Ocular trauma

Evaluation of the Patient Following Ocular Trauma

A complete history is crucial when the patient with ocular trauma is first examined. Important information that should he obtained includes the following list:

• How and when was the patient injured?

• Was the injury work related?

• What emergency measures were taken (e.g., tetanus shot given, antibiotics administered)?

• Are there concomitant systemic injuries?

• When was the patient's last oral intake?

• What was the status of the eye before the injury?

• Is the presence of an intraocular foreign body possible? For example: Was the patient hammering metal on metal ? Was the patient wearing spectacles

• How forceful was the injury?

• Was the patient wearing eye protection?

Initial caution is required to avoid more damage to the eye, especially after it has been determined that surgery is necessary. In that case, or if rupture of the globe is suspected, the eye should be covered with a shield. The physician should avoid trying to open the eye of an uncooperative patient. If severe chemosis or eyelid edema prevents a thorough examination, this is best postponed until the time of surgery. Examination under anesthesia should be considered for children or anyone unable to cooperate. If the patient is able to cooperate, the examiner should measure visual acuity of both eyes and evaluate the pupil for an afferent pupillary defect. Careful slit-lamp examination can reveal an entrance wound, hyphema, iris damage or incarceration, cataract, or other anterior segment pathology, although a scleral entrance wound is sometimes obscured by hemorrhagic conjunctiva. Intraocular pressure should be checked. Reduced lOP may suggest a posterior scleral rupture; however, normal lOP does not exclude an occult penetration.

It is important to examine the eye with the indirect ophthalmoscope as soon as possible. A posterior penetration or an intraocular foreign body is less difficult to detect if the patient is examined before synechiae, cataract, dispersed vitreous hemorrhage, or infection can develop. If the examiner suspects that the eye may possibly harbor an intraocular foreign body that is not seen on examination, an imaging study should be considered. Ultrasound examination may be useful in eyes with opaque media following trauma, although it may be necessary to defer ultrasonography until an open wound is closed surgically.

Blunt Trauma

The object that causes the injury in a blunt trauma does not penetrate the eye. Nevertheless, blunt trauma can have a number of serious sequelae:

• Hemorrhage into the anterior chamber (hyphema) or vitreous

• Retinal tears or detachment

• Subluxated or dislocated lens

• Commotio retinae

• Choroidal rupture

• Macular hole

• Avulsed optic nerve

• Scleral rupture

Perforating Trauma

It is important to differentiate a penetrating wound from a perforating wound. A penetrating wound passes into a structure; a perforating wound passes through a structure. For example, an object that passes through the cornea and lodges in the anterior chamber perforates the cornea but penetrates the eye.

Penetrating Trauma

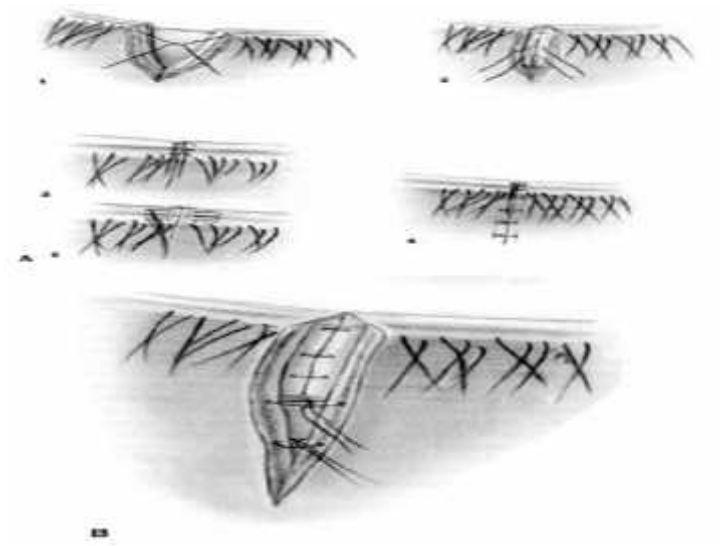
A detailed knowledge of eyelid anatomy helps the surgeon in repairing a penetrating eyelid injury and often reduces the need for secondary repairs.

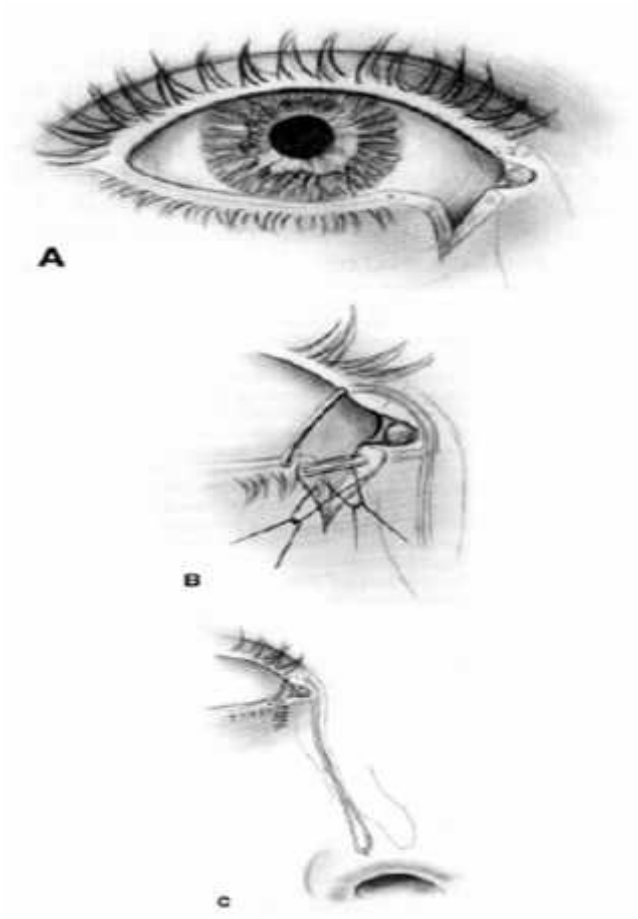
Generally, the treatment of eyelid lacerations depends on the depth and location of the injury.

Lacerations not involving the eyelid margin Superficial eyelid lacerations involving just the skin and orbicularis muscle usually require only skin sutures. To avoid unnecessary scarring, however, basic principles of plastic repair must be followed. These include conservative debridement of the wound, use of small-caliber sutures, eversion of the wound edges, and early suture removal.

The presence of orbital fat in the wound means that the orbital septum has been violated. Superficial or deep foreign bodies should be searched for meticulously before these deeper eyelid lacerations are repaired. Copious irrigation lavages away contaminated material in the wound. Orbital fat prolapse in an upper eyelid wound is an indication for levator exploration. A lacerated levator muscle or aponeurosis must be carefully repaired to avoid postoperative ptosis. . Orbital septum lacerations should not he sutured. Meticulous closure of overlying eyelid skin and orbicularis muscle is adequate in all cases . Lacerations involving the eyelid margin require precise suture placement and critical suture tension to avoid notches in the margin.

Trauma to the medial or lateral canthal areas is usually the result of horizontal traction on the eyelid, lacerations in the medial canthal area demand evaluation of the lacrimal drainage apparatus, which is always involved in an avulsion injury. Canalicular involvement is usually confirmed by inspection and gentle probing.





Secondary Repair

Secondary repair of eyelid trauma usually requires treatment of cicatricial changes that result from either the initial trauma or the subsequent surgical repair. Revision of scars may require simple fusiform excision with primary closure or a more complex rearrangement of tissue. The location of a particular scar in relation to the relaxed skin tension lines (which correspond to the facial wrinkles in most cases) determines the best technique or combination of techniques. An elliptical excision of the scar is most useful for revision of scars that follow the relaxed skin tension lines. Single Z-plasty or multiple Z-plasty reconstructive techniques can be used to revise scars that do not conform to relaxed skin tension lines.

Free skin grafts alone or in combination with various flaps are used when tissue has been lost.

Commotio Retinae

The term cornmotio retinae describes the damage to the outer retinal layers caused by shock waves that traverse the eye from the site of impact following blunt trauma. Ophthalmoscopically, retinal whitening appears some hours following injury . It is most commonly seen in the posterior pole but may occur peripherally as well. Several mechanisms for the retinal opacification have been proposed, including extracellular edema, glial swelling, and photoreceptor damage. Commotio retinae in the posterior pole, also called Berlin's edema, may decrease visual acuity to as low as 6/60. Fortunately, the prognosis for visual recovery is good, as the condition clears in 3—4 weeks. In some cases, however, visual recovery is limited by associated macular pigment epitheliopathy or macular hole formation. There is no acute treatment.

Traumatic Hyphema

Traumatic hyphema occurs most commonly in young males. It results from injury to the vessels of the peripheral iris or anterior ciliary body. Trauma causes posterior displacement of the lens—iris diaphragm and scleral expansion in the equatorial zone, which leads to disruption of the vessels at the peripheral iris, . Histopathologic studies of gross hyphemas reveal a red blood cell aggregate surrounded by a pseudocapsule of fibrin/platelet coagulum.

Anterior segment bleeding can often be seen on penlight examination as a layering of blood inferiorly in the anterior chamber. At other times the bleeding is so subtle that it can be detected only as a few circulating red blood cells on slit-lamp examination (microscopic hyphema). At presentation, more than 50% of hyphemas occupy less than one third of the height of the anterior chamber; fewer than 10% fill the whole chamber. The prognosis is good in patients who do not develop complications, but it is not dependent on the size of the hyphema itself. Even total hyphemas can resolve without sequelae, unless secondary complications result .

Hyphema is frequently associated with corneal abrasion, iritis, and mydriasis, as well as significant injuries to the angle structures, lens, posterior segment, and orbit.

The major concern after a traumatic hyphema is rebleeding. Complications associated with secondary hemorrhage include glaucoma, optic atrophy, and corneal blood staining . The rate of rebleeding varies from 3% to 30%.

Rebleeding may complicate any hyphema, regardless of size, and occurs most frequently between 2 and 5 days after injury. The timing of the rebleeding may be related to the lysis and clot retraction that occur during this period. Numerous studies have documented the importance of rebleeding as a prognostic factor for poor visual outcome.

Approximately 50% of patients with rebleeding develop elevated lOP.

blood predisposes the eye to corneal blood staining. On slit-lamp examination, early blood staining is detected by yellow granular changes in the posterior corneal stroma, Blood staining leads to a reduction in corneal transparency that may persist for years and can lead to the development of amblyopia in children. Histologically, red blood cells and their hreakdown products can he seen within the corneal stroma. Corneal blood staining slowly clears in a centripetal pattern starting in the periphery .

Medical management

The overall treatment plan for traumatic hyphema should he directed at minimizing the possibility of secondary hemorrhage. Elevated lOP may require treatment in order to reduce the chances of corneal blood staining and optic atrophy. most patients are treated with the following:

• A protective shield over the injured eye

• Moderate restriction of physical activity

• Elevation of the head of the bed

• Frequent observation

Analgesics that do not contain aspirin should be used for pain relief, . Hospitalization often facilitates daily examination and is necessary if satisfactory home care and outpatient observation cannot be ensured.

Most ophthalmologists administer long-acting topical cycloplegic agents initially for comfort, to facilitate posterior segment evaluation, and to eliminate iris movement. Others, however, think these agents should be instituted only after the hyphema has cleared. Miotics are rarely used, because they may increase inflammation. Topical corticosteroids are of benefit in cases with significant anterior chamber inflammation. Topical β-adrenergic antagonists, and carbonic anhydrase inhibitors are the mainstays of lop control . Intravenous and oral hyperosmotic agents may be required.

Prospective studies have supported the efficacy of antifibrinolytic agents in reducing the incidence of rebleeding. It is postulated that these agents act to inhibit fibrinolysis at the site of the injured blood vessel. However, the side effects of antifihrinolytic agents include nausea, vomiting, postural hypotension, muscle cramps, headache, rash, pruritus, dyspnea, toxic confusional states, and arrhythmias as well as the risk of

increased lop on discontinuation. Patients on aminocaproic acid should be hospitalized; but patients using oral corticosteroids, which may also reduce the rate of rebleeding, may be treated as outpatients

Surgery

may be required to prevent corneal blood staining and optic atrophy from persistently elevated lOP. The timing of surgery is controversial, but immediate surgery is indicated at the earliest detection of blood staining. Some authors suggest that surgery may be indicated if the lOP averages greater than 25 mm Hg for 6 days when the blood is in direct apposition to the endothelium. In healthy individuals, surgical intervention should he considered when the lOP is greater than 50 mm Hg despite maximal medical management. Patients with preexisting optic nerve damage or hemoglohinopathies may require earlier intervention.

Surgical techniques are multiple and varied. The simplest technique is paracentesis and anterior chamher irrigation with balanced salt solution, The goal is to remove circulating red blood cells that may obstruct the trahecular meshwork; removal of the entire clot is neither necessary nor wise. This procedure can be repeated. Intraocular diathermy may also be employed to control active intraoperative bleeding. large limbal incision techniques with clot expression, if necessary, are best performed 4—7 days after the initial injury, when clot consolidation is at its peak. Automated cutting/aspiration instruments can be used to remove blood and clots through quite small incisions. Iris damage, lens injury, and additional bleeding are the major complications of surgical intervention.