Ptosis Correction: A Challenge Following Complex Orbital Injuries

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Abstract Ptosis occurs when the muscles that raise the upper eyelid (levator and Muller's muscle) get damaged. There are lot of ptosis correction surgery reported in the journals of oculoplastic surgery and ophthalmic surgery. Most of these surgeries are cosmetic correction. Rarely ptosis can be seen as a complication following orbitozygomatic complex injuries. Cause of traumatic ptosis most often is levator detachment from the superior tarsal plate. Lacerations of the lid may sever the levator tendon leading to scarring and secondary mechanical ptosis. Challenge in surgical management lies in identification of Levator aponeurosis, posterior to orbital septum and preaponeuratic fat. Once the levator muscle is freed from scar tissue it should be reapproximated to tarsal plate.

Keywords Traumatic ptosis

Introduction

With increase in pace of life, there is increase in the incidence of facial trauma. Road traffic accidents, interpersonal violence, Sports injuries, industrial injuries and animal attacks are some of the common etiologies for facial fractures. Some of the trauma cases can come back with post traumatic defects which include facial asymmetry, facial scar, loss of ear, nose or teeth and ptosis.

Ptosis means drooping of the upper eyelid. Ptosis occurs when the muscles that raise the upper eyelid (levator and Muller's muscle) are not strong enough to do so properly. It can affect one eye or both eyes and is more common in the elderly as, muscles in the eyelid may begin to deteriorate. There are several etiologies for ptosis; it can be of (1) congenital origin (2) Neurogenic origin (3) Myogenic origin (4) Mechanical origin (5) Traumatic origin. On the basis of severity and levator muscle function it can be (1) Mild ptosis (2) Moderate ptosis (3) Severe ptosis [1].

Trauma to the upper eyelid region may sometimes lead to ptosis. Traumatic ptosis may have three possible etiologies. (1) Mild degree of trauma associated with edema or haemorrhage may produce levator disinsertion (2) Lacerations of the lid may sever the levator tendon leading to scarring and secondary mechanical ptosis (3) Third major variety of traumatic ptosis involves damage to the nerve supply to the levator muscle [2].

Case Report

A 46 year old male patient reported to our unit with a chief complaint of difficulty in opening of left eye since 6 month. He first reported to us 6 months back with a history of bear attack during which he had suffered multiple facial injuries like fracture orbital complex involving supra orbital rim, infraorbital rim, fracture of maxillary bone and nasal bone. Bony injuries were also accompanied by laceration of upper eyelid and nose. After the surgery he recovered well with good post operative healing of facial lacerations and fractures. But there was no eye opening on left side, which was diagnosed as ptosis due to traumatic origin (Fig. 1).

Diagnosis of traumatic ptosis was made on the basis of local examination of eye which shows drooping of the

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Fig. 1 Severe ptosis of the left eye

upper eyelid, no voluntary opening of left eye, no levator function, no scleral show, visual acuity was normal and pupils were reactive.

After 6 months decision was taken for the surgical correction of ptosis. Case was posted under general anaesthesia, step by step dissection done to look for levator muscle. First skin incision given at the eyelid crease 5–7 mm above the eye lashes, dissection done through orbicularis oculi to identify the orbital septum (Fig. 2).

Once the dissection is done through the orbicularis oculi, orbital septum should be identified (Fig. 3). Orbital septum is an anatomic boundary between the eyelids and orbit. It is a multilamellar layer of dense connective tissue arising from the arcus marginalis, a thickened white fibrous line on the periosteum of bony orbital margin. Orbital

Fig. 3 Orbicularis oculi exposed

septum forms the anterior boundary of the orbit. Medially the septum splits to cover the posterior aspects of Horner's muscle and adhere to the lacrimal fascia, inserting on posterior lacrimal crest and anterior lacrimal crest, respectively. Laterally the septum inserts anteriorly on the lateral canthal ligament and posteriorly on whitnall's tubercle of the lateral orbital rim. In the upper eyelid the orbital septum joins the levator aponeurosis 2 to 5 mm above the superior tarsal border [3] (Fig. 4).

In next step, Orbital septum with preaponeuratic fat is retracted anteriorly to look for levator muscle. In ideal scenario levator aponeurosis should be visible just below the preaponeuratic fat; in this case it was not present at its normal anatomic position, suggestive of muscle dehiscence due to trauma (Fig. 5).

Later the levator aponeurosis was identified by doing dissection posterior to orbital septum and preaponeuratic fat.

Due to muscle dehiscence, there was lot of scar tissue around the levator muscle (Fig. 6). Levator muscle was freed from the scar tissue (Figs. 7, 8), then in the next step

Fig. 2 Incision given over the skin of upper eyelid

Fig. 4 Orbital septum identified

Fig. 5 Pre-aponeurotic fat

Fig. 6 Absence of levator aponeurosis as it is not present at its normal anatomics position

Fig. 7 Levator aponeurosis identified

Fig. 8 Levator muscle is freed from scar tissue

Fig. 9 Levator aponeurosis sutured to superior aspect of tarsal plate

the tarsal plate was exposed and levator aponeurosis was sutured to the superior aspect of tarsal plate, which showed good eye opening (Fig. 9). Skin incision closed with 4–0 Vicryl sutures. Frost suturing was done through lower eyelid and dressing given. Post operative results were satisfactory (Fig. 10).

Discussion

There are lot of ptosis correction surgery reported in the journals of oculoplastic surgery [4, 5] and ophthalmic surgery. Most of these surgeries are cosmetic correction [5, 6]. Maxillofacial surgeons come across the ptosis cases as post trauma defect [7]. Severe ptosis can affect the individual patient's life style. It can decrease patient's vision and gives unesthetic appearance.

Fig. 10 Post operative view comparison of both the eyes show good result

A thorough understanding of upper eyelid anatomy is important to understand the basics of ptosis surgery.

The upper eyelid takes its form from the tarsal plate, a cartilaginous structure, which is covered by skin on its external surface and by the palpebral conjunctiva on its internal surface. The tarsal plate extends upward approximately 10 mm from the upper eyelid margin [8].

The eyelashes insert into the inferior border of the tarsal plate to extend out through the gray line, which is the anatomical division between the anterior and posterior lamellae of the eyelid. The anterior lamella is composed of eyelid skin and orbicularis oculi muscle, while the posterior lamella is made up of the tarsus and the palpebral conjunctiva. Forty millimeters in length, the levator palpebrae superioris originates slightly above the annulus of Zinn adjacent to the lesser wing of the sphenoid. At the equator of the globe, a transition from muscle to aponeurosis occurs 15 to 17 mm proximal to the superior tarsal border. Muller's muscle, sympathetically innervated minor retractor of upper eyelid arises from the under surface of levator palpebra superioris muscle, and inserts into the superior tarsal border [9].

So any weakening of levator muscle or Muller's muscle may result in drooping of upper eyelid which is known as Blepharoptosis.

In most of the traumatic ptosis cases, levator aponeurosis gets detached from the superior aspect of tarsal plate. So challenge in post traumatic ptosis correction lies in identification of levator aponeurosis. Three methods of surgical correction of ptosis have been described in the literature which includes levator resection surgery, Muller's muscle resection and frontalis sling operation [4]. Cases in which there is severe damage to levator aponeurosis as well as tarsal plate, the choice of operation is Frontalis sling operation using fascia lata, temporalis fascia or silicon rod. In our case tarsal plate was intact and we were able to identify the levator aponeurosis posterior to preaponeuratic fat, so the decision was taken to suture the

Fig. 11 Anatomy of upper eyelid

tarsal plate with aponeurosis, which resulted in good eye opening [10] (Fig. 11).

Conclusion

The treatment of choice for post traumatic ptosis correction depends upon the levator muscle function and condition of tarsal plate. In case of adequate levator muscle function, if it is possible to identify levator muscle and the tarsal plate is intact, suturing the tarsal plate with levator aponeurosis will be enough to give desired result. If the levator function is poor then frontalis sling operation will be the better choice.

Some of the complications which can be seen as a part of ptosis surgery are under correction, over correction, inability to close the eye, suture abscess, eyelid hematoma, injury to eyeball and lidlag in downward gaze.

Proper understanding of upper eyelid topography and careful assessment of muscle function will result in appropriate selection of operative procedure with good result and minimum morbidity.

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