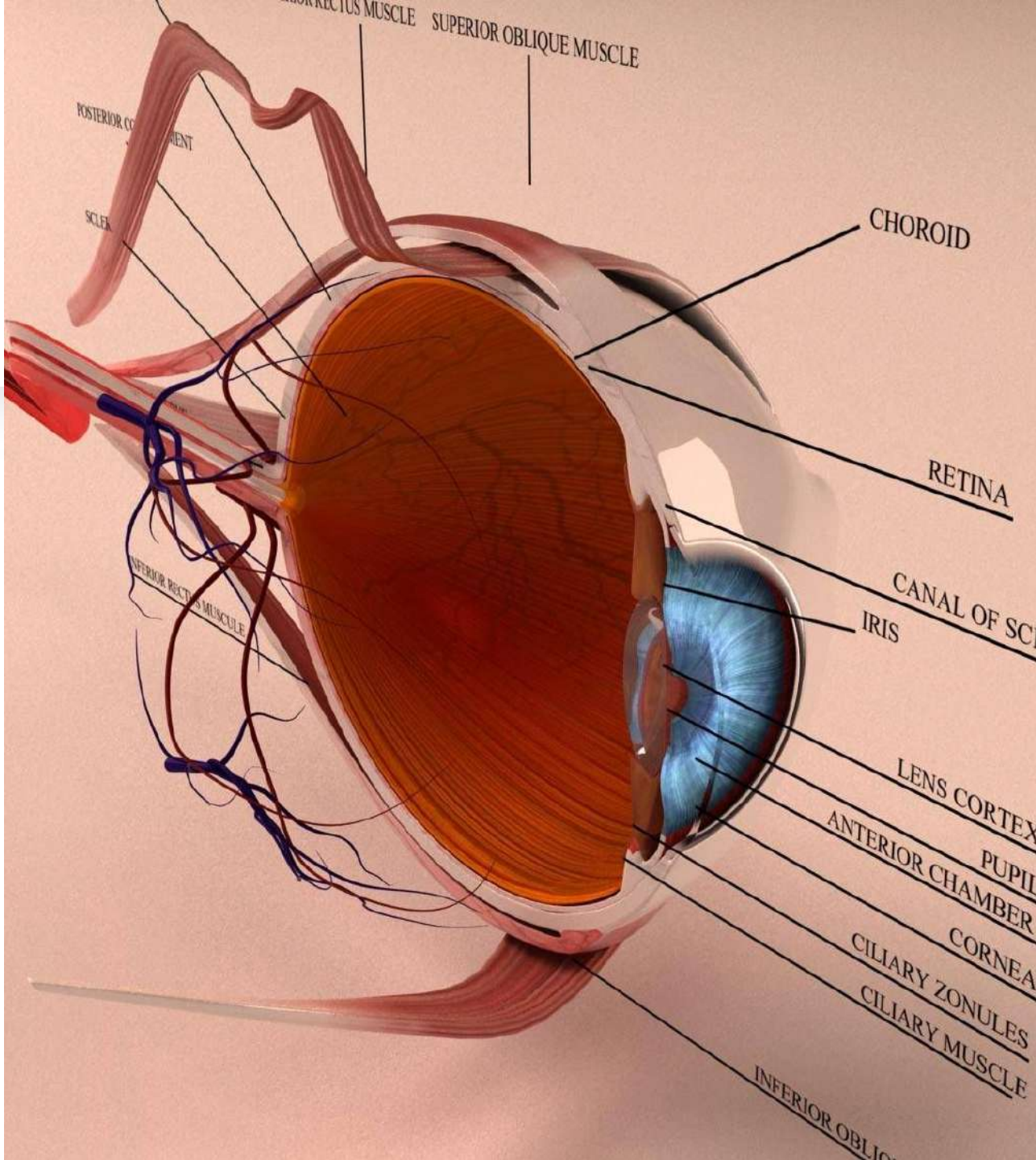
INTRODUCTION TO OCULAR TRAUMA

BY NAIGA M HAWA

OUTLINE

- Introduction
- Epidemiology
- Classification
- Evaluation
- General Principles
- Management of individual conditions
- Complications
- Prevention
- Conclusion



Introduction

Its an ocular emergency and major cause of preventable (40%) monocular blindness and visual impairement esp in developing countries

Ocular trauma and resultant loss of vision leads to psychological, economical and professional crippling of the patient

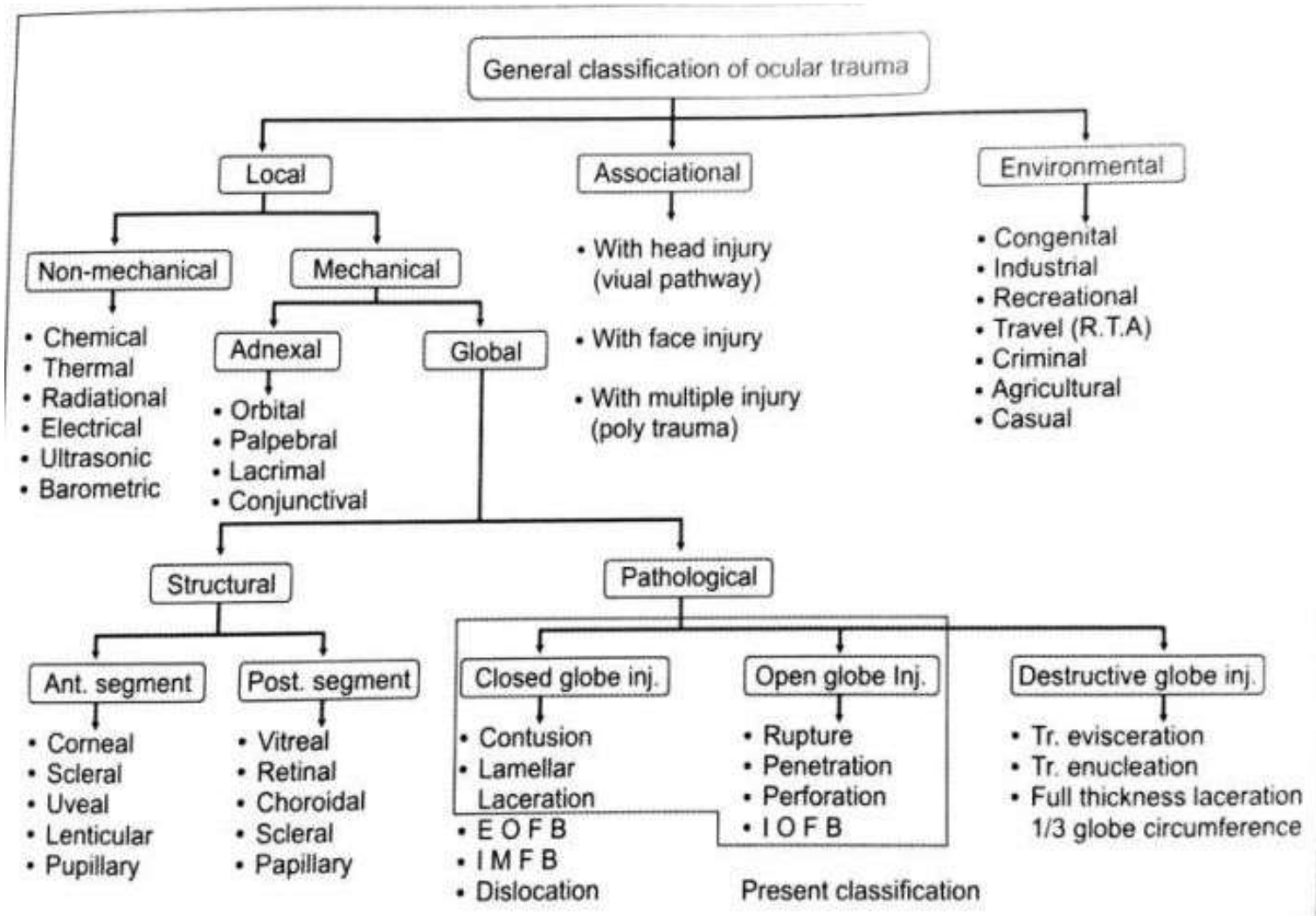
Prophylactic measure is always better than management.

Epidemiology

- Bimodal age distribution: children and young adults;>70 yrs of age
- M>F: 3-5x
- workplace, sports, falls(elderly)

The WHO Programme for the Prevention of Blindness

- 55 million eye injuries restricting activities
- 750,000 cases will require hospitalization
- 200,000 open-globe injuries
- approximately 1.6 million blind from injuries


General classification of ocular trauma
Local
Associational
Environmental
Non-mechanical
Mechanical
• Chemical
• Thermal
• Radiational
• Electrical
• Ultrasonic
• Barometric
Adnexal
Global
• Orbital
• Palpebral
• Lacrimal
• Conjunctival
• With head injury (viual pathway)
• With face injury
• With multiple injury (poly trauma)
• Congenital
• Industrial
• Recreational
• Travel (R.T.A)
• Criminal
• Agricultural
• Casual
Structural
Pathological
Ant. segment
Post. segment
Closed globe inj.
Open globe Inj.
Destructive globe inj.
• Corneal
• Scleral
• Uveal
• Lenticular
• Pupillary
• Vitreal
• Retinal
• Choroidal
• Scleral
• Papillary
• Contusion
• Lamellar Laceration
• E O F B
• I M F B
• Dislocation
• Rupture
• Penetration
• Perforation
• I O F B
• Tr. evisceration
• Tr. enucleation
• Full thickness laceration 1/3 globe circumference
Present classification

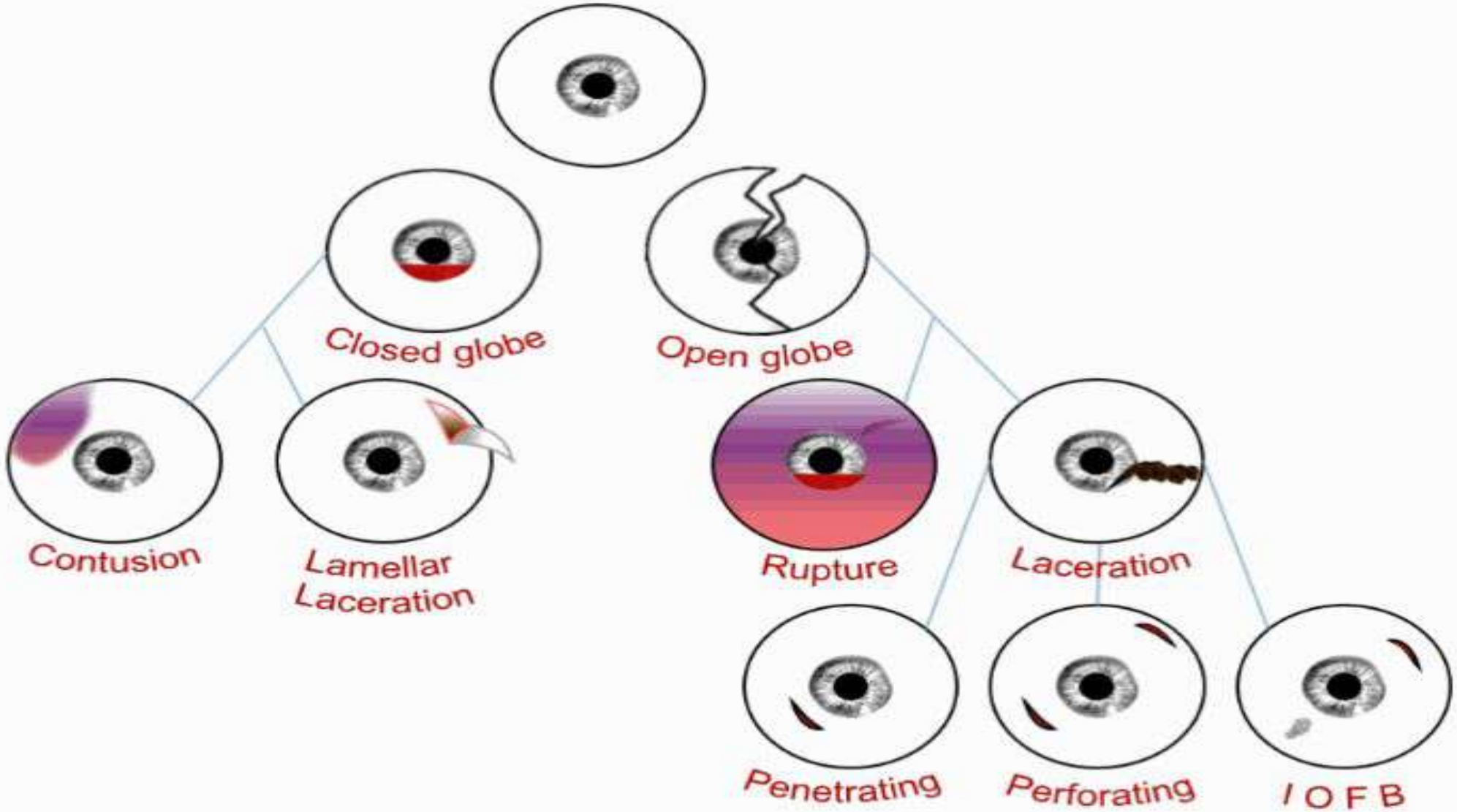
Mechanical eye trauma

- The Birmingham Eye Trauma Terminology System (BETTS) devised a classification for ocular trauma which is accepted worldwide.
- It is unambiguous, consistent and simple
- Created by Kuhn et al in 1996 to provide a simple, clear definition of all injury types and place the injuries with a comprehensive framework.
- While attempts have been made to improve the BETT system, none have been consistently incorporated

Birmingham Eye Trauma Terminology System

(BETTS)

Eye Injury Terminology



Evaluation and assessment

History-

should be detailed as possible

time & nature of injury

missile,blunt,?FB remaining,chemical etc.

Past ocular history - VA, lid function

Immunization history

Rule out life threatening injuries

Rule out globe threatening injuries

Examine both eyes

Documentation +/- photograph

Plan for repair

Assessment – OTS

This involves developing the ocular trauma score at initial assessment

It is derived from

- Initial VA
- Globe rupture
- Endophthalmitis
- Perforating injury
- Retinal detachment
- RAPD

Calculating the OTS

Variable	Raw points
Initial Vision	
NLP	60
LP/HM	70
1/200- 19/200	80
20/200-20/50	90
≥20/40	100
Rupture	-23
Endophthalmitis	-17
Perforating Injury	-14
Retinal Detachment	-11
Afferent pupillary defect	-10

Ref : Kuhn F, Maisiak R, Mann L et al. The ocular trauma score Ophtalmol Clin N Am 2002 : 15: 163-165

Categorisation and the potential visual acuity outcomes

Sum of raw points	OTS	No PL	PL/HM	1/200-19/200	20/200-20/50	≥20/40
0-44	1	74%	15%	7%	3%	1%
45-65	2	27%	26%	18%	15%	15%
66-80	3	2%	11%	15%	31%	41%
81-91	4	1%	2%	3%	22%	73%
92-100	5	0%	1%	1%	5%	94%

Ref : Kuhn F, Maisiak R, Mann L et al. The ocular trauma score Ophtalmol Clin N Am 2002 : 15: 163-165

PAEDIATRIC OCULAR TRAUMA SCORE

- Modified OTS
- Estimate prognosis of patient
- Awards fewer points for intial VA than the OTS in consideration of the probability of obtaining false inintial VA scores or the inability to obtain VA scores in children <15yrs
- Pt variables such as age and wound location were considered important parameters and were included in the scoring

PAEDIATRIC OCULAR TRAUMA SCORE

- Following equation used to determine the trauma score in pts for whom initial VA was

$$2\times(\text{age}+\text{zone})-\text{corresponding pathologies}$$

Variables	Raw points
Initial visual acuity	
NLP	10
LP/HM	20
Counting fingers	30
0.1–0.5	40
0.6–1.0	50
Age of the pediatric patients (years)	
0–5	10
6–10	15
11–15	25
Wound location	
Zone I	25
Zone II	15
Zone III	10
Concomitant eye pathologies	
Iris prolapse	−5
Hyphema	−5
Organic/unclean injury	−5
Delay of surgery (>48 h)	−5
Traumatic cataract	−10
Vitreous haemorrhage	−20
Retinal detachment	−20
Endophthalmitis	−30

Final Visual Acuity outcomes based on POTS

Sum of raw points	*Group*	*Number of eyes (n=27)*	NLP	*LP/HM*	*Counting fingers*	*0.1–0.5*	*≥0.6*
≤45	1	7	3	3	—	1	—
46–64	2	11	—	—	1	9	1
65–79	3	6	—	—	1	1	4
80–89	4	0	—	—	—	—	—
90–100	5	3	—	—	—	—	3

Abbreviations: HM, hand motion; LP, light perception; NLP, no light perception.

Importance of the OTS

- To provide a simple system with few variables to predict final visual outcome of an injured eye – prognosis
- Enables doctor to counsel pts and their families and to manage their expectations
- Assist in triage
- Allows quick and organised assessment of ocular injury

Evaluation of ocular trauma

Systemic examination

Visual acuity testing

Thorough Ophthalmic examination using slit lamp and ophthalmoscope, when feasible

In case of chemical injuries, take quick history and give immediate eyewash and treatment.

Defer any evaluation till then.

History

- Sudden/ gradual changes in vision since the trauma occurred
- Pain, diplopia and photophobia
- Date and time of incident.
- Mechanism of injury
- Accidental, intentional or self-inflicted
- Where it occurred- home, workplace
- Use of glasses or protective eyewear
- Mechanical trauma with a foreign object
- Size and shape
- Distance from which it came
- Exact location of impact

History

- Cases of foreign bodies
  - Composition of FB, contamination
  - Origin and exact mechanism of impact
  - Single/multiple
- Injuries from animals
  - Type of animal and nature of injury
  - Try to locate the animal to test for transmissible diseases
- Chemical Injuries
  - Nature of chemical
  - Check pH if sample available

History

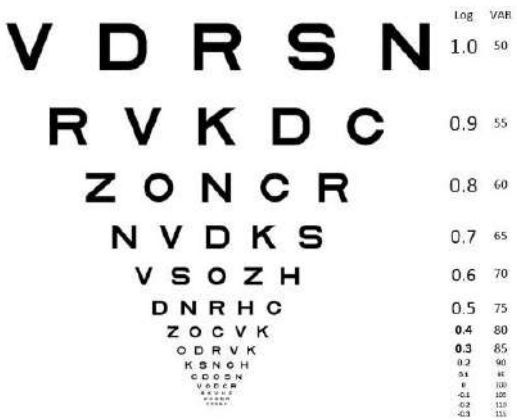
- Past ocular history
  - Pre-existing ocular diseases
  - Previous ocular surgeries
  - Visual acuity prior to incidence
- Intraocular or periocular appliances
  - IOL
  - Scleral buckle
  - Glaucoma drainage implant
- Tetanus immunization
- Any treatment taken for the injury in detail

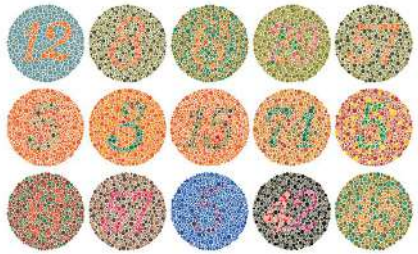
History

- Systemic Examination
  - General Condition of patient
  - Associated head injury, fractures
  - Any systemic conditions that may need urgent intervention

Location of injury

- Anterior segment
- Posterior segment
- Adnexa
- Orbital structures





Ophthalmic examination

- Record visual acuity on Snellen's chart
  - Test each eye individually
  - VA with spects
  - If not available, VA with pinhole
  - Near vision
  - In case of no PL, check with brightest light available (e. g. IDO)
  - Keep a record
- Colour vision
- Ophthalmoscopic examination- direct and indirect
- Slit lamp examination
- Photography
- Proper documentation and medico-legal case registration

Ophthalmic examination

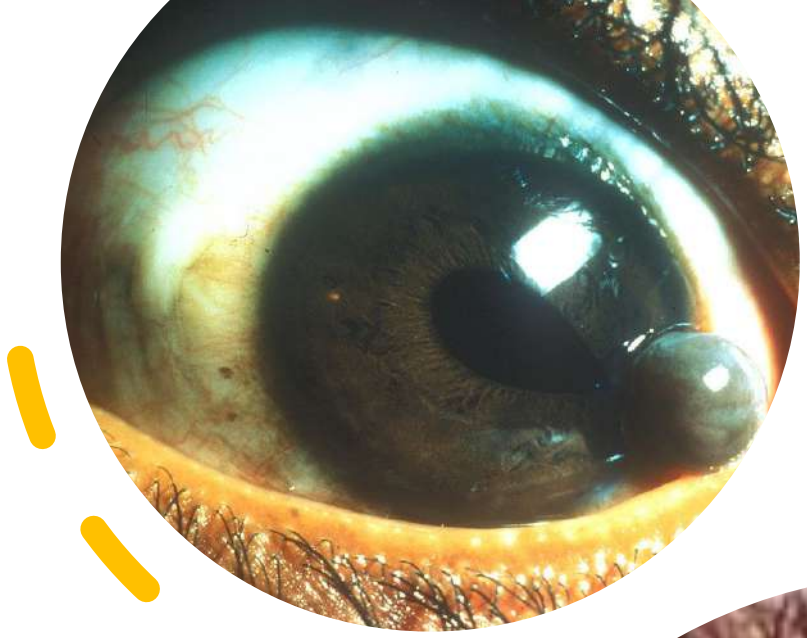
- Visual field by confrontation test
- IOP recording
  - Deferred until nature of injury is established- open-globe/close
  - Can be done by Schiotz, **Applanation** or hand held devices

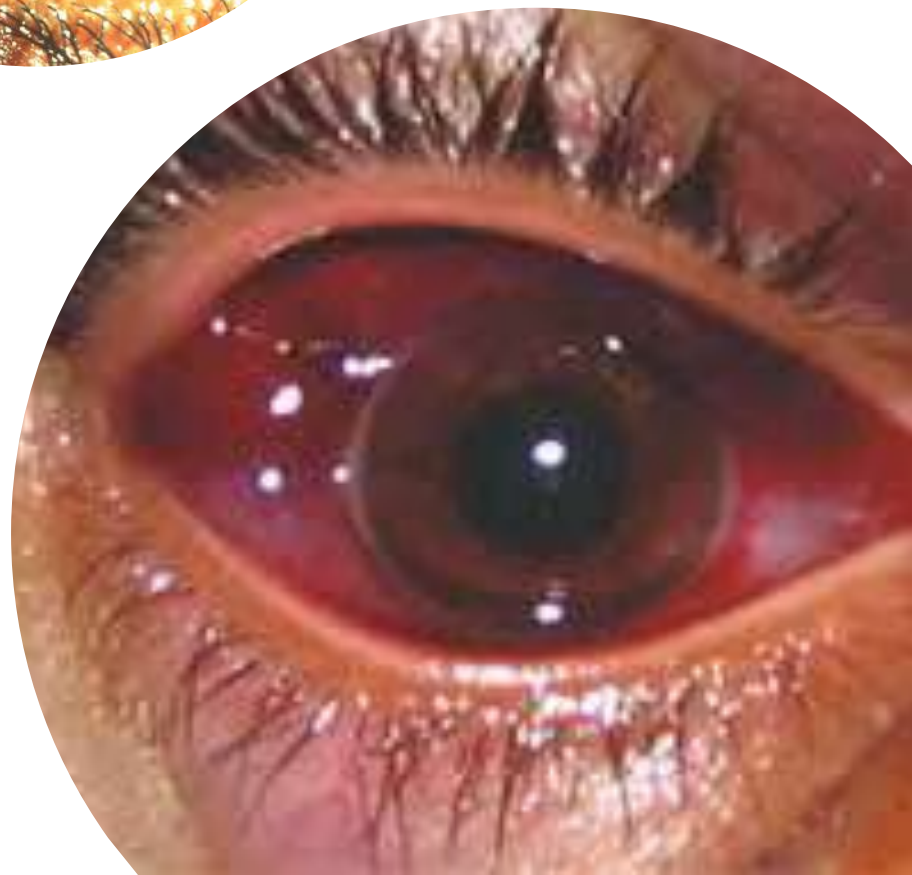
Ophthalmic examination

- Head Posture
- Facial Symmetry
- Eye alignment
- Orbital Fractures- crepitus, infraorbital hypoaesthesia, restricted EOM
- Extra-ocular movements- cranial nerve involvement,entrapment of muscle
- Eyebrows, eyelids and eyelashes
    - Abrasions, marginal and canthal tears including canalicular tears – probing
    - Ecchymosis, edema
    - Ptosis, FB, enophthalmos/exophthalmos

Ophthalmic examination

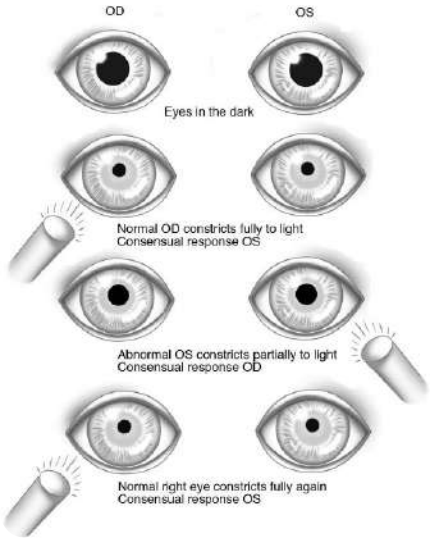
- Conjunctiva-
  - Chemosis, sub-conj. Haemorrhage
  - Examine fornices for any FB by double eversion
  - conj FB, abrasions (fluorescein staining), lacerations,emphysema
- Cornea-
  - abrasion- superficial/deep (Fluorescein staining)
  - Corneal FB- metallic burr/ vegetative matter
  - Chemical burns, ulceration
  - Corneal, Corneoscleral tear with/without iris prolapse
  - Seidel's test

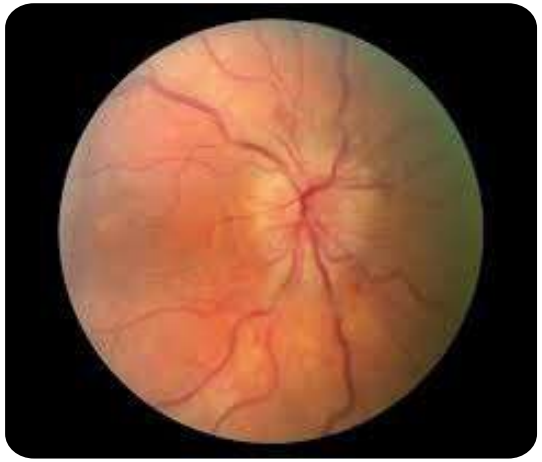




Ophthalmic examination

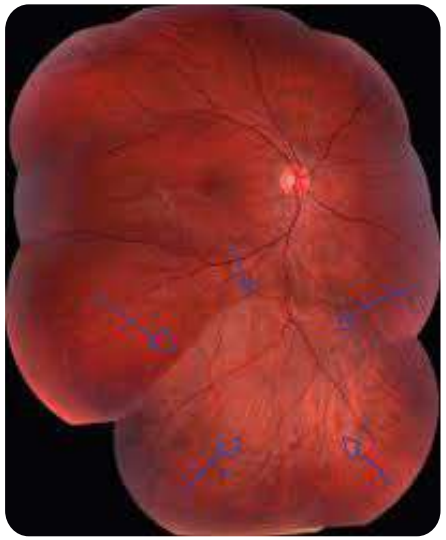
- Anterior Chamber-
  - Depth
  - Gonioscopy- iridodialysis, FB, angle recession
  - Cells, flare- iritis
  - Hyphaema , hypopyon
  - Cortical matter or dislocated lens in AC
  - Vitreous, FB
- Iris- examine before dilating the pupil
  - Iridodonesis, Iridodialysis
  - Iris prolapse
  - Sphincter tears
  - Traumatic iritis

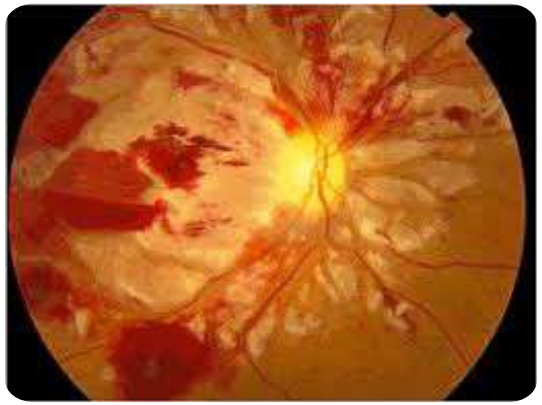




Ophthalmic examination

- Pupil-size, shape and **Pupillary Reaction**
  - Traumatic mydriasis
  - RAPD
  - D shaped
- Lens-
  - Position- Subluxation/ dislocation of lens
  - Stability
  - Clarity- traumatic cataract- rosette shaped cataract
    - PSC, ant subcapsular cat, Sectoral cataracts
    - Vossius ring
  - Capsular integrity





Ophthalmic examination

- Vitreous
  - Pigment (tobacco dusting)
  - Haemorrhage, IOFB
  - Weiss ring- indicates PVD
- Choroid- choroidal rupture, detachment
- Optic Nerve-
  - Edema, haemorrhage
  - Note c:d ratio
  - Avulsion- partial/complete
  - optic neuritis
- Retina- scleral depression is important
  - Berlin's edema (commotio retinae)
  - IOFB
  - Retinal tears, holes
  - Retinal dialysis and detachment

Investigations

- Routine haematological investigations
- Radiological imaging
  - Plain radiography – if CT and MRI not available
  - X-ray orbit AP and lateral view,
    - Orbital fractures
    - IOFB and intraorbital FB

CT

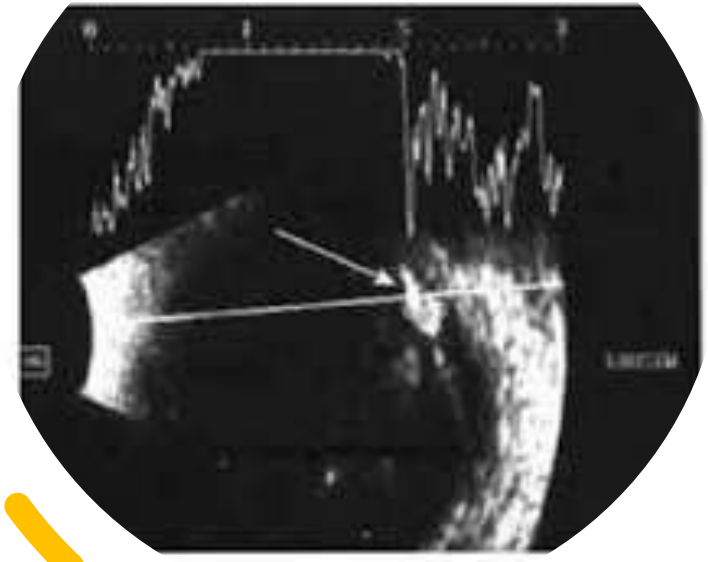
- Suspect orbital fracture
- Suspect IOFB i.e metallic objects
- Axial sections – globe, MR, LR, medial and lateral wall of orbit
- Coronal sections – SR, IR, roof and floor of orbit
- Indications
  - Post seg visualisation
  - Suspected IOFB / haemorrhage
  - Orbital fractures

MRI

- Indications
  - To visualise periocular soft tissues
  - Suspected vascular lesions, intracranial pathology, ON lesions
  - Non magnetic IOFB
- CIs- metallic IOFB, implants

Ultrasonography

- B-scan
- Best resolution of post seg (0.1 to 0.01mm)
- Extreme caution in c/o open globe injuries preferably avoided
- Indications
  - Vitreous haemorrhage, PVD
  - Retinal tears and detachment
  - Choroidal rupture, suprachoroidal Haemorrhage
  - Scleral rupture
  - To visualize Lacrimal gland, EOM, soft tissues, FB



Management

- First – Aid
  - Thorough eyewash- FB , chemical injuries
  - Cleaning and dressing of the wounds
  - Do Not give pressure on the eyeball in cases of globe rupture
  - Apply a shield in case of open globe injuries
  - Tetanus immunisation
  - Systemic Analgesics and antibiotics
- Manage respective injuries to the eye with the appropriate manner
- Call ophthalmologist

References

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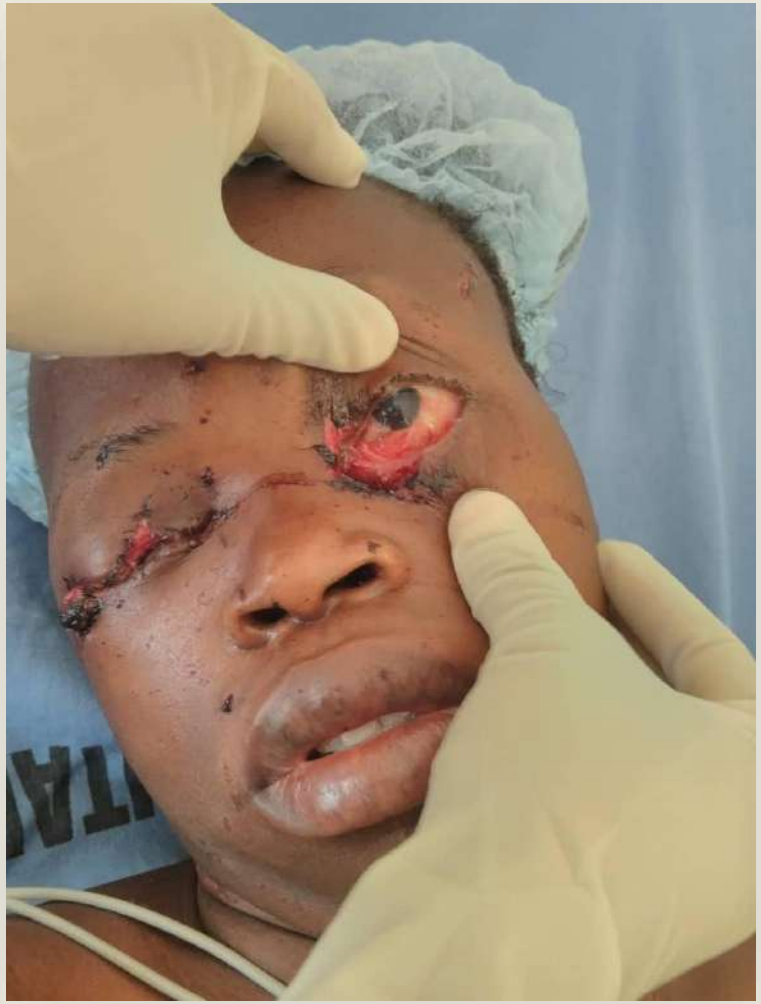
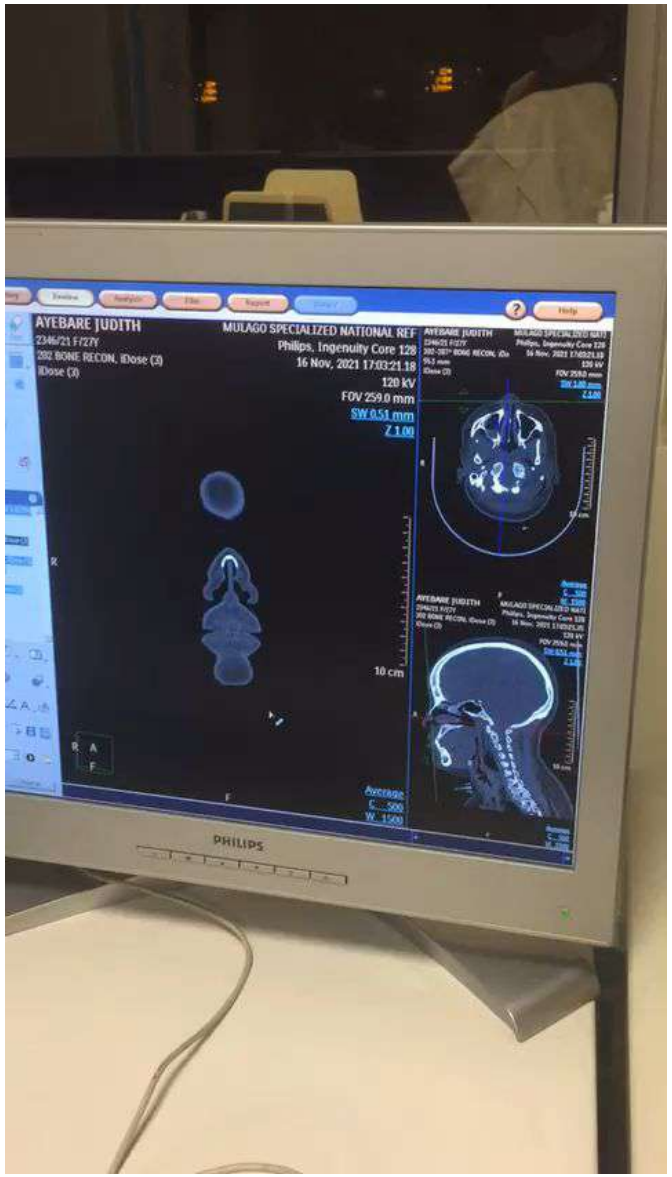
Case 1

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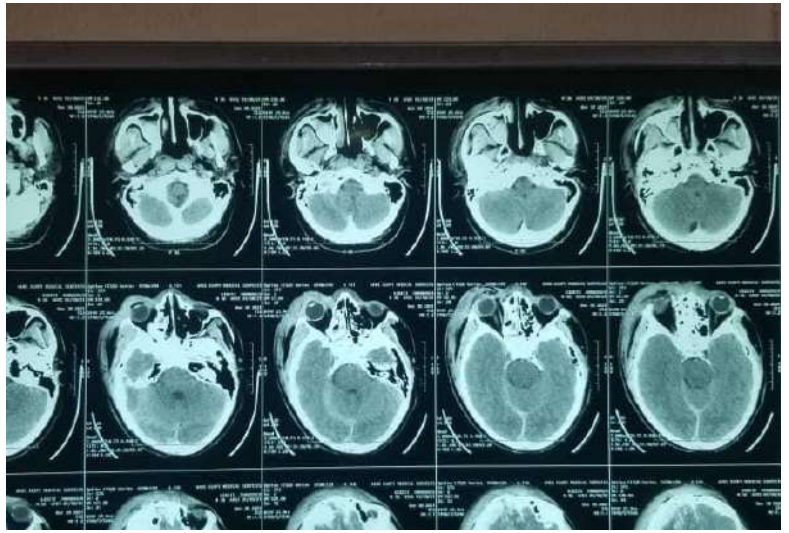

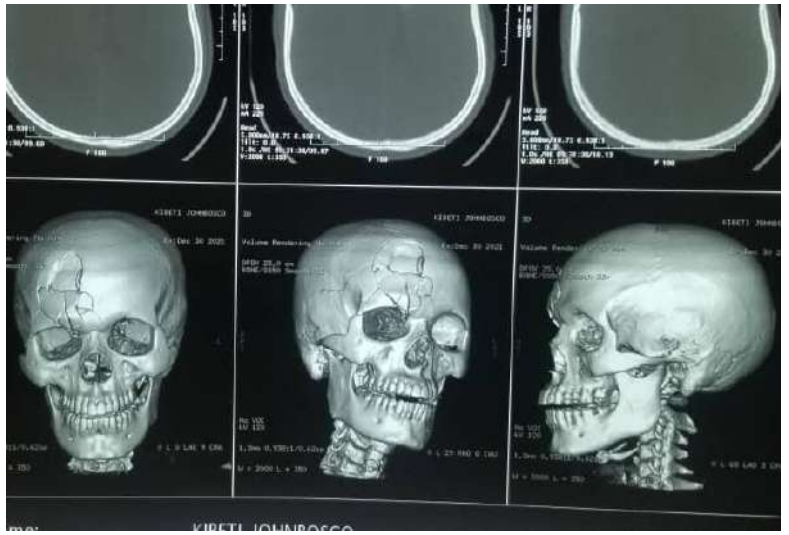

Case 2

Case 3


Thank you for listening