## Head trauma and the eye Ian Simmons Leeds Teaching Hospitals NHS Trust

# Topics

- Trauma network
- Closed head injuries
- Whiplash and the eye
- Facial and blow out fractures
- Direct ocular trauma

#### Organisation of trauma services in the UK



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Closed head injuries

- Coup and contre-coup
- Impact-related
- No direct impact
- Glasgow coma scale (out of 15)
- Loss of consciousness
- Concussion



\*ADAM.





## Traumatic cranial nerve palsies

- Anatomy
- Second (optic neuropathy)
- Third (Oculomotor)
- Fourth (Trochlear)
- Sixth (Abducens)















# Posterior indirect traumatic optic neuropathy (PITON)

- Trauma to bony prominence (orbital rim/cheekbone)
- Acceleration/deceleration stretching
- Disruption to posterior (cannalicular) blood supply
- Immediate vision loss (usually in one eye)
- May develop over 6 weeks
- Visual field loss (often altitudinal or central)
- High dose steroids may help in the acute phase
- Optic atrophy pale optic disc





#### Blood supply to the optic nerve



Closed Head Traumatic Brain Injuty (TBI) - Coup and Contrecoup



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Left eye

Right eye



#### Traumatic third nerve plasy

- Associated with more serious head injuries
- Basal skull fractures
- 3<sup>rd</sup> nerve supplies all the extra-ocular muscles except superior oblique and lateral rectus.



Traumatic third nerve palsy

- Eye diverges and is hypotropic ('down and out')
- Dilated pupil and ptosis





#### Traumatic fourth nerve

- 4<sup>th</sup> nerve supplies the superior oblique muscle
- Usually associated with loss of consciousness
- Often bilateral but asymmetric
- Head tilt and worse vertical double vision (diplopia) away from affected or worse side
- Can resolve but often needs surgery
- 4 different surgical options depending on symptoms (most need >1 operation)
- Surgery designed to enlarge the field of single vision (will not put things back to where they were pre-injury)







#### Traumatic sixth nerve palsy

- ▶ 6<sup>th</sup> nerve supplies the lateral rectus muscle
- Patients complain of horizontal diplopia worse in the distance than for near
- Some will resolve but this may take >12 months
- Prism support (no torsion) either temporary or incorporated
- Strabismus surgery to affected and possibly unaffected side





Figure 1: Left VI nerve (abducens) paresis or paralysis. Left esotropia with major limitation of abduction, increasing on left gaze

# Whiplash Injuries in an Accident

#### What is a Whiplash?

- Whiplash injury results from an rear end accident in which the driver is in a stationary vehicle that is struck from behind
- The movement of the neck is followed by massive rebound in the opposite direction, causing bone and soft tissue injuries
- Around 570,000 whiplash injury claims were made in the UK, last year [ABI 2012]



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## Whiplash injuries

- Coup/contrecoup injury
- Posterior vitreous detachment
- Retinal detachment
- Weakness of accommodation
- Migraines









## Facial fractures

- Le Fort classification
- Fractures not involving the orbit can still lead to vision loss (PITON)
- Blow-out fracture
  - Sub-conjunctival haemorrhage with no posterior extent
  - Pain on eye movement
  - Restricted up gaze
  - Infra-orbital numbness
  - Surgery within 2 weeks if required
  - May need squint surgery later











Source: Shah BR, Lucchesi M, Amodio J, Silverberg M: Atlas of Pediatric Emergency Medicine: www.accessemergencymedicine.com Copyright © The McGraw-Hill Companies, Inc. All rights reserved.





#### Direct ocular trauma

- Blunt ruptures and sharp lacerations
- Corneal abrasions and perforations
- Traumatic hyphaema (blood in the anterior chamber)
- Traumatic mydriasis
- Traumatic cataract
- Retinal commotio (bruising)
- Choroidal rupture



"In my opinion your bluffed vision is caused by the axe in your head. But you may want a second opinion."









## Thanks for inviting me to speak!

- Ian Simmons
- Consultant Paediatric Ophthalmologist and Ophthalmic Surgeon
- Neuro-ophthalmology, adult motility, ocular trauma, ophthalmic surgery complications, general ophthalmic negligence
- Spire Hospital Leeds
- tracey.horne@spirehealthcare.com
- i.simmons@nhs.net