



## Slit Lamp Skills Lab

This hands-on workshop will rotate participants among three stations. The basics of slit lamp equipment and slit lamp examination will be described in the work station setting. The examination work station will include simulated eyes with foreign body removal. The second work station will teach participants to use different types of tonometers. The third work station will be a slide show to present and discuss various pathologies. (This lab is limited to 25 participants.)

- Identify the essentials of the slit lamp examination.
- Explain the approaches to foreign body removal and use of the tonometer.
- Discuss common eye disorders and their presentations.

WE-125

Wednesday, October 13, 1999

8:00 AM - 9:55 AM

Room #

Las Vegas Hilton

## FACULTY

Kelly P. O'Keefe, MD, FACEP  
(Moderator)

Commander, Medical Services  
Flight; Director, Emergency Services,  
MacDill Air Force Base, Florida

Kenneth C. Jackimczyk, Jr, MD,  
FACEP

Associate Chairman, Department of  
Emergency Medicine, Maricopa  
Medical Center; Phoenix, Arizona

Tracy G Sanson, MD, FACEP

Assistant Medical Director,  
Department of Emergency Medicine,  
Brandon Regional Hospital, Brandon,  
Florida

Jeff J Schaidler, MD, FACEP

Assistant Professor, Emergency  
Medicine, Rush Medical College;  
Vice Chairman, Department of  
Emergency Medicine, Cook County  
Hospital; Chicago, Illinois

## Slit Lamp Skills Lab

ACEP Annual Scientific Assembly  
Las Vegas  
October 1999

Kelly P. O'Keefe, MD, FACEP (Moderator)  
Tracy G. Sanson, MD, FACEP  
Jeff J. Schaider, MD, FACEP

### 1. Essentials of Slit Lamp Evaluation

Slit Lamp evaluation should be accomplished after a basic eye examination has been completed and any immediate care needs addressed, i.e. irrigation for chemical exposure.

The basic eye examination consists of:

- visual acuity (best corrected, include pinhole testing)
- external examination
- pupillary examination
- ocular motility
- visual fields
- direct ophthalmoscopy

Historical factors to be addressed include:

- acute changes in visual acuity
- diplopia or visual field cuts
- drainage or discharge
- eye pain or itching
- eye redness
- trauma
- risks for foreign body
- previous ocular history
- past medical history
- medications, ocular or oral
- tetanus status

Ophthalmic medications useful in the slit lamp examination include:

- Anesthetics: useful to relieve pain or to prevent discomfort during

the evaluation. Properacaine is quickest and least irritating. Tetracaine  
has longer onset and is slightly irritating, but lasts longer (30 minutes).  
DO NOT send the patient home with anesthetic drops.

-Mydriatics: useful to treat pain due to spasm from abrasions or  
uveitis/ iritis; helpful for fundus exam. Phenylephrine is a direct  
sympathomimetic, dilating the pupil without affecting  
accommodation thus permitting diagnostic mydriasis. Anticholinergic  
agents block muscarinic receptors on the iris and ciliary body producing  
mydriasis and cycloplegia (loss of accommodation). Homatropine is  
ideal for ED treatment applications, lasting 24 hours. Atropine may  
last up to one week and should generally be avoided.

-antibiotics

Three parts to the slit lamp:

- microscope
- lighting device with filters
- mechanical assembly for positioning the patient

Controls and positioning:

- Table and height adjustment
- chin rest, head immobilization, eye level
- rheostat
- light source: angle, width, height, filters
- biomicroscope: interpupillary distance, eyepieces, magnification
- joy stick
- locking mechanism

Basic procedure:

- position** the patient
- settings:** low power, white light, narrow and tall beam, obliqued
- scan** the surface of the cornea, bulbar and lower palpebral

conjunctiva

- focus** deeper and search anterior chamber for cells and flare (use  
small square of light, obliqued, with posterior portion passing  
through pupil and lens)

- focus deeper** and examine lens

- evert lid** and search for foreign body

- fluorescein stain** the cornea and repeat examination with cobalt

blue light to look for corneal defects

The slit lamp is most useful for evaluating corneal injuries, foreign bodies,

and anterior segment pathology (e.g., iritis), but should be accomplished routinely for all eye complaints, especially those involving the red eye.

## **2. Foreign Body Removal**

Extraocular foreign body removal is always indicated. Obtain immediate ophthalmologic consultation when the patient is extremely uncooperative or when the globe is penetrated by a deeply embedded object or multiple objects.

Method:

- instill** topical anesthetic
- position** patient and have them fix gaze on a stationary object
- attempt removal** with sterile cotton tipped applicator while holding lid open and applying a gentle sweeping or twirling motion
- utilize drill spud or needle** for objects more deeply embedded and not easily removed by cotton tipped applicator
- remove rust ring** with burr as needed
- instill** topical antibiotic
- instill** homatropine / **patch** eye if indicated for large abrasions or for comfort
- tetanus prophylaxis** as indicated
- follow up** or refer within 24 hours for recheck
- discharge instructions** should include no driving if patched

Have respect but do not fear! The cornea is surprisingly resilient and difficult to penetrate using these methods.

## **3. Tonometry**

Tonometry is the measurement of intraocular pressure by determining resistance of the globe to indentation by an applied force.

Sudden elevation of intraocular pressure may occur as a result of trauma or acute angle-closure glaucoma. This pressure may impair retinal blood flow.

Methods:

- Instill topical anesthetic** before attempting measurement with contact device.
- Tono-pen:** a hand held pen-like device, with measurement tip protected by a latex condom, is pressed against the eye of the sitting

or recumbent patient. Has a learning curve, but is easy on the patient, provides a digital read out, and avoids spread of infectious disease.

**-Schiotz tonometer:** scale like device using weights, applied lying down. Easy to use on a cooperative patient. Requires reading tonometer scale and use of a table based on weights used to obtain pressure. May transmit infectious disease if not well cleaned before use. Sterile disposable films (Tono-film) available. Be sure to let alcohol or peroxide dry fully if cleaning between uses.

**-Goldmann applanation tonometry:** available on slit lamp. Measuring drum is placed against the patient's eye while positioned in the slit lamp. Requires fluorescein. Must obtain apply correct amount of pressure and line up semicircles arising from contact. Requires good patient behavior and may spread infectious disease.

**-Air puff tonometry:** requires equipment and training not available in most EDs.

**-Digital globe palpation:** Pressing on both eyes shows relative increase in pressure. Crude, but easily done, requires no equipment.

Complications:

- corneal abrasion
- infectious disease

#### 4. Common eye disorders and presentations:

**-subconjunctival hemorrhage:** painless, no change in vision.

Caution: a circumferential, elevated, dense subconjunctival hemorrhage is suspicious for ruptured globe.

**-corneal abrasion:** severe pain, tearing, blepharospasm

**-contact lens-related abrasion:** maintain suspicion of ulcer, always refer.

**-Foreign bodies:** pain or irritation, tearing. Look for rust ring.

**-Globe Penetration:** irregular pupil, flaccid globe, flat anterior chamber, prolapsed iris. Place a metal eye shield and avoid any pressure to the globe.

- Super-Glue:** copious irrigation
- Traumatic iritis:** pain, headache, tearing. Look for cells and flare.
- Traumatic miosis or midriasis:** Treatment not required.
- Blowout fracture:** orbital rim fracture and entrapment of muscle leads to diplopia, paralysis of upward gaze.
- Hyphema:** microscopic to “eight-ball”. Watch IOP.
- Intraocular foreign body:** “metal on metal”
- Corneal / Scleral lacerations:** ophtho referral
- Chemical burns:** irrigate, irrigate, irrigate.
- UV keratitis:** sunburn, welding. Pain, photophobia, diffuse punctate uptake.
- Conjunctivitis:** viral, bacterial, allergic, other. Itching, red, discharge.
- Keratitis:** pain, decreased vision. Bacterial, ulcers, viral, autoimmune, idiopathic. Rule out herpes.
- Acute angle closure glaucoma:** red eye, steamy cornea, mid-position pupil, pain, nausea and vomiting.
- Amaurosis fugax:** graying of visual field, associated with TIA.
- Central retinal artery occlusion:** painless, total loss of vision, pale fundus except for cherry red macula. Immediate ballotment.
- Central retinal vein occlusion:** painless loss of vision of varying severity; retinal hemorrhages.
- Retinal detachment:** floaters, flashing lights, painless visual loss.
- Migraine headaches:** scotomas and scintillation followed by headache (usually).

References and Suggested Reading:

Janda AM, Ocular Emergencies, chapter 201 in Emergency Medicine: A Comprehensive Study Guide, edited by Tintinalli JE, Ruiz E, Krome RL, 4th edition, American College of Emergency Physicians, pp.1059-1068, pub 1996.

Scott JL and Ghezzi KT, Emergency Treatment of the Eye, Emergency Medicine Clinics of North America, volume 13: 3, pp. 1-712, August 1995.

Barr DH, Samples JR, and Hedges JR, Ophthalmologic Procedures, chapter 85 in Clinical Procedures in Emergency Medicine, edited by Roberts JT and Hedges JR, 2nd edition, WB Saunders Co., pp. 995-1019, pub 1991.

Knoop K and Trott A, Ophthalmologic Procedures in the Emergency Department -Part I: Immediate Sight Saving Procedures, Academic Emergency Medicine, vol 1:4, pp. 408-13, Jul/Aug 1994.

Knoop K and Trott A, Ophthalmologic Procedures in the Emergency Department -Part II: Routine Evaluation Procedures, Academic Emergency Medicine, vol 2:2, pp.144-50, Feb 1995.

Knoop K and Trott A, Ophthalmologic Procedures in the Emergency Department -Part III: Slit Lamp Use and Foreign Bodies, Academic Emergency Medicine, vol 2:3, pp. 224-30, Mar 1995.