

Technical Note Orthognathic Surgery

Buccal fat pad as a sealant in palatal mucosa tearing: technical note

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Abstract. For patients with a dentofacial deformity undergoing a planned segmentation of the maxilla for the management of a transverse maxillary arch discrepancy, palatal mucosa tearing may occur during sawing or palatal expansion traction, giving rise to an oronasal communication. This technical note describes the covering of a tear in the palatal mucosa using a buccal fat pad (BFP) flap, in the context of maxillary segmentation during Le Fort I osteotomy. Through the limited buccal incision used for the Le Fort I osteotomy, a small incision is made in the right periosteum posteriorly, and a supraperiosteal dissection is performed to access the BFP. After a sufficient amount of flap is made available, it is gently introduced through the osteotomy gap until it reaches the palatal mucosa defect and is then sutured. In the patient case presented, the palatal mucosa healed fully within 18 days, and the patient reported no nasal regurgitation of food, defective speech, fetid odour, bad taste, or upper respiratory tract or ear infection during the postoperative period. This technique using a BFP flap should therefore be considered in the context of unexpected tearing of the palatal mucosa in patients undergoing a segmented Le Fort I osteotomy.

Keywords: Adipose tissue; Autografts; Le Fort osteotomy; Minimally invasive surgical procedures; Orthognathic surgery; Piezo-electric surgery.

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Patients with dentofacial deformities with a transverse maxillary arch discrepancy may require maxillary segmentation as part of orthognathic surgery treatment.¹ This segmentation is also necessary in cases characterized by segmental vertical and sagittal discrepancies, such as open bite skeletal deformities. Although the segmented Le Fort I osteotomy has evolved over the years to become a safe and

predictable technique and is currently regarded as a routine procedure, it is not without complications.

One of the most feared surgical complications during segmentation in Le Fort I osteotomy is palatal mucosa tearing, which can occur secondary to expansion traction or during bone cutting with the surgical saw. The resulting main adverse effect that can occur is fusion between the nasal mucosa and

oral mucosa,¹ giving rise to an unnatural communication between the oral and nasal cavities, and thus to the passage of liquids to the nose and/or an air leak. Oronasal communication is also associated with defective speech, a fetid odour, bad taste, and upper respiratory tract and ear infection.

In order to avoid excessive expansion traction in the context of maxillary segmentation, non-growing patients

with a transverse discrepancy larger than 7 mm previously undergo surgically assisted rapid palatal expansion (SARPE). In growing patients with an immature palatal suture, orthodontically assisted rapid palatal expansion is recommended. Moreover, several technical modifications have been introduced to minimize the palatal mucosa tearing associated with vertical maxillary osteotomies, such as the use of a piezoelectric device. This adds precision, minimizes surrounding soft and hard tissue damage, reduces blood loss,² and facilitates bone healing compared to traditional osteotomies performed with burs and saws.

When an oronasal communication arises, palatal coverage with an acrylic splint is done to avoid oronasal reflux and facilitate healing of the mucosa.

The buccal fat pad (BFP) has previously been used successfully to repair different oral defects, since it has a good blood supply, is rich in mesenchymal cells, and harvesting results in minimal donor site morbidity and a low complication rate.³ The BFP was first described by Lorenz Heister in 1727. Subsequently, in 1801, Xavier Bichat described the BFP as a ball (from the French term 'boule') composed of adipose tissue, located between the skin and the buccinator and masseter muscles.⁴ However, it was not until 1977 that Peter Egyedi first described the use of the BFP as a pedicled flap with an overlying free skin graft for the closure of oroantral and oronasal fistulae.⁵

The use of the BFP flap to cover tears in the palatal mucosa that may occur during sawing or palatal expansion traction in the context of the

segmented Le Fort I osteotomy is described here.

Technique

The technique was used on a 29-year-old female patient undergoing orthognathic surgery under general anaesthesia to correct a dentofacial deformity and non-growing right condylar hyperplasia. After the Le Fort I osteotomy and maxillary down-fracture conducted using the 'twist technique', vertical osteotomies were performed with a piezoelectric device in order to obtain multiple-piece segmentation and move the maxillary pieces in the transverse, vertical, and sagittal planes. Careful sectioning when performing these osteotomies was considered in order to avoid injury to the tooth roots, mucosa, and blood supply. However, tearing of the palatal mucosa occurred unexpectedly in this case (Fig. 1).

Accordingly, through the limited buccal incision used for the Le Fort I osteotomy, a small incision was made in the right periosteum posteriorly at the level of the second molar, and a further dissection was conducted supraperiosteally to access the right BFP. Gentle dissection of the BFP from the adjacent tissues around the periphery of the BFP was performed utilizing monopolar cautery. Once a flap of sufficient size to cover the defect without tension was available, the caudal margin of the BFP flap was gently introduced through the osteotomy gap until it reached the palatal mucosa defect. Then, the upper side of the BFP flap was attached with resorbable suture (Vicryl 5-0; Ethicon

Inc., Johnson and Johnson Co., Somerville, NJ, USA) to three holes made in the bone around the defect with a burr (Fig. 2). During BFP harvesting, the buccal branch of the facial nerve was not identified or monitored, but facial mimic movements were checked during the procedure; the anaesthetist had previously been asked not to relax the patient. The contralateral BFP was also partially removed in order to avoid postoperative cheek asymmetry.

Regarding postoperative care, sinus precautions were recommended for 4 weeks, sneezing with an open mouth and avoiding the Valsalva manoeuvre. Standard antibiotic prophylaxis for orthognathic surgery (amoxicillin-clavulanic acid) was administered for 1 week. Additionally, gentle chlorhexidine rinses were prescribed for 14 days, with the optimization of dental hygiene.

The palatal mucosa healed fully within 18 days. During the postoperative period, the patient reported no nasal regurgitation of food, defective speech, fetid odour, bad taste, or upper respiratory tract or ear infection.

Discussion

The BFP has been found to possess cells that share characteristics similar to those of other adipose-derived stem cells that are capable of differentiation into chondroblasts, adipocytes, and osteoblasts.^{3,6} The BFP can therefore be considered a safe option for enhancing bone repair,⁷ without inducing a malunion of the bone fragments. Even if the pedicle is sectioned, the BFP continues to be a promising source of stem cells, maintaining the capacity for tissue regeneration and its immunomodulatory effect, although to a slightly lesser degree.⁸ For this reason, the BFP flap has been used in combination with diverse local flaps to repair oral cavity defects secondary to oncological resections, congenital diseases, and oral surgery procedures, among others.

In cleft lip and palate patients, the BFP flap has been used widely for primary and secondary palatoplasties, uvula thickening, lining of the denuded bony hard palate, and oronasal fistula closure, among other procedures.⁸ The latter scenario resembles the case presented herein, since there was a mucosal oronasal communication with a lack of underlying maxillary and/or palatal bone.



Fig. 1. Intraoperative view showing palatal tearing after vertical osteotomies in maxillary segmentation.

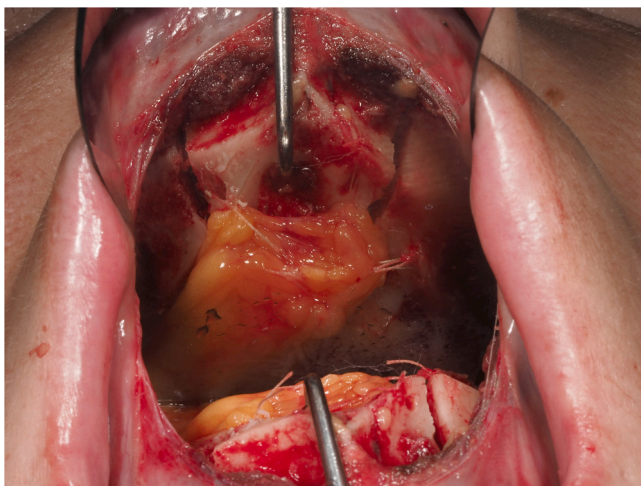


Fig. 2. Intraoperative view showing coverage of the segmented maxilla with the pedicled BFP flap, where the caudal margin of the BFP flap is gently introduced through the osteotomy gap of the damaged mucosa.

Specifically regarding the treatment of oronasal fistulas, several options have been described to date; however, the management of these fistulas should be individualized and tailored to the patient. A number of treatment options are generally proposed, depending on the size of the fistula, and ranked from less to more invasive. Additionally, whenever possible, two-layer closure is recommended, since it provides greater support and stability, and reduces the risk of failure.

Very small fistulas (< 2 mm) can close spontaneously. It is known that many of these small fistulae will resolve spontaneously with the use of an Orabase protective paste and may not require surgical repair. However, there is no consensus regarding the length of time to allow before surgical repair becomes advisable.

Medium-size fistulas (up to 20 mm) can be repaired with local rotational flaps, the BFP flap being one of the most widely used in the current literature due to the ease of harvesting and low related morbidity. On the other hand, newer procedures such as the use of bone morphogenetic protein, acellular dermal matrixes, human amniotic membrane, distraction osteogenesis, and laser therapy or electrical stimulation have been used successfully.⁸

Extensive fistulas (> 20 mm) will require well-vascularized tissue transfer, with the indication of larger flaps such as tongue or temporalis muscle flaps and free vascularized flaps such as the radial forearm free flap.⁸

Palatal coverage with a splint or stent avoids oronasal reflux, but most patients find a stent unacceptable as a long-term option. In the case presented here, a splint was not necessary even in the immediate postoperative period, since the BFP collapsed the communication, acting as a physical barrier.

In the context of orthognathic surgery, the BFP has been used for upper lip sagittal augmentation with a bilateral BFP transposition flap.⁹ This flap provided volumetric enhancement to the upper lip of patients with sagittal maxillary hypoplasia, avoiding the use of foreign materials, with minimal morbidity. The BFP has also been used for malar augmentation,¹⁰ creating a sub-periosteal pocket on the anterior and lateral aspects of the malar bone and repositioning the BFP, with satisfactory soft tissue augmentation.

Although further clinical studies are needed before firm conclusions can be drawn, the technique using a BFP flap presented here should be considered in the context of unexpected tearing of the palatal mucosa in patients

undergoing a segmented Le Fort I osteotomy.

Ethical approval

Approval obtained from Quiron Teknon Ethics Committee.

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Competing interests

None.

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Patient consent

Patient consent was obtained.

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