Discussion: The Tear Trough Ligament: Anatomical Basis for the Tear Trough Deformity

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In their cadaveric study of 36 hemifaces, the authors describe a ligamentous structure that arises from medial orbital rim periosteum and inserts into dermis. The authors suggest that this is an osteocutaneous ligament that defines the anatomical area referred to as the tear trough or medial nasojugal crease. The conclusion of the article is that the tear trough ligament is the primary etiologic factor in the development of the tear trough deformity; effective treatment requires submuscular preperiosteal release to effect a marked correction.

This study defines a tear trough ligament that originates from the maxilla near the medial canthal tendon inferior to the lacrimal crest. It travels to the medial pupillary line, where it becomes continuous with the bilaminar orbicularis retaining ligament. The dissections are meticulous; the anatomy is precise; and the work is clinically relevant in that it explains why release of the orbicularis origin helps to diminish the tear trough deformity. This classic article advances some of the authors’ previous work and ideas concerning lower eyelid and cheek anatomy.

The present work addresses one of the most difficult areas and concepts in facial anatomy: the submuscular fascial network of the face. Work in this field began in the late 1800s with Juvara’s early work on spaces and fascial membranes. Other studies, including articles by Collier and Yglesias and Grodinsky and Holyoke from the 1930s defined fusion zones as part of this network. More recently, the concept of facial ligaments has been investigated by a number of authors over the past 30 years. This article defines the ligamentous structure of the tear trough region. An anatomical discussion focuses on the presence, possible function, and exact extent of the facial ligaments.

The authors’ work adds validity to the concept of submuscular ligamentous attachments of the face. The pertinent literature has been cited. Points of fixation have been described in the forehead, lower eyelid, and cheek. These may represent points of suspension, as suggested by the authors. Release of these ligaments is then required if the surgical goal is to reposition or elevate soft tissue.

There exists another possible function for these soft-tissue ligaments. Fixation of the facial muscles to periosteum, a valid definition of the term “ligament,” has been noted in association with the orbicularis oculi muscle. This occurs when the orbicularis oculi muscle changes in position from deep to superficial, at the lid-cheek junction, as it courses toward the orbital rim.

We have observed that this also occurs with the platysma muscle, and probably with the orbicularis oris muscle as well. It is noteworthy that ligaments are associated with all of these muscles as they course over a bony margin. In the case of the platysma muscle, there is a ligament that travels from the muscle to the mandibular border. With the orbicularis oris muscle, a ligament travels from the undersurface of the muscle to the maxilla and mandible.

In each case, fascial attachments originate from the undersurface of these facial muscles and insert into bone when the muscle travels over a free bony margin. This adds a point of fixation for the action of the muscle, in effect providing an insertion point as a fulcrum for motion. These muscles—the orbicularis oculi and oris, and platysma—do not otherwise have strong origin at bone, unlike other facial muscles such as the levator labii or angularis muscles. Conceptually, the orbicularis retaining ligament, and the platysma ligament (the mandibular ligament), are bilaminar because fascia from the undersurface of the muscle above and below the bony margin contributes to the structure. This concept suggests this...
possible functional role for the submuscular ligamentous structure of the face. This factor may be a consideration when one plans to release any specific submuscular ligament.

As to the exact extent of the tear trough ligament, it may be open to debate whether this is a submuscular structure or whether it is osteocutaneous as suggested. The authors provide good evidence in the way of histology that this membrane spans the distance from bone to dermis. However, early studies on the orbicularis retaining ligament suggested it too was osteocutaneous. Our studies show that the supramuscular ligamentous system, a system that stabilizes blood supply and determines the adipose compartments, inserts along the same line as does the proposed insertion of the tear trough ligament. In other words, there is a supramuscular ligamentous system with dermal insertions from superficial fascia (superficial musculoaponeurotic system) that coincides with the tear trough crease and lid-cheek junction. At the present time, our personal opinion and research suggest the latter concept. Only time and additional research will clarify this point.

The authors do state that other factors help to determine the tear trough deformity, notably, the difference in thickness of subcutaneous fat above and below the corresponding crease. This is true of the lid-cheek junction as well. There are two ways to conceptualize this zone. First, there are two different parts of orbicularis oculi muscle above and below the tear trough and lid cheek, the preseptal and preorbital orbicularis oculi muscle. One wonders whether these might be different muscular bellies entirely, as they have different origins from the rim and maxilla, as noted by the authors. The other point is that the thickness of adipose tissue is inversely proportional to the motion required of the muscle. Adipose tissue acts as a supporting structure; where more motion is required (lower eyelid, preseptal muscle), less adipose tissue is present. This is also true for the upper and lower lips and the orbicularis oris muscle. The tear trough is then determined, in part, by the difference in thickness of subcutaneous fat, making it a true fold along with a corresponding crease.

Other etiologic factors are discussed, such as maxillary retrusion. Faces with a more prominent tear trough deformity almost always display compression of the soft-tissue envelope and a deficient surface area of maxillary bone. This occurs with an enlarged pyriform aperture and increased orbital aperture, a finding associated with aging. The point is that a multifactorial cause may require that several factors be addressed for the most efficacious correction.

This information is relevant in many other ways. When describing the face, it is convenient to refer to the lower eyelid, cheek, and nasal sidewall, although these are more often than not seemingly arbitrary subregions of the face. The presence of submuscular fascial membranes provides definitive boundaries between anatomical regions or zones. In the present work, the tear trough ligament distinguishes a deep boundary between the lower eyelid and the cheek medially. The orbicularis retaining ligament is the deep boundary between these regions more laterally. This adds description precision to our most basic anatomical terminology. It is also clinically relevant: injection of any filler cephalad to the tear trough ligament risks intraorbital injection.

The authors are to be congratulated for their article, which details a previously unknown structure. It is methodical, detailed, and precise in its description. It furthers our understanding of lower eyelid and cheek anatomy, adds precision to anatomical terminology, and will certainly benefit current techniques that address the region of the tear trough deformity.

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REFERENCES