offer a solution to these issues by improving availability of tissues for repair, it may also form another layer of tissue and its vascularity may improve wound healing.

The BFP has grown in recognition as an alternative to conventional modes of maxillary defects reconstruction; however, its use as an adjunct in palatal cleft repair is still in its developmental stages. Reports of its use in palatal cleft repairs in Africa are certainly scarce in the literature. It is a reliable flap, with good vascularity, easy to mobilize, simple to harvest and with low complication rates [16, 17].

Conclusions

Successful application of BFP as an adjunct flap in palatal cleft closure is demonstrated in these series. Buccal fat pad is a useful, dependable and reliable adjunct flap in cleft palate repair. Its success has been attributed to its rich vascularity. 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.

Compliance with Ethical Standards

Conflict of interest All the authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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