Contents

1 A Three-Dimensional Approach to Facial Anatomy for the Injector

Abstract
Facial anatomy for the injector is predicated upon a strong understanding of the three-dimensional architecture of the face. This chapter will describe the concentric layers of the face as well as the symphony of structures in the face that can be utilized by the injector to optimize outcomes.

Keywords: Superficial musculoaponeurotic system (SMAS), retaining ligaments, potential spaces, facial fat compartments

1.1 Facial Skeleton

Anatomy for the facial injector is unique and complex. It is paramount that the injector has a comprehensive understanding of the three-dimensional architecture of the face. The authors urge injectors to consider the superficial musculoaponeurotic system (SMAS) as a depth gauge to assist in navigating from superficial to deep and vice versa during clinical injection.

Simplistically, the face has five concentric layers (▶ Fig. 1.1, ▶ Fig. 1.2, ▶ Fig. 1.3, ▶ Fig. 1.4).

- **Layer 1** is the facial skeleton and periosteum.
  - Facial skeleton loses bone mineral density with age resulting in morphological changes.
- **Layer 2** is the “sub-SMAS” plane.
  - It contains deep fat compartments, potential spaces, and the origins of the “true” osseocutaneous retaining ligaments.
- **Layer 3** is the SMAS layer.
- **Layer 4** is the “supra-SMAS” layer.
  - It contains the superficial fat compartments and the retinacular cutis extension of the “true” osseocutaneous retaining ligaments.
- **Layer 5** is the skin.

1.2 The Birthday Cake Analogy (The Layers of the Face)

A relatable analogy is comparing the facial layers to a two-tiered birthday cake. The platter of the cake is the facial skeleton, which undergoes resorption and alteration during the aging process. The first layer of cake is the “sub-SMAS” layer containing the deep facial fat compartments, potential spaces (i.e., upper temporal space aka interfascial plane, prezygomatic space, deep pyriform space), and the origins of the “true” osseocutaneous retaining ligaments (i.e., main zygomatic retaining ligament, orbital retaining ligament, zygomaticocutaneous retaining ligaments, mandibular osseocutaneous retaining ligament, platysma mandibular ligament). The middle layer of icing is the SMAS layer. In several locations in the face, the vasculature is commonly intertwined within the confines of SMAS layer and its analogues such as the superficial temporal fascia.

The top layer of cake is the “supra-SMAS” plane that contains the superficial fat compartments of the face, which are divided by vascular septae as well as the retinacular cutis of the facial retaining ligaments. One could consider the structure of the osseocutaneous retaining ligaments as a tree. In the deep layer of the face, the ligament is robust and compact like the trunk of a tree. As the ligament traverses superficial through the SMAS to eventually insert onto the skin the ligament “arborizes” into a branching pattern titled the retinacular cutis.

The top layer of icing is the skin which contains topographic anatomy reflecting the deeper layers of the face and their respective anatomical structures (i.e., lid–cheek junction, nasojugal groove, nasolabial fold, marionette crease) (▶ Fig. 1.5, ▶ Fig. 1.6, ▶ Fig. 1.7, ▶ Fig. 1.8).

1.3 The SMAS as a “Depth Gauge”

As the facial injector navigates the anatomy of the face, consideration should be given to the interplay and/or symphony of structures that contribute to each three-dimensional subunit in the face. For example, the injector can use the SMAS as a depth gauge to predictably access the deep layer of the face or as a stopping point to remain in the subcutaneous layer of the face. Then the injector can target specified fat compartments and/or potential spaces building between or within the facial retaining ligaments while exercising the appropriate amount of caution to avoid the vessels and lymphatics.

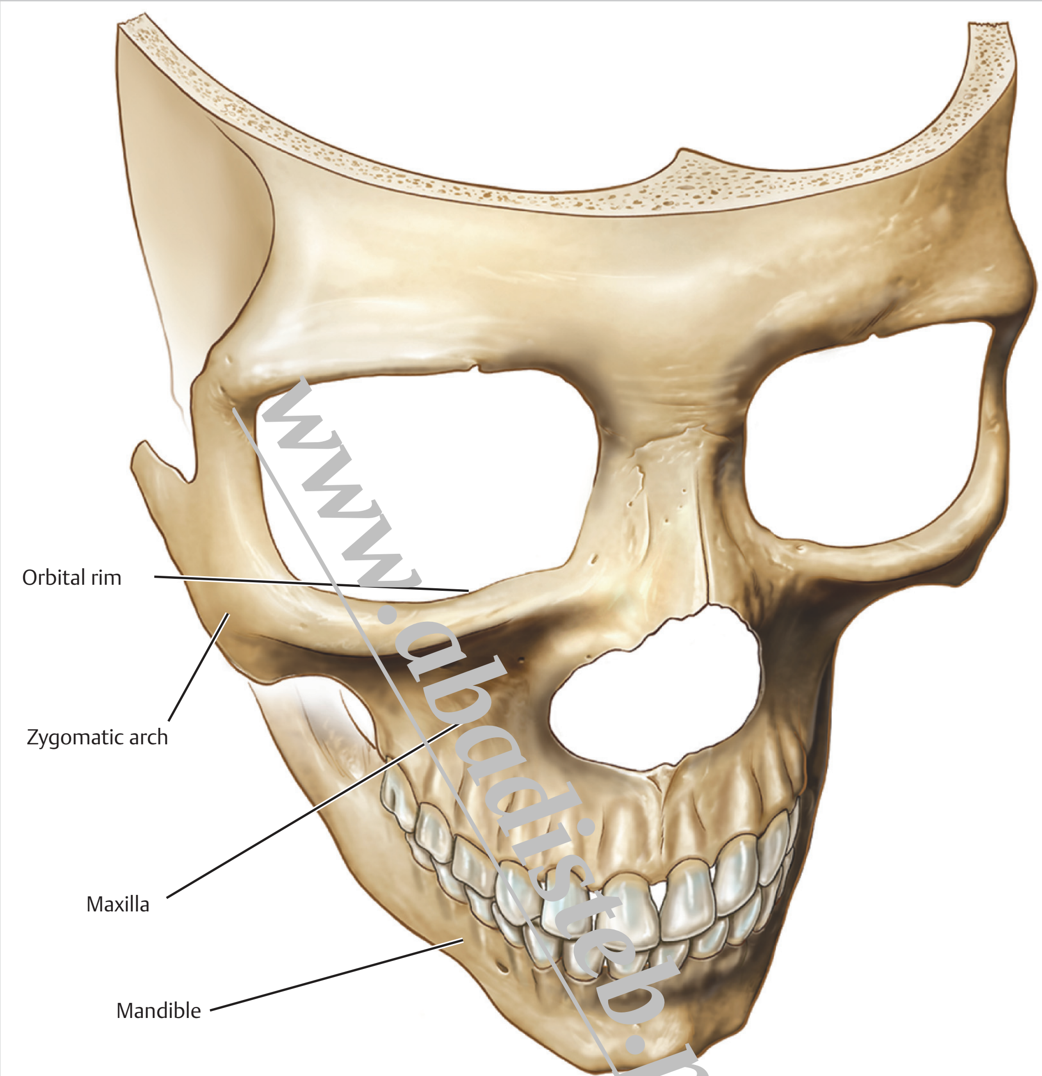

Fig. 1.1 Anatomic illustration of the facial skeleton. © Dr. Levent Efe, CMI.

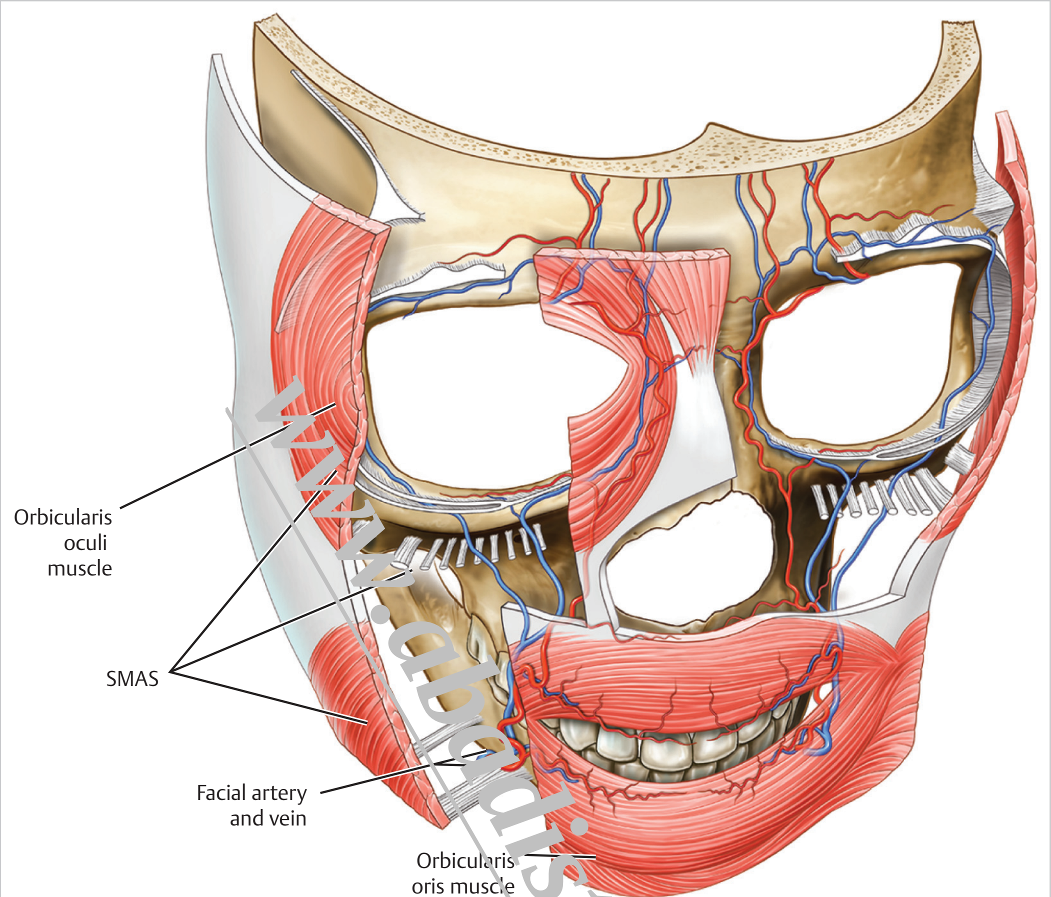

Fig. 1.2 Anatomic illustration of layer 4 of the face, also known as the "sub-SMAS plane" that contains the deep fat compartments of the face, the origin of the osseocutaneous retaining ligaments, and the gliding potential spaces of the face. SMAS, superficial musculoaponeurotic system. © Dr. Levent Efe, CMI.

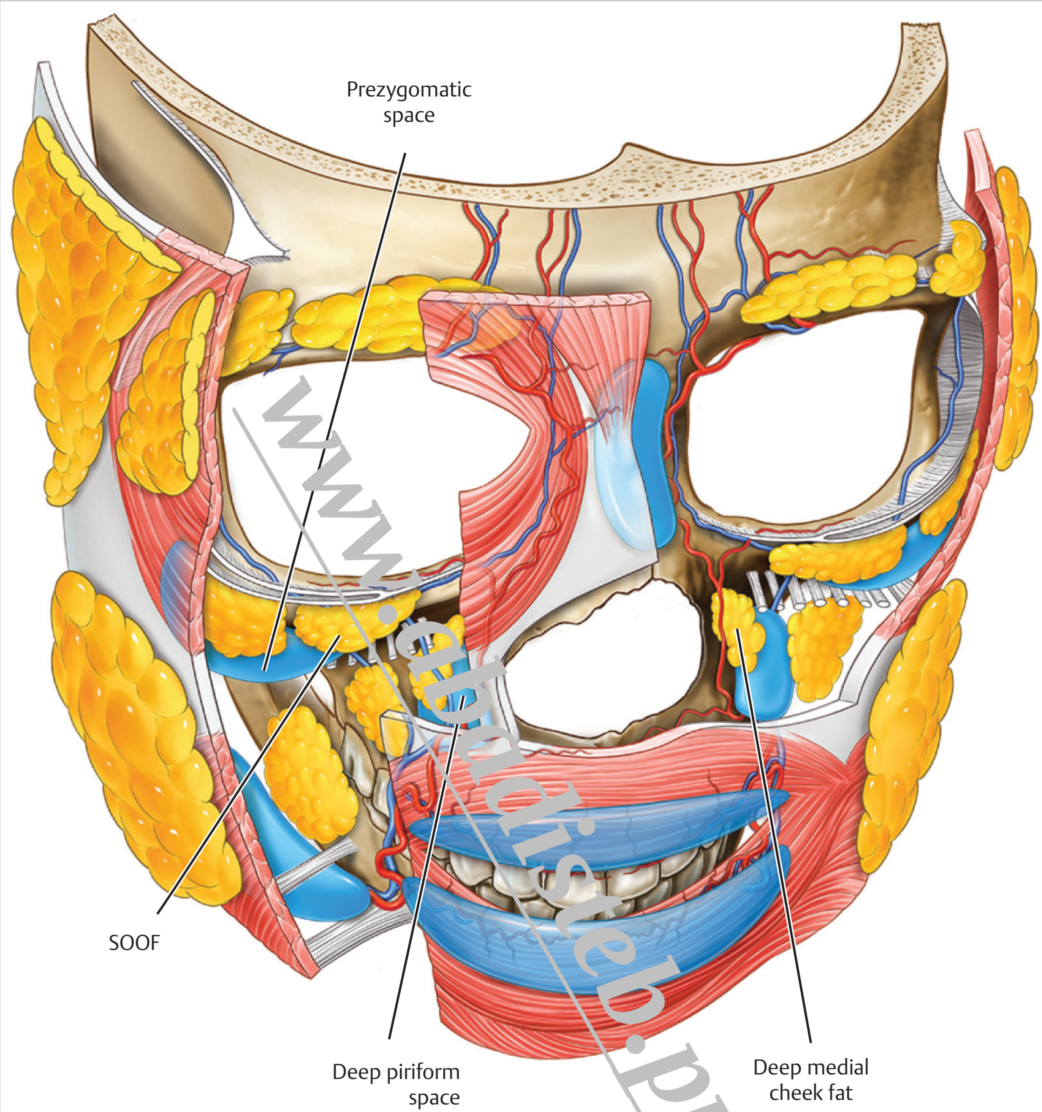

Fig. 1.3 Anatomic illustration of layer 3 of the face, also known as the "SMAS plane" that contains the muscles of facial animation as well as the arterial vasculature of the face in certain locations. SOOF, suborbicularis oculi fat. © Dr. Levent Efe, CMI.

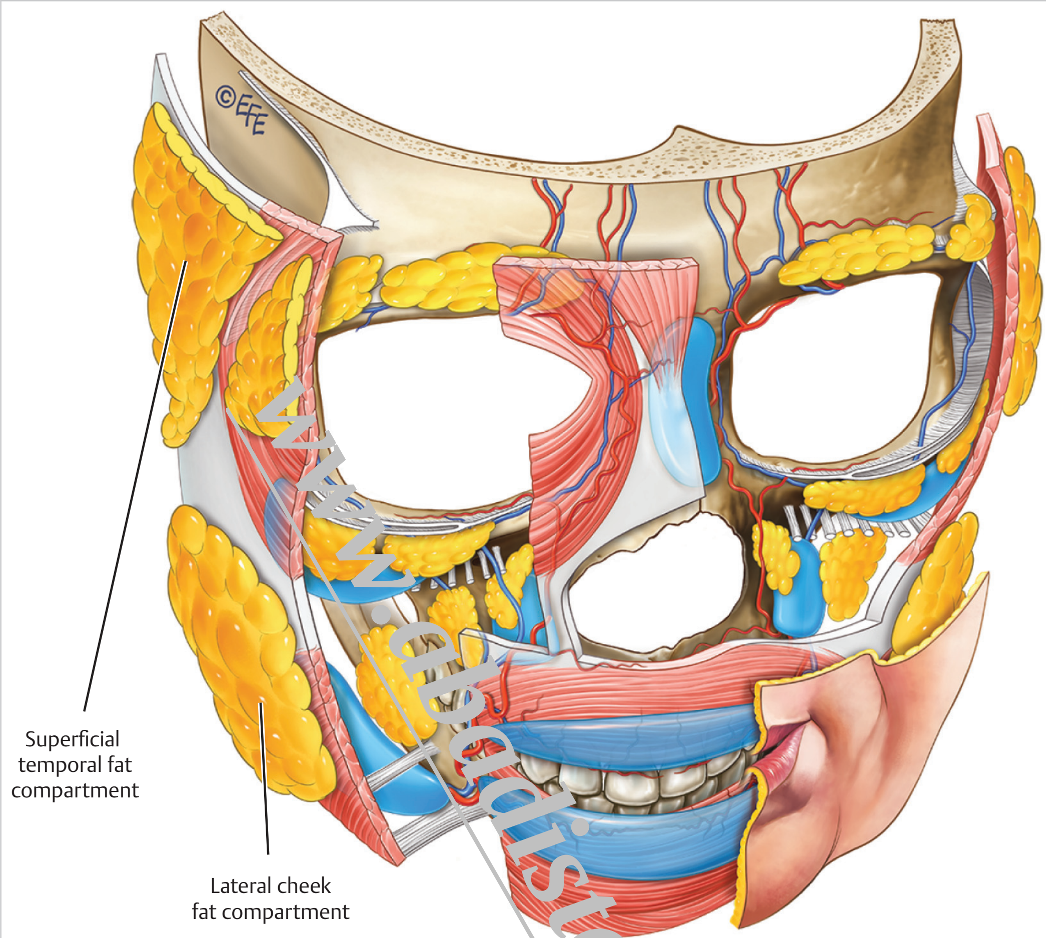

Fig. 1.4 Anatomic illustration of layer 2 of the face containing the superficial fat compartments and the branching retinacular cutis of the osseocutaneous retaining ligaments. © Dr. Levent Efe, CMI.

2 Layered Anatomy of the Upper Face

Abstract
The upper face contains the temple, forehead, and glabella. With age, the temporal fossa is visualized due to soft tissue change and atrophy. Injection technique for temple volumization can be performed in multiple locations. Glabellar vasculature communicates closely with the ophthalmic vasculature. A comprehensive understating of upper facial vasculature is critical for the facial injector. This chapter will describe the three-dimensional layering of the temple, outlining possible targets for injection procedures as well as the vascular anatomy of the temple and glabellar regions. Anatomical descriptions are then complemented by detailed ultrasound visuals and technique pearls when imaging the upper face anatomy.

Keywords: Superficial temporal fascia, deep temporal fascia, superior temporal septum, inferior temporal septum, intermediate temporal fat pad, superficial temporal fat compartment, superficial temporal artery, supratrochlear artery, supraorbital artery, upper temporal space, interfascial plane

2.1 Temple

The layers of the temple are complex. A multilevel approach is often warranted when performing temple volumization procedures. The bony temple hollow becomes uncamouflaged with age. There is minimal bony change in the temporal fossa with age. Soft tissue atrophy of the temporalis muscle and intermediate temporal fat pad unveils the anterior–inferior bony trough of the temple fossa over time.

In this chapter, we will describe the temple layer by layer from deep to superficial. The temple fossa is composed of the parietal, temporal, frontal, and sphenoid bones. The first layer in the temple is the temporal extension of the buccal fat pad. Next is the temporalis muscle, which is covered the deep layer of deep temporal fascia (D-DTF). The deep and middle temporal arteries travel on the deep surface of the temporalis muscle and form a robust arterial network. The anterior deep temporal arteries are 1.5 to 2 cm lateral to the lateral orbital rim; therefore, deep supraperiosteal injections are recommended within 1 cm of the lateral orbital rim to avoid the deep temporal arteries which have connections to the ophthalmic vasculature. The D-DTF is a continuation of the periosteum of the frontal bone (▶ Fig. 2.1, ▶ Fig. 2.2).

The deep temporal fascia (DTF) splits into a deep layer (D-DTF) and superficial layer (S-DTF) which wraps around the intermediate temporal fat pad. This has been described as a potential target for volumization. However, the fat pad often contains a branch of the middle temporal vein. It is recommended to access this fat pad through direct visual guidance only with ultrasound to ensure accuracy and avoid vascular sequalae. The middle temporal vein runs 20 mm superior to the zygomatic arch and joins the superficial temporal vein above the level of the arch (▶ Fig. 2.3, ▶ Fig. 2.4).

Key Point

The muscles of mastication (masseter and temporalis) have a different embryologic origin than the muscles of facial expression. Therefore, the masseter and temporalis are covered by deep facial fascia whereas the muscles of facial expression (mimetic muscles) are commonly invested in the superficial facial fascia also known as the superficial musculoaponeurotic system (SMAS).

The next layer is an open gliding potential space called the upper temporal space, also known as the interfascial plane. This potential space is bounded superiorly and inferiorly by fascial septa. These septa travel from the DTF to superficial temporal fascia (STF), which is continuation of the SMAS in the temple. The superior boundary is the superior temporal septum (STS). This STS runs along the bony temporal crest, which can be easily palpated during clinical assessment. The inferior boundary is the inferior temporal septum (ITS). Clinically, this can be marked on the surface of the skin using an oblique line from the superior lateral orbital rim to the root of the helix. The ITS is an important landmark as it often stabilizes rami branches of the frontal branch of the facial nerve as well as anterior arterial branches of the superficial temporal artery (STA) (▶ Fig. 2.5, ▶ Fig. 2.6).

The next layer after the upper temporal space (aka interfascial plane) is the STF, which is synonymous with the SMAS. It has been shown that the arterial branches of the STA often travel within the