OCULAR INJURIES
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As a primary care and family physician, one day you will be confronted with an ocular injury, whether in the office, the emergency room or even at your home. Prompt treatment, particularly in a major ocular injury could mean the difference between preservation and loss of the patient's eye. I hope to assist you in developing confidence, when approaching minor or major eye injuries in how to assess them and initiate the treatment.

Objective:

- Recognize that which is urgent and non-urgent
- Be able to obtain salient history
- Be able to examine a traumatized eye
- Be able to record the visual acuity as accurately as possible
- Be able to manage common eye injuries
- Know when to refer.

Purpose:

- Develop confidence in approach.
- Enhance your ability in basic assessment
- Enhance your ability in diagnosis
- Enhance your ability to initiate treatment.

Incidence of ocular injuries:

1.3 million injuries a year in US and 40, 000 of these will lead to loss of vision.

History:

It is most important to document the type of the injury and the event as well as the time of onset and the nature of symptoms. For instance whether it is a blunt or sharp trauma, acid or alkali burn, the patient's history of eye conditions, drug allergies and tetanus immunizations are important. Nevertheless, prompt treatment should not be delayed for lack of a detailed history. This is particularly important in a chemical burn. Also, enquire if both eyes are affected and what was vision before trauma.

It is also possible that the patient will be unconscious or unable to answer accurately. In this case, you can question the people accompanying the patient or the family members in order to gather as historical information as possible. However, you must be prepared to assess the injury and proceed with the treatment or referral in the absence of adequate history.

Most ocular injuries present with obvious redness and pain. However, not all injuries provide such obvious warning signs. For instance, a small perforation will produce minimal redness and escape attention. You should be particularly alert with the history

of metal striking metal and something hitting the eye. In this particular case there may be an intraocular foreign body, but there is no pain, as the lens, retina and vitreous have no nerve endings, which will produce the pain.

If you suspect an intraocular foreign body or a retinal detachment, referral to an ophthalmologist is urgently indicated. It will be beneficial not to use ointment in the eye, to facilitate the examination by the ophthalmologist.

HOW TO EXAMINE

Visual Acuity Testing:

The visual acuity should be recorded in every case. You could use a Snellen chart or given the patient's ability to read, you can use any available reading material such as a newspaper or a telephone book. You should also record the distance at which it was read. Note if the vision is equal in both eyes. If the vision is below this level, then you should ask the patient to count fingers, to perceive hand movements or to perceive light. It will be recorded as count fingers, hand movements, light perception or no light perception vision.

External Examination:

Quite often, it may be very difficult to perform an external examination without using an anaesthetic drop in the eye. The examination of the external structures may include palpation, pen light inspection, lid eversion, fluorescein staining and topical anesthesia.

Do not manipulate the eyelids if you suspect a penetrating or perforating injury of the globe. Palpate the orbital rims if you suspect a blunt trauma or fracture of the orbital bones. Use a penlight to inspect the eye for any sign of perforation as reduced depth of the anterior chamber or prolapse of the uveal tissue. Eyelid eversion may reveal a foreign body or a chemical burn.

If the patient has a foreign body sensation or if there is a history of blunt or sharp injury, fluorescein is used to stain the cornea to identify any corneal epithelial defects.
One drop of Proparacaine Hydrochloride will provide the relief of pain in almost 15 sec and allow you to proceed with an adequate examination including recording the visual acuity. Remember not to prescribe or provide samples of anaesthetic drops or ointment as prolonged use can result in corneal ulceration and inadvertent injury.

Pupillary Reaction:

Always check the pupillary reactions in a trauma case, particularly before instilling any dilating drops in the eye. An afferent pupillary defect may indicate an optic nerve injury.

Extraocular Movement:

Eye movement may be restricted and it may produce diplopia or double vision. Eye

movements will be restricted in orbital hematoma. If you find vertical restriction combined with vertical diplopia, your should suspect a blow out fracture of the orbit. If there is limitation of the eye movement accompanied by proptosis and auscultation the head and the eye, you hear a bruit, suggesting a carotid- cavernous sinus fistula.

Ophthalmoscopy:
If you can visualize the fundus, look for retinal edema, retinal hemorrhages, retinal detachment or if a penetration is suspected a foreign body.

The normal red reflex from the fundus is evenly colored and is not interrupted by shadows. If the red reflex is absent, it may indicate hyphema, cataract or a vitreous hemorrhage. Hyphema, which is blood in the anterior chamber, will be visible on examination with a penlight, whereas for a cataract and vitreous hemorrhage, you will require assessment with a direct ophthalmoscope.

Remember not to dilate the pupil in patients with head trauma, where pupillary signs may be important for neurologic evaluation and patients with narrow angles, which could pre-dispose them to acute angle closure glaucoma.

Radiological Studies:
If there is any question of facial or orbital fracture or of the intraocular foreign body, a radiological examination is required. A CT scan can often provide useful detail. A MRI scan should not be done if a metallic foreign body is suspected.

Now, I will review some of the common ocular injuries:

Management and/or Referral:
As a primary care physician, you should be able to initiate treatment in every case and refer those, which are outside your expertise.

True Emergencies:
Treatment for true emergencies must be instituted within minutes. A chemical burn of the cornea is one such true emergency. An alkali burn usually results in greater damage to the eye than an acid burn. Alkali compounds penetrates ocular tissues more rapidly. All chemical burns require immediate and profuse irrigation followed by a referral to an ophthalmologist.

Ocular Irrigation
Plastic squeeze bottle of eye irrigation fluid and normal saline IV drip with plastic tubing is ideal for ocular irrigation. Irrigation is facilitated by the use of a topical anaesthetic. The first aid for chemical injuries of the eye may demand the earliest possible irrigation using any source of water available including a garden hose, drinking fountain or faucet. I cannot overstate the fact that chemical burns require immediate and profuse irrigation.

Urgent Situations:

In an urgent situation, therapy can be instituted within a few hours. Common urgent situations can be:

- **Conjunctival or corneal foreign body** requires topical anesthesia followed by removal of the object with either vigorous irrigation or a cotton tip applicator.

If the foreign body is superficial on the cornea or conjunctiva, instill an anesthetic drop and use a cotton tip applicator across the globe to pick up the object. A forceful stream of irrigating solution can be used to dislodge a superficial foreign body. A sharp instrument may be required if the foreign body remains embedded. If a rust ring is present from a metallic corneal foreign body, referral to an ophthalmologist is required.

- **Corneal abrasion: -** ***Conjunctiva and Cornea:***

The corneal epithelium usually heals quickly following abrasion. This occurs within to 24 to 48 hours. Small lacerations of the conjunctiva heal quickly and consequently may conceal a penetrating injury of the globe.

You should anaesthetize the cornea and perform an eye examination, then stain with fluorescein to enhance the view. Instill a drop of cycloplegic drop for relief of pain followed by an antibiotic drop. Any small abrasion, up to about three to 4mm can be treated with no patch, however if the corneal abrasion is large, then a pressure patch to maintain lid closure is indicated for 24 hours. These cases must be re-examined in 24 hours. In severe cases, referral to an ophthalmologist in indicated.

Pressure patch - a moderate pressure patch is used following injuries that affect the corneal epithelium, for instance, corneal abrasion or after removal of the foreign body. Two eye patches can be applied by putting moderate tension on the strips of tape, which are used. You should make the patch tight in order to prevent the patient from inadvertently opening the eye under the patch.

- **Penetrating injury of the globe***:* - both actual and suspected. You should protect the eye with a shield and do not use a patch or ointment. An X-ray or CT scan of the orbit and referral is indicated.

- **Hyphema** is blood in the anterior chamber and requires immediate referral to an ophthalmologist.

- ***Ciliary Body:***

Following laceration of the cornea, the iris may prolapse resulting in an irregular pupil. The blunt trauma to the eyeball may produce iritis, which may result in pain, redness, photophobia and a small pupil.

Contusion may deform the pupil by tearing the iris root or by notching the pupillary margin. A contusion may also result in tearing of small vessels in the anterior chamber angle, causing hemorrhage into the anterior chamber, that is hyphema. Hyphema is generally the result of trauma and usually resolves spontaneously within three to five days.

In a hyphema, elevation of the intraocular pressure may necessitate medical or surgical intervention. It may also indicate a globe rupture or other serious ocular injury such as dislocated lens or a retinal detachment.

Lid laceration:
Eyelids close reflexively whenever the eyes are threatened. You may have seen that whenever a finger approaches the eye, the eye naturally close reflexively. The blinking also keeps the cornea clear through surface contact and tear production. In the case of facial nerve palsy, the globe may be exposed to drying or other injury. Lid margins must be intact to ensure proper lid closure and tear drainage.

Lacrimal Apparatus*:*
Tear drainage occurs at the medial aspect of the eyelids primarily through the lower lacrimal punctum and continues through the canaliculi to the lacrimal sac to the lacrimal duct to the nose. Failure to recognize them properly and repair a lower canaliculi laceration can result in chronic tearing for the rest of their life.

- Lid laceration can be sutured if it is not deep and the lid margin or the canaliculi is not involved. Full thickness lid laceration involving the lid margin will require referral to an ophthalmologist.

- **Radiant energy** - burns such welder's flash or snow blindness requires topical anesthesia, examination, topical antibiotic and cycloplegic agents along with patching.

Semi-Urgent Conditions:
Semi-urgent conditions require referral within one or two days and can involve an orbital fracture or a subconjunctival hemorrhage in blunt trauma. However, if you suspect a globe rupture or intraocular hemorrhage, then the referral becomes urgent.

Orbit:
The orbit protects the globe from impact of large objects. Any fracture of the rim usually does not produce any decrease in function. In palpation of the orbital rim, you may find acute tenderness or a step. A very thin orbital floor may blow out into the maxillary sinus from blunt impact to the orbit, for instance, from a fist or tennis ball. In this situation the orbit, contents including the inferior rectus and the inferior oblique muscle may become trapped in the bones producing restriction of the vertical movements and thereby causing diplopia or double vision.
A fracture of the medial bones, that of the ethmoid of the orbit may be associated with subcutaneous emphysema of the eyelids and on palpation, you may hear crackling sound under the skin in the medial aspect of the eyelids.

A fracture at or near the optic canal, through which the optic nerve and ophthalmic artery pass, may cause damage to the optic nerve with resulting visual loss. An X-ray of

the orbit and optic canals can demonstrate the fracture.

Treatment Skills:
To manage ocular injuries, every physician should be proficient in ocular injury, foreign body removal, eye medication prescription, patching and suturing.