External Approach to Buccal Fat Excision in Facelift: Anatomy and Technique

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Abstract

Background: Masculinization of the face is a common finding in facelift patients. It is attributed to deflation and decent of the midface-jowls coupled with skin laxity. Fullness is evident lateral to the jowl in a small percentage due to prominent buccal fat pad (BFP).

Objectives: The authors sought to examine the anatomy of the BFP, triangulate the prominent BFP with surgical landmarks, and describe an external approach to excise the BFP during facelift surgery.

Methods: Eighteen cadaveric dissections were performed. Facelift flap was elevated and the prominent buccal extension of the BFP protruding through the superficial-musculo-aponeurotic-system was identified. Measurements were taken from the BFP to surgical landmarks: zygomatic arch, tragus, and gonial angle. The locations of the facial nerve, parotid duct, and vascular pedicle relative to the BFP were calculated.

Results: BFP was 4.1 cm inferior to the zygomatic arch, 7.5 cm anterior the tragus, and 4.5 cm medial the gonial angle. The middle facial artery supplied the BFP on the inferior-lateral quadrant in 61% and inferior-medial quadrant in 39% of specimens . In all specimens, the parotid duct traversed the BFP superiorly, and the buccal branches of the facial nerve traversed the capsule superficially.

Conclusions: The buccal extension of the BFP can pseudoherniate in the aging face. Excision may improve lower facial contour. Measurements from facial landmarks may help surgeons identify the buccal extension of the BFP intraoperatively. The surgeon must be careful of the vascular pedicle, parotid duct, and the facial nerve. The external approach safely excises buccal fat during facelift dissection while avoiding intraoral incisions and unnecessary contamination.

Level of Evidence: 4

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Masculinization of the female face with age is a common finding in the facelift patient population. This masculinization of the lower facial third and gradual loss of a youthful shape is often what drives these patients to seek rejuvenation procedures. The morphology of lower face aging is largely attributed to deflation and decent of the midface and jowls coupled with skin laxity. In a small percentage of this population, a fullness is evident lateral to the jowl on physical exam. We and others have observed this clinically to be prominent buccal fat pad (BFP). This pseudoherniation of BFP was first described by Matarasso and later by others who employ an intraoral approach for removal of this accessory cheek bulge.[1-4] In this study, we examine the detailed anatomy of the BFP specific to this clinical finding. First, in a cadaver model, we triangulate this portion of BFP with known surgical landmarks through a standard facelift dissection approach. Then, based on our findings, we describe a safe and accurate approach to BFP external excision during facelift surgery to avoid intraoral surgery.

METHODS

Eighteen hemifacial fresh cadaveric specimens were dissected in the supine position with the head turned in a similar manner to facelift dissection over 10 months from July 2017 to April 2018. The study was conducted following the guiding principles of the Declaration of Helsinki because institutional review board approval is not required for cadaveric research at our institution. A facelift flap was elevated and the prominence of the buccal extension of the buccal fat protruding through the anterior superficial-musculo-aponeurotic-system (SMAS) was identified. A sub-SMAS dissection was performed to localize the buccal extension of the BFP. Measurements were taken from the center of the BFP to known surgical landmarks: inferior border of the zygomatic arch, anterior border of the tragus, and the gonial angle. In 16 hemifacial specimens (89%), a measurement was taken from the center of the BFP to the ipsilateral oral commissure. The location of the buccal branches of the facial nerve and the parotid duct relative to the BFP was recorded. Lastly, the vascular pedicle to the fat pad was dissected, and the quadrant in which it entered the BFP was recorded.

Surgical Technique

Intraoperatively, following extended SMAS flap elevation and repositioning, the visible and palpable bulge of buccal fat was identified. The capsule was incised and the fat was exposed utilizing a gentle teasing motion through the opening in the capsule. The fat was interposed over the end of a cotton tip applicator and excised employing bipolar electrocautery. Once adequate excision had been performed, hemostasis was obtained and the capsule was reapproximated with buried simple interrupted sutures (Figure 1). An intraoperative video demonstrating the above described technique was created. (Videos 1-3). Clinical examples are demonstrated (Figures 2-3; Supplemental Figure 1).

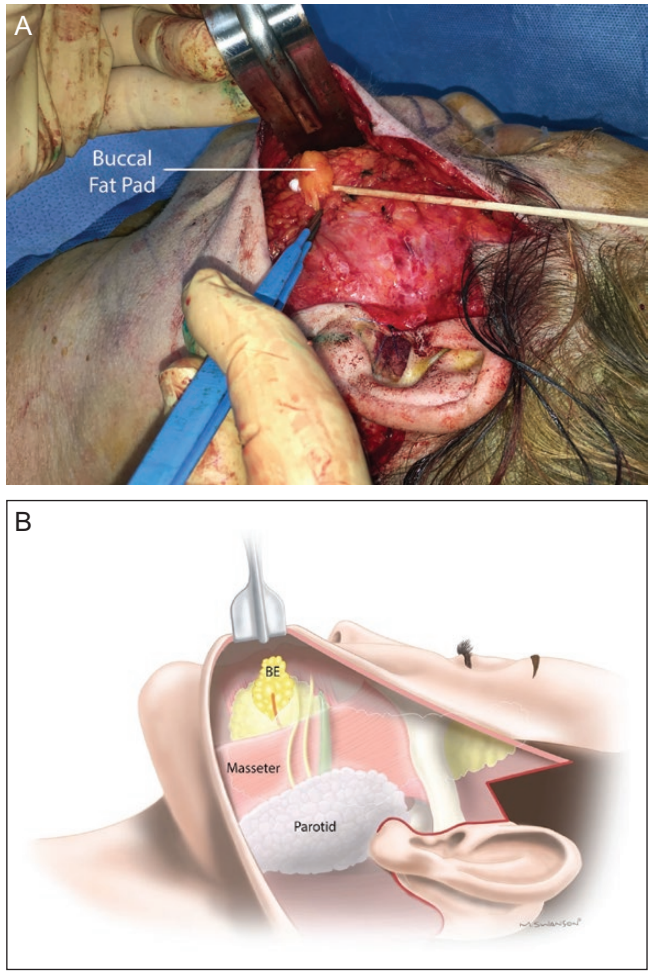
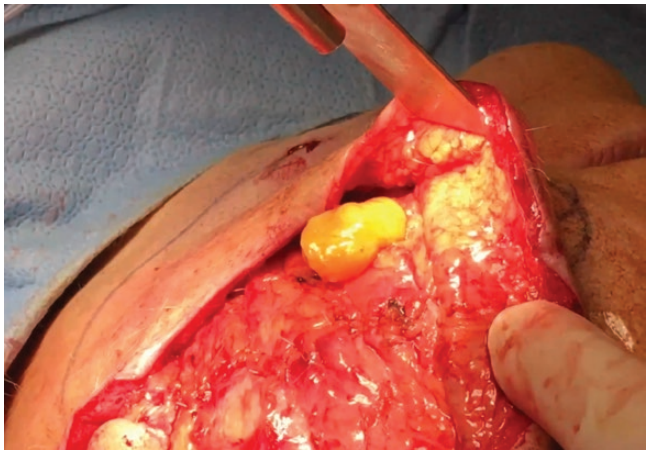


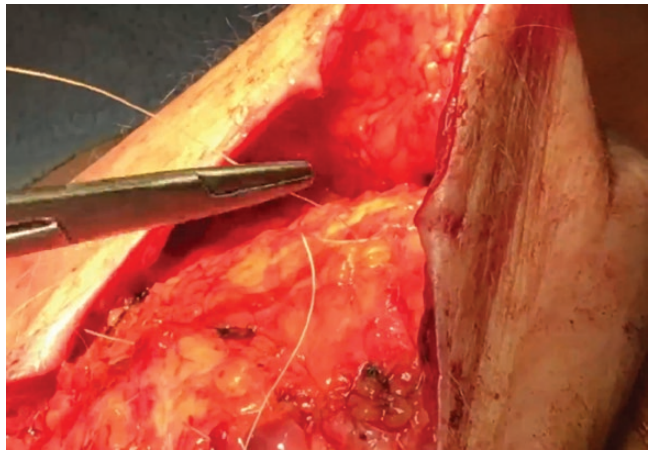
Figure 1. (A) Intraoperative photograph of an external approach to buccal fat excision during a facelift. The capsule has been incised and herniated fat is removed with bipolar electrocautery. (B) Medical illustration of external approach to buccal fat excision. Note the incision in the buccal fat capsule, the location of the buccal nerve branches, and parotid duct relative to the fat pad. Also note the vascular pedicle entering the inferior-lateral portion of the buccal extension of the buccal fat pad (BE).

RESULTS

The BFP is divided into 3 lobes anatomically, each encapsulated by an independent membrane, fixed by membranous adhesions, and nourished by different blood



Video 1. Watch now at http://academic.oup.com/asj/article-lookup/doi/10.1093/asj/sjaa015



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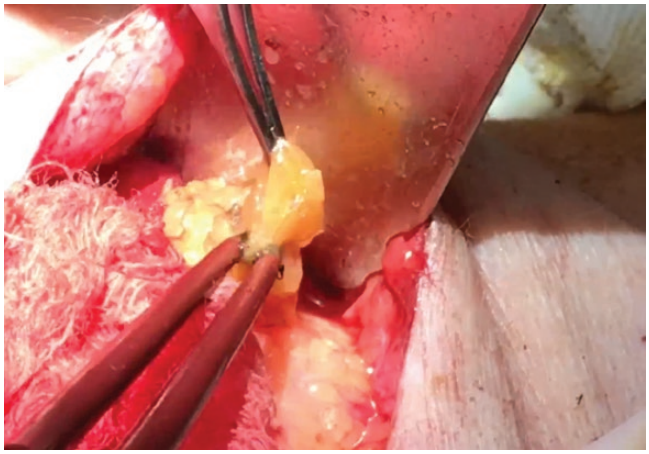

Video 3. Watch now at http://academic.oup.com/asj/article-lookup/doi/10.1093/asj/sjaa015

supply sources.[5,6] The anterior lobe is triangular and located below the zygoma. It extends anterior to the maxilla and buccinator muscle and posterior to the zygomaticus major muscle. The parotid duct passes through the posterior part of the anterior lobe. The facial vein passes through the anterior-inferior margin of the lobe, and the facial nerve branches lie on the outer surface of the capsule. The intermediate lobe lies in the space around the lateral maxilla between the anterior and posterior lobes. The posterior lobe is located in the masticatory space surrounding the temporalis muscle and tendon along the mandibular body. The posterior lobe forms the buccal, pterygoid, pterygopalatine, and temporal extensions. Of particular interest to the facelift surgeon is the buccal process, for example, buccal extension of the posterior lobe (the most superficial process below the parotid duct), because its size can affect the buccal appearance in the aging face.

The buccal extension of the BFP was located approximately 7.5 cm (range, 6.2-8 cm) anterior to the tragus, 4.5 cm (range, 4-6 cm) medial to the gonial angle, and 4.1 cm (range, 4-5 cm) inferior to the zygomatic arch (Figure 4). The average distance from the BFP to the oral commissure was 4.3 cm (range, 3.7-6 cm) (Table 1; Figure 4B).

The vascular pedicle to the buccal extension of the BFP was a branch off of the middle facial artery and entered the fat pad on the posterior surface in the inferior-lateral quadrant in 61% and inferior-medial quadrant in 39% of specimens (Figure 5). In all specimens, the parotid duct traversed on the superior aspect of the BFP capsule, and the buccal nerve branches coursed on the superficial surface of the capsule (Figure 6).

DISCUSSION

Originally described by Heister over 300 years ago, the BFP is a triangular-shaped adipose mass in the cheek with numerous functional and aesthetic clinical uses.[1-18] The BFP plays a large role in the cheek prominence as well as in the suckling mechanism in newborns and infants.[6,7] As growth of facial structure ensues, the volume of fat diminishes.[8-11] Although the BFP demonstrates progressive atrophy with aging, it has been found to be hormone insensitive and unresponsive to weight fluctuations. Therefore, unlike other fat in the face and body, the buccal fat maintains a constant volume. The buccal fat facilitates masticatory muscle glide and serves as a cushion mechanism against neurovascular bundle damage in traumatic facial injury.[4,11]

Possible causes of fullness lateral to the jowl in select aging faces include: (1) displacement of buccal fat, (2) herniation of buccal fat secondary to weakness in the anterior SMAS, or (3) a combination of both. Matarasso suggests that this is a pseudoherniation secondary to weakening of

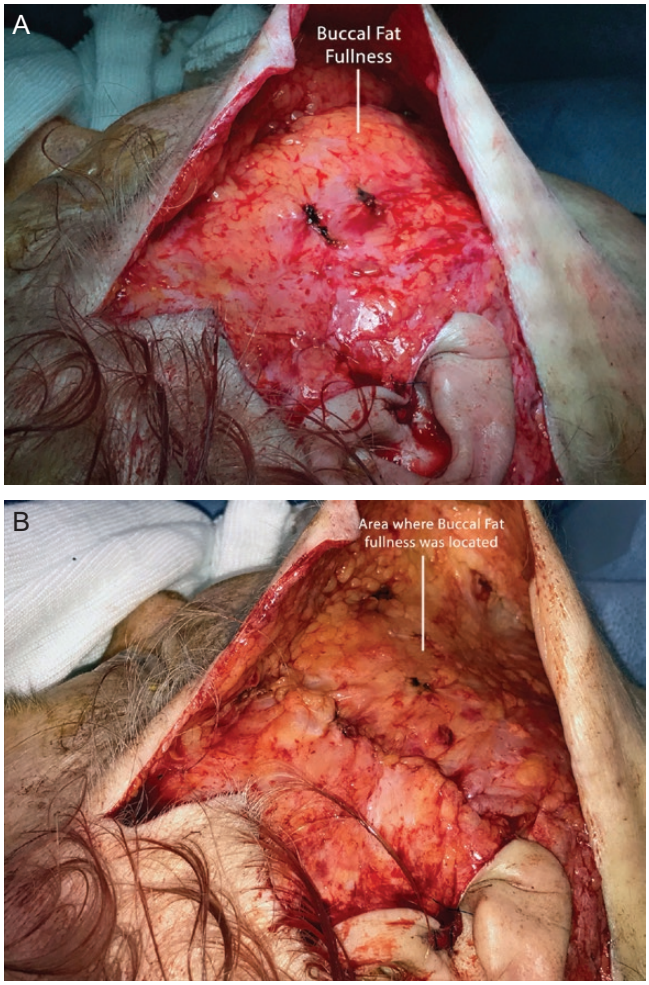

Figure 2. (A) Intraoperative photograph of a visible bulge of pseudoherniated buccal fat during facelift surgery in this 68-year-old female. (B) Intraoperative photograph of improved lower facial contour following an extended superficial-musculo-aponeurotic-system procedure and direct excision of buccal fat in this 68-year-old female.

investing fascia.[2,3] Our clinical observation of the deformity is consistent with this. Another question to be posed is if this fat can be treated safely through an anterior approach. And if so, what is the anatomy the surgeon needs to know prior to performing this approach?

The most commonly described method for buccal fat excision at the time of facial rejuvenation surgery is via an intraoral approach.[4,12] Paul has, however, described an external approach to BFP excision as an adjunct to his anterior SMAS technique.[13] The objective of this study was to examine the anatomy of the buccal fat through a standard facelift approach and to detail the location and variability of the BFP in relation to nearby critical structures. With this knowledge, we then describe a safe approach to external excision of buccal fat during a facelift avoiding an intraoral incision and unnecessary contamination.

Although the anatomy of the BFP as a whole has been well described, the anatomy of the buccal extension of the BFP is not well understood. Clinically, it appears that the buccal extension plays the most important role in buccal fat prominence in the aging face. The first aesthetic surgery reference of this fat herniation in the lower face was when Gierloff et al. examined it in conjunction with the other fat compartments of the face. They injected contrast in the superficial portion of the buccal extension of the BFP and found that it stained the buccal extension itself but did not stain the entire posterior lobe. They hypothesized that the buccal extension of the fat pad is separated by an anatomical boundary and can be regarded as a distinct fat compartment.[14] In this anatomical study, we did not find a distinct septum between the buccal extension and the posterior lobe. However, the location of the buccal extension was consistent with previous descriptions.

Six anchor ligaments to the BFP have been described that serve as entry points for vessels supplying the BFP. Each lobe is anchored to surrounding structures by 2 to 4 ligaments: maxillary, posterior zygomatic, medial and lateral infraorbital fissure, temporalis tendon, and the buccinator ligament.[15,16] Because anatomy is variable, this previously described septum may be a ligamentous division within the posterior lobe separating the buccal extension from the remainder of the posterior lobe.

To our knowledge, this is the first study to map and triangulate the buccal extension relative to known surgical landmarks in facelift surgery. Given the proximity of the parotid duct and buccal branches of the facial nerve to the fat pad, identifying the BFP accurately prior to incising the capsule can help avoid unwanted complications. In this study, we focused on the central-most aspect of the buccal herniation because isolating this may decrease the risk of parotid duct injury. This hypothesis stems from previous cadaver studies documenting the parotid duct passing deep (26.3%), superficial (42.1%), or on the superior border (31.6%) of the fat pad.[17] Therefore, incising the capsule in the central and slightly inferior zone should avoid duct injury. In this study, we found the parotid duct to consistently course on the superior aspect of the BFP capsule.

The zygomatic and buccal branches of the facial nerve cross the anterior and lateral surfaces of the BFP. In a previous large sample size study, the anterior surface of the BFP was covered by buccal branches of the facial nerve in 75% of specimens, and the lateral border of the BFP was covered by zygomatic branches in 90% of specimens.[8] We noted that when the capsule was incised, the structures traversing over the capsule (eg, parotid duct and buccal branches of the facial nerve) retracted back into the capsule, leaving a safe zone centrally for the surgeon to tease out the buccal fat.

With regards to the BFP capsule, prior anatomic studies demonstrate that the BFP is surrounded by a clearly

Figure 3. (A, C, E) Preoperative photographs of this 65-year-old female patient. (B, D, F) Postoperative photographs taken 7 months following extended superficial-musculo-aponeurotic-system facelift and buccal fat excision of the AP view.

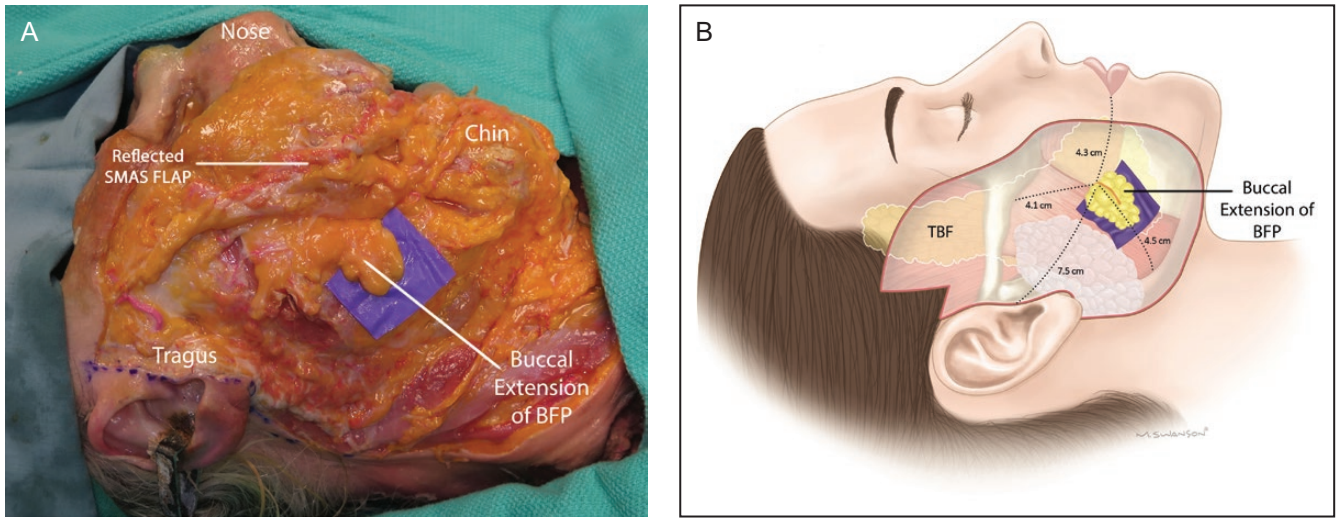

Figure 4. (A) Cadaver dissection with all demographic and identifying information dissociated demonstrating the buccal extension of the buccal fat pad (BFP) relative to known surgical landmarks. The superficial-musculo-aponeurotic-system layer has been reflected to reveal the buccal extension of BFP. (B) Medical illustration demonstrating triangulation measurements from known surgical landmarks to the buccal extension of the BFP. Temporal lobe of the buccal fat (TBF).

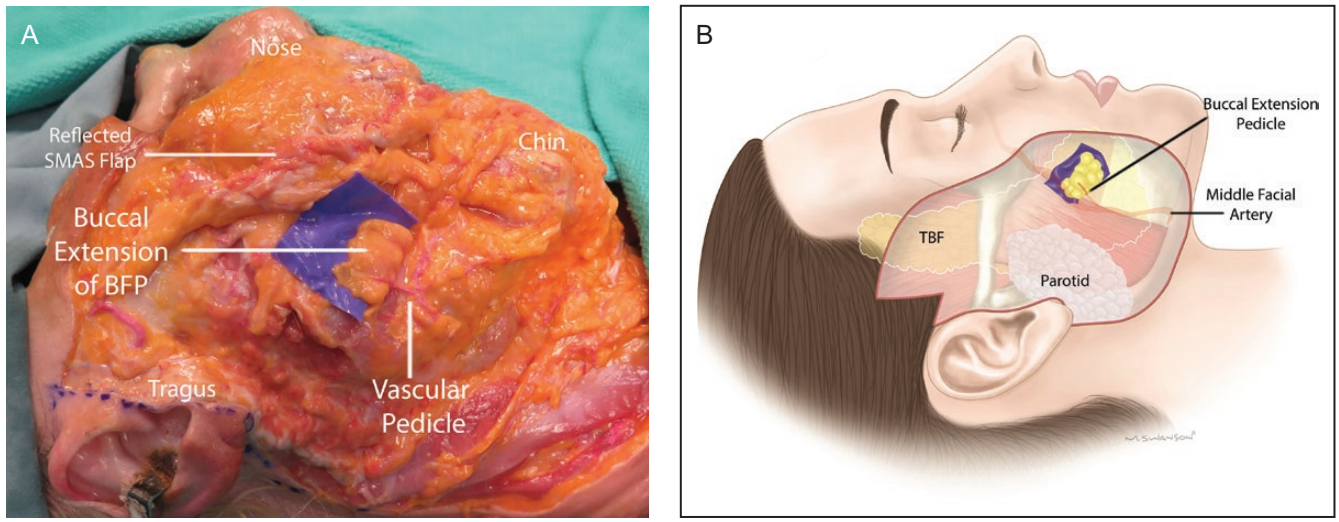

Figure 5. (A) Cadaver dissection with all demographic and identifying information dissociated demonstrating the vascular pedicle blood supply to the buccal extension of the buccal fat pad (BFP). The superficial-musculo-aponeurotic-system had been reflected superiorly. (B) Medical illustration demonstrating the course of the vascular pedicle to the buccal extension of the BFP off the middle facial artery. Temporal lobe of the buccal fat (TBF).

defined connective capsule that separates the lobes of the BFP from one another. This connective tissue network sends septa towards the deep adipose tissue carrying the neurovascular elements. Ultimately, the capsule attaches the adipose tissue to the ligaments that carry the vascular supply to the BFP lobes.[15,16]

Once the buccal fat has been isolated, one must be cognizant of the vascular pedicle location. The literature describes 7 various arterial branches that supply the 3 lobes of the buccal fat. The buccal branch of the middle facial artery supplies the targeted fat to be resected in this described operative technique. The pedicle traverses from the middle facial artery through a space between the parotid gland and masseter muscle to supply the buccal extension. We found the pedicle to enter on the posterior surface of the BFP in the inferior-lateral quadrant in 61% of specimens and inferior-medial quadrant in 39% of specimens.

There are several limitations to this study. Our clinical examples represent a small sample size with translation to clinical practice to follow in future studies. The intent of

Table 1. Measurements From Known Surgical Landmarks to Center of Buccal Extension of BFP

Facial landmarks	Distance to buccal extension of BFP
Zygomatic arch (inferior border)	4.1 cm
Tragus (anterior border)	7.5 cm
Gonial angle	4.5 cm
Oral commissure (ipsilateral)	4.3 cm

BFP, buccal fat pad.

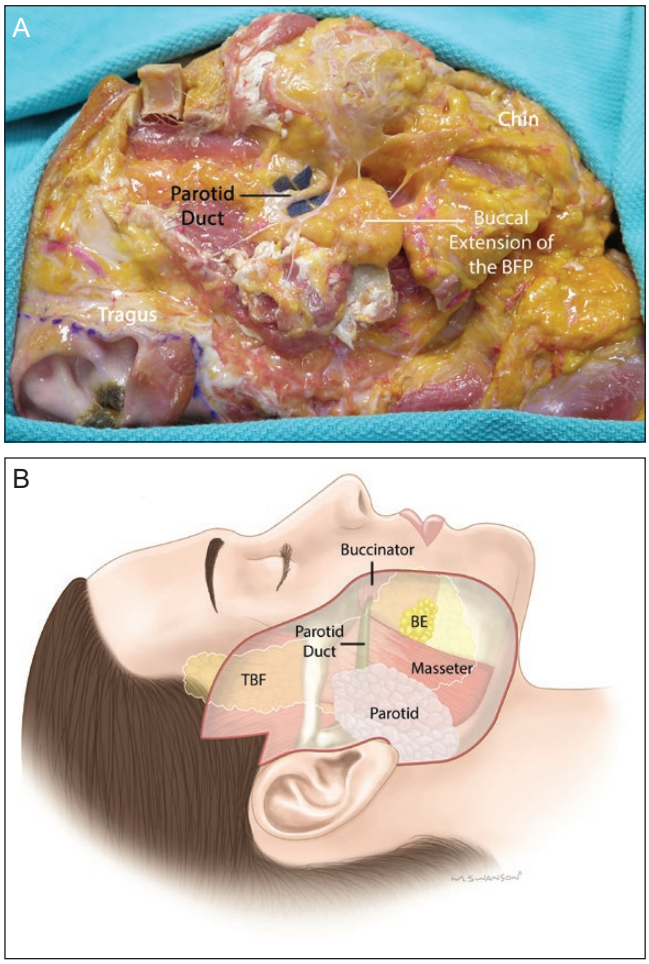

Figure 6. (A) Cadaver dissection with all demographic and identifying information dissociated demonstrating the buccal extension (BE) of the buccal fat pad (BFP). The zygomatic arch has been removed to show temporal lobe of the BFP (TBF). (B) Medical illustration demonstrating the relationship of the BE of the BFP relative to the most common path of the parotid duct in this study.

this study is not to suggest the external approach to buccal fat excision is superior to the intraoral approach. Our study was not designed to make these comparisons. The goal is to demonstrate an alternative approach to buccal fat excision that can be performed through a facelift dissection, obviating the need for an intra-oral incision. If the anatomy is understood, pertinent structures are avoided, and understanding that anatomical variability exists, we believe this is a safe, technically simple, and reproducible technique. Potential pitfalls of buccal fat excision include hematoma, infection, trismus, nerve or duct injury, and under- or over-resection of fat leading to contour irregularities.[1-18] Careful preoperative and intraoperative evaluation is imperative to determine the necessity for excision and the amount of fat to be excised. However, the findings are often subtle and, at times, difficult to appreciate on 2-dimensional photography. The pseudoherniation often becomes apparent while operating. When the SMAS is tightened, it is typically made worse. Therefore, it is all based on clinical suspicion with only the final decision being made while in surgery.

As a final point, it is imperative for the surgeon to identify and discuss the presence of buccal fat fullness with patients prior to surgery. If an unexplained bulging is evident following facelift surgery, pseudoherniation of buccal fat may be the culprit.[1-4,11-13] In our clinical experience, it appears that patients undergoing secondary and tertiary facelifts may be at increased risk of buccal fat herniation because the SMAS may have been previously manipulated. The anterior SMAS is thinner and weaker compared with the more proximal SMAS over the parotid. By not removing it, the persistent buccal fat herniation may result in a suboptimal final aesthetic result.

CONCLUSIONS

The buccal extension of the BFP can demonstrate pseudoherniation in the aging face. In select cases, excision of buccal fat may improve lower facial contour in facial rejuvenation surgery. This study provides triangulation measurements from known facial landmarks that may help surgeons identify the buccal extension of the BFP intraoperatively. When excising buccal fat from an external approach, the surgeon must be cognizant of the vascular pedicle location and the relationship of the fat pad to the parotid duct and buccal branches of the facial nerve. The external approach safely excises buccal fat during a facelift while avoiding an intraoral incision.

Supplementary Material

This article contains supplementary material located online at www.aestheticsurgeryjournal.com.

Disclosures

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