



Ocular Trauma in Multisystem Trauma

Kelly T. Mitchell, MD
Professor
Residency Program Director
Co-Director Retina Service
Department of Ophthalmology
Adjunct Faculty
Department of Pediatrics
TTUHSC
Consultant Ophthalmologist
Athletic Department
Texas Tech University

"Nothing Gold Can Stay"

*Nature's first green is gold,
Her hardest hue to hold.
Her early leaf's a flower;
But only so an hour.
Then leaf subsides to leaf.
So Eden sank to grief,
So dawn goes down to day.
Nothing gold can stay.*

-Robert Frost

Today's Goals

Follow ATLS Principles

1. An organized approach to the evaluation and treatment of seriously injured patients
 2. Treat the greatest threat to life first
 3. Minimize risk of morbidity due to none-life threatening co-injuries
-while focusing on the eye & visual system**

The ATLS Way

Preparation

Triage

Primary Survey

Primary Resuscitation / Stabilization

Secondary Survey

Monitor / Re-evaluation

Definitive Care

The ATLS Way: Preparation Knowledge

What do you **need** to know

Level of Consciousness: AVP

Pupil Exam ↔ **Obvious Eye Injury**

What do you **want** to know

Visual Acuity

Fabulous Five Eye Questions

1. Eye Glasses & contact lens
2. Eye drops (what, how, why)
3. Eye trauma History
4. Eye surgery History (ask about laser surgery)
5. Lazy Eye (aka Amblyopia)

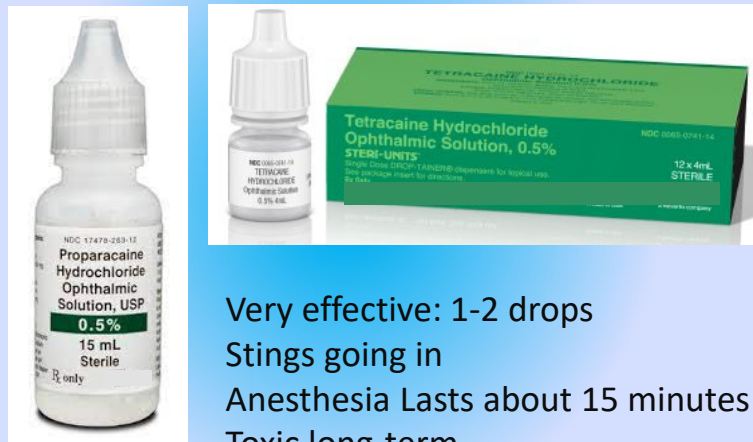
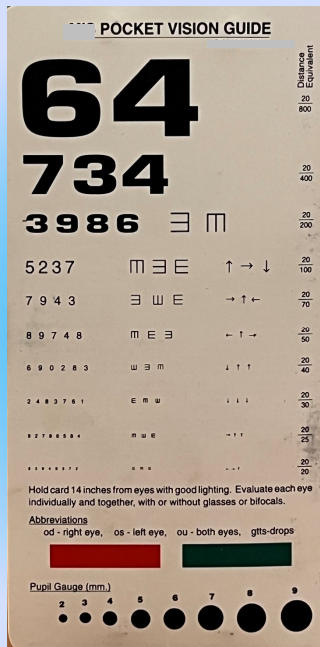
Supplies

Penlight

Eye card/lid speculum/topical anesthetic/ eye irrigation

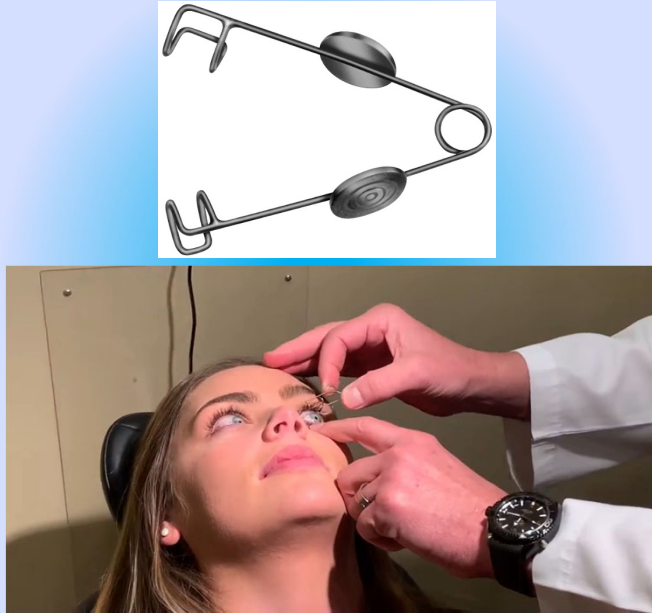
Eye shields (fox shields)





Very effective: 1-2 drops
 Stings going in
 Anesthesia Lasts about 15 minutes
 Toxic long-term
 Do not send to the floor/unit
 Do not send home

Alfonso Type lid speculum



Morgan Lens

Eye Irrigation Fluid

Any fluid that safely goes into the body

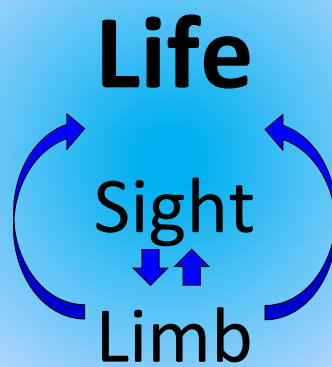
Or

fluid that the body normally produces (urine)

Eye (Fox) protective Shields



The ATLS Way: Triage



The ATLS Way: Primary Survey

- A** Airway & C-spine control-protection
- B** Breathing & Ventilation
- C** Circulation & Control of Bleeding
- D*** *Disability & Neurologic Status*
- E*** *Exposure & Environmental Control*

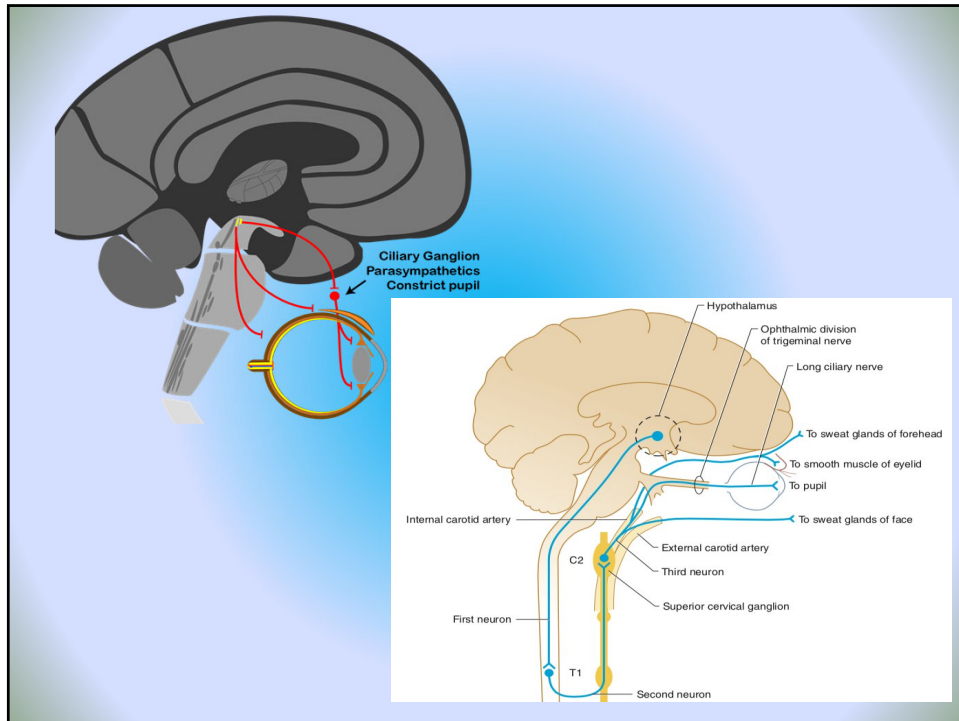
The ATLS Way: Primary Survey Disability – Neurologic Status

Level of Consciousness

AVPU

Pupil Exam

PERRL (A)



Pupil Exam

Oculomotor Nerve Compression

Dilated, nonreactive (fixed) pupil due to either cerebral edema or uncus herniation at the ipsilateral side of the dilated pupil.

Bilateral Diencephalic Damage

Small, reactive pupils indicative of bilateral, sympathetic pathway injury at the thalamus and hypothalamus. This can be present in metabolic coma.

Horner's Syndrome

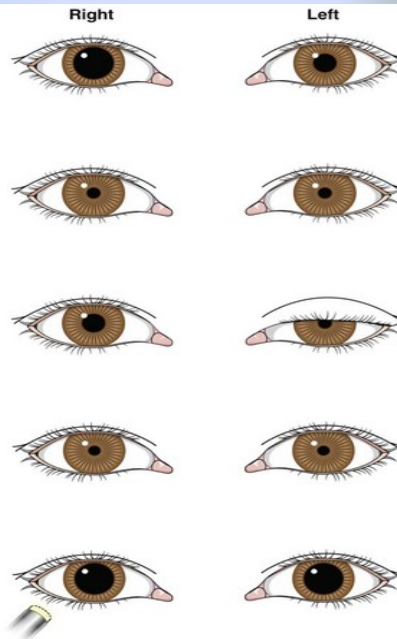
Small, reactive pupil (miosis) at the affected side with lid ptosis. Patient will also exhibit anhidrosis on the forehead on the same side. It can be caused by trauma to the neck, carotid artery dissection, or a lesion at the lateral medulla or ventrolateral cervical spinal cord.

Pontine Damage

Small, nonreactive pupils. This can be due to pontine damage due to ischemia or hemorrhage. Bilateral pinpoint pupils could also be representative of opiate overdose.

Bilateral Dilated Unreactive Pupils

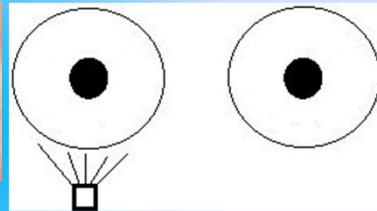
Pupils are dilated and fixed secondary to severe anoxia and indicative of severe brain injury and imminent death.



The Pupil Exam: Relative Afferent Pupil Test

For the patient who can't or won't give us an acuity OR
"gives us an acuity that we want to give back"

How to do it:
2 seconds on
2 seconds off



When to use it

Poor or no acuity and normal pupil reaction

Maybe hysteria or malingering

Normal/good acuity and abnormal pupil reaction

Early optic nerve disease

A Dilated and fixed pupil is not an afferent pupil

The ATLS Way: Primary Survey Exposure with Environmental Control

Think about chemical injury

liquids/mists/powders/smoke

bases are worse than acids (both are bad)

If present then, if possible:

Treat during primary resuscitation

Irrigation: 2-3 drops of topical anesthetic (Q15min)
+/- Morgan lens,
1-2 bags of IVFs,
use non-needled IV tubing
use gentle flow (fast drops)
need med tech or LVN to hold at corner of eye

The ATLS Way:

Primary Resuscitation / Stabilization

IF POSSIBLE, avoid injury to eye

Compression while securing airway or
dealing with severe head bleeding

Betadine Soap /Chlorhexidine is toxic to eye

Betadine Solution is not toxic to eye
(cleaning wounds/central lines/CNS
monitoring)

If possible with chemical injury, irrigate eye

The ATLS Way: Secondary Survey

Ocular Assessment

Eye & Vision

Periocular Assessment

Ocular History

Exam: Looking at the Eye

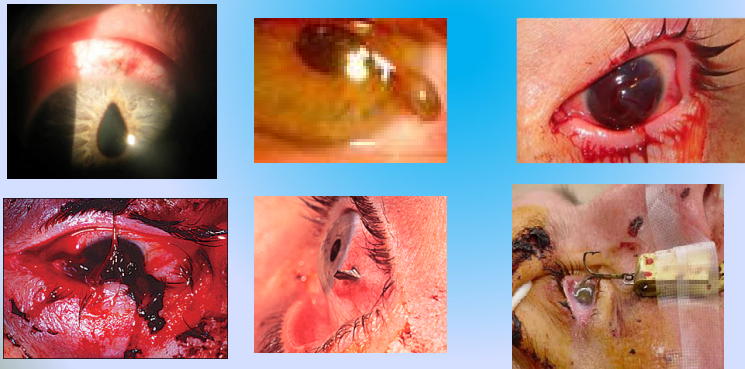
The external exam

Brow, lids, soft tissue at orbital rim

The front of the eye

The conjunctiva to the lens

No magnification needed "A Eye named S.U.E." (Screwed Up Eye)

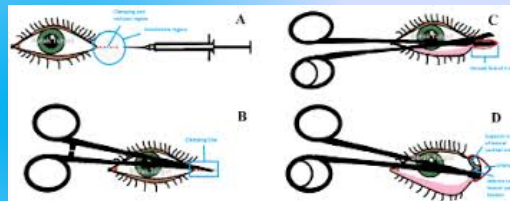


Orbital Hematoma & Fracture

Orbital Hematoma (Black eye)

Orbital Compartment Syndrome

Usually large energy transfer to face



Orbital Wall Fractures

Orbital CT (3mm or smaller cuts A&C)

TX: afrin, oral Antibiotic effective for sinusitis, warn against nose blowing, ophthalmology consult 24-48 hours.

With very abnormal vision and exam

Get urgent ophthalmology evaluation

Orbital fractures in Children

Blunt facial trauma: fist, ball, bat

Orbital fracture = “blow out” fracture

Orbital fracture with entrapped rectus muscle

In children this entrapment can cause significant nausea and vomiting that can result in dehydration and electrolyte abnormalities

may require urgent surgical repair and decompression of muscle

The Eye Exam

Why vision is not visual acuity?

Vision is what we see.

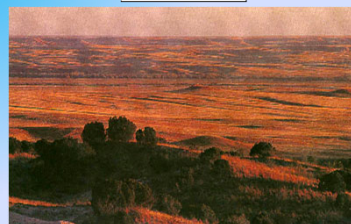
Visual acuity is what we measure

Is it subjective or objective?

YES

The needy e x a g g e r a t e

The independent minimize



Visual Acuity is the Key Vital Sign

The Blood Pressure of the Eye



Efficient routine → 30secs/eye

Have the non-physician clinical staff do it

When: first, (except chemical injury – irrigate)

Where: anywhere it can be done

How → one eye at a time

glasses on, if possible

encourage but beware of the peeker

“your best guess is ok”

near → arms length

how to measure (majority rules)

more than half right; move on

how to document it. (20/20, 20/40-2, 20/80+1)

The usual history is usually not enough

Allergies

Medications

Past medical history

Last meal

Events of the problem

Fabulous Five Eye Questions

1. Eye Glasses & contact lens

2. Eye drops (what, how, why)

3. Eye trauma History

4. Eye surgery History
(ask about laser surgery)

5. Lazy eye (aka Amblyopia)

The ATLS Way: Monitor / Re-evaluation

1. Neuro status changes → recheck pupils
2. Chemical injury → status of irrigation
3. New information via imaging →
 - CT scans very useful for ocular and orbital injuries
 - MRI only if magnetic foreign body ruled out

Ocular/orbital ultrasound in context of traumatic ocular disease should be reserved for the ophthalmologist

The ATLS Way: Monitor / Re-evaluation

Imaging Findings

+/- ruptured globe +/- foreign body

Foreign Bodies

intraocular foreign body IOFB

Means open globe and more urgent

intraorbital foreign body

Frequently left if non-caustic so less urgent

Retina detachments rarely occur immediately
more likely intraocular hemorrhage or as sign of
occult posterior eye wall/scleral rupture related to
the trauma

Exam: Looking at the back of the Eye

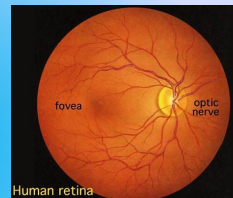
Rarely needed (**blasphemy for a retina surgeon**)



+



≠

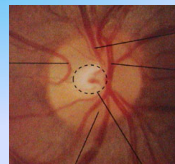


Important exception (1)

Optic Nerve Evaluation

Exam for severe head trauma where imaging // pupil or other exam findings are equivocal

In the sub-acute setting



Hyphema – A Significant injury

Airbag or assault

Check vision

Key medical history = sickle cell

Protect Eye

Today Ophthalmology consult

If impossible:

Cyclogyl 1-2% one drop TID

Strong Steroid Drop (Pred Forte or Enconpred) one drop QID



Corneal Abrasion & small foreign body

Pain is greater than findings: **remember the homunculus**

Liberal use of topical anesthetic by medical staff is fine

Can attempt gentle removal of FB with irrigation or CTA,

Small non central abrasions

Repeated use of anesthetic q 15-20 minutes only during contest
= may get athlete back into contest

Large central abrasion

Can use *emycin ung*, a bandage contact lens, or patch closed and follow-up in 24 hours

Large abrasion usually take several days to heal.

blue light plus Fluorescein dye **R.O.Y. G. B.I.V.**

Produces that **green glow that we know as fluorescence**

How:

1. anesthetic drop in eye
2. wet Fluorescein strip with anes. Drop
3. quickly and gently touch wet fluorescein strip to inside lower lid
4. have patient blink slowly 2-3 times (total time of 3-5 seconds)
5. look with blue light for **fluorescence**



The ATLS Way Definitive Care

Ophthalmology called while in trauma bay or on way to urgent trauma surgery

Chemical exposure to eyes

Ruptured Globes /Corneal Lacerations

Orbital compartment syndrome

Orbital wall fracture with CT showing entrapment in patient with unstable vitals

Eye lid lacerations involving the eyelid margin

Ophthalmology called once in SICU or in patient bed

Non-marginal Eyelid lacerations

Orbital wall fractures in stable patient

Blurry vision in alert trauma patient or other ocular concern not covered above

Ophthalmology Reference

The Wills Eye Manual

Lippincott Williams and Wilkins

Concise outlines

well known to ophthalmologists

Great for quick reference in ED and clinic

Questions?