The ability to successfully assess and treat physical ailments requires an understanding of the anatomy involved in the injury or trauma. When dealing with injuries and trauma associated with the eye, it is necessary to have a working knowledge of basic ocular anatomy so that an accurate diagnosis can be achieved and treatment can be implemented.

The upcoming articles in this special theme section on the eye will deal specifically with recognizing ocular illness, disease, and injuries, and will also address the incidence of sports related eye injuries and trauma. This paper covers the basics of eye anatomy, focusing on the eye globe and its surrounding structures. Once one gains an understanding of the normal anatomy of the eye, it will be easier to recognize trauma, injury, or illness.

Getting a good grasp on the anatomy of the eye requires knowledge not only of the eye globe itself but also of the surrounding bony orbit, muscle layers, and nerve and vascular supply that together make up the visual system and its protective shell (Figure 1).

The eye itself lies within a protective shell called the bony orbits. These bony cavities are located on each side of the root of the nose. Each orbit is structured like a pear with the optic nerve, the nerve that carries visual impulses from the retina to the brain, representing the stem of the orbit (Duke-Elder, 1976). Seven bones make up the bony orbit: frontal, zygomatic, maxillary, ethmoidal, sphenoid, lacrimal, and palatine (Figures 1 and 2).

The roof of the orbit is composed anteriorly of the orbital plate of the frontal bone and posteriorly by the lesser wing of the sphenoid bone. The lateral wall is separated from...
the roof by the superior orbital fissure, which is the division of the lesser and greater wings of the sphenoid bone. The superior ophthalmic vein and the lacrimal, frontal, and trochlear nerves all pass through the lateral portion of the fissure. The superior and inferior segments of the oculomotor nerve pass through the fissure's medial portion.

The anterior portion of the lateral wall is the strongest part of the bony orbit and is formed by the zygomatic bone. The orbital floor and lateral wall are separated by the inferior orbital fissure. The orbital floor is formed by the orbital plate of the maxilla, the orbital surface of the zygoma, and the orbital process of the palatine bone. The walls of the floor of the orbit are thin (especially the orbital plate of the maxilla), and “blowout” fractures, a herniation of orbital contents into the maxillary antrum, most frequently occur in this part of the orbit (Newell, 1996).

Portions of the zygomatic and maxillary bones complete the inferior orbital rim. Those bones that make up the medial wall are slightly less distinct. Portions of the ethmoid, lacrimal, sphenoid, frontal, and maxillary bones all contribute to the formation of the medial surface of the orbit (see Figure 2).

Vascular Structures

Arterial supply to the orbit comes from the ophthalmic artery, the first intracranial branch of the internal carotid artery. The ophthalmic artery enters the orbit through the optic canal accompanied by the optic nerve.

Venous drainage of the orbit is accomplished primarily by the ophthalmic vein, the anterior ciliary veins, and the central retinal vein. There is a communication between the ophthalmic veins, angular vein (which drains the skin of the periorbital region), and the cavernous sinus which can potentially lead to a lethal cavernous sinus thrombosis secondary to a superficial periorbital skin infection (Vaughan et al., 1995). The apex of the orbit is the entry site for all the nerves and vessels innervating the eye and serves as a site of origin for a majority of the extraocular muscles.

Extraocular Muscles

There are six extraocular muscles that control the movement of each eye: two oblique muscles and four rectus muscles (see Figure 3). The four rectus muscles originate at the apex of the orbit at a common ring tendon surrounding the optic nerve and are named based on their insertion on the medial, lateral, inferior, and superior surfaces of the eye. The actions of these muscles are to adduct, abduct, depress, and elevate the eye globe. Each muscle is about 40 mm long and 10 mm wide and becomes tendinous 4–9 mm from the point of insertion into the scleral portion of the eye globe (Vaughan et al., 1995).