Ophthalmic Plastic Surgery for the General Ophthalmologist

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To my wife, Adrienne
—who makes it all worthwhile.

Introduction

In the period since World War II tremendous strides have been made in the field of surgery of the lids and adnexa. This has been mainly due to the demands of traumatic repair both in wartime and in peacetime, high speed mechanized society, and increased emphasis on cosmetic appearance both in younger and older generations. All of this has led to the development of the subspecialty of ophthalmic plastic surgery involving ophthalmology with special application of the principles of plastic surgery and knowledge of maxillofacial surgery. Indeed, a whole new breed of super specialists has emerged with special postgraduate training and experience in this area. This is all well and good in handling complex cases of trauma or tumor reconstruction or certain complicated aspects of lacrimal surgery. However, in some cases it has also had the unfortunate side effect of intimidating the general ophthalmic surgeon into a feeling of insecurity in handling many aspects of common problems of the lid and adnexae. Most of these problems are well within the capabilities of the general ophthalmic surgeon.

It is entirely appropriate that ophthalmic plastic surgery be done by the ophthalmologist rather than being given by default to interested parties in other related fields. To be sure, there are instances when the team approach may be of great benefit, particularly in cases where the area of surgery or repair extends over a larger area of the face. However, in general, the basic aim of surgery of the lids and orbit is to protect the globe and its visual function. In addition, any complications of the surgery usually pertain to the eye itself and, therefore, require the skills of the ophthalmologist. We are familiar with the use of fine instruments and suture material working within a small space, sometimes even under a microscope.

The purpose of this book is to provide a practical handbook of currently used ophthalmic plastic surgical procedures which should be within the armamentarium of the general ophthalmic surgeon. The procedures described are being used by the author in private practice and are being taught to residents at Mt. Sinai Hospital and Manhattan Eye, Ear and Throat Hospital in New York City. No attempt is made to provide a compendium of all of the many possible procedures available, but rather a few useful procedures are presented for each of several problems which are compatible with current techniques and with the current concepts of pathophysiology of these problems.

Finally, it is good to be mindful of our role as physician and healer. Even in an area as limited as surgery of the eyelid, the entire patient must be considered: both his psychic and somatic problems. It is as important to know what we cannot do as well as what we can lest we become too inflated with a sense of surgical omnipotence. We are, after all, only mortal, with mortal frailties. At best, we can only put the patient in the most optimal situation to heal; he alone can do the mending.

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CHAPTER 1

Anatomy of eyelids and orbit

Successful surgery in the area around the eye depends upon thorough knowledge of the surgical anatomy and function of the tissues involved. One must be aware of and identify the various structures in a surgical repair in order to reestablish function.

EXTERNAL ANATOMY

The palpebral fissures are roughly elliptical and symmetrical. The medial and lateral canthi are at approximately the same level so that a straightedge across the nose should pass over all four canthi of both eyes. If the lateral canthi are elevated higher than the medial it is called a mongoloid slant. Conversely, when the lateral canthi, in rare cases, are lower than the medial canthi, it is called antimongoloid slant. The eyebrows separate the eyelid from the forehead. They are symmetrical, being thicker medially with the hair follicles entering the skin obliquely.

EXTERNAL ANATOMY OF LIDS (Fig. 1.1)

The major skin folds of the eyelids are determined by attachments to deeper structures producing the superior palpebral (or supratarsal) fold due to attachments of the levator aponeurosis and inferior palpebral and nasojugal folds of the lower lid and cheek. In addition, lines of expression or "crow's feet" may radiate out from the lateral canthal area due to redundant skin having a concertina effect over the lateral raphe and underlying orbicularis muscle. Whenever possible, skin wounds should be planned to lie in these folds or parallel to them in order to make the scars least visible. The superior palpebral fold is located 5 to 7 mm above the lid margin and represents the uppermost attachments of the aponeurosis of the levator aponeurosis. This tends to deepen as the eyelid is raised and may be completely absent in congenital ptosis where there is no levator function. Below the fold is the more adherent pretarsal skin, while above the fold is the looser preseptal skin which is subject to marked stretching and redundancy with advancing age. The abundance of loosely

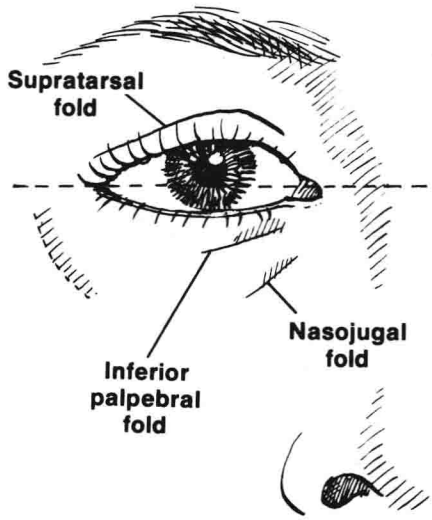

Fig. 1.1. External anatomy.

attached skin creates a potential space which may fill with fluid following trauma, bleeding, or allergic conditions. The inferior palpebral fold may vary considerably and roughly marks the lower margin of the tarsus approximately 5 mm below the lashline sloping downward laterally.

EYELIDS (Fig. 1.2)

All four lids contain analogous basic structures and their basic function is to protect the globe. Movement of the lids aids in visual function and also serves to spread the tear film.

Lid structures are divided into anterior and posterior lamellae by a fascial plane that extends to the lid margin where it can be identified as the "gray line," a thin linear change in color along the lid margin which represents the muco-cutaneous junction. The lid may be readily split surgically along this plane dividing the lamellae for resection of reconstruction. The anterior lamella consists of skin and orbicularis muscle with associated structures, while the posterior lamella consists of tarsus and conjunctiva.

The skin of the eyelids is among the thinnest, most delicate, and pliable in the whole body. It contains small sebaceous glands and sweat glands along with a few fine hairs but no fat. The skin is more closely adherent over the tarsus superiorly and inferiorly especially at each canthus and along the lid margins. The thin lid skin gradually blends into the thicker skin of the brow and cheek which does contain some fat. It is important to remember this in repairing lid skin, as attaching the thin palpebral skin to the thicker brow skin will produce a scar which is cosmetically more noticeable.

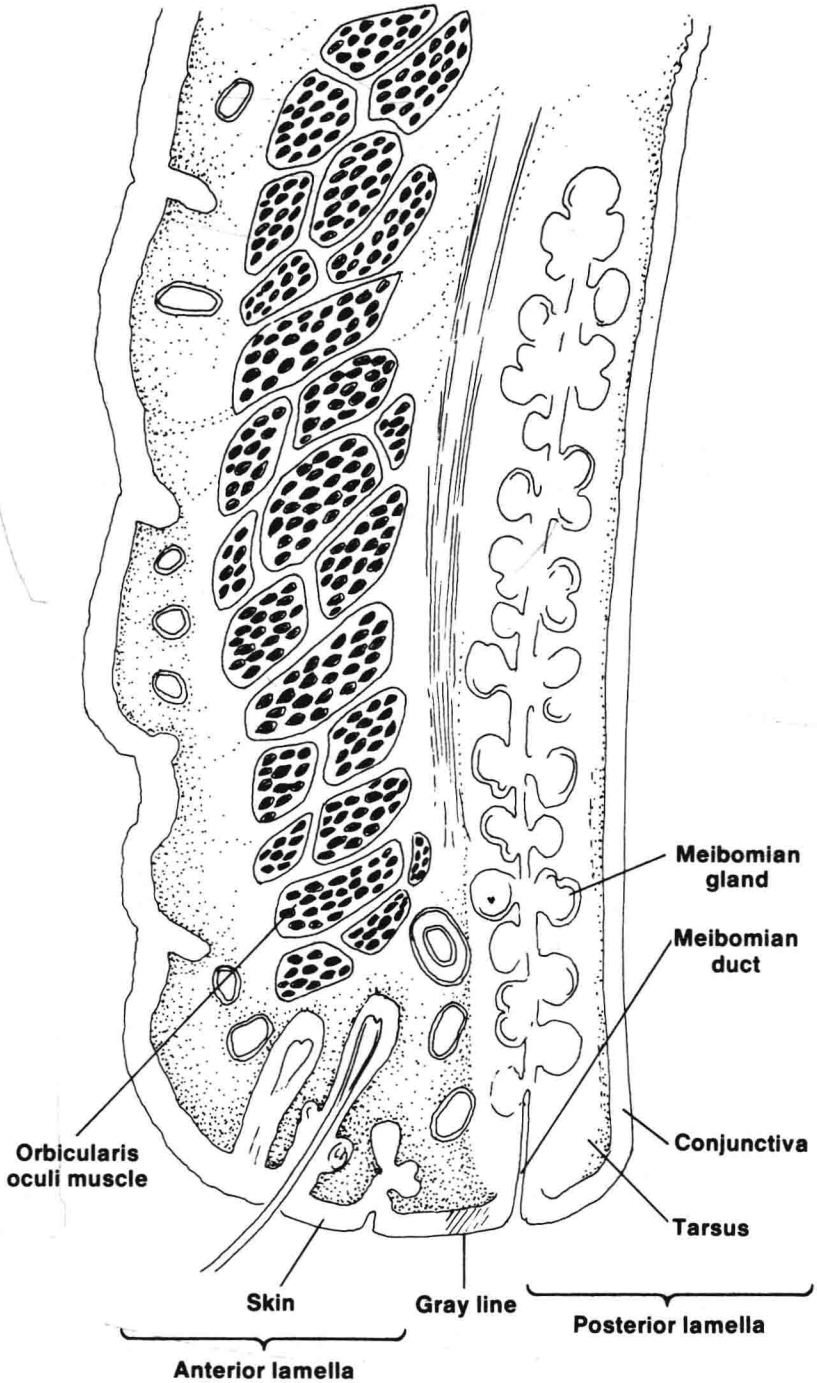

Fig. 1.2. Eyelids.

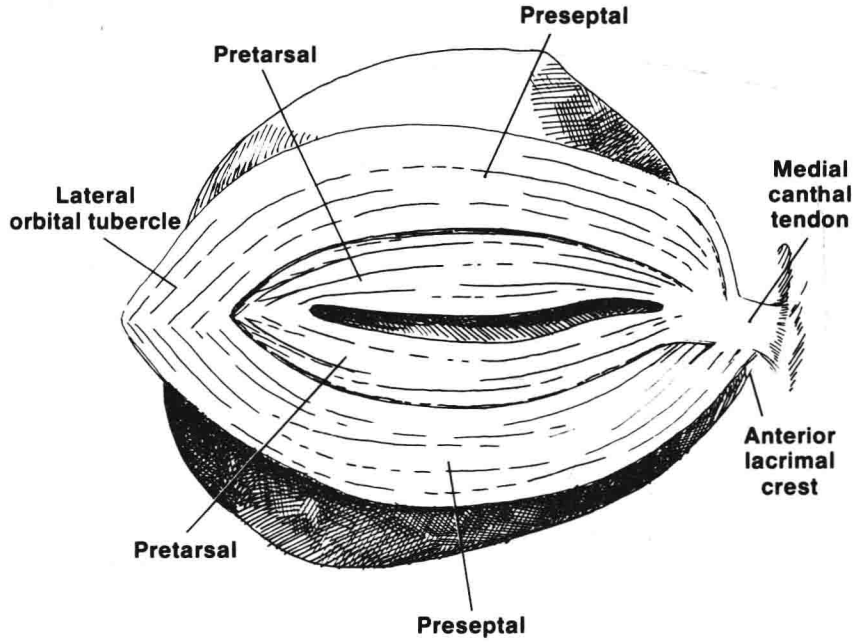

Fig. 1.3. Palpebral portion of orbicularis oculi muscle.

Underlying the skin of the lids is the palpebral portion of the orbicularis oculi muscle (Fig. 1.3). . This acts as a sphincter with attachments to bone medially and laterally to close the lids and maintain muscle tone to hold the lids in apposition to the globe. The fibers arch across the upper and lower lids and although fused together into one sheet of muscle, may be divided into a preseptal and pretarsal portion. In younger individuals the skin is firmly adherent to the underlying muscle, whereas in elderly people there is a looser attachment with more folds in the skin. In the upper lid, the superior portion of the pretarsal muscle receives interdigitating fibers from the levator aponeurosis. Laterally, each pretarsal muscle extends and joins to form a lateral canthal tendon which inserts on the lateral orbital tubercle of the malar bone. The upper and lower preseptal fibers fuse over this laterally at the lateral palpebral raphe. Medially, both the preseptal and pretarsal muscles divide into deep and superficial heads. The superficial heads of the pretarsal muscles are the larger ones and fuse medially to form a medial canthal tendon which attaches to the anterior lacrimal crest on the nasal process of the maxilla. The superficial head of the preseptal muscles attaches to the medial canthal tendon while the deep heads of both the preseptal and pretarsal muscles pass deep to the larcrimal sac attached to the larcrimal diaphragm and posterior lacrimal crest. In this way the lids are firmly fixed medially to the bone, the lacrimal sac is protected, and there is a rhythmic compression of the muscles surrounding the sac and canuliculi with each blink to help the movement of tears down the passageway into the nose.

The tarsi have the main tectonic function and contribute to the structural stability of the lids and lid margins (Fig. 1.4). In addition, they contribute

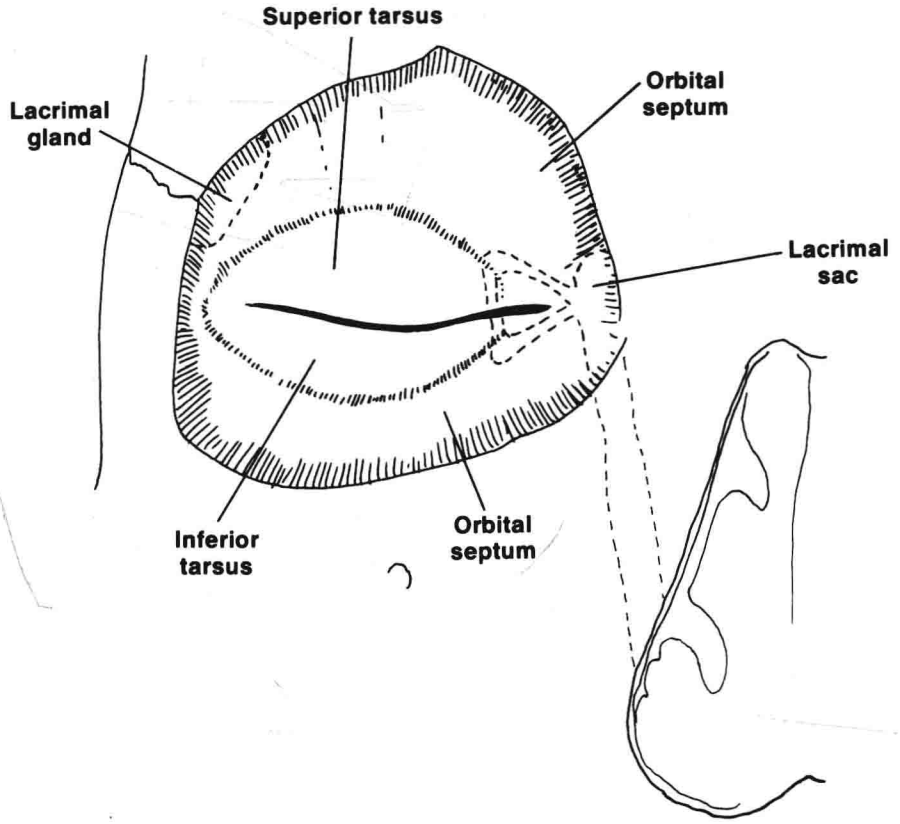

Fig. 1.4. Tarsi and orbital septum.

Meibomian secretions, a significant component of the tear film and, by maintaining the close apposition of the lid margin to the globe, play a vital role in the homogeneous spread of the tear film over the cornea. The tarsi are composed of dense fibrous tissue, crescentic in shape with the borders near the lid margin slightly curved while the other border is thinner and more convex. They extend in each lid from the lateral commisure to the area of the lacrimal puncta. The superior tarsus is about 10 mm in vertical height whereas the inferior tarsus is 4 to 5 mm in vertical height. Each tarsus contains a linear series of meibomian glands. These are arranged in parallel lines with orifices of the meibomian ducts exiting in a line along the lid margin posterior the gray line. The tarsi are attached to the periosteum of the orbital rims above and below by the orbital septum which lies in the same fascial plane with the tarsi which represent thickened portions of the same embryologically developed mesodermal layer of the lid. This forms a barrier between the orbital contents posteriorly and the skin muscle layer anteriorly. Immediately behind the orbital septum in the upper and lower lids is a layer of fat. Thus, weaknesses in the orbital septum allow the fat to pouch forward giving the lids a "baggy" appearance.

The retractors of the lids consist of the levator palpebrae superioris and

superior tarsal (Müller's) muscles in the upper lids and the analogous, although less well defined, structures arising from the capsulopalpebral fascia of the inferior rectus muscle in the lower lid. Anatomy of these structures will be discussed in greater detail in Chapters 3 and 4 as it specifically relates to surgery of blepharoptosis and entropion, respectively.

The conjunctiva is a mucous membrane which entirely lines the posterior surface of the lids and at the fornices is reflected back onto the surface of the globe as the bulbar conjunctiva. The conjunctiva is firmly adherent to the posterior tarsal surfaces. It is a distinct separate layer lying against the superior and inferior tarsal muscles leading to the superior and inferior fornices where it is loosely attached with many folds thus permitting mobility of the lids and globe.

ANATOMY OF ORBIT (Fig. 1.5)

The configuration of the orbital cavities are roughly that of four-sided pyramids whose bases face forward. The medial walls are almost parallel with the midsaggittal plane. The lateral walls diverge at an angle of about 45° from the medial. The apex of each pyramid is at the optic foramen. In the adult male the orbital margins are about 4 cm in transverse width, 3½ cm high and 4½ cm deep.

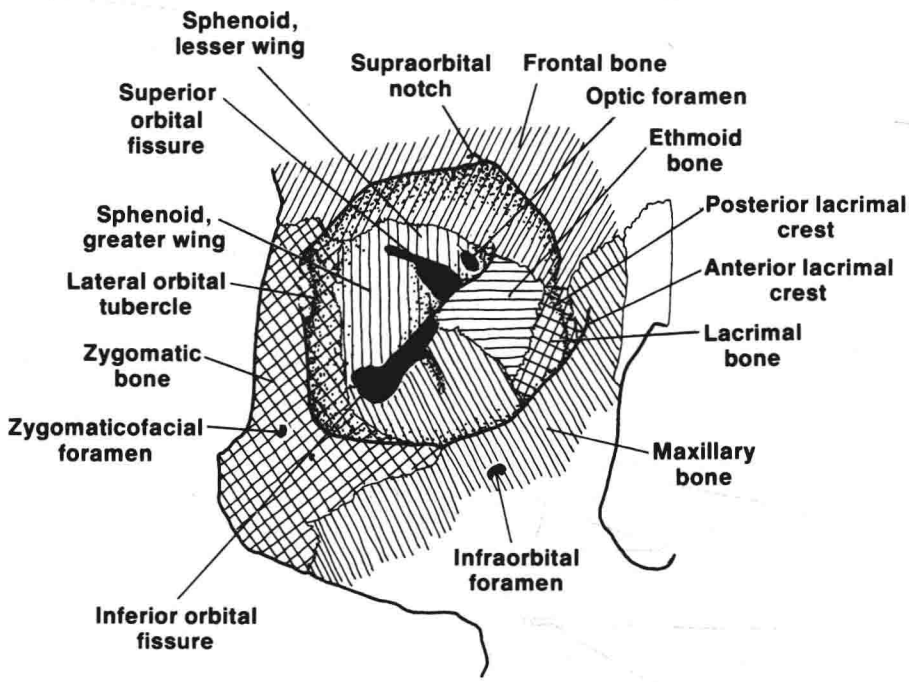

Fig. 1.5. Anatomy of orbit.

The orbital rims are very strong and provide a protective encasement for the globe. The margin has a sharp border on three sides formed by the frontal bone above, the zygomatic bone laterally, and the zygomatic and maxillary bones below. The medial margin is less distinct, being formed by the frontal process of the maxilla extending upward to form the anterior lacrimal crest while superiorally, the frontal bone extends downward and follows into the posterior lacrimal crest of the lacrimal bone which fuses with the anterior crest inferiorally at the lacrimal tubercle. Between the anterior and posterior lacrimal crests is the lacrimal fossa in which sits the lacrimal sac.

The superior orbital rim contains the supraorbital notch or foramen which is located at the junction of the medial and middle third of the superior margin and transmits the supraorbital vessels and nerve. Medial to this and 4 mm behind the margin is the bony attachment of the superior oblique pulley.

The roof of the orbit is made up almost entirely of frontal bone which also forms the floor of the frontal sinus. Posteriorly, the lesser wing of the sphenoid contributes to the roof and contains the optic foramen.

The medial wall is formed by the nasal process of the maxilla, the lacrimal bone, the lamina papyracea of the ethmoid, and a small portion of the sphenoid bone. It lies in direct relation to the ethmoid and sphenoidal sinuses as well as the lower portion of the frontal sinus. It is the thinnest wall of the orbit and may readily transmit infections into the orbit through dehiscences in the bone.

The floor of the orbit is formed by the zygomatic bone and the orbital surfaces of the maxilla and palatine bones. The orbital surface of the maxilla lies directly over the maxillary sinus and is the area involved in the so-called "blow-out fracture" of the orbit with resultant prolapse of adnexal tissue into the maxillary sinus. The inferior orbital groove passes forward through the maxilla from the inferior orbital fissure to become the inferior orbital canal which exits from the anterior maxillary surface about 4 to 12 mm below the orbital rim in a direct vertical line with the supraorbital notch.

The lateral wall is the strongest orbital wall and is formed by the zygomatic bone anteriorally and the orbital surface of the greater wing of the sphenoid posteriorly. About 10 mm below the zygomatico-frontal suture is the lateral orbital tubercle which marks the point of attachment of the lateral ocular retinaculum. Small canals in the inferior aspect of the lateral wall transmit the zygmatico-facial and zygmatico-temporal nerves and vessels. The superior orbital fissure separates the lateral wall from the roof of the orbit, while the inferior orbital fissure separates the lateral wall from the floor of the orbit.

VASCULAR SUPPLY

The vascular supply to the eyelids is generous, promoting good healing with rare infection following eyelid surgery. For this reason only minimal debridement is necessary following penetrating trauma, permitting saving of tissue and lid structures that would not remain viable following comparable trauma to other parts of the body.