Repair of Eyelid Trauma

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Introduction

Eyelid trauma defined as a trauma to external surface of the lids with or without loss of tissue or other ocular co-morbidities. The United States Eye Injury Registry (USEIR) reports periocular injuries ± 5% among all severe trauma cases which 81% of the cases involving lacrimal system. Cipto Mangunkusumo Hospital Ophthalmology Department Emergency Unit reported there were 134 cases of palpebral trauma from 2010-2012. Eyelid trauma is classified based on its depth (partial thickness which involved only anterior lamellae, and full thickness which involved both anterior and posterior lamellae) and location (non-marginal, marginal, medial canthal, lateral canthal and canalicular). History of present trauma is essential to determine the mechanism, onset, location, cause (direct or indirect, blunt or sharp object) and loss of visual acuity (sudden or gradual). In the ocular examination, it is important to find the palpebral tissue discontinuity: assess the location, depth, canalicular involvement. If laceration involves eyelid margin, the key considerations are whether it is partial or full thickness and whether it is medial or lateral to the punctum. If it is medial to the punctum, it will likely result in damage to the canaliculus (most common in lower canaliculus). 1-3

Methods

1. Partial thickness laceration
   In simple laceration (partial thickness), we use simple interrupted suture but if wound is under tension, use horizontal / vertical mattress suture. 4

2. Full thickness laceration
   In full thickness laceration, vertical mattress suture is used with the first mattress suture placed through tarsus and the second mattress suture placed anterior to the first suture (between tarsus and orbicularis). 2

3. Canthus laceration
   If the laceration located at lateral canthus, use lateral tarsal strip procedure or canthopexy.
   Surgical procedures for lateral canthopexy are as followed:
   1. Skin incision at the lateral canthus horizontally ± 1 cm
   2. Make a blunt dissection until the periosteum lateral orbital rim appears
   3. Suture the inferior tarsus to the periosteum using vicryl 5.0.
   4. Make a canthoplasty by suturing the superior margo palpebral with the inferior margo palpebral with vicryl 6.0.
   5. Subcutaneous suture with vicryl 6.0 and skin with prolene 6.0.
If the laceration located at medial canthus, we use transcaruncular surgical approach:
A. conjunctival incision at inferior tarsal margin.
B. vertical conjunctival orbitotomy incision posterior to caruncle through which blunt dissection exposes medial orbital wall periosteum.
C. engagement periosteum posterior to posterior lacrimal crest with 4-0 polypropylene suture.
D. suture passed subconjunctivally from medial orbitotomy incision to conjunctival incision along inferior tarsal margin and then through full-thickness coronal height of tarsus.
E. retrograde passage of suture to orbitotomy incision posterior to caruncle.
F. suture tied to achieve appropriate tension with knot then rotated to medial orbital wall.²,⁵

Figure 1. Medial canthal repair using transcaruncular approach⁵

4. **Marginal laceration**
If the laceration located at the eyelid margin, the surgical procedure are as followed:
A. Align lid margin using a vertical mattress suture passed through meibomian gland orifices.
B. Suture the tarsal plate using 2 or 3 interrupted sutures passed in a lamellar fashion.
C. Suture the lid margin using an additional vertical mattress suture anterior to the gray line.
D. Close the skin.²,⁶
5. **Canalicul laceration**

Surgical procedures using monocanalicular (mini-monoka) stent are as followed:

A. Mini-monoka stent being inserted in canaliculus.
B. Advancement of the stent.
C. Insertion of collarette into punctum.
D. Mini-Monoka stent in place. \(^7\) \(^9\)

Surgical procedures using bicanalicular stent are as followed:

A. Pass the stent through the cut end of the canaliculus and into the lacrimal sac.
B. Intubate the opposite canaliculus and nasolacrimal duct.
C. Reinforce the medial canthal tendon with a 4-0 vicryl suture.
D. Approximate the canalicular mucosa using sutures in the canalicular mucosa or adjacent tissues.
E. Use additional sutures in the orbicularis muscle as required to reinforce the wound. Suture the skin. Tie the stents in the nose. \(^2\) \(^6\) \(^10\)
Discussion

The goals of eyelid trauma management are avoid the infection, achieve functional palpebral and aesthetically pleasing scar. It is not always necessary to repair the laceration immediately. Initial treatment of patching with antibiotic ointment and tetanus prophylaxis can be given while stabilizing the patient. Definitive surgical repair should be performed within 24-48 hours. Choosing the appropriate surgical technique is based on severity, depth, and canalicular involvement.¹, ², ¹¹

If the patient came with simple laceration (partial thickness), the repair should be well apposed and without tension to have narrowest scar. The most common suturing technique used is simple interrupted suture. However if the wound is under tension, we can use horizontal / vertical mattress suture. In patient with full thickness laceration, vertical mattress suture can provide excellent support for the eyelid and for eversion at the lid margin.², ⁴

Trauma involving the medial canthal tendon is more difficult to manage than lateral canthal tendon. Repair of medial canthal tendon involves fixating the tendon to periosteum at the level of posterior lacrimal crest. Repair of medial canthal tendon methods using transcaruncular approach is to engage the medial tarsus and secure it to the periorbita at the posterior lacrimal crest. If the laceration involved the eyelid margin, it should be repair first before repairing the non-marginal laceration. Failure in marginal repair can cause lid notching, abnormal palpebral contour and lagophthalmos with corneal exposure.², ⁵

If the laceration involved the canalicular system, it should always be repaired first before repairing marginal laceration. The surgical aims for canalicular laceration were to perform anastomosis within lacerated canaliculus and intubate canalicular system until re-epithelisation of canalicula. Current techniques for canalicular repair are monocanalicular stent, bicanalicular stent and direct closure without stenting. Ideally, the stent should remain in place for at least 3-6 months. Patients must be encouraged not to rub their eyes or to pull out the tube in medial canthus.¹, ¹²

In monocanalicular stent technique, most common stent material used is mini monoka. Advantages of this technique are it is the best technique for canalicular laceration that are close to the punctum with minimal tension across the canalicular suture line, avoid possible damage to other intact canaliculus, simple to perform, less invasive and doesn’t
require nasal manipulation / endoscopic assistance. The disadvantages are premature stent extrusion and greater risk of corneal problem (keratitis, abrasion, ulcer). Crawford tube consists of silicone tubings attached to 2 malleable probes which commonly used for bicanalicular stent technique. The probes have a small bulb at the end to facilitate their removal from the nose with a Crawford hook. The advantages are easy to retrieve using a Crawford hook and less likely to become displaced. The disadvantages are potential risk of iatrogenic damage to uninvolved canaliculus & nasolacrimal lumen, technical difficulty of placing the stent.

Conclusions

Early recognition of eye injuries in patients with major trauma is important as timely intervention may save visual acuity. Good knowledge of the eyelid anatomy can help better wound apposition. For laceration with canalicular involvement, stent is used to maintain the canalicular patency.

References