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RESEARCH ARTICLE

A CASE REPORT OF CORNEAL TEAR REPAIR

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Abstract

Corneal tear is an ophthalmic emergency that can lead to severe visual impairment if not managed promptly. This case report describes the presentation, surgical repair, and postoperative outcome of a patient with a traumatic corneal tear. Timely diagnosis, primary corneal wound repair, and appropriate postoperative care resulted in restoration of globe integrity and satisfactory visual recovery.

Introduction:-

Corneal tears are commonly caused by blunt or penetrating ocular trauma and may result in significant visual morbidity [1,2].Corneal lacerations vary in size and shape, can be partial or full-thickness, and range from a simple linear pattern to a complex stellate formation [1,3]. All lacerations require urgent repair to reduce the risk of infection, decrease tissue necrosis, and alleviate patient discomfort and further damage to the eye [2,4]. The typical recommendation for a repair is within 24 hours. [2,4]The goal of any repair is a watertight closure, restoration of normal anatomy, and limiting the amount of post-operative corneal scarring and astigmatism.

Anatomy and physiology:-

Normal human cornea is transparent and avascular. It provides structural support to the eye and acts as a barrier to infections. The average adult cornea is 12 mm horizontally by 11 mm vertically and 0.5 mm in thickness. There are five distinct layers of the cornea starting from the outer surface: epithelium, Bowman membrane, stroma, Descemet membrane, and endothelium. In 2013, a 6th layer was reported, called Dua's layer, situated between the stroma and Descemet membrane. About 80 to 85% of the cornea is the stroma which consists of Type I and V collagen fibers arranged in specific parallel patterns to maintain transparency. The endothelial layer is monocellular and responsible for the optical clarity of the cornea by keeping it dehydrated through a sodium-potassium pump Injury to the epithelial layer leads to the destruction of the cells and a subsequent defect in the layer. This defect will heal by migrating epithelial cells created at the limbus. About an hour after the injury, the epithelial wound healing starts. Until the defect has healed, the cornea is at significant risk of infection. If the depth of the injury did not violate the Bowman membrane, the cornea heals without scarring.

An injury to the stroma heals with fibrotic deposition, which seals a wound but interferes with normal function. Excess fibrotic tissue repair causes increased scarring and contracture, limiting the optical clarity. Endothelial cells do not regenerate, and therefore when injured, the cornea may become edematous and cloudy due to the loss of the sodium-potassium pump function of the cells. The cornea is a highly innervated and sensitive tissue, which receives sensation from the nasociliary branch of the ophthalmic division of the trigeminal nerve.Due to the dense innervation, a patient can feel extreme pain from a corneal injury

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Indication:-
A diagnosis of corneal laceration by slit-lamp examination is an indication for repair. Signs and symptoms of a corneal laceration after trauma are decreased vision, ocular pain, a positive Seidel test, irregular pupil such as a peaked or teardrop pupil, intraocular foreign body, and prolapse of intraocular contents. No specific time for repair is published in the literature, but the standard preferred practice is within 24 hours.

Case Reoprt:-
A 36 years old male patientpresented to the emergency department with a history of injury to the right eye by a knife approximately 4 hours before presentation. He complained of severe pain, photophobia, watering , eyelid swelling and sudden diminution of vision in right eye.

Ocular Examination:-

O/E	**RIGHT EYE**	**LEFT EYE**
Vision (using snellen's chart)	Hand movement	6/9
Perception of light	Present	Present
Projection of rays	Inaccurate	Present in all 4 quadrants
Orbital margin	Intact on palpation	Intact on palpation
Ocular movement	WNL in all directions of gaze	WNL in all directions of gaze
Eyelid/ Eyebrow	WNL	WNL
Conjunctiva/ Sclera	WNL	Congestion
Cornea	On slit lamp:- full thickness corner tear, mild to moderate hazy cornea with Uveal tissue prolapse (iris) seen	Clear
Anterior chamber	Shallow	Normal depth
Iris	Iris prolapse	Normal colour/normal pattern
Pupil	Non reactive	Round/Regular/Reactive
Lens	Greyish white reflex	Greyish white reflex
Fundal glow	Absent	Good
IOP	Digitally low	Digitally normal
Seidal test	Positive	Negative

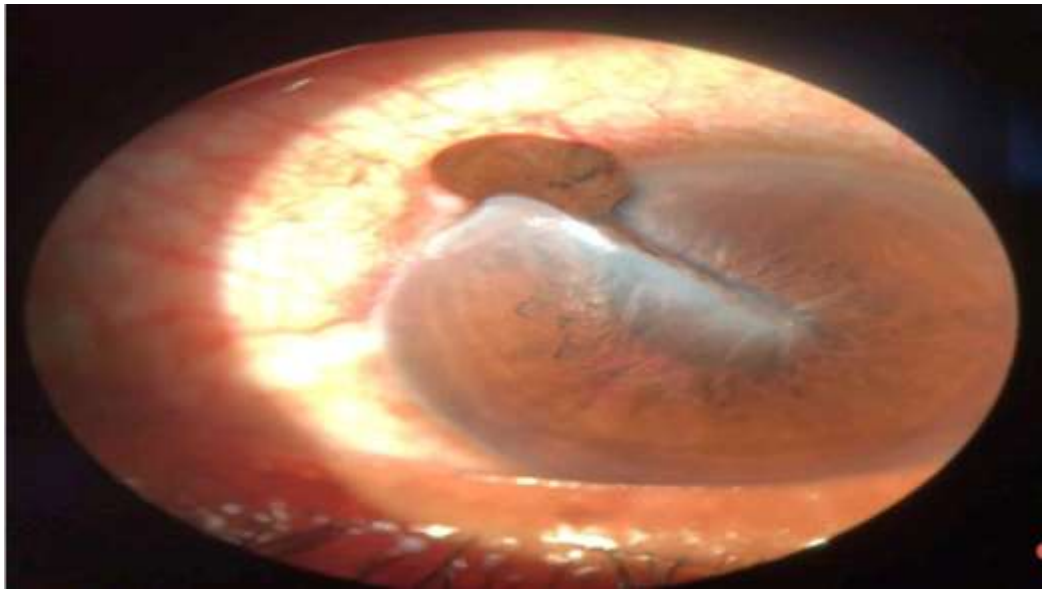

Figure 1: patent's eye photo on (day 0)

Preperation- While the patient waits for a repair, cover the injured eye with a rigid eye shield.Control pain and nausea with analgesics and antiemetics. Acquiring computed tomography(CT) of the face before the repair can identify foreign bodies. Administer tetanus prophylaxis to the patient and start antibiotics early to prevent infection. Do not perform intraocular pressure if a full-thickness laceration is present or suspected. If unsure if the laceration is full-thickness, perform a Seidel test to confirm it.

Surgical Management – the goal is to create a watertight closure by sealing the cornea without incorporating the intraocular contents, restoring the integrity of the globe and preventing further damage to the cornea or other parts of the eye. Following basic corneal suturing technique helps avoid excess postoperative corneal scarring and high residual astigmatism.

Anesthesia: For a small laceration in the clinic, topical anesthesia or a peribulbar block may suffice. General anesthesia is ideal if the laceration is complex or tissue is protruding. General anesthesia is the preferred practice as it allows for a controlled repair and alleviates any patient anxiety or pain.

As in this case , corneal repair was done with 10-0 nylon monofilament suture:-
NO TOUCH TECHNIQUEI.ecorneal would edeges were not held with forceps , needle tip is placed perpendicular to corneal surface and Rotate the wrist following the needle curvature and come out the other side of the wound perpendicular to the tissue. Tie the suture with a slip knot, 2-1-1, or 3-1-1, and then cut the loose ends. The smaller the knot, the easier it is to bury. Sutures should be passed at 90% depth in the stroma because too shallow can lead to posterior wound gape. Full-thickness passes can become a track for microorganisms to enter the eye. When determining the placement of a second suture, remember the compression zones, which are triangular extensions from the suture, to ensure there are no gaps. Long sutures will have a large zone of compression compared to shorter sutures. Long sutures should be passed in the periphery to steepen the cornea centrally and seal the wound. Centrally the sutures are in the visual axis. Placing short sutures centrally with minimal suture tension will reduce astigmatism and prevent excess scarring.

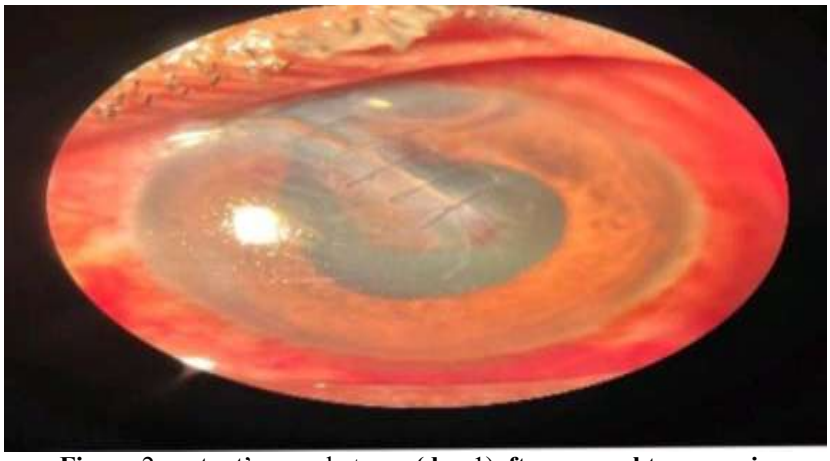

Figure 2**: patent**'s **eye** photo **on (day** 1)**after corneal tear repair**

The main aim: restore anatomical integrity of the eyeball:-
Full thickness < 2 mm:

- Self sealing, Seidel's test negative.
- Edges well opposed: BCL with topical antibiotics.
- Edges displaced: Bandage contact lens(BCL) with tissue adhesives.

Full thickness > 2 mm:-

- Under GA.
- A clear corneal stab incision given at 90° away from tear and AC formed with viscoelastic.
- 10-0 nylon monofilaments suture is used.
- No touch technique.

Astigmatic considerations:-

- Laceration near visual axis cause more flattening.
- To minimise induced astigmatism, it is sutured with small bites, knots buried away from visual axis and Suture should be placed with equal tension .

Post Operative Managemnt:-

- **Eye patch opened after 24 hr**
- **On day 1:- sutured wound examined for leakage using flourescein dye ,**
- **Iop , AC depth noted.**
- **If fundus visible examine for sign of Vitritis**

- **E/d Moxifloxacin 0.5% 1d QID**
- **E/d Homatropine 2% 1d BD**
- **E/d Carboxymethyl Cellulose 0.5 % or HPMC 1% to reduce FB sensation**
- **Oral painkiller SOS if wound is clean topical steroid is given and then tapered in subsequent visits.**
- **If ac reaction anticipated oral tab prednisolone 1mg/kg once a day for 1 week**
- **Subsequent follow up are done .**
- **Suture removal done after 6 week.**

Disclosure:-
All the photographs used in this journal have been published after obtaining informed consent and permissions from the patient.

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Conflicts of interest:-
Nil

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