

INTRODUCTION

Lower eyelid entropion is an eyelid malposition in which the lower eyelid margin is turned inward against the globe. The keratinized skin of the eyelid margin and the eyelashes rub against the inferior cornea and bulbar conjunctiva, causing irritation. ^(1, 2)

Patients with a lower lid entropion tend to seek medical advice early because of the troublesome symptoms. Lower lid entropion can be classified into four types; involutional, cicatricial, acute spastic and congenital entropion.

In the lower eyelid, involutional changes typically result in either a lower lid entropion or ectropion, whereas in the upper eyelid the same changes result in ptosis. A combination of factors has been proposed to account for the eyelid malposition. These are:

1. Laxity, dehiscence or disinsertion of the lower eyelid retractors.
2. Over-riding of the preseptal orbicularis oculi muscle over the pretarsal part.
3. Horizontal eyelid laxity.
4. Enophthalmos.

Any surgical treatment should aim to address these factors with the exception of enophthalmos. It has not been

shown to be a significant factor in the etiology of involutional lower eyelid entropion.

Laxity, dehiscence or disinsertion of the lower eyelid retractors is the primary cause of involutional entropion. This lower eyelid retractor problem allows the inferior edge of the tarsus to rotate away from the globe. Horizontal eyelid laxity leads to instability of the eyelid. The preseptal orbicularis appears to force the lower eyelid margin inward. ^(1, 2)

AIM OF THE STUDY

The aim of this study was to assess the value of lower lid retractors re-attachment in repair of involutional entropion.

Chapter 1

ANATOMY OF THE LOWER EYELID

Eyelid Margin

The eyelid margin is divided into a medial lacrimal portion and a lateral palpebral or ciliary portion by the lacrimal punctum. Medially, the margin is rounded without lashes and carries the lacrimal canaliculus a variable depth beneath its surface. A cross-section through the eyelid at this point demonstrates pretarsal muscle encompassing the canaliculus. The papilla lacrimalis is a fibrous ring within the medial end of the tarsus; the canaliculus dives anteriorly to the ampulla and located on the anterior eyelid margin. The ciliary portion shows cilia and their number is 50 in the lower lid. Two sebaceous glands (Zeis's glands) empty into each follicle. Between each follicle is a spiral sweat gland (Moll's gland) ending either onto the eyelid margin, or open in a sebaceous gland duct, or a follicle. ⁽³⁾

Just in front of the posterior edge of the margins of the lids are the orifices of the tarsal glands which mark the site of the junction between the skin and conjunctiva. A greyish sulcus can be seen running along the eyelid margin between eye lashes and the openings of the tarsal glands. This grey line is important surgically because it serves as a plane along which the eyelid may be split into anterior lamella (skin and muscle) and posterior lamella (tarsus and conjunctiva). Structure of the

eyelid from superficial to deep consists of skin, subcutaneous tissue, striated muscle fibers of orbicularis oculi, orbital septum and tarsal plates, smooth muscle, and conjunctiva.⁽⁴⁾

Orbicularis Oculi Muscle

The orbicularis oculi (**Fig. 1**) is a complex striated muscle that lies just below the skin. It is divided anatomically into three contiguous parts; the orbital, preseptal, and pretarsal portions.^(5, 6)

The orbital portion overlies the bony orbital rims. It arises from insertions on the frontal process of the maxillary bone, the orbital process of the frontal bone and from the common medial canthal tendon. Its fibers pass around the orbital rim to form a continuous ellipse without interruption at the lateral palpebral commissure and insert just below their points of origin.^(2, 6)

The palpebral portion of the orbicularis muscle overlies the mobile eyelid from the orbital rims to the eyelid margins. The muscle fibers sweep circumferentially around each lid as a half ellipse, fixed medially and laterally at the canthal tendons. Although this portion forms a single anatomic unit in each eyelid, it is customarily further divided topographically into two parts; the preseptal and pretarsal orbicularis.

The preseptal portion of the muscle is positioned over the orbital septum in both upper and lower eyelids and its fibers

originate perpendicularly along the upper and lower borders of the medial canthal tendon. Fibers arc around the eyelids and insert along the lateral horizontal raphe. ^(2, 7)

The pretarsal portion of the muscle overlies the tarsal plates. Its fibers originate from the medial canthal tendon via separate superficial and deep heads, arch around the lids and insert onto the lateral canthal tendon and raphé. Contraction of these fibers aids in the lacrimal pump mechanism. ^(2, 7)

Medially the deep heads of the pretarsal fibers fuse to form a prominent bundle of fibers, Horner's muscle that runs just behind the posterior limb of the canthal tendon. It inserts onto the posterior lacrimal crest. Horner's muscle helps maintain the posterior position of the canthal angle, tightens the eyelids against the globe during eyelid closure and may aid in the lacrimal pump mechanism. ^(2, 8)



Figure (1): Different parts of orbicularis oculi muscle
a) Pretarsal. b) Preseptal. c) Orbital. ^(5, 6)

Relations and innervations of orbicularis oculi muscle

The palpebral part has areolar tissue but no fat on both aspects. Anteriorly, this separates it from the skin; posteriorly, the submuscular areolar layer separates it from tarsal plates, nerves and fibers of levator. The orbital part spreads above on the forehead, laterally on the temple and below on the cheek overlapping the zygomatic bone and elevator muscles of the lip and nostril. Anteriorly it is separated from the skin by a layer of fat, to which it is adherent and thus to skin. ⁽⁹⁾

The pars lacrimalis (Horner's muscle) which is a thin layer attached behind the lacrimal sac to the upper posterior lacrimal crest and lacrimal fascia. Passing anterolaterally, it divides into two slips around the canliculi and blends with the pretarsal and ciliary parts of orbicularis on both lids. The pars ciliaris (muscle of Riolan) formed of fine striated muscle fibers. The ciliary glands (of Moll) are between these fibers and palpebral parts of orbicularis. They also surround the tarsal glands.

Orbicularis oculi is innervated by the facial nerve through its temporal and zygomatic branches which enter the muscle from its lateral side and deep aspect. ⁽⁹⁾

The Orbital Septum

The orbital septum (**Fig. 2**) is a thin fibrous multilayered membrane anatomically beginning at the arcus marginalis along the orbital rim and represents a continuation of the orbital fascial system. Distal fibers of the orbital septum merge into the anterior surface of the levator aponeurosis.^(10, 11) The point of insertion is usually about 3 to 5 mm above the tarsal plate, but may be as much as 10 to 15 mm.⁽¹²⁾ In the lower eyelid the septum fuses with the capsulopalpebral fascia several millimeters below the tarsus, and the common fascial sheet inserts onto the inferior tarsal edge.^(13, 14)

The septum can always be identified at surgery by pulling it distally and noting firm resistance against its bony attachments. Immediately behind the septum are yellow fat pockets that lie immediately anterior to the levator aponeurosis in the upper lid and the capsulopalpebral fascia in the lower lid. This anatomic relationship is important to note since identification of the levator aponeurosis or capsulopalpebral fascia is critical in many eyelid surgical procedures.



Figure (2): The orbital septum originating from the arcus marginalis of the orbital rim.^(10, 11)

Medial and Lateral Canthal Ligaments

Medially the tarsal plates pass into fibrous bands that form the crura of the medial canthal tendon. These lie between the orbicularis muscle anteriorly and the conjunctiva posteriorly. ⁽²⁾ The superior and inferior crura fuse to form a common tendon that inserts via three limbs.

The anterior limb inserts onto the orbital process of the maxillary bone in front of and above the anterior lacrimal crest. It provides the major support for the medial canthal angle.

The posterior limb arises from the common tendon near the junction of the superior and inferior crura and passes between the canaliculi. It inserts onto the posterior lacrimal crest just in front of Horner's muscle. The posterior limb directs the vector forces of the canthal angle backward to maintain close approximation with the globe. The superior limb of the medial canthal tendon arises as a broad arc of fibers from both the anterior and posterior limbs. It passes upward to insert onto the orbital process of the frontal bone.

The posterior head of the preseptal orbicularis muscle inserts onto this limb and the unit forms the soft-tissue roof of the lacrimal sac fossa. This tendinous extension may function to provide vertical support to the canthal angle, but also appears to play a significant role in the lacrimal pump mechanism. ⁽¹⁵⁾

Laterally the tarsal plates pass into fibrous strands that become the crura of the lateral canthal tendon (**Fig.3**). The lateral canthal tendon is a distinct entity separate from the orbicularis muscle. It measure about 1 mm in thickness, 3 mm in width and approximately 5 to 7 mm in length.

Insertion of these fibers extends posteriorly along the lateral orbital wall where it blends with strands of the lateral check ligament from the sheath of the lateral rectus muscle. ⁽¹⁶⁾

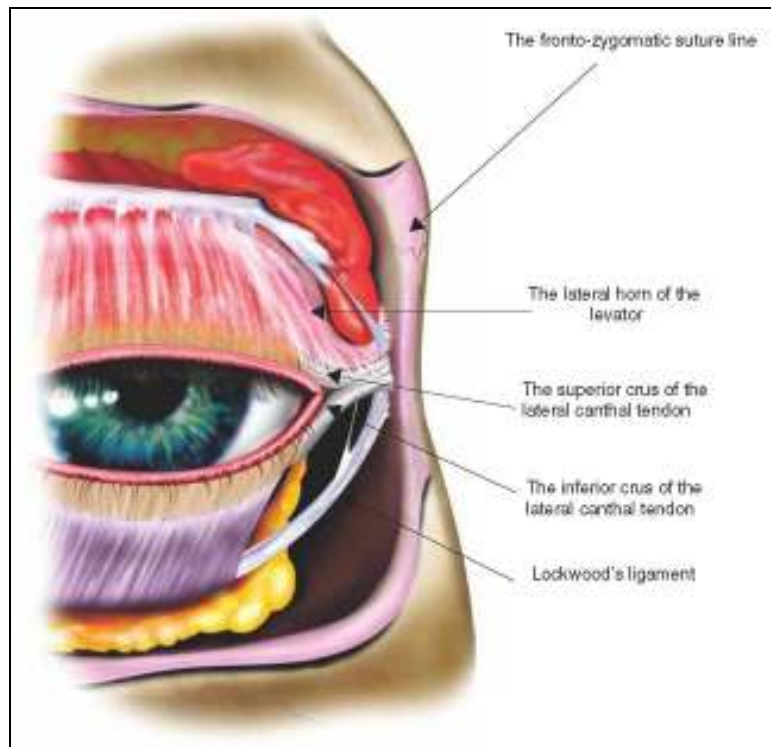


Figure (3): The lateral canthal tendon and its adjacent structures. ⁽²⁾

Lower Eyelid Retractors (Fig.4)

In the lower eyelid, the capsulopalpebral fascia is a fibrous sheet which arises from Lockwood's ligament and the inferior rectus and inferior oblique muscle sheaths. As it passes superiorly the fascia fuses with the orbital septum approximately 4 to 5 mm below the inferior border of the tarsal plate. From this position, a common fascial sheet passes superiorly and inserts onto the inferior border of the tarsus. Fine fibers pass anteriorly from this fascial sheet to the orbital septum and the skin creating the lower eyelid crease in a manner analogous to that of the upper eyelid.⁽²⁾

Smooth muscle fibers analogous to Müller's muscle in the upper eyelid lie posterior to the capsulopalpebral fascia forming a very thin muscular layer. These fibers are also innervated by the sympathetic nervous system. Disruption of the sympathetic innervation of these muscle fibers results in a slight rise in the lower eyelid seen in a Horner's syndrome⁽²⁾.

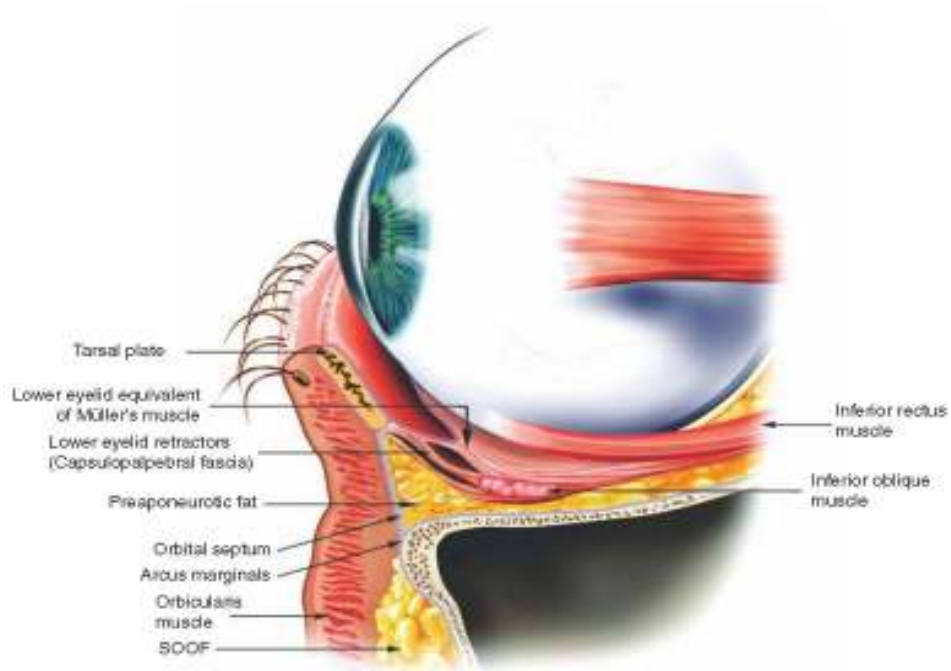


Figure (4): Anatomy of the lower eyelid demonstrated the lower lid retractors. ⁽²⁾

Chapter 2

ENTROPION

Entropion is a turning inward of the eyelid margin and eyelashes toward the globe. While the lower eyelid is most commonly affected, this condition can also involve the upper eyelid. Like ectropion, the causes are numerous but unlike the latter the results may be far more devastating to the eye. It can be unilateral or bilateral. ⁽¹⁷⁻²¹⁾

Involucional entropion is the most common form seen in older individuals related to aging with horizontal and vertical laxity of eyelid suspensory structures particularly the capsulopalpebral fascia. Entropion is more common when the tarsal plate is narrow allowing it to rotate inward. It has many etiologies including inflammation, autoimmune disease, congenital abnormalities and trauma. It is also caused by involutional changes associated with aging and subsequent disruption of the normal eyelid anatomy. ⁽²²⁻²⁴⁾

It is not known to what extent other factors such as sun exposure, chronic blepharitis and Meibomian gland inflammation, irritation-induced eyelid spasm, chronic eyelid manipulation associated with ocular allergy, contact lens insertion, the instillation of ocular medications or conditions such as floppy-eyelid syndrome are also involved. ⁽²⁵⁻²⁷⁾

Clinical evaluation of the lower eyelid

Whatever the specific etiology of entropion, the mucocutaneous border of the eyelid and the lashes are directed towards the globe secondary to the lid malposition. ⁽¹⁷⁻¹⁹⁾

The clinical spectrum of entropion may vary from a mild intermittent backward tilting of the marginal tarsus associated with only occasional corneal touch to severe 180 degree inversion of the entire eyelid with the lashes and skin in full contact with the globe. ⁽²⁰⁻²²⁾

The resulting ocular surface irritation is associated with conjunctival injection, reflex lacrimation, epiphora, and ocular discomfort from corneal epithelial disruption. ^(1, 23, 24)

Corneal abrasion and even frank ulceration may evolve if the condition is not corrected. A secondary blepharospasm is frequently present which exacerbates the condition. ⁽²⁵⁻²⁶⁾

Simple observation will reveal the presence of entropion or ectropion. If not immediately obvious, asking the patient to squeeze the eyelids closed may trigger spontaneous entropion formation. ⁽²⁷⁻³¹⁾

General examination for eye lid laxity

A simple external examination with a pen light is usually sufficient for demonstrating the presence of an entropion. Sometimes a patient will present with the eyelid taped to keep it

from turning inward. Occasionally the entire margin is rolled inwardly making it appear to be absent. Pulling the lower eyelid skin downward will reveal the actual problem as the margin and lashes are exposed. In such cases when the patient blinks or forcibly closes the lids, the entropion will recur. This is also a helpful observation when the condition is intermittent. ⁽³³⁾

There are several simple tests for demonstrating the involutional changes associated with entropion. ⁽²⁸⁻³²⁾

Eyelid laxity and canthal tendon weakness can be demonstrated by the **snap –back test (Fig. 5)** and the eyelid distraction test. The former is performed by pulling the lower eyelid downward with a finger and then slowly releasing it. Normally, the eyelid will “snap-back” to its normal position almost immediately. Any delay in this indicates eyelid laxity. Severe laxity is evident when the eyelid completely fails to return to its resting position. ⁽³³⁾

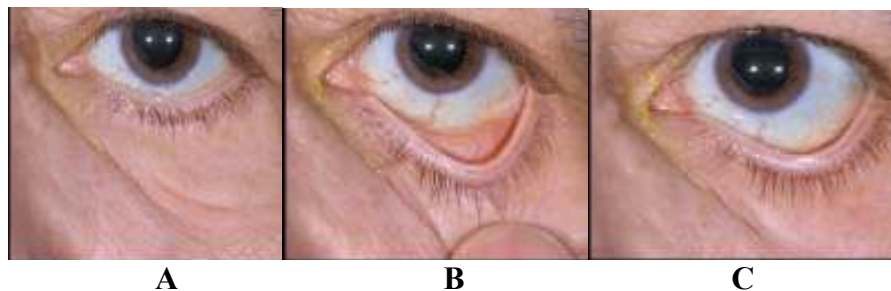


Figure (5): Lower eyelid laxity determined with the snap-back test. **A.** The lid in normal position after a blink; **B.** The lid is pulled forward away from the eye; **C.** Before another blink the lax lid fails to snap back against the eye indicating significant laxity. ⁽³³⁾