

# Buccal Fat Pad Excision: Proceed with Caution

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**Background:** Buccal fat pad excision is offered as a means of obtaining a more aesthetic midface. This procedure has been documented in the form of countless videos on Instagram and other social media platforms with no long-term patient follow-up. We performed a retrospective analysis of published data regarding buccal fat pad excision and sought to better elucidate pitfalls regarding this under-reported procedure.

**Methods:** A literature search was conducted in October 2017 through the PUBMED database regarding the utility of buccal fat pad excision in the setting of aesthetic improvement of the midface. Reference articles were screened to obtain relevant studies. A total of 121 citations were identified in the search but after eliminating duplicate studies and abstracts and utilizing predefined inclusion/exclusion criteria only 11 articles were satisfactory. None of these articles demonstrated any long-term patient follow-up.

**Results:** Out of the 121 relevant citations identified, only 2 studies published describe a case series of > 5 patients regarding cheek or midface sculpturing with buccal fat pad excision for aesthetic purposes, the total sample size between these 2 studies was 53 patients. Neither of the studies had follow-up regarding patient satisfaction or related outcomes.

**Conclusions:** Buccal fat pad resection as an aesthetic improvement of the midface has been described, but follow-up regarding loss of subcutaneous fat with aging and late secondary deformities have not been published in the literature. Further research in long-term patient follow-up including patient satisfaction and the encouragement of reporting postoperative complications is warranted. (*Plast Reconstr Surg Glob Open* 2018;6:e1970; doi: 10.1097/GOX.0000000000001970; Published online 16 October 2018.)

## INTRODUCTION

Various descriptions have been provided in the literature in an attempt to define what makes an aesthetic or congruent midface. These definitions have further been categorized and have evolved over time. Common visual guidelines that have been published in the literature have focused on the following criteria: (1) defining the anterior border of the parotid gland and cheek hollow; (2) visualizing the posterior border of the nasolabial fold; (3) a notable cheek-soft tissue convexity that does not exceed a plane perpendicular from midzygoma to mandible;

(4) projecting zygomatic eminences and finally; (5) a well-defined mandibular angle.<sup>1</sup> The concepts of midface atrophy and soft-tissue ptosis contributing as a major mechanism for senescent changes and evidence of aging have already been described in the literature.<sup>2</sup> Attempting to define the ideal midfacial “cheek hollow” has included a combination of aesthetic procedures including facial liposculpture, aesthetic contouring of the facial skeleton through means of augmentation, and what is sparsely described in the literature as buccal fat pad excision.

It has already been demonstrated in the literature through computer tomographical images that the volume of the buccal fat pad is not often symmetrical.<sup>3</sup> In addition, the buccal fat pad growth and size is dynamic and drastically increases between the ages of 10–20 (4,000–8,000 mm<sup>3</sup>) to then decrease over the following 30 years (decline to ~7,000 mm<sup>3</sup>).<sup>4</sup> Long-term follow-up on patients with buccal fat excision are absent in the literature and subsequent symmetrizing procedures of the midface following excision are not reported.

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This review of the scientific literature attempts to examine the reported cases of buccal fat pad resection as an aesthetic procedure to improve the midface. There is a paucity of data regarding long-term patient follow-up and complications regarding the procedure published in the literature. We performed a retrospective analysis of the data from a number of clinical case reports and took a closer look at some of the anatomical relationships of the buccal fat pad interrelated to nearby nerve structures. The findings of the report sought to better elucidate pitfalls regarding the procedure that may have been underreported in the literature.

## PATIENTS AND METHODS

A literature search was conducted in October 2017 through the PUBMED database for articles regarding the utility of buccal fat pad excision in the setting of aesthetic improvement of the midface. Key words used in the search included (“Cosmetic Buccal Fat Resection” or “Buccal fat pad excision”) AND (“Cheek hollowing”) AND (“Anatomical landmarks of Buccal branches” or Surgical anatomy of the buccal nerve”) AND (“Aging facial soft tissue” or “Aging facial morphology”).

Reference articles were screened manually to obtain relevant studies. A total of 121 citations were identified in the original search. After eliminating duplicate studies and abstracts of the citations reviews, we further filtered our studies regarding predefined inclusion/exclusion criteria. Inclusion criteria comprised of studies published in the last 30 years, total number of patients, and complications if listed. Exclusion criteria were case reports or series < 5 patients, buccal fat resection for noncosmetic or aesthetic reasons, letters or editorials, and non-English articles.

A total of only 11 articles and reviews satisfied the above criteria. None of these articles demonstrated any long-term follow-up of their patients. The majority of the articles were either of a review and/or case series of an individual surgeon’s experiences with buccal fat resection and/or a narrative of buccal fat and surrounding anatomical relationships.

Since none of the studies commented on complications and/or had any long-term follow-up of the patients following buccal fat resection, outcomes data were limited. Studies regarding anatomical landmarks and interrelated facial buccal branches and analysis of aging soft tissue were utilized to extrapolate potential pitfalls in fat pad resection.

## RESULTS

Out of the 121 relevant citations identified in our search, only 2 studies published describe a case series of > 5 patients regarding cheek or midface sculpturing with buccal fat pad excision for aesthetic purposes, the total sample size between these 2 studies was 53 patients. One of the 2 articles continued to describe buccal fat resection in the setting of a subcutaneous cheek and neck lipoplasty.<sup>5</sup> In addition to these articles, another study published in 1980 by Li<sup>6</sup> in the *Annals of Plastic Surgery* was a case

series of 9 patients over a three and a half-year period that did not describe any permanent complications but was excluded from this study due to > 30 years. Finally, 4 studies regarding the anatomical relationships of buccal branches of the facial nerve and volumetric analysis of the buccal fat pad and 2 studies regarding analysis of facial soft-tissue aging were identified.

The first case series study focused on combining the removal of buccal fat pad and excision of the fat of the cheek and neck as published by Guerrerosantos and Manjarrez-Cortes.<sup>5</sup> This particular research study discussed the combined procedure in efforts of improving contour in both cheeks and neck simultaneously. They applied this technique in a sample size of 28 patients of various ages and did not have any reported complications. Patient satisfaction was deemed very positive at both the immediate postoperative period as well as 1-year postoperatively. The article continued with a general review of the limited literature and concluded by stating that removal of the buccal fat pad and lipoplasty of the subcutaneous fat of the cheeks and neck offered more improvement than either procedure alone.

The second case series study was a reported retrospective series of 25 consecutive patients undergoing a submuscular fat removal. To preserve subcutaneous fat commonly lost with aging and avoid late secondary deformities, only submuscular buccal fat excision was recommended with carefully selected groups of patients. The article stated that 3-dimensional computer tomography studies have already demonstrated that the volume of the buccal fat pad is not always symmetric, especially in a patient who had previously experienced facial trauma. The article continued by describing that the most common aesthetic procedure involving the buccal fat pad is removal to reduce the submalar prominence and stated a stepwise approach to how to gain access and surgically resect the buccal fat pad. Malar augmentation with hydroxyapatite granules was also described as a possible option before buccal fat pad removal for patients who desired to achieve and mark a desired area of prominence in the midface. The article concluded by stating that the procedure to remove the fat pad may be virtually complication-free if the surgeon is more comfortable with operating in this area and familiar with the surrounding anatomy.

## DISCUSSION

The limited number of published studies regarding buccal fat pad resection for aesthetic contouring of the midface and lack of patient follow-up or reported postoperative complications implores us to explore potential pitfalls of this seemingly benign surgical procedure. Many of the presumed published literature regarding surgical pitfalls of buccal fat pad resection is relative to the surrounding anatomical structures that can be inadvertently injured during the resection. The buccal fat pad is an anterior extension of the masticatory fat pad, which fills the space of the masticatory musculature.<sup>4</sup> The fat pad rests on the maxillary periosteum and upper fibers of the buccinators with processes that extend to the pterygopalatine,

temporal, pterygoid, and buccal spaces. The relationship of the buccal branches of the facial nerve and the location of the parotid duct in proximity to this pad is variable and has widely been described in the literature. Several studies regarding cadaveric dissections were undertaken to clarify the surgical course of this nerve.<sup>7</sup> A study by Pogrel et al.<sup>8</sup> in the *Journal of Oral Maxillofacial Surgery* studied the relationship of the buccal branch of the facial nerve to the parotid duct through cadaveric dissections and through 85% of the cadavers were noted to have a single buccal branch of the facial nerve, whereas 15% were noted to have 2 branches. In 25% of these cadavers, the buccal nerve crossed the parotid duct from superior to inferior. This relationship is of particular importance with relation to facial cosmetic surgery and buccal fat resection. It is important to note that the fat pad is typically resected via either a sub-SMAS and/or transbuccal approach. The sub-SMAS exposure of the fat pad has been typically aborted in cosmetic operations attributed to the inadvertent risk of injury to branches of the facial nerve that lay underneath. The transbuccal approach avoids the majority of the major branches of the facial nerve but exposure to the fat pad is difficult and quite often performed blindly. There have been published buccal branches of the facial nerve that remain intimately involved in the different components of the buccal fat pad.

This study was followed by another by Saylam et al.<sup>9</sup> in the *Journal of Radiologic Anatomy* that sought to further classify the buccal branches of the facial nerve. In this study, 30 cadaver heads and 60 specimens were dissected and buccal branches of the facial nerve were further classified into 4 types: (type I) a single buccal branch of the facial nerve at the point of emergence from the parotid gland and inferior to the parotid duct, (type II) a single buccal branch of the facial nerve at the point of emergence from the parotid gland and superior to the parotid duct, (type III) buccal and other branches of the facial nerve formed by a plexus, and (type IV) 2 branches of the buccal nerve one superior and one inferior to the duct at the point of emergence from the parotid gland.<sup>9</sup> Knowledge of the variability of the nerve in relation to the duct and buccal fat that surrounds this area is essential in preventing unintentional injury to the nerve or duct during buccal fat resection. Although blunt dissection aids in avoiding inadvertent injury to these branches, their anatomical relationship must be respected when attempting resection of the buccal fat pad.

The major potential pitfall in resection of this fat pad has to do with inadvertent surgical manipulation of branches of the facial nerve. The study by Hwang et al.<sup>10</sup> in *The Journal of Craniofacial Surgery*, aimed to further define the precise anatomical interrelation of the buccal fat pad, buccal branches of the facial nerve and parotid duct. In their 19 total hemiface dissections, they noted an interrelation of the parotid duct and buccal fat pad as follows: parotid duct crossing superficial to the buccal extension of the buccal fat pad 8 of out 19 (42.1%) specimens, crossing deep to the buccal extension of the buccal fat pad in 5 of 19 (26.3%) specimens and crossing along the superior border of the buccal extension of buccal fat pad in 6 of 19

(31.6%) specimens.<sup>10</sup> The study concluded by stating that based on their data, there is a 26.3% chance of injury to the buccal branch of the facial nerve during total removal of the buccal fat pad simply based on anatomical variation. The parotid duct runs deep to the buccal extension of the buccal fat pad in 26.3% of these cases.<sup>10</sup> This would have to be the percentage of risk that the surgeon would be willing to risk during resection of this fat pad, which may lead to consequences ranging from metallic taste of food, ptosis, and/or tingling or numbness of the face, jaw, or neck.

Potential damage to surrounding nearby anatomical structures aside, perhaps the largest pitfall regarding resection of the buccal fat pad is with regard to the long-term hollowing of the midface. The changes of the aging face relative to soft-tissue ptosis and fat loss is something that is widely published throughout literature. The features of the human face and its facial components were well studied through a study in 2015 by Kaur et al.<sup>11</sup> group. This group collected 400 photographs of 400 individuals from 4 different age groups (30–40 years, 40–50 years, 50–60 years, > 60 years) and categorized intrinsic and extrinsic factors of the aging face. The sample size was further divided into morphological categories noting the changes in skin texture and appearance of rhytids, which was defined as follows: None (0% signs of aging), Minimal (showing 10–20% signs of aging) where the form of fine lines were minimal, Fair (20–40% signs of aging) formation of deep lines, Marked (50–70% signs of aging) deep grooves present and Prominent (70–100% signs of aging), which included the presence of deep grooves and folds.<sup>11</sup> The morphological changes were categorized and charted according to soft-tissue changes of the upper third, middle third, and lower third of the face. Of particular interest, signs of characteristic aging signs made for the middle third of the face included prominent nasolabial folds, shifting of the malar fat pad, and reduction of total fat drastically increasing cheek hollowing between the ages of 30–40 years.<sup>11</sup> The study also concluded that in the early 30s, females showed less visual signs of aging respective of their male counterparts and that after the 40s females had a sudden rise in the signs of aging attributed to hormonal changes and decreases in estrogen levels.<sup>11</sup> The midfacial region had decreasing fat deposition with advancing age and the associated ligaments holding the malar fat pad in place weaken as the nasolabial fold develops along with the decrease in fat deposition.<sup>11</sup> It has been mentioned that in select individuals with patients of pseudoherniation of the buccal fat in conjunction with signs of midface aging, buccal fat excision has been performed in conjunction with facelift for enhanced midface rejuvenation. However, once again the long-term results and patient case series regarding this combination of surgical procedures cannot be found in the literature. Resection of the buccal fat pad has only served to expedite this process and advance skin related deformations associated with facial aging.

There is a clear lack of published long-term patient follow-up following buccal fat resection in efforts to track these case complications or undesired outcomes. Removing of the buccal fat pad accentuates the appearance of the low-lying jowls and expedites facial deformations com-

monly associated with aging. Several case reports are only now being reported across social media platforms and plastic surgery guided websites such as RealSelf, which include patients seeking fat grafting options and scaffold injections into their malar area to treat the facial hollowing and gaunt that is left behind after buccal fat pad resection. Autologous fat transfer has emerged as a safe and viable option for aesthetic refinement of the midface in this patient population.

### CONCLUSIONS

Buccal fat pad resection as an aesthetic improvement of the midface has traditionally been described but long-term follow-up regarding loss of subcutaneous fat with aging (or cheek hollowing) and late secondary deformities have not been published in the literature. In addition, the anatomic landmarks of buccal branches of the facial nerve and the close relationship of the parotid gland to the buccal fat pad underscores the importance of the surgeon's knowledge of relevant surrounding anatomy and potential pitfalls of resection of this fat pad.

The paucity of published data regarding the long-term patient follow-up and complications of this procedure only serve to further substantiate the controversy regarding buccal fat pad resection for aesthetic improvement of the midface. Further research in long-term patient follow-up postoperatively including patient satisfaction rates and the encouragement of reporting postoperative complications is warranted. The lack of long-term data regarding this unproven procedure stresses the need for a surgeon to hesitate to offer this procedure in their practice.

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