ORBITAL FRACTURES

TOC
EYE AND FACE

Information Series

OCULOFACIAL PLASTIC SURGERY

Oculofacial Plastic or Ophthalmic Plastic Surgery is a surgical subspecialty of Ophthalmology that seeks to improve physical appearance and function, or minimize disfigurement resulting from accidents, disease, or birth defects. The word plastic comes from the Greek meaning "molding" or "giving form".

ORBITAL FRACTURES

Orbital fractures are common injuries that result from blunt trauma to the eye or surrounding tissues. These fractures may cause difficulty with eye movement, double vision, loss of vision, facial numbness, and a "sunken" appearance of the eye. They may be associated with injuries to the eye, eyelids, sinuses, brain or surrounding structures.

This handout will address orbital fractures and the methods of medical and surgical treatment.

ANATOMY

The eye is located in a bony cavity called the orbit. Beneath the orbit is a large sinus cavity *(maxillary sinus)*. A second sinus cavity *(ethmoid sinus)* is located between the orbit and nose. The bone separating the eye from the maxillary sinus cavity is called the *orbital floor.* This is the bone upon which the eye and orbital soft tissues rest. It is a thin, delicate bone that is prone to break or fracture during blunt orbital or midfacial trauma. The *medial orbital wall* is the bone between the orbit and ethmoid sinus and is also paper thin and is appropriately named the *lamina papyracea* (Greek for paper plate). This bone is supported by other bones and therefore is less likely to fracture under similar circumstances. In severe facial injuries, both bones can break as can the stronger bones along the outer rim of the orbit and the bones of the midface. Within the orbit, the eye is surrounded by fatty tissue and by muscles which control the movement of the eye (up and down and from

side to side). A nerve called the *infraorbital nerve* extends from the back of the orbit to the cheek within the bone of the orbital floor. This nerve supplies sensation to the lower eyelid, cheek, side of the nose, center of the upper lip and some of the upper teeth. The *optic nerve* is located directly behind the eye and connects the eyeball *(globe)* to the brain. This nerve transmits visual impulses from the eye to the brain and must be healthy if one is to see.

RESULTS OF ORBIT FRACTURES

Double vision *(diplopia)* following injury may result from swelling and bleeding into the tissues surrounding the eye, swelling, hemorrhage or other injury directly to the muscles controlling eye movement, damage to the nerves which supply the eye muscles, and/or entrapment of muscles by bone and bone fragments. There are six muscles that direct the movement of each eye, and each muscle is controlled by one nerve branch; therefore, many opportunities exist for the development of double vision. The particular problem with diplopia that any patient experiences will be determined by the extent of injury and the number and location of the nerves or muscles that are injured. Unfortunately, there is no straight forward and direct treatment for double vision resulting from hemorrhage and swelling of the tissues around the eye that may result in injury to the muscles or nerves. There may sometimes be improvement as the hemorrhage and swelling resolve with the passage of time. Impingement or entrapment of the eye muscles or tissues surrounding the muscles on the sharp edges of the fractured bone most commonly involves fractures of the orbital floor, but may also involve the medial wall. Muscle entrapment within a fracture is the main cause of double vision which can be directly addressed by surgery.

It is important to recognize that there are some patients who experience a degree of double vision on a permanent basis even

after successful repair of the orbital fracture. This residual double vision probably results from an injury to the eye muscles, and/or their nerve supply at the time of initial trauma. Fortunately in many cases residual double vision can be improved with glasses or eye muscle surgery six to twelve months following orbital fracture repair.

Facial numbness involving the eyelid, cheek, nose, upper lip and teeth often occurs in association with an orbital floor fracture due to infraorbital nerve injury at the time of trauma. The infraorbital nerve supplies sensation to these areas. It travels through the bone of the orbital floor where fractures commonly occur and can be bruised or severed by the fractured bone at the time of injury. There is no medical or surgical treatment currently available for numbness caused by an orbital fracture. Numbness may actually get worse for a short time due to postoperative swelling following successful surgical treatment of an orbital floor fracture. In most cases, this numbness improves in the weeks or months following surgery; however, permanent numbness can rarely occur.

Nose bleeds can occur with fractures that involve bones and mucosal lining of the nasal cavity creating a direct defect into the nose. For this reason, it is recommended that any patient sustaining an orbital fracture refrain from nose blowing for at least two months following injury or after fracture repair surgery. We recommend you do not fly or participate in scuba diving activities without discussing the situation with your physician as changes in sinus pressure may cause pain or further injury. To be safe, you should not fly or scuba dive for at least four weeks following injury or surgery. If you have a trip scheduled, bring it to the attention of your physician and follow the advice offered.

Enophthalmos is a descriptive term that denotes a “sunken” or “fallen” eye appearance. It is caused by the settling of

the eye and orbit soft tissue into one or more fracture sites or sinus cavities surrounding the orbit. Enophthalmos takes several forms. At times, the eye settles toward the floor of the orbit and looks "low" when compared to the opposite eye. In other patients, the eye sinks back in the orbit and looks "small" when compared to the uninjured eye. Both appearances are due to expansion of the orbital walls from injury with prolapse of orbital contents into the fracture sites. For enophthalmos to develop, a large fracture of one orbital wall or fractures of two or more orbital walls must be present. The larger the fracture and the more bone displacement, the more likely that enophthalmos will develop. Fortunately, large fractures can be seen on a CT scan. When large fractures likely to cause enophthalmos are identified, surgery is usually recommended. Sometimes enophthalmos can develop in patients with small fractures. When this is observed within the first three weeks following injury, surgery is usually offered. Rarely, enophthalmos is not observed this early and only develops months or even years following injury. It can even develop after successful fracture repair. When enophthalmos develops late delayed surgery can usually improve, but not totally correct the problem.

PREOPERATIVE CONSIDERATIONS

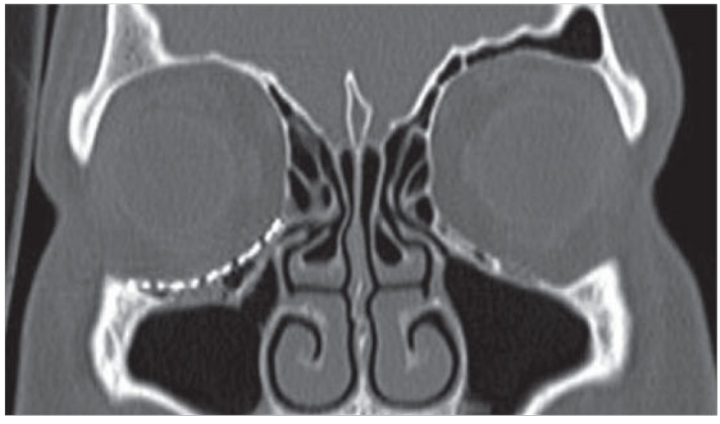
One of the most difficult decisions to be made is when to operate. In many cases it is preferable to operate early when the fractures are fresh because the bone fragments can usually be removed or moved back into place. Patients are offered early surgery as soon as a day or two after the injury to release muscle or other tissues trapped in the bone fragments of the fractured orbit, or when the fracture is large and there is a significant risk of observable enophthalmos. The goal is to reduce the fractures soon after injury and thereby release the soft tissues with the hope of preventing double vision from scar tissue formation and to cover the defect to prevent

tissues from falling back into the fracture. However, it is well known that some patients do not develop enophthalmos or persistent double vision and will not require any surgery following orbital fracture. Thus, at times, it can be difficult to sort out who will benefit from surgery and who will not. A CT scan of the orbit will aid in making the decision whether or not to operate. All surgery carries with it some risk and orbital fracture repair is no exception. For these reasons, and after careful examination and review of the CT scans, we may recommend observation in lieu of surgery for one to two weeks following injury. With observation some patients can be identified who may not benefit from surgery. Such patients have fractures with no entrapment and only minimal displacement of bone. The eye movement usually improves as the swelling subsides; therefore, surgery is not necessary. Close office follow-up is all that is required. Some patients have confounding variables that make it difficult to determine if surgery will be of benefit. It is customary to carefully follow such patients in the office performing serial examinations for the first two to three weeks following injury to determine when and if surgery will be necessary. Indications for surgery in this group include lack of improvement of eye movement over time with persistent double vision, and/or progression to a "sunken" eye appearance. Your surgeon will explain and discuss the reasons for and against surgery applicable to your case.

THE SURGICAL PROCEDURE

Surgery for repair of an orbital fracture is typically performed on an outpatient basis under general anesthesia. Rarely a patient may be admitted to the hospital overnight. The duration of the surgical procedure varies depending on the severity of injury and the nature of the surgical repair, but is customarily one to three hours. Although there are several surgical techniques that may be employed; in many cases the surgical procedure is performed with a combination

of techniques that utilizes an incision through the inner lining of the eyelid *(conjunctiva)* and a small incision at the very outer corner of the eye or within the crease of the upper eyelid. These incisions tend to minimize visible scars. For more complex fractures that involve the bones of the midface an additional incision may be placed through the gum line behind the upper lip to access the midface from below. During surgery, fragments of the fractured bones may be repositioned or removed, and soft tissues entering the fracture site are carefully lifted out. The defect in the bone is then usually covered with a plate or implant made of a variety of materials to prevent the orbital soft tissues and eye muscles from falling back into the fracture site. When the fractures involve bones of the orbital rim and midface special metal plates and screws may be utilized to restore the correct size, shape and projection of the orbit and face. In rare cases bone grafts are necessary to replace some of the bone at the time of injury. The techniques recommended to repair any orbital or facial fractures will be discussed during the preoperative evaluation.



Postoperative CT scan shows
orbital implant in proper position

POSTOPERATIVE RECOVERY AND CARE

Postoperative drowsiness is very common on the evening following surgery. Patients feel more alert and comfortable on the day following surgery. After surgery expect some soreness and discomfort. In most cases the pain can be controlled with ice

compresses and pain medication. You will be instructed to keep your head slightly elevated and to apply cold compresses (quart sized Ziploc bags filled with frozen peas/ corn or crushed ice) to your eye and face for several days following surgery. By keeping swelling in check, postoperative pain is also reduced. Thus, ice compresses are a very important part of postoperative care. Steroid medication is sometimes prescribed for the first few days to further reduce postoperative swelling.

Although you will be up and about shortly after surgery, you will not be able to resume full physical activity for several weeks. It is necessary to avoid strenuous exercise and especially further trauma during this time. You should not blow your nose for two weeks and should not fly for at least one month. You can expect that double vision will not clear for several months. In fact, you may notice that the double vision is worse in the first two to four weeks following surgery due to postoperative swelling.

You will be advised on the proper schedule for resuming your usual routine. The decision on when to return to work or school and resume normal activities depends on your vision, how fast you heal and how you feel. We will guide you during this time and provide specific instructions.

LATE RECONSTRUCTIVE SURGERY

Major head and facial trauma may involve more serious and life threatening injuries that either preclude timely repair of an orbital fracture or prevent complete repair. Secondary problems may then develop that might include an unsightly scar, enophthalmos, deformity of the forehead, cheek or nose, persistent double vision, tearing, or blepharoptosis (droopy upper eyelid). Many of these conditions can be addressed through a series of planned reconstructive operations over a period of six to eighteen months or longer. We can advise

you if such a reconstructive treatment plan will be of benefit in your particular case.

CONCLUSION

The treatment of an orbital and facial fracture will depend on the severity of the injury, changes in visual function, and location of the fracture. Minor fractures without injury to the eye that do not result in double vision, or are unlikely to cause a change in the appearance of the face, are generally observed without surgery. In more extensive injuries the fractures may require surgical intervention. After an examination and review of your CT scans your TOC surgeon will make a determination regarding the necessity of surgery in your case.

This brochure is intended as an introduction to orbital fracture repair. It may not cover every aspect of your injury or answer all questions you may have. You should address all your concerns during your appointment with your TOC surgeon. For more information visit our website at **www.toceyeandface.com.**

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