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Alteration in Facial Contour Associated with Aging

Case Report

Bohan Lin, D.D.S.; Louis Mandel, D.D.S.

ABSTRACT

The authors examined a 73-year-old female because of a chief complaint of bilateral swellings of the parotid gland. After detailed questioning, the authors determined that the perceived facial swelling was caused by the inferior displacement of separate and identifiable facial fat compartments. Aging, coupled with gravity, results in both a compartmental and intracompartamental inferior displacement of facial fat. Long-lasting fillers injected intra- or extra-compartmentally also contribute to this inferior migration.

When observed in a dental setting, extraoral swellings in the maxillary mandibular area are usually associated with dental infection. Nevertheless, the dental practitioner must consider other causes, such as aging, for the facial distortion. Aging results in facial fat displacement. The injection of a durable cosmetic filler may enhance this effect such that the resulting facial alteration mimics an extraoral dental swelling.

Facial aging results primarily from a redistribution of the superficial facial fat which is located in individual and identifiable fat compartments.^[1,2] Because each fat chamber has its own be-

havior pattern during the aging^[3,4] process, a full understanding of their anatomic location is required prior to their recontouring with a filler. The identification of these compartments, separated from each other by septae, has been made possible by using contrast-enhanced computer tomographic and magnetic resonance imaging, combined with anatomical dissections.^[2]

Five individual and distinct superficial facial fat compartments, separate from each other by septae^[5-7] can be identified below a line drawn from the inferior orbital rim to the tragus of the ear.^[2]

- The nasolabial compartment is a thin, longitudinally oriented fat mass along the lateral side of the nose that extends to the angle of the mouth.
- The medial cheek compartment, triangular in shape, has a base that spreads posteriorly from the level of the infraorbital rim and an apex that extends inferiorly to the zygoma.
- The middle cheek fat compartment (Figure 1), just posterior to the medial cheek compartment, has a rectangular shape, and is positioned superiorly in the malar/zygomatic arch zone and extends down to a line level with the maxillary dentition.

From the Salivary Gland Center, Columbia University College of Dental Medicine, New York, NY.

- The superficial lateral cheek compartment, also rectangular in shape, stretches superiorly from the zygomatic arch to the inferior border of the mandibular body, and is located between the superficial middle fat compartment and the tragus of the ear.
- The jowl compartment is located inferior to the medial cheek compartment, lateral to the nasolabial fat, and extends down to the level of the inferior border of the mandibular body.^[2]

Gierloff et al.^[4] reported that an inferior migration of some facial fat compartments occurs during aging and that the ptosis is due to gravity. This process is facilitated by an age attenuation of the limiting septae of some but not all fat compartments. Although the middle cheek fat compartment (Figure 1) will change position and move inferiorly, other compartments will remain fixed in position because of their more effective ligamentous attachment to the underlying bone.^[2] Simultaneously, an inferior volume shift within some individual fat chambers was also observed.^[4]

Significant inferior volume displacement of fat contained within the middle cheek fat compartment was observed when the effects of gravity were simulated.^[2] Aging again plays a role because it allows gravity increased time to exert its effect. This fat migration is different in that it represents a volume movement of middle cheek fat within its own compartment. This intracompartmental fat migration is independent of the in toto migration of the middle cheek compartment that is associated with weakening of the enclosing septa. Two autonomous movements of fat are in play: inferior movement of the entire middle cheek fat compartment and an inferior movement of intracompartmental fat within the individual compartment. These two inferior but separate fat displacements result in a loss of facial fullness in the malar/zygomatic arch area, and a concomitant increase in buccal soft-tissue bulk at the level of the maxillary dentition.

Restoration of normal malar/zygomatic arch area facial contouring is frequently requested by the aging population. Facial rejuvenation, via the injection of a cosmetic filler, has become a commonly used procedure to solve this aesthetic facial defect. Currently, Juvéderm Voluma XC (*Allergan Inc*) is approved by the FDA for cheek augmentation to correct age-related volume loss in the midface. This product is a volumizing hyaluronic acid filler whose use has become very popular because it possesses a high safety profile and has a durability that has been variously reported to range from 18 months to 3 years.^[8-10]

Case Report

A 73-year-old female presented herself to the College of Dental Medicine Salivary Gland Center because she thought she had developed bilateral swellings of the parotid salivary gland (PG) (Figure 2). Although the swellings were asymptomatic, they had become a cosmetic issue that caused some patient distress.

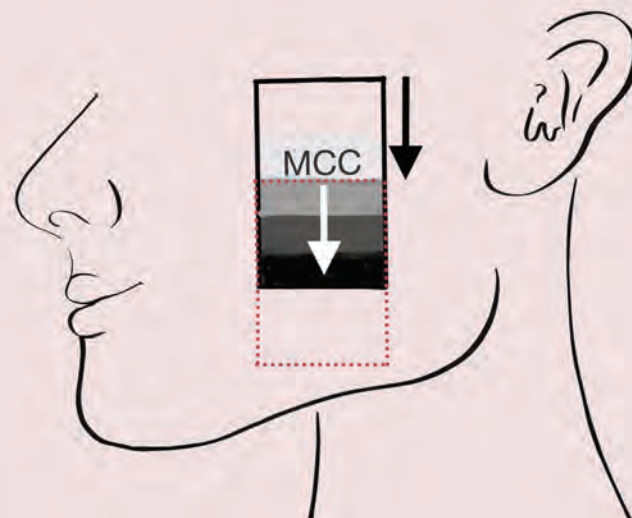


Figure 1. White arrow and increasing gray intensity indicate inferior aging shift of fat within middle cheek compartment (MCC). Black arrow and dotted rectangle indicate aging shift of entire fat compartment.



Figure 2. Clinical view of patient. Demonstrating contour distortion of lower third of face, most evident on left side.

A medical history indicated she had been previously treated for Graves' disease and a kidney stone. Her current medications include levothyroxine for her thyroid condition and atorvastatin for an elevated cholesterol level.

A cursory visual examination revealed that the swellings of concern were not caused by the PGs. The swellings were symmetrically located, albeit the left side swellings were slightly larger than the right. Anatomically, the swellings were located anterior and inferior to the bulk of the PG, and occupied the lower regions of the facial buccal soft-tissue area. The patient said the painless swellings had developed slowly over the past two years. No surface erythema was evident. External palpation indicated that the swellings were painless and normal in tone. No cervical lymphadenopathy was present. Trismus was not present, and no oral pathology was noted. A normal quality and quantity of saliva were observed exiting intraorally from the PG duct orifices when the respective PG was aggressively palpated extraorally.

During the examination, the patient volunteered the information that for the past 20 years, she had received annual facial injections of cosmetic fillers. She indicated that the fillers were introduced bilaterally into the cheek area because of “hollows that had developed.” She also said that for the past four years, Juvéderm Voluma has been the filler that was introduced into her malar areas because of the perceived volume loss.

An MRI was requested. The coronal (Figure 3) and axial images (Figure 4) clearly revealed that the bilateral swellings were caused by an increased amount of fat and also by the presence of filler material. The imaged bilateral tissue bulk was situated anterior to the PG, with the accumulated mass being most pronounced at the level of the maxillary dentition.

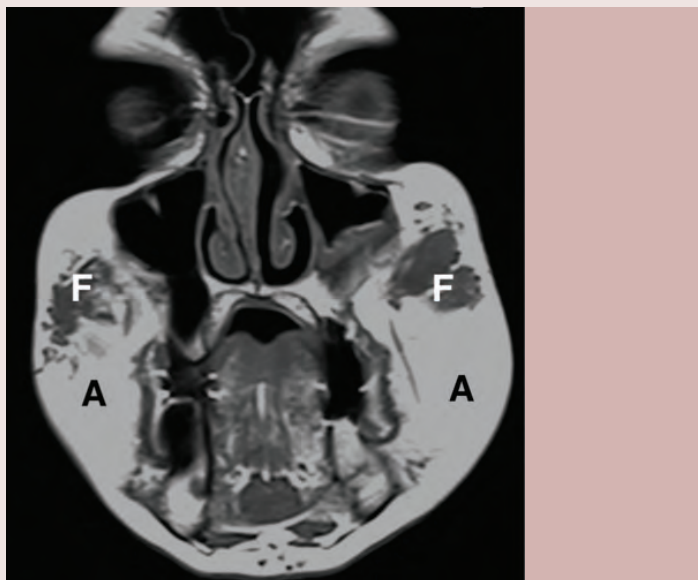


Figure 3. MRI T1 coronal. Increased fat (A) bilaterally. Filler (F) also present bilaterally.

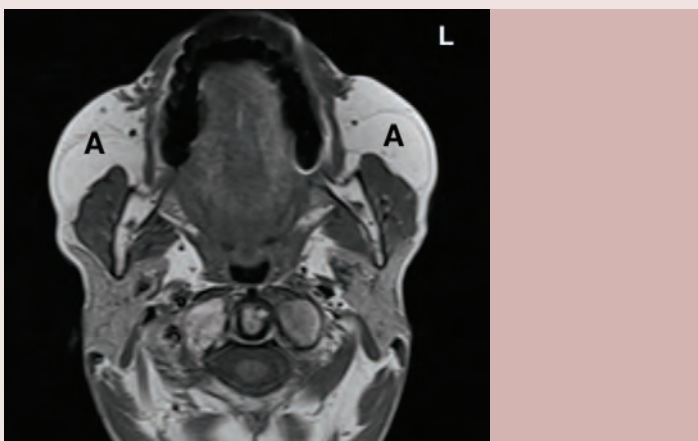


Figure 4. MRI T1 Axial. Increased fat (A) at level of maxillary dentition.

Once the patient was informed that therapy for her asymptomatic swellings involved surgical intervention or liposuction, she opted for the conservative no-treatment approach.

Discussion

Several factors have contributed to the change in our aging patient’s facial contour. As indicated, two processes are actively engaged in the aging of the face, with the middle cheek fat compartment being very involved. Primarily with aging, there is a weakening of the septal border around the middle cheek fat compartment. Gravity then serves to produce ptosis of this compartment, which then becomes manifest as an inferior accumulation of soft-tissue bulk in the lower area of the buccal soft tissues.

This progression in the alteration of facial contour is further accentuated by a second cause. With age, there is a movement of fat within the middle cheek fat compartment. A loss of fat develops superiorly within the middle cheek compartment as time and gravity exert their effect, and the fat migrates inferiorly to occupy space in the lower portion of the middle cheek fat chamber.

Added to these two normal physiological progressions of fat seen in aging is the iatrogenic role of the cosmetic filler. Our patient was very concerned about her facial appearance. As the age-related change in malar area facial contour became evident, she sought rejuvenation with a filler. Her practitioner chose to use Juvéderm Voluma XC because of its safety record and durability.

Bilateral volume facial recontouring with this agent was performed annually on four occasions to solve the malar defect caused by the inferior fat migration that had developed with age. In turn, the filler contributed to the abnormal inferior buccal facial contour. The filler had been bilaterally introduced into the superior portion of the middle cheek compartment in the malar/zygomatic arch area. Because of the filler’s slow resorption, it had the opportunity to partake in the described compartmental and intracompartmental tissue movements. Previously, other more resolvable filler had been used, and their more rapid resorption had obliterated their presence on the MRI. The displaced slowly resorbing filler now added to the patient’s complaint of an abnormal facial contour.

Substantiation for the cause of the bilateral facial swellings can be derived from imaging. The MRI clearly demonstrated that the swellings were caused not only by the increased presence of displaced fat, but also by filler that had as yet not been resorbed because of its relatively recent introduction.

Conclusion

Facial fat is dispersed in various individual compartments. These fat compartments react differently to the effects of age and gravity. The physiologic in toto migration of the middle cheek compartment, as well as its intracompartmental fat, can cause a significant change in the inferior proportions of the facial buc-

cal soft tissues. Durable fillers, introduced into the facial malar/zygomatic arch area, will take part in this migration and add to the inferior facial distortion. The dental clinician should become aware of the unique location of distinct facial fat compartments susceptible to age-related migration. As an increasing number of people seek out facial rejuvenation therapy, the displacement of fillers injected into these compartments should be taken into consideration in patient assessment. Misdiagnoses when evaluating facial swelling and alterations in facial contour will be avoided. //

Queries about this article can be sent to Dr. Mandel at lm7@columbia.edu.

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