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

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Background: The exact anatomical cause of the tear trough remains undefined. This study was performed to identify the anatomical basis for the tear trough deformity.
Methods: Forty-eight cadaveric hemifaces were dissected. With the skin over the midcheek intact, the tear trough area was approached through the preseptal space above and prezygomatic space below. The origins of the palpebral and orbital parts of the orbicularis oculi (which sandwich the ligament) were released meticulously from the maxilla, and the tear trough ligament was isolated intact and in continuity with the orbicularis retaining ligament. The ligaments were submitted for histologic analysis.
Results: A true osteocutaneous ligament called the tear trough ligament was consistently found on the maxilla, between the palpebral and orbital parts of the orbicularis oculi, cephalad and caudal to the ligament, respectively. It commences medially, at the level of the insertion of the medial canthal tendon, just inferior to the anterior lacrimal crest, to approximately the medial-pupil line, where it continues laterally as the bilayered orbicularis retaining ligament. Histologic evaluation confirmed the ligamentous nature of the tear trough ligament, with features identical to those of the zygomatic ligament.
Conclusions: This study clearly demonstrated that the prominence of the tear trough has its anatomical origin in the tear trough ligament. This ligament has not been isolated previously using standard dissection, but using the approach described, the tear trough ligament is clearly seen. The description of this ligament sheds new light on considerations when designing procedures to address the tear trough and the midcheek. (*Plast. Reconstr. Surg.* 129: 1392, 2012.)

The nasojugal groove, commonly known as the tear trough, is a distinct cutaneous groove that extends inferolaterally from the medial canthus to approximately the medial pupillary line and becomes progressively more prominent with aging[1,2] (Fig. 1). Extending laterally from this point is the palpebromalar groove.[3] With more advanced aging, these two grooves connect to become a continuous groove that sharply demarcates the bulging orbital fat above, from the retruded midcheek below. This groove is commonly known as the lid-cheek junction (Fig. 2).[3,4]

The tear trough deformity is such an important aesthetic concern that it is one of the most discussed landmarks in facial aesthetic surgery. However, its exact anatomical origin remains essentially unknown, with various authors offering conflicting descriptions of its anatomy. These include the following: (1) it is the prominence of the

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Fig. 1. The tear trough is a cutaneous groove extending inferolaterally from the medial canthus to approximately the midpupillary line.

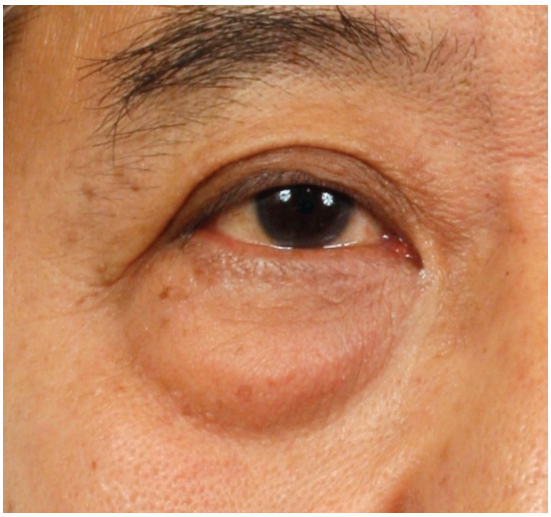
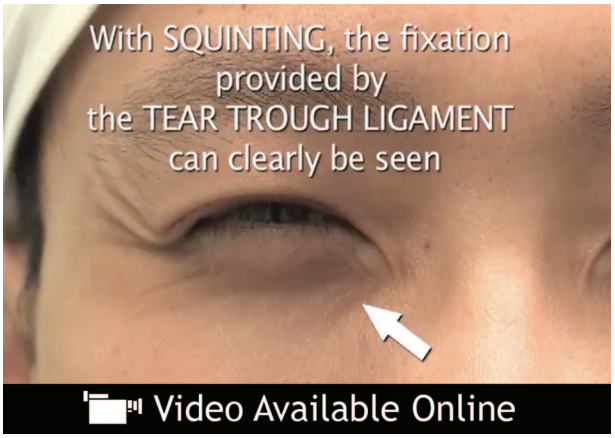


Fig. 2. With more advanced aging, the tear trough becomes continuous with the palpebromalar groove laterally. The presence of prominent lower lid bags accentuates this deformity. This appearance is descriptively called a prominent lid-cheek junction.

orbital rim resulting from descent of the malar fat pad; (2) it is the attachment of the orbital septum to the arcus marginalis; (3) it is the result of a loss of fat in the tear trough or herniation of the orbital fat superior to the trough; (4) it is the result of a triangular confluence of the origins of the orbicularis oculi, the levator labii superioris alaeque nasi, and the levator labii superioris; and (5) it is a "cleft" between the palpebral and orbital parts of the orbicularis oculi.[1,2,5–9] These conflicting descriptions highlight the widespread confusion and ongoing uncertainty regarding the anatomy of the tear trough. It is significant that the exact anatomical basis of the tear trough deformity has never been conclusively seen on dissections up to this point.

The tear trough is not exclusively a feature of aging, as it can be seen in some young people. It does, however, become more pronounced with age, and when fully manifest, it is regarded as a deformity. Also, the tear trough is not static but changes with animation.[10] This can best be appreciated in younger patients in whom the tear trough is not obvious at rest. Observing the patient in the video, in repose, the tear trough is not evident and there is a smooth transition between the preseptal and nasolabial segments of the midcheek. (**See Video, Supplemental Digital Content 1**, which demonstrates the dynamic changes of the tear trough with animation, ***http://links.lww.com/PRS/A499***.) With squinting, however, there is an upward movement of the palpebral and orbital parts of the orbicularis oculi, as indicated by the surface puckering of the delicate periorbital skin. A distinct line of tethering with relative immobility can clearly be seen over the exact location of the tear trough. Areas of relative immobility such as this seen in other areas of the face are usually the result of internal fixation provided by facial retaining ligaments.[11–14] The palpebromalar groove arises as a result of fixation provided by the lateral part of the orbicularis retaining ligament, the orbitomalar ligament.[14,15] Accordingly, the continuity of the tear trough with the palpebromalar groove strongly suggests that the deformity may in fact have its anatomical origin from an undocumented ligament in the medial suborbital area. This cadaveric dissection study was designed to systematically ex-



Video 1. Supplemental Digital Content 1 demonstrates the dynamic changes of the tear trough with animation, ***http://links.lww.com/PRS/A499***.

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plore the anatomy of the tear trough and its surrounding tissues.

MATERIALS AND METHODS

In total, 24 fresh cadaver heads (48 hemifaces) were dissected in this study. A preliminary dissection of six heads (12 hemifaces) was performed to understand the area and to enable us to develop a technique of dissection that would allow us to consistently and reliably identify the structures of interest, principally the tear trough ligament. Then, the definitive series of 18 cadaveric heads (36 hemifaces) was systematically dissected to define the anatomy, dimensions, and relations of the tear trough ligament.

Dissection Approach

The tear trough was marked with a skin marker. Through a transcutaneous lower eyelid approach, the preseptal space was opened bluntly to define its lower boundary formed by the orbicularis retaining ligament laterally and the palpebral origin of the orbicularis oculi medially.[16] Then, a line was marked from the lateral canthus to the angle of the mandible. The upper half of the line was incised and carried through the roof of the prezygomatic space, containing the orbicularis oculi, allowing the space to be entered and then developed bluntly to define its upper boundary, formed by the orbicularis retaining ligament.[15] Medially, at the level of the medial canthus, a vertical incision was made over the ascending process of the maxilla and carried down to the periosteum. Through this incision, the palpebral and orbital parts of the orbicularis oculi originating off the maxilla could be seen. Caudally, between the orbicularis oculi origin and the levator labii superioris, a plane exists, and this can be connected with the previous prezygomatic space dissection laterally, using blunt dissection. The skin and soft tissue overlying this dissection are then incised. The ligament of interest has now been isolated.

Using outward traction on the skin overlying the medial tear trough, a distinct fibrous structure can be appreciated between the palpebral and orbital parts of orbicularis oculi. This is the tear trough ligament. Using blunt dissecting scissors, the muscle can be separated cleanly from the upper and lower surfaces of the ligament and released from the maxilla across its entire extent from the medial canthus to the midpupillary line. With this dissection approach, we were able to consistently isolate the tear trough ligament in continuity with the orbicularis retaining ligament laterally. (**See Video, Supplemental Digital Content 2**, which demonstrates our approach to dissecting and isolating the tear trough ligament, ***http://links.lww.com/PRS/A500***.) The location of the origin of the tear trough ligament on the maxilla and its vertical and horizontal dimensions, and that of the palpebral and orbital parts of the orbicularis oculi, cephalad and caudal to the ligament, respectively, were measured. The tear trough ligament was harvested in its entirety and submitted for histologic analysis. Comparative analysis with the zygomatic ligament was also performed.

RESULTS

The preliminary dissection of 12 hemifaces noted the following findings. At the level of the skin and subcutaneous tissue, the tear trough forms the boundary between the preseptal segment above and the nasolabial segment below.[3] In the preseptal segment, the skin was extremely thin and delicate, and subcutaneous fat was absent. In contrast, in the nasolabial segment, the skin was thicker and subcutaneous fat was present in abundance. At a deeper level, a distinct separation was consistently seen between the palpebral (cephalad) and orbital (caudal) parts of the orbicularis oculi origin off the maxilla (Fig. 3). This corresponds to the exact location of the tear trough. These findings were consistent with the previous study by Haddock et al.[8] However, we found that it was not possible to reliably demonstrate the tear trough ligament using a layer-by-layer approach as used by previous authors.

Using our dissection approach through the facial soft-tissue spaces as described, we were able to consistently isolate a true osteocutaneous liga-

Video 2. Supplemental Digital Content 2 demonstrates our approach to dissecting and isolating the tear trough ligament, ***http://links.lww.com/PRS/A500***.

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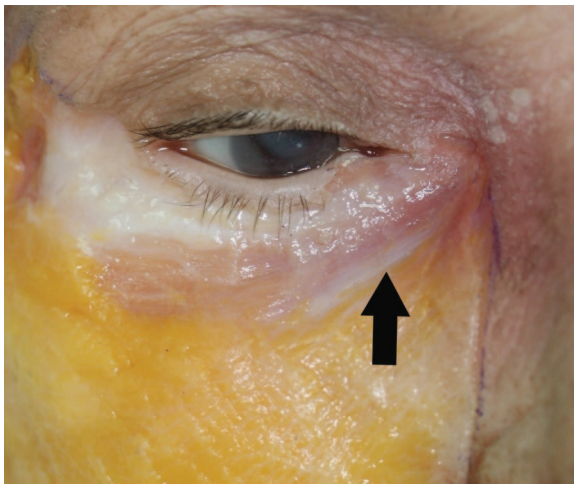

Fig. 3. The skin has been removed in the specimen. It can be seen that in the preseptal segment, subcutaneous fat is absent. Below this, abundant subcutaneous fat is present. A "cleft" (*arrow*) can be seen between the palpebral (*above*) and orbital (*below*, covered by subcutaneous fat) parts of the orbicularis oculi. This cleft is located in the exact location of the tear trough and has previously been referred to erroneously as the cause of the tear trough deformity.

ment, which we called the tear trough ligament, in all of our definitive dissections on 36 fresh hemifaces. This ligament was sandwiched between the origins of the palpebral and orbital parts of the orbicularis oculi, immediately cephalad and caudal to the ligament, respectively (Fig. 4). This osteocutaneous ligament was noted to arise from the maxilla and to insert firmly into the skin at the exact location of the tear trough (Fig. 5). The ligament extended from the level of the insertion of the medial canthal tendon, immediately inferior to the anterior lacrimal crest, to approximately the line of the medial pupil, where it continues laterally as the orbicularis retaining ligament. The cephalocaudal dimension of the combined attachments of the palpebral and orbital parts of the orbicularis oculi (with the tear trough ligament sandwiched in between) spanned a mean distance of 8 mm (range, 6 to 10 mm) at it widest. The tear trough ligament itself was less than 0.5 mm in thickness. This septum-like ligament was extremely strong. For example, when grasped with a hemostat, the head could be rocked vigorously without the ligament tearing. Histologic analysis confirmed the ligamentous nature of the tear trough ligament (Fig. 6). It was histologically identical to the zygomatic ligament, the most widely recognized osteocutaneous ligament in facial anatomy (Fig. 7).[13]

The tear trough ligament continues laterally from the medial pupil line as the orbicularis retaining ligament, which in turn continues as the lateral orbital thickening at the lateral canthus (Fig. 8). Consistent with the findings of Muzaffar et al., the orbicularis retaining ligament was noted to be a bilayered structure, with a mean maximal separation of 5 mm (range, 4 to 8 mm) between the superior and inferior lamella of the ligament inferolaterally (Fig. 9).[16] The continuous tear trough–orbicularis retaining ligament originated from the maxilla, the orbital process of the zygoma, and the body of the zygoma more laterally. Its origin is distinct from and not related to the arcus marginalis, which arises from the inferior

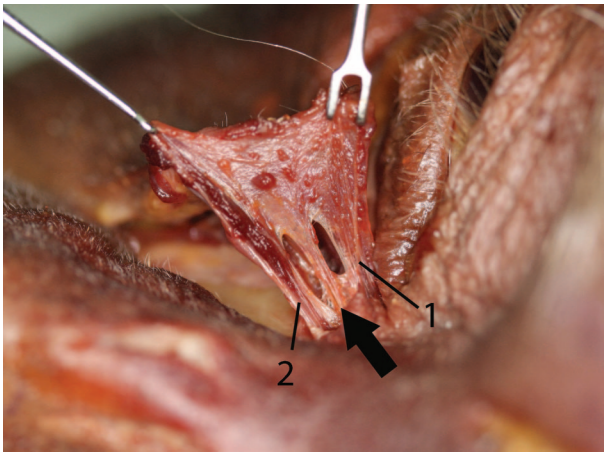

Fig. 4. Medially, at the level of the medial canthus, a vertical incision was made down to the maxilla. The origins of the orbicularis oculi off the maxilla were tented up. The ligamentous structure is clearly seen (*arrow*) between the palpebral (*1*) and orbital (*2*) parts of the orbicularis. This is the tear trough ligament.

Fig. 5. The orbicularis origins have been separated meticulously from the ligament and divided. The osteocutaneous nature of the tear trough ligament is clearly seen, originating from the maxilla and inserting densely in the skin at the exact location of the tear trough.

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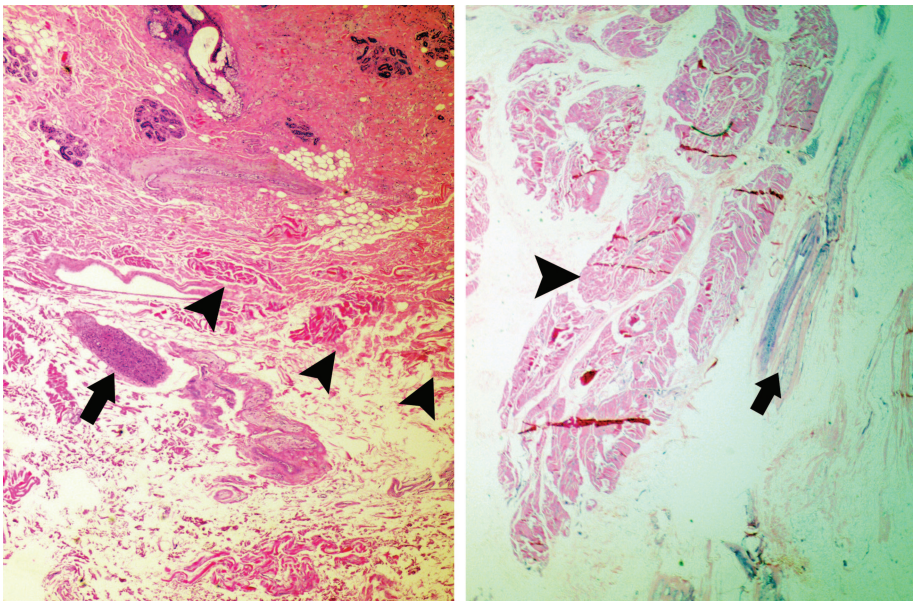

Fig. 6. Hematoxylin and eosin stain of the tear trough ligament. (*Left*) Dense ligaments (*arrowheads*) inserting into the reticular dermis proved the osteocutaneous nature of the tear trough ligament (original magnification, ×10). (*Right*) At higher magnification (40×), highly organized and densely packed collagen bundles of the ligaments can be clearly seen (*arrowhead*). Several nerves can also be seen in close association with ligament (*arrow*).

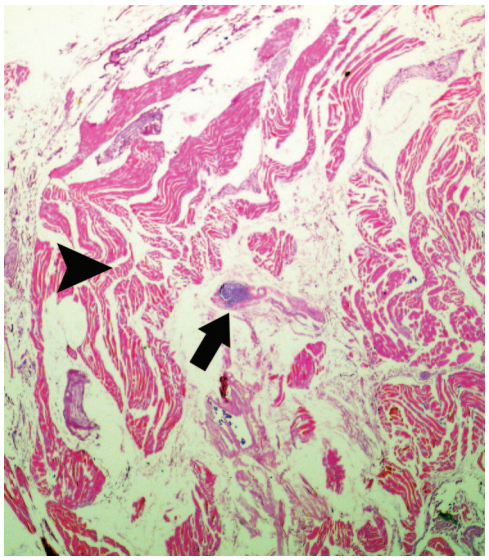

Fig. 7. Hematoxylin and eosin stain of the zygomatic ligament. Histologically, the tear trough ligament appears identical to the zygomatic ligament, with well-organized, densely packed collagen bundles (*arrowhead*) and nerves in close association with the ligament (*arrow*).

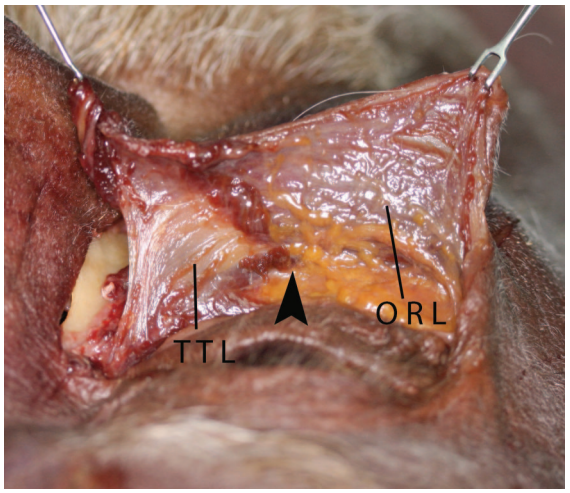

Fig. 8. The tear trough ligament (*TTL*) extends from just below the anterior lacrimal crest to approximately the level of the medial pupil (*arrowhead*), where it continues laterally as the bilayered orbicularis retaining ligament (*ORL*).

orbital rim proper and is a separate structure that is part of the septum orbitale. With reference to the right orbit, the tear trough–orbicularis retaining ligament takes its origin at a mean distance of 1, 3, 7, 6, and 5 mm from the infraorbital rim at the 3-, 4-, 5-, 6-, and 8-o'clock positions, respectively (the 3-, 4-, and 5-o'clock positions measured the distance from the orbital rim to the tear trough ligament, whereas the 6- and 8-o'clock positions measured the distance from the rim to the orbicularis retaining ligament).

The tear trough ligament is shorter medially and becomes progressively longer from medial to

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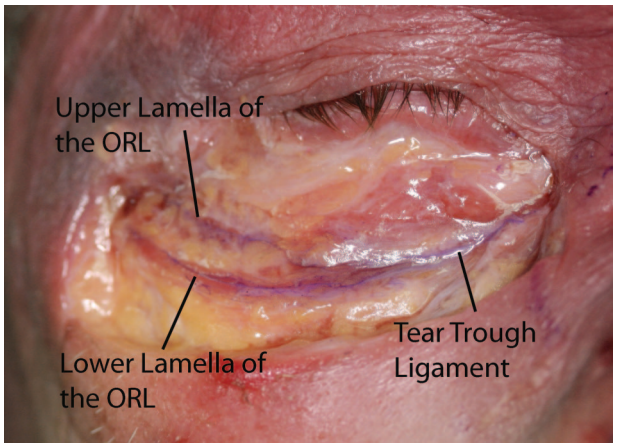

Fig. 9. The tear trough ligament–orbicularis retaining ligament complex has been marked and divided. The orbicularis retaining ligament (*ORL*) is a bilayered structure, merging medially as the tear trough ligament.

lateral. Medially (at the level of the medial canthus), the mean length was 7 mm (range, 5 to 10 mm) from its origin on the bone to its insertion into the dermis. Laterally at the medial pupil (just before it joins the bilayered orbicularis retaining ligament), the mean length of the ligament was 16 mm (range, 14 to 18 mm). The mean length of the orbicularis retaining ligament in its central and lateral parts was 17 mm (range, 16 to 19 mm) and 20 mm (range, 18 to 21 mm), respectively. In summary, from its commencement, at approximately the level of the insertion of the medial canthal tendon, immediately inferior to the anterior lacrimal crest, to the point where it continues as the orbicularis retaining ligament, the tear trough ligament diverges progressively from the crest, to be located approximately 7 mm below the rim at its lateral end. In addition, the medial part of the ligament is shorter (approximately 7 mm) and the ligament lengthens progressively as it passes laterally to be approximately 16 mm.

Of note, because the skeletal origin of the palpebral part of the orbicularis is cephalad to the tear trough ligament, when approached from the lower lid, the interval from the medial orbital rim to the muscle attachment is only approximately 1 to 2 mm. The tear trough–orbicularis retaining ligament has the effect of tethering and holding the orbicularis oculi and malar fat pads down onto the skeleton. Significant elevation of the upper nasolabial segment and malar fat pad can be achieved only after complete release of the orbicularis retaining ligament *and* the tear trough ligament (Fig. 10).

DISCUSSION

This study demonstrated that a true osteocutaneous ligament, called the tear trough ligament, arises from the maxilla and inserts into the skin along the exact location of the tear trough (Fig. 11). Among the factors that contribute to the prominence of the tear trough deformity, the primary etiologic factor is the tethering effect of the tear trough ligament, binding the medial suborbital skin to the maxilla. Secondary contributory factors are the contrasting tissue quality and quantity both above and below the tear trough.[8–10] Above the trough, the preseptal skin is thinner and subcutaneous fat is absent. Also, a darker discoloration of the skin ("dark eye circles") is usually present. Below this, the skin is thicker and subcutaneous fat more abundant. Bulging orbital fat (above the ligament) and maxillary retrusion,[17–20] tissue descent, and atrophy[4,8] (below the ligament) account for the increasing prominence of the tear trough deformity with aging.

The tear trough ligament continues laterally as the bilayered orbicularis retaining ligament.[15,16] This anatomy explains the clinical observation that with more advanced aging, the tear trough becomes continuous with the palpebromalar groove laterally. The cutaneous groove, formed by the tethering provided by the tear trough–orbicularis retaining ligamentous system, is the anatomical basis for the "prominent lid-cheek junction" that develops with aging. Our observations confirmed the findings of Ghavami et al. that the ligaments are arranged circumferentially around the orbit.[21] Based on the findings of this study, the continuous circumferential periorbital ligaments can now be redefined as follows: inferomedially, it is the tear trough ligament, which continues inferolaterally as the orbicularis retaining ligament; laterally, it becomes the lateral orbital thickening, and this continues as the periorbital septum of the upper orbit.[21,22]

It is intriguing that this ligament has not been identified previously. In fact, Haddock et al. have stressed that there is no evidence of any ligament in the tear trough.[8] This discrepancy may be related to the dissection approach used. The layer-by-layer dissection approach has been widely used to study the anatomy of this region.[8,10,23] We found that the process of removing the skin also transects the cutaneous attachments of this osteocutaneous ligament, allowing it to recoil and retract. This results in the distinct cleft between the origins of the palpebral and orbital parts of the orbicularis oculi, which has previously been referred to erro-

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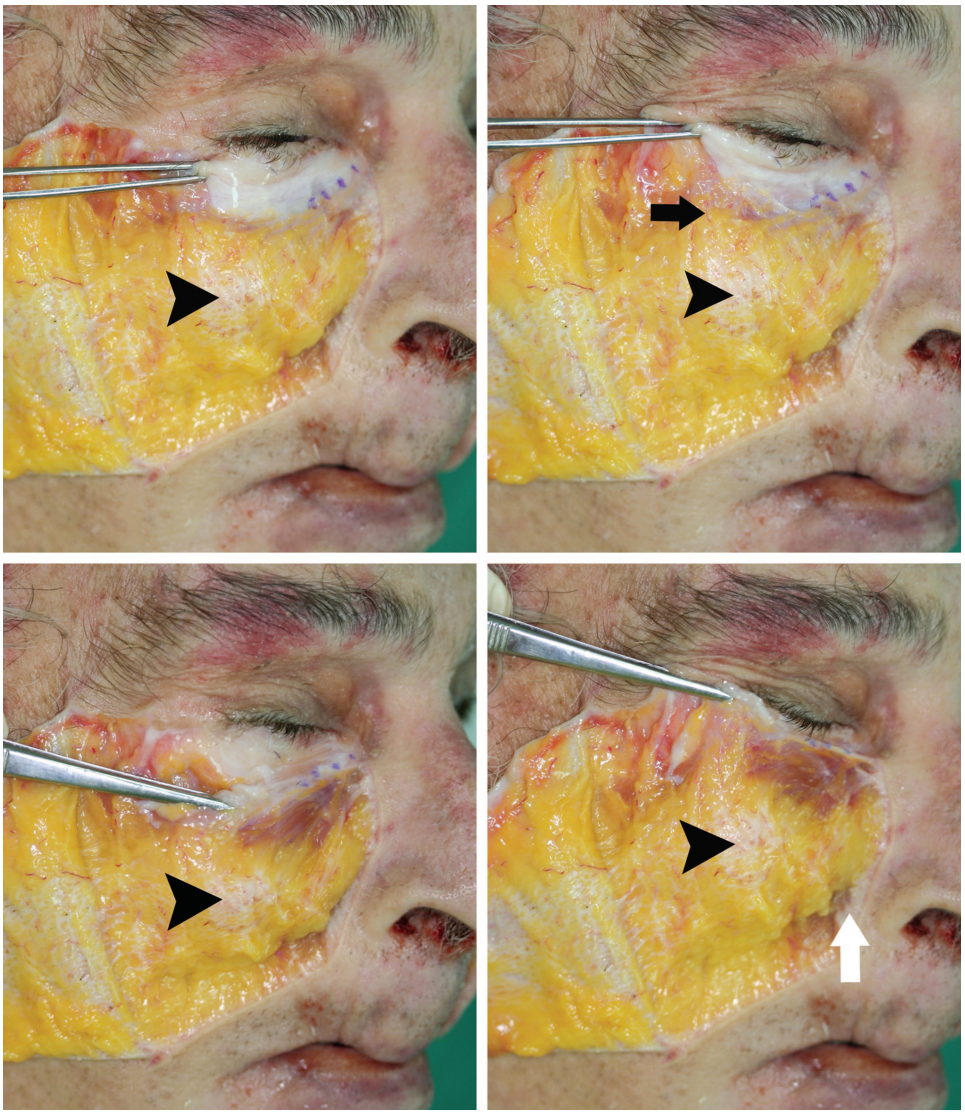

Fig. 10. In this specimen, the skin has been removed to allow visualization of the midcheek fat. The *arrowheads* point to the exact same point on the midcheek. (*Above*) With the tear trough–orbicularis retaining ligament intact, upward traction on the orbicularis oculi has no effect on the upper nasolabial and malar segments of the midcheek. Tethering was seen all along the tear trough–orbicularis retaining ligament at the lid-cheek junction. (*Below*) With the tear trough–orbicularis retaining ligament completely released, upward traction on the orbicularis oculi elevates the upper midcheek. Note elevation of the upper nasolabial segment achievable with this release (*white arrow*).

neously as the cause of the tear trough deformity. In retrospect, then, this cleft is essentially a dissection artifact. Clinically, it is also very challenging to identify the ligament with the surgical access permissible (i.e., through the lower eyelid). Although it is extremely robust, it is very thin, with a thickness of less than 0.5 mm when placed under tension. This may be an adaptation for extremely delicate tissue in the medial suborbital area that needs only a thin ligament for effective tissue support. Because the palpebral and orbital origins of the orbicularis oculi are so intimately associated with the tear trough ligament itself, it is extremely difficult to discern this detailed relationship during the preperiosteal release of the orbicularis oculi off the maxilla in the tear trough region (Fig. 12). As a result, the ligament is often divided without being noticed by the surgeon.

The tear trough ligament has important clinical implications for both nonsurgical and surgical

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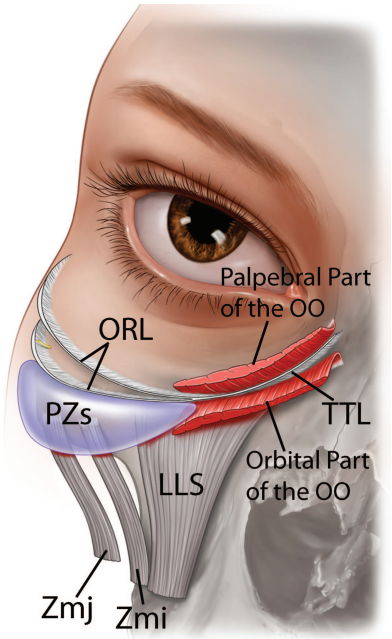

Fig. 11. Schematic depiction of the tear trough ligament, the anatomical basis for the tear trough deformity. *TTL*, tear trough ligament; *ORL*, orbicularis retaining ligament; *OO*, orbicularis oculi; *PZs*, prezygomatic space; *LLS*, levator labii superioris; *Zmj*, zygomaticus major; *Zmi*, zygomaticus minor.

correction of the tear trough deformity. Nonsurgical techniques that have been described for the correction of tear trough deformity are volume based, including the use fat and hyaluronic acid.[10,24–27] In general, these techniques are useful only for patients with mild manifestations of the tear trough deformity and small protrusions of the lower lid fat pads, without significant tissue laxity.[10] Nonsurgical procedures do not disrupt the tear trough ligament. The effectiveness of fillers in softening the tear trough deformity is attributable to restoration of the volume to the deficient medial suborbital area, caudal to the location of the tear trough ligament. This has the benefit of reducing the visibility of the defect by ameliorating the tethering effect of the ligament. Accordingly, the filler should be placed in the area below the tear trough ligament (Fig. 13). It should not be placed above or directly into the tear trough, as this can aggravate the deformity.[10] Adding volume cephalad to the tear trough ligament would have the same visual effect as the presence of prominent lower lid bags in highlighting the tear trough deformity. Similarly, placement directly into the groove of the tear trough, at a superficial level, may amplify the tethering effect of the dermal

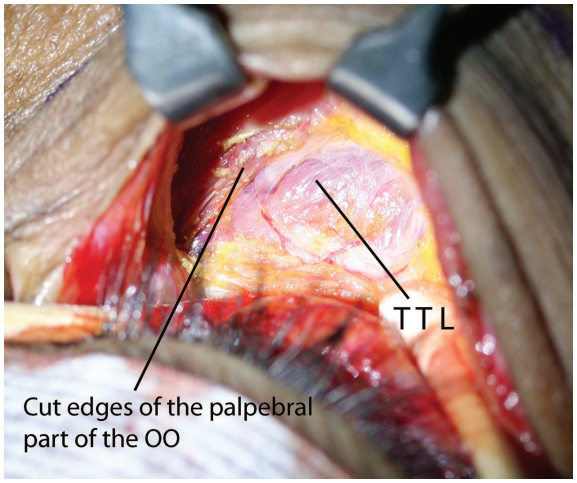

Fig. 12. A distinct, white, fibrous structure was seen after the palpebral part of the orbicularis oculi (*OO*) was divided at the preperiosteal plane. This is the tear trough ligament (*TTL*). The fibers of the orbital part of the orbicularis oculi, located just beyond the tear trough ligament, can be discerned through this semitranslucent ligament. This ligament is so thin that it is often released without being noticed with the division of the origins of palpebral and orbital parts of the orbicularis oculi off the maxilla.

Fig. 13. (*Above*) This patient has a significant tear trough, with minimal lower lid bags and skin excess. He was not enthusiastic about surgical correction of this deformity. (*Below*) The patient is shown after 0.4 cc of hyaluronic acid (Juvéderm Ultra; Allergan, Inc., Irvine, Calif.) was injected preperiosteally on each side, with placement of the filler strictly below the tear trough ligament. This effectively softened the tear trough deformity.

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insertions of the ligament, aggravating the tear trough deformity.

Surgically, the tear trough ligament has implications for two interrelated aspects of midcheek rejuvenation: (1) the correction of the tear trough deformity itself and (2) its impact on procedures design to elevate the midcheek.[28] The tear trough ligament needs to be released completely as a prerequisite to efface or at least soften the tear trough deformity. This is particularly so for patients with moderate to severe manifestations of the deformity. Many procedures described in the literature that are effective in managing the tear trough may have already been doing this, without the surgeon's aware of its existence.[29–39] In preperiosteal procedures to address the tear trough, it is generally accepted that the orbicularis oculi origin needs to be completely released off the maxilla medially.[29] The effectiveness of releasing the orbicularis origin in managing the tear trough can now be explained anatomically in that this maneuver would also completely transect the tear trough ligament located between the two parts of the orbicularis oculi. Subsequent maneuvers, such as medial fat pad transposition or septal reset, are also important, as they have the benefit of preventing reattachment of the tear trough ligament to the maxilla and adding volume inferior to the ligament. Subperiosteal techniques to address the tear trough have also been described. With this approach, the osteocutaneous tear trough ligament is detached off the maxilla at the subperiosteal level.[31,32,34,35]

When considering procedures designed to elevate the midcheek, the tear trough ligament (like the orbicularis retaining ligament located more laterally) functions as the key retaining ligament of the midcheek. Therefore, for effective mobilization of the midcheek, the entire tear trough ligament–orbicularis retaining ligament complex needs to be released completely[40,41] (Fig. 14). Hamra noted that with his zygorbicular dissection, he was able to achieve profound lifting of the midcheek with traction on the orbicularis oculi. This in part may be attributed to the completeness of his preperiosteal (suborbicularis) release of the *key* midcheek retaining ligaments, that of the hemicircular continuous retaining ligament formed by the tear trough ligament medially and the orbicularis retaining ligament laterally.[40] Le Louarn noted that for the nasolabial segment to be elevated with lateral tightening of the orbicularis oculi, in addition to release of the orbicularis retaining ligament laterally, two additional structures need to be released medially. These are the medial

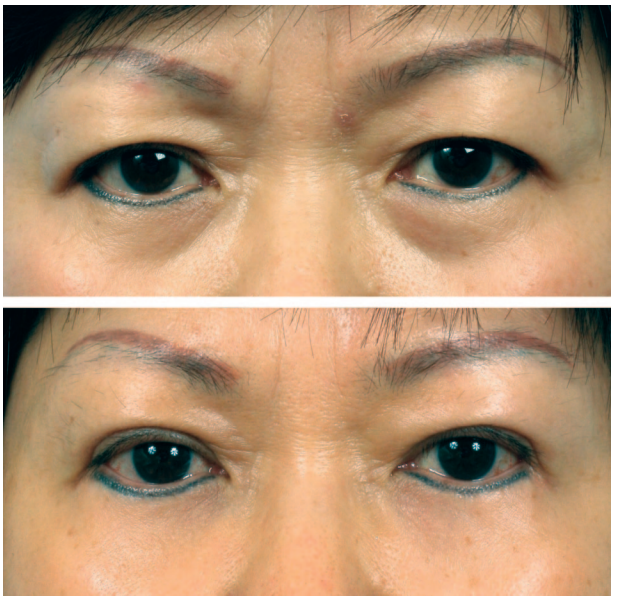

Fig. 14. (*Above*) A 54-year-old woman is shown with a deep tear trough that continues as the palpebromalar groove laterally. (*Below*) The patient is shown at 1 year postoperatively, following a brow lift, upper lid blepharoplasty, lower lid blepharoplasty, and midcheek lift. The tear trough–orbicularis retaining ligament complex was released completely through a transcutaneous lower lid approach to achieve an effective midcheek elevation with transposition of the central and medial lower lid fat pads to efface the tear trough.

insertion of the septal part of the orbicularis oculi and what he called the medial insertion of the superior malar part of the orbicularis oculi (this is the orbital part of the orbicularis oculi).[41] Releasing these two orbicularis origins inherently results in the division of the tear trough ligament, which is located between them. This is consistent with our findings that the tear trough ligament needs to be released completely for effective upper midcheek redraping.

As a technical note, the combined attachment of the palpebral and orbital parts of the orbicularis is wider than is generally appreciated (spanning a mean distance of 8 mm cephalocaudally at its widest). As noted, to ensure that the ligament is released completely, the origin of the palpebral and orbital parts of the orbicularis oculi should be disinserted completely from the maxilla. This should be performed as close to its insertion on the bone as possible to avoid injuring motor nerves and vessels running in close association with the muscle. These include the terminal branches of the buccal and zygomatic nerves and the angular vein more medially.[42] Complete muscle release is heralded by visualization of

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the fibers of the levator labii superioris. The fibers of the levator are orientated differently from those of the orbicularis oculi and they do not tent with upward traction on the orbicularis oculi (Fig. 15). With subperiosteal dissection, once the infraorbital nerve is seen exiting the infraorbital foramen, one can be sure that sufficient caudal dissection has been performed beyond the attachment of the tear trough ligament because the infraorbital foramen is caudal to the origin of the levator labii superioris, which itself is caudal to the orbital part of the orbicularis oculi and thus the tear trough ligament.

CONCLUSIONS

First, a true osteocutaneous ligament, called the tear trough ligament, exists in the medial suborbital region of the maxilla, extending from the level of the insertion of the medial canthal tendon, just inferior to the anterior lacrimal crest, to approximately the medial pupil line. Second, the tear trough ligament is the main etiologic factor responsible for the tear trough deformity. Third, the tear trough ligament is continuous laterally as the bilayered orbicularis retaining ligament. This is the anatomical basis for the clinical manifestation of a deep lid-cheek junction (a continuation of the tear trough medially with the palpebromalar groove laterally) seen with more advanced aging. Finally, the tear trough ligament has a profound impact on procedures that are designed to improve the tear trough and lift the midcheek. It must be released completely as a first step in eliminating the tear trough. For midcheek lifts, the tear trough ligament–orbicularis retaining ligament complex must be released completely to effect elevation of the entire midcheek.

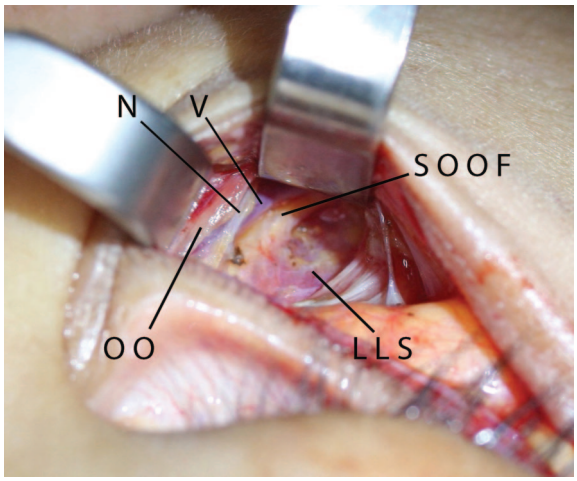

Fig. 15. Clinically, complete release of the orbicularis origin (*OO*) (with concomitant release of the tear trough ligament) is confirmed by visualization of the levator labii superioris (*LLS*) in the floor and the sub–orbicularis oculi fat (*SOOF*) above. Note the close association of the angular vein (*V*) and terminal branches of the zygomatic nerve (*N*) with the orbicularis oculi muscle medially. Injury to these structures could be avoided during the preperiosteal release of the muscle by staying very close to the bone.

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PATIENT CONSENT

Patients provided written consent for the use of their images.

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