

Commentary

Commentary on: SMAS Fusion Zones Determine the Subfacial and Subcutaneous Anatomy of the Human Face: Fascial Spaces, Fat Compartments, and Models of Facial Aging

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What's in a name? That which we call a rose by any other name would smell as sweet.

William Shakespeare

As the title suggests, this contribution by Dr Pessa¹ differs from the usual focused plastic surgery articles in this journal. It is closer to a thesis, being several papers in one on related aspects of this anatomy, to which the reader will likely return. Unfortunately, as is the anatomy, the paper is not easy to understand and I regret this brief Commentary cannot do justice to many aspects worthy of comment. It is the culmination of Dr Pessa's anatomical contributions to plastic surgery over more than 20 years that have followed a continuous theme, being largely based on dye injection studies.^{2,3} The earlier studies focused on the superficial anatomy, whereas the recent progression into unfamiliar territory of the deeper facial anatomy has been more difficult for plastic surgeons to follow.⁴

The difficulty is defined in the opening paragraph "the sub-divisions of these layers, the terminology that defines them, and their boundaries have remained a source of controversy throughout medical history."¹ Some good clinical correlations and excellent dissections are included to explain the messages. Having spent considerable time studying the illustrations and their legends on several occasions. I concur with the overall message, despite some disappointing errors of detail in the text. So the focus is to understand the relationship between the superficial and deeper facial anatomy.

BASIC PRINCIPLES OF FACIAL ANATOMY

A sound understanding of basic anatomical principles provides the framework on which to understand the detail described. The cheek is not homogenous, but consists of several functionally, and therefore structurally, different regions. In simplest terms the cheek can be considered as having a central part, the cheek proper, and a peripheral part that can be likened to a picture frame around the central cheek (Figure 1). The picture frame part overlies the solid structure of the skeleton to which the overlying soft tissues are attached by retaining ligaments.^{5,6} The frame includes the lateral cheek over the masseter and the prezygomatic part over the zygoma.

In the central cheek the arrangement is different as it overlies the gap in the underlying skeleton for the oral cavity (Figure 2). There are similarities with the orbit, being the other major gap in the facial skeleton, about which surgeons are more familiar. The bony orbital rim provides the nearest stable structure for attachment of the overlying soft tissues, mediated by the orbicularis retaining ligament.

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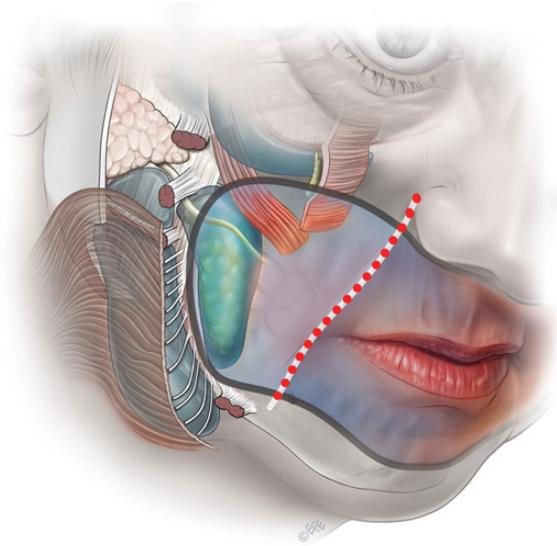


Figure 1. The picture frame concept of the cheek. The picture frame at the periphery (shaded in the illustration) overlies the stable cheek structures. The cheek proper is the central part overlying the vestibule of the oral cavity largely overlapped by the body and buccal extension of the buccal fat pad. The central cheek is limited medially at the nasolabial and labio-mental creases (red dotted line). The peripheral part of the cheek in the frame is reinforced on its deep aspect where it overlies the facial skeleton, to which it is attached by retaining ligaments (cut edges), while there are not any comparable retaining ligaments centrally.

The unusual movements of the central cheek relate to its functions of eating (suckling as well as mastication) and communication (which includes facial expression, vocalization, and whistling). The movements to accomplish these include the range of mandibular movement with wide opening of jaw and mouth as well as three-dimensional “in and out” cheek movement.

It is essential to understand the basic 5-layer construction of the superficial soft tissues over the facial skeleton.⁷ Layer 1: skin; layer 2: subcutaneous, including the fibrous retinacula cutis; and layer 3: the superficial musculoaponeurotic system (SMAS). Together these outer 3 layers form a composite anatomical unit, which is fixed in areas through ligaments in the sub-SMAS layer 4. Mobility is enabled in other areas by the presence of sub-SMAS spaces. Layer 5 is the investing layer of deep fascia on the muscles of mastication or the periosteum, where the skeleton is not concealed by these muscles. Variations within the 5-layer construct occur over the face, including in the different parts of the cheek.

The concept of “deep” in aesthetic facial surgery has specifically meant dissection in the “deep plane,” layer 4, immediately deep to the SMAS,^{8,9} which is superficial to the deep fascia layer of the face and neck (layer 5). This is quite superficial to the deep facial spaces described in classical anatomy cited by Pessa.

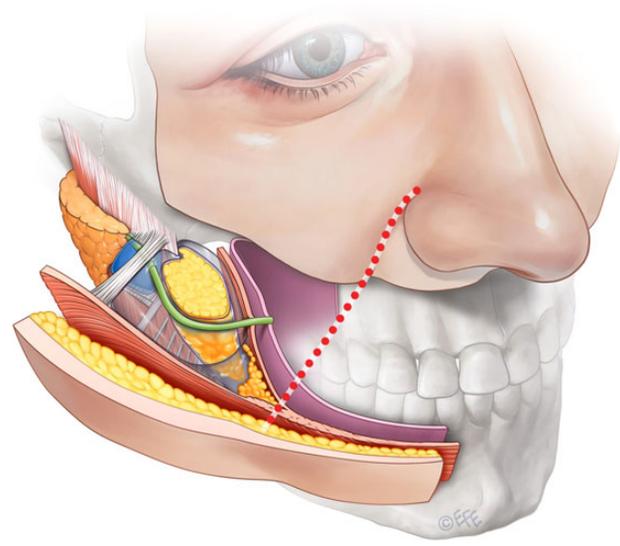


Figure 2. The unique anatomy of the central cheek. The vestibule of the oral cavity is colored purple. The vertical line of masseteric ligaments separate the central cheek from the lateral cheek, while the 5-layered superficial construct continues from the peripheral cheek over the central cheek, with adaptations. The layer 5, deep fascia in the central cheek, being a medial continuation of the masseteric fascia is not strong. The fascia defines the bursa-like buccal space that contains the buccal extension of the buccal fat pad, which is that part inferior to the parotid duct. As in the orbit, the deep structures tend to bulge into and distend the overlying superficial fascia.

For perspective, it is important to recall that the focus of contemporary studies by Pessa and other plastic surgeon anatomists has been to explain “normal” facial aging and its surgical correction. This contrasts with the classical descriptions of the deep spaces in the face and neck undertaken in an earlier era to understand the spread of abscesses arising from deep pathology, originating from dental and deep visceral (pharyngeal) structures.

Most of the variations of the basic 5-layer soft tissue construct occur over the orbital and oral cavities. Here the soft tissues continue beyond the skeletal apertures to form the eyelids, the central cheek, and lips. The superficial 5-layer construct then overlies the unique deep structures within the cavities, without a bony barrier separating the superficial from the deep. The orbital fat, which is the posterior lamella of the lid, tends to bulge outward with aging into the superficial lid structures. Attenuation of the septum orbitale (the middle lamella, or deep fascia equivalent in the lid) occurs, while the overlying orbicularis distends and thins.

In the cheek, separating the lateral from the cheek proper is the vertically oriented line of masseteric retaining ligaments near the medial border of masseter (Figures 1 and 2). As occurs over the orbit, the superficial layers continue medial to this ligamentous boundary to now overlie

the deep soft tissues of the central cheek, the vestibule of the oral cavity, and buccal fat. Variations of the 5-layered construct occur to accommodate the mobile and expansile activity here.

Medial to the ligamentous boundary, not only is there not bone, but the layer of deep fascia separating the superficial from deep is not strong. This deep fascia is formed by the medial continuation of the superficial leaf of the masseteric fascia as the fine membrane lining the buccal space, in which is contained the buccal fat pad.¹⁰ Again, similar to the orbit, there are not any retaining ligaments directly overlying the central cheek, instead they are located around its periphery, although discontinuous. Bulging of the buccal fat pad (deep to the deep fascia) distends the superficial cheek soft tissues, contributing to labiomandibular fold fullness, not the jowl.¹¹

Aside from subperiosteal plane surgery, aesthetic surgery is only performed deep to the deep fascia in certain places, where the superficial anatomy is not separated from the deep anatomy by bone, such as the buccal fat in the central cheek, and also the orbital fat and submandibular gland surgery in the upper neck.

NOMENCLATURE AND SMAS FUSION ZONES

Facelift surgeons know through dissecting within the layers of the superficial anatomy that, in certain locations, vertically oriented membranes connect the horizontal tissue layers, particularly between the SMAS and the deep fascia. These membranes are a form of ligament present between the horizontal structures.^{12,13} They do not “travel,” as described in the text,¹ as do vessels and nerves that proceed in a direction to a final destination.

The extensive review of the classic literature and discussion of anatomical nomenclature forms a sizeable part of Dr Pessa’s paper in fulfilling his objective that “all of the concepts and ideas discussed herein are dependent on work that has come before.”¹ The cited evidence seems compelling at first, but on review, the reality is that the historical precedents are not all that strong and not necessarily a sufficient basis for supporting the nomenclature proposed. The important term “fusion zones” is a prime example. Specifically, the word *fusion* where used in the classic Grodinsky 1938 article refers to a fusion between laminae of the deep fascia in the neck, not in the context of between superficial and deep fasciae.¹⁴ “Zone of fusion” was mentioned by Gaughran, but only once, and also not in the context of superficial fascia.¹⁵ Rather, as a fusion of adjacent parts of the same level, deep fascia “it (the buccal nerve) passes laterally, within the zone of fusion between the lateral pterygoid and deep temporal fasciae.”¹⁵

Use of the word “zones” in *fusion zones* is not inherently appealing because by definition “zones” have a dimension of area,¹⁶ whereas the structural fusion described is largely

mediated by septal membranes, which are essentially two-dimensional and hardly constitute areas.

The author’s use of the term “compartment” to describe the series of discrete subcutaneous fat compartments that fill with the injected dye was fortunate. By convention, these compartments are specifically located in the subcutaneous layer. This contrasts with the specifically located series of level 4, *sub-SMAS spaces*.¹⁷ Anatomical communication requires the topographical location to be added, as in *medial cheek compartment*, *premasseteric space*, and so on.

Pessa points out the difficulty reconciling use of the term *space* with the previously described deep abscess spaces, beneath the deep fascia. These deep spaces have a specific surgical meaning that allowed some of them to include anatomical content even though by dictionary definition, a space is a “free, unoccupied expanse.”¹⁸ The sub-SMAS spaces are located in the picture frame outside the central cheek. These spaces function to enhance movement of the superficial soft tissues that overlie the spaces and continue over the central cheek. Delineation of the sub-SMAS spaces is a major advance for modern facelift surgery because they have an inherent safety as a plane for surgical dissection, being a void, free of important anatomical content.¹⁹

CONCLUSION

In conclusion, this anatomical “tour de force” is built on previous work as described by the author. It seems to be largely about facial ligaments, although ligaments as an entity are not specifically addressed. The concept has been developed into a system of supporting structures collectively called “SMAS fusion zones.” Unfortunately, this proposed terminology is likely to add confusion for the reasons given, but this does not negate the concept, which is most helpful in understanding facial anatomy.

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