

Emergency Medicine Update 2018



Fairmont Royal York Hotel,
Toronto, Ontario, CANADA

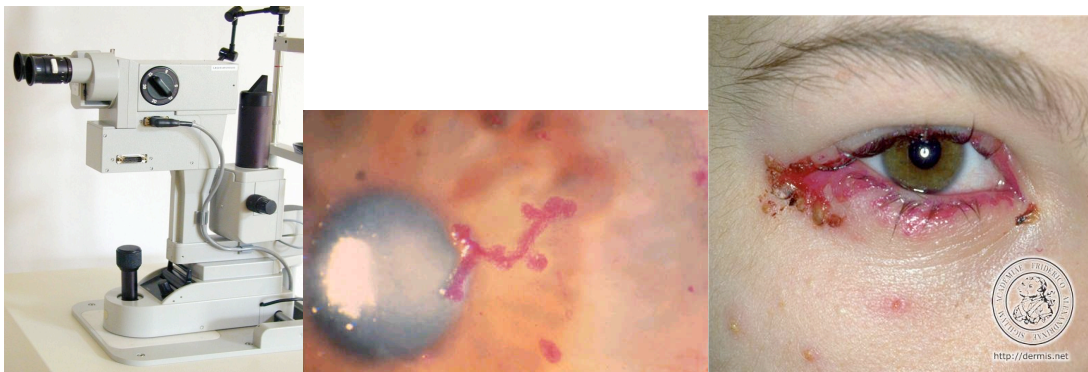
April 25, 2018

Ophthalmology Lab W02

PM 14:00-17:00

OPHTHALMOLOGY

Slit Lamp Biomicroscopy
Corneal / Conjunctival Foreign Body Removal
The Red Eye



Herb Tanzer, MD, FRCSC
Hugh D. McGowan, MD, FRCSC
S. Blair Fearon, MB, FRCSC
Raj Rathee, MD, FRCSC

1. Slit Lamp Biomicroscopy

Dr.Herb Tanzer



Every modern slit lamp biomicroscope consists of 3 basic parts each of which must be adjusted to perform well for a particular examiner and patient.

1. the biomicroscope: which provides a stereoscopic, binocular, magnified view of the eye (10X-20X magnification)
2. the illumination system: illuminates the field of the biomicroscope often focused as a “slit of light” which is variable in brightness, size, orientation and color.
3. the mechanical system: this supports the other two systems in an ingenious way. The microscope and illumination system move together but have a common pivot point permitting independent rotation around the vertical axis. The focal points of the slit lamp and the microscope are “locked together” with a subject to object distance of about 90-120 mm (about 4 “) ie: the biomicroscope objective lens must be about 4“ from the object of regard (cornea) in order to be in focus.

Steps in using the Slit Lamp

1. Adjust the microscope
 - a. Pupillary distance between the two ocular eye lenses.
 - b. Set “oculars” at “0” for normal eyes, “-“ minus for short sighted eyes and “+“ plus for far sighted eyes.
2. Adjust the heights
 - a. Chair height of the examiner and the patient
 - b. Patients head and eye level
 - c. Place patients chin on the chin rest
 - d. Place patients head against the forehead rest
 - e. Place patients eye level to the “mark” on the frame
 - f. Adjust the slit beam to be at the patient’s eye level, neither above nor below.
3. Adjust the illumination
 - a. Set the slit beam length, width, intensity, and orientation (vertical or horizontal)
 - b. Set the slit beam color, White, Colbalt Blue, Red free or Green
4. Focus
 - a. With gross observation bring the assembly towards the eye so the slit is in sharp focus and then, with the “joy stick” control and observation through the microscope, fine focus the area of concern

NOTE: The focal point of the slit beam and the microscope are “locked” at a distance of 4“ from the front of the objective lens of the microscope.

Methods of Examination

Visual acuity measurement
Single and Double eversion of the upper lid
Afferent papillary defect
Intraocular pressure measurement: Schiotz, Goldmann, Tonopen™
Confrontation visual field examination
Fluorescein instillation
Slit lamp corneal / conjunctival examination

Visual acuity measurement

- Using standard Snellen Chart or Near Reading Card if former not available
- Test each eye separately
- Record: distance to chart/smallest letter size (eg. 20/40)

Single and Double eversion of the upper lid

- Instill drop of topical anaesthetic (Ophthalmic, Alkaine, etc)
- Ask patient to look down
- Use cotton swab or a Demarres retractor placed at the upper lid skin crease to act as a fulcrum
- Grasp the lashes with the other hand and pull straight out from the globe
- Evert the lid over the fulcrum
- Tilt the Demarres retractor towards the forehead to expose the superior cul-de-sac (for double eversion of the upper lid)

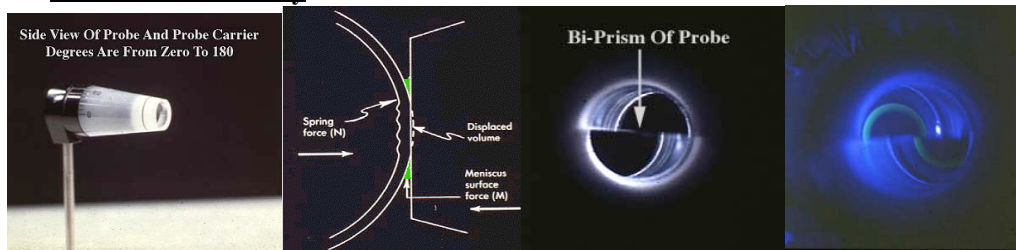
Afferent Pupillary Defect

- Indicative of extensive retinal abnormality (retinal detachment, etc) or optic nerve disease (optic neuritis)
- Shift the light source back and forth from pupil to pupil (swinging flashlight test)
- The normal pupil constricts with illumination
- A paradoxical dilatation of the pupil with direct illumination indicates a defect in the afferent arc of the pupillary light reflex

Intraocular Pressure Measurement

- Normal intraocular pressure = 10-21 mmHg
- Schiotz Tonometry
- A zero "0" reading on the scale of the tonometer when placed on the metal footplate standardizes the instrument
- The patient should be supine
- Ask the patient to fixate on a point on the ceiling directly above
- Initially use the 5.5 gm weight on the tonometer
- Place topical anaesthetic in the eye
- Gently retract the eyelids without placing pressure on the globe
- Hold the tonometer vertically in one hand and place the footplate on the central cornea
- Record the pointer "scale reading" in scale units (0-20)
- Convert the scale reading to an intraocular pressure (mmHg) using the conversion table found in the instrument's case
- Any scale reading with the 5.5 Gm weight < (less than) 3.0 means elevated eye pressure

Goldmann Tonometry



- Used in conjunction with slit lamp
- Instill local anaesthetic with Fluorescein into the eye (Fluori-strips)
- Place the Goldmann Tonometer in position in front of the right ocular eyepiece, the split field will be seen only through the right ocular, not the left
- Turn the tonometer force knob from the zero position to about 16, average pressure
- Bring the applanation head close to the eye with gross observation
- Hold the upper and lower lids without placing pressure on the globe
- Look through the R ocular and slowly advance the tonometer head towards the cornea until you see a central circle in the field
- Slowly turn the force knob that enlarges as two half circles as you turn
- END POINT: Upper and lower half circles slowly separate until the opposite edges just touch
- Intraocular pressure equals the number reading on the force knob scale (0-70)

TonoPen™



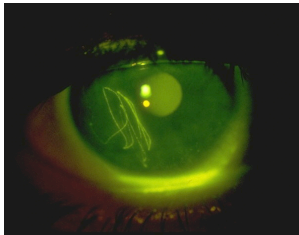
This will be demonstrated during the session

Confrontation Visual Fields (compares the patient's visual field to the examiners

field)

- Test one eye at a time (occlude the other eye)
- Sit directly opposite to the patient
- Instruct the patient to fix with the eye to be tested on the examiners eye
- Hold fingers in one of 4 quadrants and ask the patient to count them, test all 4 quadrants individually
- Hold up fingers in one nasal quadrant and one temporal quadrant and ask the patient to add up the total number of fingers
- Compare the patient's peripheral field to your field in the superior, inferior, nasal and temporal extremes

Fluorescein instillation

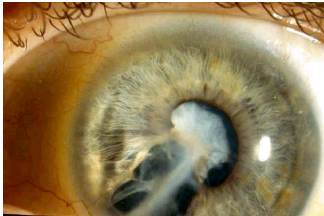


- Sodium Fluorescein is a water-soluble fluorescent dye that stains collagen and basement membranes (as seen with a corneal epithelial defect)
- Wet the sterile "Fluoristrip™ with BSS™ or Ophthalmic™
- Touch the strip to the inside of the lower lid margin
- Best to place a minimal amount of Fluorescein as too much may pool over small epithelial defects and make them hard to see
- Epithelial defects best seen with Cobalt Blue light

Fluorescein left on an eye with a large epithelial defect on the cornea will also eventually enter the corneal stroma and give a yellow-green appearance to the whole cornea.

Corneal Foreign Bodies: Diagnosis and Management

Hugh D. McGowan



Diagnosis

- History of the exact nature of the injury is very helpful to direct the examiner where to look and how hard to look
- Ask the specific mechanism of injury
 - High risk: "metal on metal" injury, high velocity injury (power tools)
 - Low risk: felt something blow in the eye, rubbing the eye too hard, contact lens

Symptoms relate to the irritation of the corneal nerves (trigeminal, V-1)

- Red eye=reactive conjunctival hyperemia
- Painful, FB sensation (V1)
- Pupillary miosis with iritis can also cause significant pain (sphincter ischemia)
- Tearing=V1 and 7th nerve to Lacrimal gland=protective function
- Photophobia=secondary iritis
- Decreased visual acuity=FB, secondary corneal edema, secondary iritis

Examination Techniques

KEY POINT: ALWAYS DOCUMENT A VISION PRIOR TO TREATMENT

Slit lamp biomicroscope

- Exam the patient trying to avoid bright light to the affected eye
- Assess corneal light reflex, clarity of the cornea
- Look for perilimbal flush=iritis
- Assess pupil status, miotic, dilated, irregular, peaked
- Test for cell and flare=iritis
- Always look for associated injury / FB

Lid and lash trauma
Lid eversion to assess tarsal conjunctival status, hidden foreign bodies
Secondary iritis (photophobic, miotic pupil, cell and flare)
Check for normal EOMs

Stain the cornea with Fluorescein and look for
Epithelial corneal defect
Linear scratches (vertical)=upper tarsal conjunctival FB, seen with lid eversion
Superficial punctate keratitis (SPK)=viral conjunctivitis, dry eye, contact lens

Removal Techniques

KEY POINT: BEST DONE ON A COMFORTABLE PATIENT BY A COMFORTABLE PHYSICIAN

Topical anaesthetic placed on the cornea
Ophthetic™ or Alkaine™ to start
Tetracaine™ gives slightly better anaesthesia
Cocaine™ 2-4 % solution in the ER can be instilled after Alkaine and then can be used to soak a pledget or Wexel and be placed over the area for 3-5 minutes to give excellent local anaesthesia

Often useful to lightly irrigate over a FB on the cornea or conjunctiva to dislodge

May use several instruments to remove a FB
A sterile moistened Q-tip
A 25 gauge sterile needle
A sterile fine jeweler's forceps
An Alger Brush (usually kept in the ER to remove FB and rust rings)

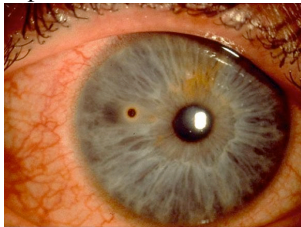
Always bring the instrument towards the patient tangentially so as to minimize and risk of perforation

Keep the bevel of the needle towards you and place it just under one edge of the FB and try to dislodge it

If you loosen the FB but cannot remove it, simply irrigate it into the inferior fornix and then remove with a moistened Q-tip

Rust Rings

Ferrous and ferric oxides leached out of iron containing FB into the corneal epithelium and superficial stroma, toxic to these cells, inhibits normal healing



Major brown areas must be removed to promote corneal epithelial healing
Small light brown staining at the edge of the epithelial defect after FB removal can be left
If difficult to remove initially, then leave the RR and remove in 24 hours, the ring usually falls out easily with the above techniques
Alger Brush: (motorized metal burr, battery run motor with very low torque) can be used to remove rust rings, brought in tangentially to the cornea, used to elevate and remove the rust ring

Post removal treatment and patient follow up

KEY POINT: DILATE THE PUPIL WITH MYDRIATIC +/-OR CYCLOPLEGIC (CYCLOGYL™ OR HOMATROPINE 2%) IF THERE IS ANY SUSPICION OF IRITIS OR SEVERE PAIN

Place topical broad-spectrum antibiotic in the eye after FB removal
Polysporin™, Sodium Sulamyl™, Polytrim™, Fucidic Acid™, Gentamicin™
Patch the eye firmly for length of time you think required for epithelium healing
Do not patch if

Contact lens wearer with corneal abrasion or FB removal
One eyed patient, treat with topical Voltaren™

Prescribe oral analgesic if required
Large abrasion, severe secondary iritis, etc

Tetanus prophylaxis

Indicated if there is a breach of a blood barrier
The cornea is an avascular structure so with simple abrasions or small FB it is probably not indicated

If the cornea is abnormal (corneal vascularization), or the injury involves the conjunctiva and there is fresh bleeding seen clinically, then is appropriate to establish the tetanus status of the patient and treat appropriately

Follow Up

See the patient in 24 – 48 hours to assess epithelial healing
May arrange with other physician (GP)

When should I do an X-ray



History of high velocity injury, “metal on metal” injury, suspicious conjunctival entry wound, lid entry wound, blood prevents accurate clinical assessment of injury on conjunctiva or lids

Order a PA and a lateral skull XR, with patient in primary gaze, and with patient looking up about 20-30 degrees, intraorbital metallic FB don't move, intraocular metallic FB do move with supraduction.

When to Refer to an Ophthalmologist

KEY POINT: ANYTHING THAT YOU FEEL UNCOMFORTABLE ABOUT (THIS WILL CHANGE OVER THE YEARS AS WE ALL GAIN EXPERIENCE)

FB embedded in the corneal stroma that you cannot remove
FB directly in the visual axis, especially in a monocular patient
Associated abnormal pupil shape, peaked pupil
Suspected full thickness corneal involvement, anterior chamber may be shallow or flat
Associated hypopyon, ocular infection, uveitis, endophthalmitis
Visual acuity decrease greater than explained by the FB alone

Preventative Medicine

It is our role to promote EYE SAFETY
Instruct patients on wearing safety glasses in high risk activities
Important in patients with amblyopia in the fellow eye

EMERGENCY DIAGNOSTIC ECHOGRAPHY EDE 1

Useful to RULE IN retinal detachment +/- vitreous hemorrhage
SONOSITE

