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Anatomy of the Orbit, Lacrimal Apparatus, and Lateral Nasal Wall

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Endoscopic approaches to the orbit take advantage of key anatomic relationships that arise from the fact that the sinonasal tract and orbit are contiguous structures. Thus, a thorough understanding of both sinonasal and orbital anatomy is essential for safe and efficacious surgery in this complex region. Practical limits between the fields of otolaryngology and ophthalmology have produced to some extent a ''no man's land'' in which otolaryngologists feel as uneasy in the orbit as ophthalmologists do in the nose. For this reason, although we have chosen to highlight the structural features of the lateral nasal wall and medial orbit, we have also reviewed general aspects of the anatomy of the orbit, lacrimal apparatus, and the paranasal sinuses.

The Orbit

Osteology

The orbit is pyramidal in shape, with the posterior aspect open at the apex. The anterior orbit measures approximately 40 mm across horizontally and 32 mm vertically. The depth of the orbit is more variable, averaging 40 to 45 mm [1]. The orbit is comprised of seven bones. The frontal bone and the lesser wing of the sphenoid form the orbital roof. The floor of the orbit is formed by the orbital plates of the maxilla (medially), zygoma (laterally), and palatine bone (posteriorly). From anterior to posterior, the medial orbital wall consists of the frontal process of the maxilla, the lacrimal bone,

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the lamina papyracea of the ethmoid bone, and the sphenoid. The majority of the wall is comprised of the ethmoid bone, which is extremely thin except at its most posterior part [2]. The bony lacrimal fossa, bounded by anterior and posterior crests, is a prominent feature of the anterior medial orbital wall (Fig. 1). The average width of the lacrimal fossa, from the anterior crest to the posterior crest, is approximately 8 mm. The anterior lacrimal crest is formed by the frontal process of the maxilla, while the posterior crest is part of the thinner lacrimal bone. The vertical suture line between these bones is slightly closer to the posterior lacrimal crest but roughly bisects the fossa [3]. The lateral orbital wall is the thickest wall of the orbit, and is comprised of the zygoma and the greater wing of the sphenoid.

Foramina are present within the bony orbit through which numerous important structures pass. The largest of these is the superior orbital fissure, which averages 18 mm in length [4]. Its boundaries are formed by the lesser and greater wings of the sphenoid. The superior orbital fissure is divided into inferomedial and superotemporal aspects by the two tendons of the lateral rectus muscle. The inferomedial portion of the fissure contains structures that pass within the annulus of Zinn, including the inferior and superior divisions of the oculomotor nerve (cranial nerve III), the nasociliary branch of the ophthalmic division of the trigeminal nerve (CN V1), the abducens nerve (CN VI), and the sympathetic supply to the ciliary ganglion. The superotemporal aspect of the fissure transmits the frontal (CN V1), lacrimal (CN V1), and trochlear (CN IV) nerves. Vessels traversing the superior orbital fissure include the orbital branch of the middle meningeal artery, the recurrent branch of the lacrimal artery, the superior orbital vein, and the superior ophthalmic vein.

The inferior orbital fissure, bounded by the greater wing of the sphenoid, the maxilla, and the palatine bones, measures 20 mm in length. This fissure permits continuity among the orbit, the pterygopalatine fossa, and the infratemporal fossa. Through it traverse the infraorbital and zygomatic nerves

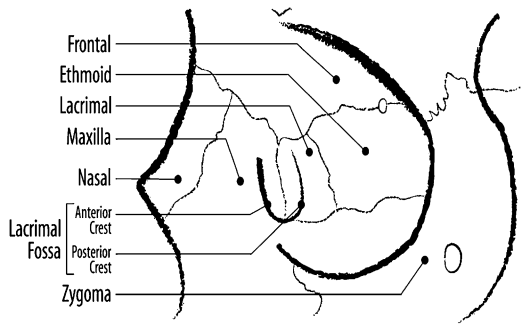

Fig. 1. Osteology of the orbit. The bones comprising the medial orbital wall include the frontal, ethmoid, and lacrimal bones, along with the frontal process of the maxilla. The anterior and posterior lacrimal crests are formed by the maxilla and the lacrimal bone, respectively.