

## Eyelid Trauma

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Eyelid injuries are on the rise primarily because of the increasing incidence of road traffic accidents, industrial mishaps and intentional assaults on the human body. Injury to the eyelids, lacrimal system or orbital wall may be isolated or may occur in association with mid facial injuries. Before proceeding to the management of localized injury the basic "ABC's" (Airway, Breathing, Circulation) must be evaluated. In adnexal injury the decision whether to repair the wound immediately or to delay repair depends on the degree of tissue edema or the presence of haematoma or infection.

### OPHTHALMOLOGICAL EXAMINATION

Whenever there is an eyelid injury, the globe must be thoroughly examined. Attempt should be made to determine the visual acuity. Conditions where in visual system evaluation is difficult, optic nerve and retinal functions may be tested by assessing the pupillary reactions. A confrontation visual field examination should also be done for any field loss. Observation of ocular adnexae is asked for before manipulating the injured eye. In the absence of signs of penetrating ocular injury a thorough anterior segment examination, IOP measurement and fundus evaluations must be performed. One should look for the presence of exophthalmos, since this may indicate a reterobulbar foreign body or haemorrhage. Subcutaneous emphysema, anaesthesia of infraorbital skin or bony step offs of orbital rim all indicate orbital bone damage. Presence of marked lid edema may necessitate use of a Desmarre's lid retractor.

### EVALUATION OF THE LID INJURY

1. Duration: The time lapsed since the patient suffered injury is important to decide the approach to wound repair.
2. Mode of injury: Injury with sharp or blunt objects. Dog bites are contaminated wounds and one needs to take preventive measures. Chemical and thermal injuries necessitate a delayed secondary wound repair. Site of Injury: It is important to know whether the lid margin is intact or lacerated. Injuries in the region of medial canthus may be associated with lacrimal injuries. (fig 2)
4. Tissue Loss :It is essential to note whether there has been any tissue loss because it may necessitate the mobilization of adjacent tissue or skin flaps from adjacent areas or free skin grafts.
5. Infection: If infection is present, the wound repair may be postponed for a few days till the infection subsides.
6. Injury to the Levator apponeurosis. Injury to Levator muscle or aponeurosis is diagnosed by asking the patient to look up as his frontalis muscle is blocked by pressing on the forehead. Inability to look up or absence or any wrinkling of the upper lid skin suggests injury to levator complex.

Radiologic evaluation is advised when indicated.

### GOALS OF EYELID REPAIR

- 1) To reestablish anatomical configuration.

- 2) To restore physiological function.
- 3) To provide better cosmetic appearance.

### TIMING OF THE SURGERY

Primary repair. In patients presenting within 24 hours of injury, primary repair of the wound is undertaken immediately. The primary repair affords the chance for best cosmetic and functional results.

Delayed primary repair : In cases where patient presents more than 24 hours after injury or where there is marked lid edema or infection, a delayed primary repair is performed after 3 to 4 days . During this waiting period, cold saline compresses, anti-inflammatory drugs and antibiotics are administered to reduce tissue edema and to control infection.

Secondary wound repair: In cases where the patient presents a long time after injury or in cases of chemical & thermal burns, healing by second intention must be allowed to take place. In such cases, one must wait for a minimum of 5 to 6 months before planning a secondary wound repair.

### REPAIR OF EYELID INJURIES

Principles to be followed for repair:

1. Local/General anaesthesia
2. Sustained haemostasis with infiltration of 2% xylocaine with adrenaline
3. Thorough examination ( with a focus on special structures such as the canaliculi , the canthal tendons and the levator function)
4. Cleansing the wound.
5. Removal of foreign material from the wound
6. Debridement of only that tissue that is conclusively devitalized.
7. Repair of special structures like the canaliculi, canthal

tendons and levator aponeurosis

8. Closure in layers.

### PRIMARY WOUND MANGEMENT

Primary wound management may be discussed under the following heads:

1. Repair of lid margin laceration
  - a. with minimal loss of tissue
  - b. with moderate loss of tissue
  - c. with severe loss of tissue
2. Lid laceration involving injury to levator muscle or aponeurosis.
3. Injuries involving medial canthus
4. Injuries involving lateral canthus.
5. Total avulsion of an eyelid.
6. Management of canalicular laceration.
7. Thermal & Chemical injury

### REPAIR OF NON-MARGINAL LID DEFECTS

#### Simple Lacerations

Smaller linear defects can be sutured without any undermining. But the round defect should be converted into an elliptical shape. There should be no tension or vertical pulling effect on the lid margins. Non-absorbable skin sutures should be removed in about 5 days. The vertical linear wounds may be broken into multiple Z plasties in order to improve the scar.

#### Deep lacerations

Deep nonmarginal lacerations require careful layer by layer inspection of the wound to assess the integrity of the orbital septum, levator aponeurosis, rectus muscles, and globe. It requires careful closure in layers. (Fig 3)

### REPAIR OF LID MARGIN LACERATION

**(i) With minimal loss of tissue:**

Lid margins should be freshened if devitalized tissue is present, to form straight, smooth surgical edges, sacrificing, as little tarsus as possible. The margin is then repaired using the three-suture technique. Use of magnification helps the repair.

Lid margin sutures are passed first. A 6-0 silk suture is passed through the grey line 3 mm from the edge of the tear, to a depth of 3mm. This is brought out of the wound and reinserted into the other side of the laceration 3 mm deep to the lid margin and emerging through the grey line 3 mm from the edge of the wound (Fig 4a). The same suture is then passed back into the grey line on the same side, 1 mm from the edge of the tear, to a depth of 1 mm (Fig 4b). The needle is brought out and reinserted into the opposite edge of the tear 1 mm deep to lid margins and emerging through the grey line 1 mm from the margin of the wound. Two more vertical mattress sutures are passed exactly in the same way through the posterior lash line and in the plane of the Meibomian gland openings. These three sutures are triply tied and ends left long (Fig 4c).

5,0 polyglactin sutures are used to reapproximate the tarsus. There is no need to place sutures on the conjunctival surface since it will heal with the approximated tarsal edges. Skin sutures are removed in 4 to 5 days. Lid margin sutures are left in situ for 10-14 days.

**(ii) With moderate loss of tissue :(From one fourth to one half of eyelid) :** In such cases, closure can be obtained by performing

- 1) a lateral canthotomy and cantholysis of either the upper or lower limb of the lateral canthal tendon,

depending on the eyelid involved.

- 2) Tenzal flap, by creating a semicircular flap.
- 3) Transconjunctival flap, or free transconjunctival graft
- 4) Mustarde's marginal pedicle rotation flap

**(iii) With severe loss of tissue (more than half of eyelid) :** Grafts from the opposite eyelid or surrounding tissue are used for repair. The commonly used techniques are:

- 1) Cutler Beard procedure
- 2) Hughe's tarso conjunctival advancement flap
- 3) Mustarde's cheek rotation flap
- 4) Free transconjunctival graft and mucocutaneous advancement.

## **TRAUMA TO LEVATOR MUSCLE OR APONEUROSIS**

The Levator palpebrae superioris (LPS) fibers are identified by their vertical orientation, in comparison with the Orbicularis muscle fibres, which run circumferentially.

"If the aponeurosis has been disinserted from the tarsus, the cut edge is drawn forwards and reinserted by placing three 5-0 double arm vicryl sutures through the tarsus. Both arms of the suture are then passed through the aponeurosis. If surgery is being performed under local anesthesia, the level of aponeurosis can be adjusted by having the patient look in the straight-ahead gaze. If the orbital septum has been opened due to injury, it should not be sutured since this could result in lagophthalmos. If the laceration is at the level of the lid fold, the eyelid crease is recreated by placing 2-3 sutures. The sutures are passed through the skin muscle layer and include a superficial bite of the levator aponeurosis.

**INJURIES INVOLVING MEDIAL CANTHUS :**

Avulsion of the lid at the medial canthus mostly involves the lower lid. In such cases, one must attempt to reconstruct the medial canthal tendon (MCT). The distal cut end is identified and sutured to its proximal part or to the periosteum with a 4-0 prolene suture. This ensures it is anchored adequately, so that the puncta are turned inwards and ectropion does not result.

**INJURIES INVOLVING LATERAL CANTHUS**

If the lateral canthal tendon (LCT) is found to be severed, it is repaired by passing 4-0 non-absorbable prolene mattress sutures through both ends and should be anchored to the periorbita on the inner aspect of the lateral orbital tubercle (Whitnall's tubercle).

**TOTAL AVULSION OF EYELID**

In this condition avulsed segments should be found and the avulsed tissue placed in a sterile container containing antibiotic solution and stored in a refrigerator until it can be surgically reimplanted.

**MANAGEMENT OF CANALICULAR LACERATION**

Avulsion of lid at the medial canthus or lacerations in this region will result in complete severance of the canaliculi. Various techniques of surgical repair of canalicular lacerations have been described in the past by various authors. The basic principle in the repair of the lacerated canaliculus is reestablishing of the drainage function. The development of fine sutures, refinement in surgical technique and the use of the microscope have contributed to a better prognosis.

**Stents :**

Monocanalicular or bicanalicular stenting may be

done. Monocanalicular have the advantage of not disturbing the normal canaliculus. Silicone is the most commonly used material. Mini-Manoka stent is one of the options. However to overcome the cost factor and difficult availability we have been using an alternative technique.

The first step is to identify the two cut ends of the canliculi. The lateral cut end is identified by passing a lacrimal probe through the punctum ( Fig 5a). To identify the medial cut end, the wound is examined under magnification, preferably an operating microscope. The tiny opening of the cut canaliculus is rather paler than the surrounding tissues. However, if the cut end is not obvious, it is identified by pooling sterile saline in the wound and then watching for bubbles while injecting air from the upper canaliculus. The use of a pigtail probe to identify the medial end of the lacerated canaliculus should be avoided because of the risk of creating false passages and trauma to the intact canaliculus.

Once the 2 cut ends are identified, a mini-manoka tubing or a 22gauge cannula (venflon) sleeve after removing the sharp tip of the stillete is introduced upto the medial sac wall (Fig 5b). Four pericanalicular bites are then taken with 8-0 vicryl or nylon sutures, two posterior and two anterior.

The lid margin wound is closed by the technique of marginal repair, as described. It is of paramount importance that the MCT should be repaired when it has been disrupted. The silicone tubing or sleeve is left in place for at least 3 months.

When not using a mini-manoka stent, one of the commonest problems encountered is extrusion of the tube from the intubated canaliculus. To retain a monocanalicular stent, fixation sutures (double arm) are passed through

the tube and eyelid skin over a peg. These sutures are then carried subcutaneously upwards and medially and tied again over a peg ( Fig 5c). These sutures provide an upward and inward traction to the tube preventing its extrusion. Alternatively, to aid in its retention, the silicone tubes may be passed into the nose by using Quickert-Dryden probing system wherein the silicone tube is fixed to a malleable probe which is passed into the inferior meatus through nasolacrimal duct and recovered from there. The other end of the tube is also passed into the nose from the opposite punctum (bicanalicular intubation). This ensures retention of the probe for the required period of time.

### **THERMAL AND CHEMICAL INJURIES TO THE LIDS:**

Emergency treatment of chemical burns consists of immediate, copious, prolonged irrigation with water or saline. No time should be wasted in looking for a specific neutralizing agent. Irrigation must be continued for a minimum of 30 minutes. Local debridement of necrotic tissue and foreign particles should be done.

Burns of the medial canthal area can cause closure of the punctum and canaliculi. So a daily dilatation may



**Fig 1 :** Injury to the Upper lid margin, deep laceration at the lower lid with trauma to the globe

be done. Tubing may be passed into the canaliculus to help maintain patency of these structures.

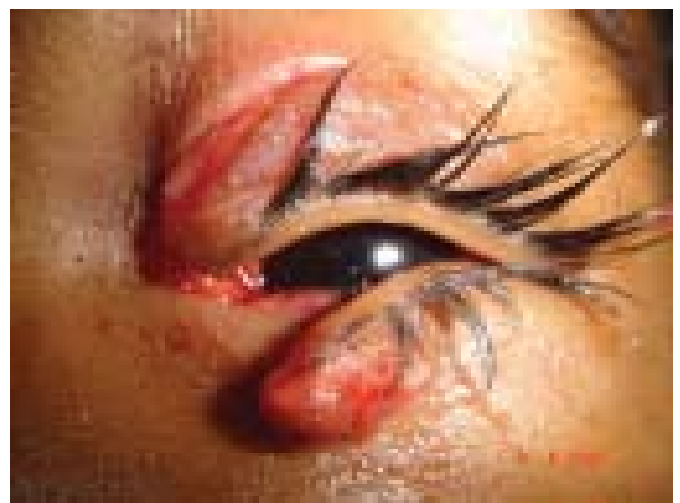
As the swelling decreases, lagophthalmos may develop, with resultant exposure of the cornea. At this stage tarsorrhaphy may be performed to protect the globe. During the healing phase in severe burns, cicatricial ectropion may develop due anterior lamellar contraction. Skin grafting is the usual treatment for these eyelid malpositions caused by wound contracture

### **SECONDARY REPAIR OF LID INJURIES**

Timing of the repair: - scars should be left for five to six months before any secondary surgery is carried out. The objective of surgical reconstruction is to release contractures by removing all scar tissue and replacement of the defect with skin.

### **CONCLUSION**

Adequate primary repair of the lid injury gives the most satisfactory results and meticulous repair is mandatory for lid injuries. However in certain conditions, secondary repair also gives reasonably better correction as far as functional and cosmetic result is concerned.

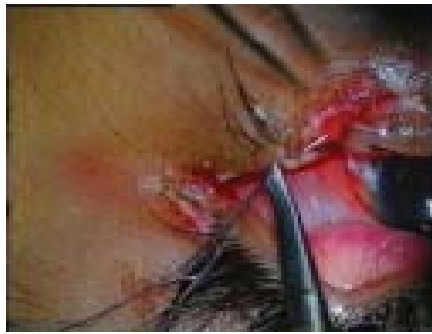


**Fig 2 :** Laceration of both upper and lower eyelid involving both canaliculi

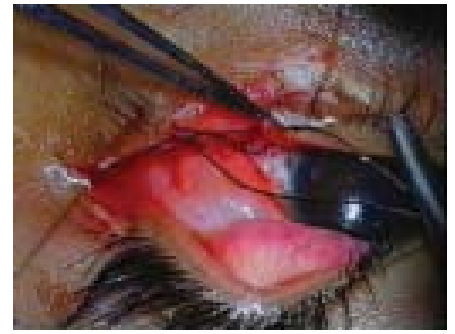




**Fig 3 :** Deep lower lid laceration



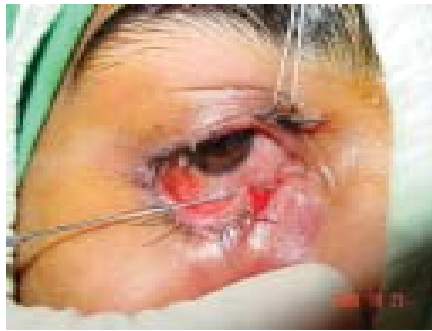
**Fig 4a-** A 6-0 silk suture is passed through the grey line 3 mm from the edge of the tear, to a depth of 3mm and is being reinserted into the other side of the laceration 3 mm deep to the lid margin.



**Fig 4 b-** The suture is then passed back into the grey line on the same side, 1 mm from the edge of the tear, to a depth of 1 mm



**Fig 4c -** Three marginal sutures are passed and ends are left long



**Fig 5a-** Lacrimal probe is passed through the cut ends of the lower canaliculus.



**Fig 5b-** 22G cannula is passed through cut ends of canaliculus into medial sac wall



**Fig 5c-** Fixation of tube by passing double arm prolene through two polythene bolster and emerging towards the medial canthus and fixed to the skin of eyelid.



**Fig 6a :** Left eyebrow deformity and traumatic ptosis



**Fig 6b :** Scar edges incised to restore back the anatomy



**Fig 6c :** Wound edges sutured back to restore original anatomy.

**Fig 6d :** Result following repair.

