Orbital Fractures

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KEYWORDS

• Orbital fractures • Orbital reconstruction • Endoscopy • Exophthalmometry

KEY POINTS

- Anatomic, rather than volumetric, reconstruction leads to improved outcomes in orbital reconstruction.
- Endoscopic visualization improves lighting and magnification of the surgical site and allows the entire operative team to understand and participate in the procedure.
- Mirror-image overlay display with navigation-guided surgery allows in situ fine adjustment of the implant contours to match the contralateral uninjured orbit.
- Precise exophthalmometry is important before, during, and after surgery to provide optimal surgical results.

Panel discussion

1. What is your preoperative management protocol for patients with orbital fractures?
2. What factors you consider in deciding on surgery for these patients?
3. What are your preferred surgical approaches for orbital fractures?
4. What is your preferred technique for fracture repair?
5. How do you manage these patients postoperatively, and what surgical outcomes do you expect?
6. How have your techniques changed over the past 5 years?

Question 1: What is your preoperative management protocol for patients with orbital fractures?

MOE

My policy for evaluating patients with orbital in jury is to first proceed with the Advanced Trauma Life Support protocol for evaluation and resuscitation. After evaluation to confirm hemodynamic stability and rule out intracranial injury, a complete craniofacial examination is performed and a maxillofacial CT scan is obtained with 0.625-mm–cut thickness. Three-dimensional reconstructions are performed when there are fractures involving bones adjacent to the orbit, such as the zygoma or maxilla. Visual acuity is checked, and range of motion of the extraocular musculature is analyzed, looking for signs of entrapment. Visual fields are checked. Color vision is evaluated (in particular, red). Direct and consensual pupillary functions are checked (swinging flashlight test) to rule out an afferent pupillary defect, which suggests injury to the globe or neural pathways. An ocular examination is performed with attention to conjunctival edema, hemorrhage, and hyphema. Globe position is noted, and exophthalmos, if present, suggests the need for tonometry to check intraocular pressure (IOP) and careful evaluation of the CT scan for a retrobulbar hematoma. An ophthalmology consult is requested to rule out injury to the globe.

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The primary condition that may require urgent treatment by surgeons who are not ophthalmologists is retrobulbar hematoma. Retrobulbar hematoma is a collection of blood in the retrobulbar space, which may evolve rapidly. The accumulation of blood may lead to increased IOP and anterior displacement of the globe, thereby placing the optic nerve under tension. This is a critical condition analogous to a compartment syndrome with arterial and venous occlusion and obstruction of ocular perfusion. Initially reversible, if left untreated, it can result in blindness. If there is concern for elevated IOP in a patient with suspected retrobulbar hematoma, emergent canthotomy and cantholysis are indicated, particularly in the setting of decreased visual acuity. The signs and symptoms are described previously. If this is suspected, emergent ophthalmology consultation should be obtained, canthotomy and cantholysis are performed, and consideration is given to administration of intravenous steroid and mannitol or acetazolamide and return to the operating room to obtain hemostasis and resect the hematoma.

A somewhat less urgent condition is the pediatric white eye fracture. This refers to a trapdoor fracture that entraps an extraocular muscle. The relative elasticity of pediatric bone allows the fracture to open and then collapse on orbital contents, possibly diminishing the blood supply to the structures involved. The patient often has nausea and vomiting and may also have bradycardia. The term, *white eye*, refers to the lack of visible external signs of trauma that is common in these patients; my policy is to repair these fractures within 12 hours to avoid permanent damage to the entrapped muscle. Injuries to the globe and optic nerve are given priority over the treatment of orbital fractures, and fracture repair is not undertaken until definitive clearance is provided by an ophthalmologist.

Patients with orbital fractures without evidence of globe or optic nerve injury are given follow-up clinic appointments 7 days to 10 days after injury. I do not prescribe antibiotics, although for patients with extensive periorbital edema, I consider a short course of oral steroids. Ice packs are recommended for 48 hours to 72 hours for symptomatic relief. By waiting 7 days to 10 days after injury to evaluate the patient in clinic, the majority of traumatic edema will have subsided, allowing more accurate assessment of globe position and condition; initial complaints of diplopia may have resolved, and occasionally patients who presented without diplopia will develop diplopia due to change in globe position. For patients with other significant craniofacial fractures, in particular those that involve occlusion or major fractures of the zygoma and maxilla, the decision to operate may be made earlier to incorporate the care of those fractures.

MURR

My current work-up of orbital fractures has had a nuanced evolution over the past 2 decades. Patients can be divided into approximately 2 categories: those patients with an isolated orbital fracture or an orbital fracture with a zygomatic complex fracture and those patients with more extensive injuries and higher-impact trauma that have associated midface fractures like Le Fort fractures or nasoethmoid complex fractures. Often patients with higher-impact trauma are brought in to the care setting through the trauma center and have a higher likelihood of associated injuries. These patients are often managed in close partnership with the neurosurgery service. Patients with isolated orbital fractures, however, are often more ambulatory and may come to the office setting for care or through less acute entry portals, such as an urgent care practice. The basic work-up involves a detailed history and physical examination. Time of injury should be determined and mechanism of injury. Physical examination keys on pupillary reaction to light, extraocular motility, and sensory nerve evaluation, especially the fifth nerve. Entrapment, if suspected, heightens the acuity of the need for repair. White eye fractures, especially in the pediatric population, should be suspected if a patient has severe pain or nausea when extraocular motility maneuvers are attempted. This is important because it is one of the true emergencies associated with the evaluation of orbital fracture patients. In the white eye fracture, orbital contents are entrapped in a minimally displaced trapdoor or green stick fracture that is easy to miss on imaging. Yet, the occulocardiac reflex can produce bradycardia, nausea, and syncope in a patient with an orbit that appears otherwise uninjured. Typically, the inferior rectus is tethered, and surgery to release it as soon as possible is required. The presence of hyphema or pupillary eccentricity should be specifically ruled out during the physical examination. I have learned to use a Naugle exophthalmometer to compare the 2 eyes with regard to projection and enophthalmos. The Naugle instrument also helps me to assess the globe position and, therefore, guides my assessment of postoperative results. The key study for any orbital fracture or suspected orbital fracture is a fine-cut axial, coronal, and sagittal CT scan. These days, most patients have already had this study done; 0.625-mm cuts are preferred to completely assess the orbital floor in my practice, but the image guidance protocols released by manufacturers generally allow 1.0-mm to 1.5-mm scans.[1] I do not find 3-D reconstructions critical to the work-up, however. Another