Managing anterior segment trauma

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LV Prasad Eye Institute

No disclosures or conflicts of interest
Poll Question 1

What is your position?

1. Ophthalmologist
2. Ophthalmologist-in-training (registrar/resident)
3. Nurse
4. Ophthalmic Technician / Allied Health
5. Cornea surgeons
Terminologies and classification
### Open-globe Injury Classification

<table>
<thead>
<tr>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Rupture</td>
</tr>
<tr>
<td>B. Penetrating</td>
</tr>
<tr>
<td>C. Intraocular foreign body</td>
</tr>
<tr>
<td>D. Perforating</td>
</tr>
<tr>
<td>E. Mixed</td>
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<table>
<thead>
<tr>
<th>Grade</th>
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<tbody>
<tr>
<td>Visual acuity*</td>
</tr>
<tr>
<td>1. $\geq 20/40$</td>
</tr>
<tr>
<td>2. 20/50 to 20/100</td>
</tr>
<tr>
<td>3. 19/100 to 5/200</td>
</tr>
<tr>
<td>4. 4/200 to light perception</td>
</tr>
<tr>
<td>5. No light perception†</td>
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</table>

<table>
<thead>
<tr>
<th>Pupil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive: relative afferent pupillary defect present in affected eye</td>
</tr>
<tr>
<td>Negative: relative afferent pupillary defect absent in affected eye</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Zone‡</th>
</tr>
</thead>
<tbody>
<tr>
<td>I: Isolated to cornea (including the corneoscleral limbus)</td>
</tr>
<tr>
<td>II: Corneoscleral limbus to a point 5 mm posterior into the sclera</td>
</tr>
<tr>
<td>III: Posterior to the anterior 5 mm of sclera</td>
</tr>
</tbody>
</table>

### Closed-globe Injury Classification

<table>
<thead>
<tr>
<th>Type</th>
</tr>
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<tbody>
<tr>
<td>A. Contusion</td>
</tr>
<tr>
<td>B. Lamellar laceration</td>
</tr>
<tr>
<td>C. Superficial foreign body</td>
</tr>
<tr>
<td>D. Mixed</td>
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<tr>
<td>I: external (limited to bulbar conjunctiva, sclera, cornea)</td>
</tr>
<tr>
<td>II: anterior segment (involving structures in anterior segment internal to the cornea and including the posterior lens capsule; also includes pars plicata but not pars plana)</td>
</tr>
<tr>
<td>III: posterior segment (all internal structures posterior to the posterior lens capsule)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition and Explanation</th>
</tr>
</thead>
</table>
| Eyewall              | Sclera and cornea  
  *Although technically the eyewall has three coats posterior to the limbus, for clinical and practical purposes, violation of only the most external structure is taken into consideration* |
| Closed globe injury  | No full-thickness wound of eyewall                                                                                                                                                                                        |
| Open globe injury    | Full-thickness wound of the eyewall                                                                                                                                                                                        |
| Contusion            | There is no (full-thickness) wound  
  *The injury is due to either direct energy delivery by the object (e.g., choroidal rupture) or the changes in the shape of the globe (e.g., angle recession)* |
| Lamellar laceration  | Partial-thickness wound of the eyewall                                                                                                                                                                                      |
| Rupture              | Full-thickness wound of the eyewall, caused by a **blunt object**  
  *Because the eye is filled with incompressible liquid, the impact results in momentary increase in IOP. The eyewall yields at its weakest point (at the impact site or elsewhere; e.g., an old cataract wound dehisces even though the impact occurred elsewhere); the actual wound is produced by an **inside-out** mechanism* |
| Laceration           | Full-thickness wound of the eyewall, caused by a sharp object  
  *The wound occurs at the impact site by an **outside-in mechanism***                                                                                                                                                 |
| Penetrating injury   | **Entrance wound**  
  *If more than one wound is present, each must have been caused by a different agent*  
  Retained foreign object(s)  
  *Technically a penetrating injury, but grouped separately because of different clinical implications*                                                                                                                                 |
| Perforating injury   | **Entrance and exit wounds**  
  *Both wounds caused by the same agent*                                                                                                                                                                                     |
Ocular Trauma Score (OTS)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Raw points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial vision</td>
<td></td>
</tr>
<tr>
<td>NLP</td>
<td>60</td>
</tr>
<tr>
<td>LP/HM</td>
<td>70</td>
</tr>
<tr>
<td>1/200 – 19/200</td>
<td>80</td>
</tr>
<tr>
<td>20/200 – 20/50</td>
<td>90</td>
</tr>
<tr>
<td>≥20/40</td>
<td>100</td>
</tr>
<tr>
<td>Rupture</td>
<td>–23</td>
</tr>
<tr>
<td>Endophthalmitis</td>
<td>–17</td>
</tr>
<tr>
<td>Perforating injury</td>
<td>–14</td>
</tr>
<tr>
<td>Retinal detachment</td>
<td>–11</td>
</tr>
<tr>
<td>Afferent pupillary defect</td>
<td>–10</td>
</tr>
</tbody>
</table>
Calculating OTS

Calculating the OTS: conversion of raw points into an OTS category, and calculating the likelihood of the final visual acuity in five categories

<table>
<thead>
<tr>
<th>Sum of raw points</th>
<th>OTS</th>
<th>No light perception</th>
<th>Light perception / hand motion</th>
<th>1/200–19/200</th>
<th>20/200–20/50</th>
<th>≥ 20/40</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–44</td>
<td>1</td>
<td>74%</td>
<td>15%</td>
<td>7%</td>
<td>3%</td>
<td>1%</td>
</tr>
<tr>
<td>45–65</td>
<td>2</td>
<td>27%</td>
<td>26%</td>
<td>18%</td>
<td>15%</td>
<td>15%</td>
</tr>
<tr>
<td>66–80</td>
<td>3</td>
<td>2%</td>
<td>11%</td>
<td>15%</td>
<td>31%</td>
<td>41%</td>
</tr>
<tr>
<td>81–91</td>
<td>4</td>
<td>1%</td>
<td>2%</td>
<td>3%</td>
<td>22%</td>
<td>73%</td>
</tr>
<tr>
<td>92–100</td>
<td>5</td>
<td>0%</td>
<td>1%</td>
<td>1%</td>
<td>5%</td>
<td>94%</td>
</tr>
</tbody>
</table>

Evaluation and decision making
Mechanisms of ocular trauma

Blunt trauma:
- Closed globe injury
- Open globe injury

Penetrating trauma:
- Open globe injury

History:
- Blow to eye with fist, ball, stick or stone
- Roadside fall
- Automobile accidents, trauma by agricultural or industrial equipments

History:
- Sharp, pointed instruments like needles, knives, nails, glass piece
- FB travelling at high speed: Bullet, chopped wood,
Pre Op considerations in Trauma

Triage

Prioritizing the patient

Preoperative assessment of injury

Radiologic investigations

Gentle, minimal globe distortion

Protective shield

Avoid inadvertent globe distortion

Preparing for GA

Nil by mouth

Counseling

Prognosis Documenting consent Medico-legal considerations
Poll Question 2

How often do you manage/examine a case of corneal trauma

1. 0-5 cases per month
2. 5-10 cases per month
3. > 10 cases per month
Eye examination

- Visual acuity, PR
- Foreign body, subconjunctival hemorrhage
- Consensual light reflex
- Extent of the tear, iris status and lens status
- Infiltrate

- Pupillary reaction/ Consensual reflex
Zones of globe injuries

Zone I

Zone II

Zone III
Poll Question 3

Which intraocular antibiotic is preferred if there is a intraocular foreign body?

a. Vancomycin

b. Moxifloxacin

c. Ceftazidime

d. Clindamycin
### “Bugs and Drugs”

<table>
<thead>
<tr>
<th>Broad spectrum IV antibiotics</th>
<th>Spectrum</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cefazolin</strong>&lt;br&gt;25-100mg/kg/day IV/IM divided</td>
<td>Gram Positive Bacteria</td>
</tr>
<tr>
<td><strong>Vancomycin</strong>&lt;br&gt;40 mg/kg/day IV divided</td>
<td>Gram Positive Bacteria, Bacillus</td>
</tr>
<tr>
<td><strong>Gentamycin</strong>&lt;br&gt;2-2.5mg/kg/dose IV/IM q8hr</td>
<td>Gram Negative Bacteria</td>
</tr>
<tr>
<td><strong>Clindamycin</strong>&lt;br&gt;15-25mg/kg/day IV divided</td>
<td>IOFB, vegetative matter, Bacillus</td>
</tr>
</tbody>
</table>
Conjunctival Lacerations

- Conjunctival lacerations generally do not require surgical repair.
  - Large conjunctival lacerations
    - wound apposition with either absorbable or nylon sutures.
- Care is taken to avoid incarcerating Tenon's capsule.
 Conjunctival Lacerations

- Conjunctival lacerations less than 1 cm generally do not require surgical repair.
- Larger conjunctival lacerations can be apposed with either absorbable or nylon sutures.
- Care is taken to avoid incarcerating Tenon's capsule.

Conjunctival laceration
Review 9th day
Partial thickness tear

Edges of the wound apposed
No gape
No leak

BCL

Slide courtesy-Dr Sayali Sane
Lamellar tear

When apex of the flap tear is pointed down
- Minimal / no displacement with lid movement

Slide courtesy-Dr Sayali Sane
Lamellar tear
Needs suturing when...

- Tear edges not apposed
- Gape
- Avulsed flap
- Flap with apex up- displacement with UL movement
- Child
Slide courtesy-Dr Sayali Sane
Check Seidel’s in corneal tear

- Lamellar corneal tears may appear self sealing

- Seidel’s test determines the need to repair
Poll Question 4

Seidel’s test is performed with

a. 4 % Fluorescein

b. 2.5 % Fluorescein

c. 2 % Fluorescein

d. 5% Fluorescein
Bird beak injury with Iris in wound
Impacted metallic foreign body managed with tissue adhesives and bandage contact lens
21 yrs old male
Injury 2 days back with wooden stick
Day 2 of presentation

Remove FB at the earliest
Corneal tear suturing
Corneal tear

Full Thickness

- >2mm: Simple*
- ≤2mm: Complicated

Lamellar

* Wound does not involve limbus. is no iris or vitreous incarceration nor traumatic damage to lens.
Impacted metallic foreign body
Apposition of corneal landmarks
Zone of compression

Dr Aravind Roy
Stellate lacerations are sutured with

a. Bridging sutures

b. Purse string sutures

c. Multiple sutures and tissue adhesive

d. All of the above
32 M, Trauma with broken bottle, triradiate tear
If Iris prolapse is associated with corneal trauma?
Management of Uveal incarceration
Should we manage traumatic cataracts simultaneously with corneal trauma?
Lens involvement in anterior segment trauma
Poll question 6
45 year housewife presented with pain, redness, blurring of vision following injury with broom

A. Lens abscess
B. Traumatic endophthalmitis
C. Intraocular foreign body
D. Traumatic cataract

Slide courtesy-Dr Sameera Nayak
Traumatic subluxation

49 M, Farmer, Trauma with mango (fruit) falling onto the face with subluxation of lens
13 yrs/male
Injury with iron piece
2 days back
VA 20/100 to 20/30

Slide courtesy-Dr Sayali Sane
Post FB removal + CTR
VA 20/60
What is happening here?
How to handle vitreous prolapse with a corneal injury?
Management of vitreous strands
Managing complex corneal tears
31 M, Trauma with glass piece, zone I & II tear
31 M, Trauma with glass piece, zone I & II tear
14 M, Trauma with glass piece, corneal flap & zone II tear
47 M, Trauma with darning needle, zone I & zone II tear
Typical scenarios
Needle stick injuries
Typical scenarios - Bird beak injuries
If the corneal wound is grossly irreparable?
Irreparable Globe Injury

Primary apposition

Attempt to appose the wound

Poor prognosis clearly explained

Primary enucleation
Acknowledgements

Colleagues

@ LVPEI
Thank you!

LV Prasad Eye Institute

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Excellence ● Equity ● Efficiency