International Ophthalmology

And a Perspective on Medical Missions

Global Community

Ophthalmology

In the Tropical and Missions Setting

Kenn Freedman MD PhD
Department of Ophthalmology

No financial interests in anything mentioned here
Tropical and Missions Ophthalmology

1. Types of Vision Loss and Eye Disease
2. Optical Errors
3. External Eye Disease
4. Infectious Eye Disease
5. Eyelid Problems
6. Orbital Disease
7. Strabismus and Amblyopia
8. Eye Trauma

**Examination in the Missions Setting**
10. Basic Set of Eye Exam Tools
11. Basic Eye Presentations

**Vision loss and Cataract Surgery**
12. Causes of Severe Visual Loss
13. Examination and Triage
14. Cataract Surgery Technique

**Medical Missions**
15. Experiences
16. Philosophy
16. Motivations
17. Strategies

Blindness

1 in every 25 people in world (around 280 million) are visually impaired or blind.
Loss of Vision

- Refractive Error
- Cataract
- Glaucoma
- Optic Nerve Disease
- Retinal Disease
- Ocular Trauma

#1 cause of visual impairment

Fitting Glasses
Limitations of Donated Glasses
Systems for making simple glasses on field

http://www.prweb.com/releases/2013/sight-ministries-donation
**Loss of Vision**

- Refractive Error
- Cataract

**Eye Disease**

- Refractive Error
- Cataract
- Pterygium

- Congenital Defects
- Corneal Disease
- Amblyopia
- Retinal Disease
- Glaucoma
- Optic Nerve Disease

More readily treatable

Cataract Surgery
- Camps
- Mission Hospitals
Cataract Blindness

• 1 in every 25 people in world (~285 million) are visually impaired or blind

• Cataract, after refractive error, is the second most common cause of reversible blindness

• 90% of these are in less developed countries


Cataract Blindness

• Vision loss → decreased productivity, decreased self worth, associated with living alone and mental illness

• Primarily associated with aging- but other factors include: DM, malnutrition, etc.

• Roughly 95% probability of having improved vision after Cataract Extraction

Non-Cataract Blindness

• Some forms not so easily correctable
• Macular Degeneration
• Glaucoma
• Retinal Detachment
• Congenital Maldevelopment
• Corneal Opacification
• Optic Atrophy
• Cortical Blindness
• Results of Ocular Trauma

Ocular Trauma

Globe – e.g. Corneal abrasion; Foreign Body
  Ocular Contusion
  Corneal or Scleral Rupture or laceration – OPEN GLOBE
  Chemical, Thermal, Ultraviolet

Eyelids - e.g. lacerations, lacrimal system, burns

Orbital - hemorrhage, Foreign Body, Fractures
1. Your Hands
2. Snellen chart
3. Near card
4. Cover / Pinhole Occluder
5. Anesthetic drops
6. Dilating Drops
7. Fluorescein strips
8. Penlight, Blue Filter
9. Magnifiers, Loupes, Portable Slip Lamp
10. Direct ophthalmoscope, Panoptic Scope, portable Indirect Ophthalmoscope

Uses for the Direct Ophthalmoscope

Coaxial Light Source!

- Red Reflex – useful for:
  - Eye Trauma evaluation
  - Pediatric Screening: Asymmetry: RB, Cataract
  - Cataract Detection

- Set on +6 for magnified view of Anterior Segment
  e.g. Cataract changes against red reflex – e.g. oil droplet changes

Fundus - Limited – but can look for:
  - Disk edema, Hemorrhages, Venous Pulsations
Refractive Errors Equipment Options

- Eye Chart
- Near Card
- Retinoscope
- Basic Trial lens set or Lens Rack
- Sets of basic plus (and minus) glasses
- “Portable” Phoropters

3 Presentations

Red Eye

“White” Eye

Swollen Bulging Eye

Penlight Ophthalmology

- Eyelids – red or swollen?
- Sclera / Conjunctiva - injection
- Cornea – clear or opacified?

Sometimes the shock of being brought to someone in need in unfamiliar surroundings keeps you from thinking rationally – so maybe these will help.
**“Red Eye”**

- **Blepharitis (Eyelids Red)**
  - Allergic, Viral – Herpetic, Molluscum, Staphylococcal

- **Conjunctivitis**
  - Allergic, Viral (e.g. URI), Adenoviral
  - STD: Chlamydial, Gonococcal
  - Bacterial: Staphylococcal, Haemophilus

- **Keratitis – Corneal Ulcers**
  - Herpetic, Bacterial, Fungal and Acanthamoeba

- **Uveitis – Anterior / Posterior**

- **Acute Elevated IOP – Uveitic, Post-op, Infectious**

---

**“White Eye”**

**Am I seeing?**
- Red Eyelids or Injected Conjunctiva
- Diffuse injection or Ciliary Injection
- Papillae or Follicles
- Discharge – Serous or Purulent
- Eyelid, Conjunctival or Corneal Lesion

---

**Differential Diagnosis**

**Corneal Inflammation / Ulcer**

**Corneal Opacification**
- Exposure
- Xerophthalmia - Deficiencies
- Infection
- Congenital / Development Malformation
- Trauma

**Tumors and Growths**
- External - SCCA
- Internal - RB
Bacterial Corneal Ulcers

- Pathophysiology: disruption of corneal epithelium*
- recent herpetic infection, immunocompromised, CTL wear

- Pathogens: *Streptococcus, Pseudomonas, Staphylococcus, Enterobacteriaceae* (including *Klebsiella, Enterobacter, Serratia, and Proteus*)

- Typical Signs: Corneal Epithelial Defect and Infiltrate
  Anterior Chamber WBC, Hypopion possible

- Lab: Corneal Scraping for –
  Gram, Giemsa or Acid Fast Staining and Culture if possible

- Treatment Options:
  Topical: “Fortified” Tobramycin (14mg/ml) and Cefazolin (50mg/ml) alternating q1h
  Alternative: 4th Generation Fluoroquinolones: moxifloxacin, gatifloxacin
  Research: 1.5% Povidine Iodine??

Fungal Corneal Ulcers

- Etiology: Organic Trauma, Superinfection

- Pathogens: Filamentous – e.g. Fusarium, Aspergillus
  Yeast – Candida

Typical Signs: Feathery infiltrates, Satellite lesions
- KOH Prep – to aid in diagnosis

- Treatment Options:
  Topical: Voriconazole 1% (more for yeast)
  Natamycin 5% or Amphotericin (0.15%)(filamentous)
Bacterial and Fungal Corneal Ulcers

Treatment Options
Topical: intensive drops – q1-2 h and taper for 5-7 days. If not responding consider:

- Intra-corneal (stromal) injections
- Oral antifungals*
- Collagen crosslinking (UV)

If not responding or threatened *perforation of the cornea* then consider surgical options:

- PK or DALK (corneal transplantation)
- Gunderson Flap (conjunctival)

* Oral voriconazole may not be helpful in all case, but in *Fusarium* keratitis might be of benefit as an adjunct.

Trachoma

Infectious etiology: *Chlamydia trachomatis*

Conjunctivitis
Repeated exposure → scarring of eyelids → Trichiasis, Entropion

Eventual Corneal Scarring and Vision Loss

Endemic in multiple countries

Management:

Community and Environmental
Antibiotic – topical and oral (tetracycline, azithromycin)
Surgical – Eyelid (entropion repair), Corneal

Prevention – Community Medicine Community Development

Age-standardised disability-adjusted life year (DALY) rates from *Trachoma* by country (0-450 per 100,000 inhabitants). WHO 2004
Pterygium

Causes
Sun Exposure (UV)
Chemical or Physical Trauma
Recurrence after surgery

Signs and Symptoms
Chronic Red Eye
Decreased Vision
Fleshy* Growth
Usually from Medial (Nasal) Side

Pterygium Surgery

Procedure
1. Dissection – sharp or semi-sharp blade (Gill, Tooke)
2. Control Bleeding
3. Excision of underlying Tenon’s
4. Smoothing of Corneal Surface
   – sharp blade or diamond burr.
5. Coverage of bare sclera
   – adjuvant therapy

Risk Factors for Recurrence:
• Young Age
• Previous Excision,
• Temporal Pterygium
• Broad Based Pterygium
Timing of Surgery

*Which pterygium would you excise first?*

*Don’t wait too long –*

*Excision before irreversible corneal scarring over the visual axis.*

---

Which would you treat first?

Advancing Pterygium
Don’t wait too long –

*Excision before irreversible corneal scarring over the visual axis.*

Dense Cataract

Visual Recovery for most part not dependent on timing of surgery
Ocular Surface Squamous Neoplasia - OSSN

CIN - Conjunctival Intra-epithelial Neoplasia (CIS – Carcinoma in Situ)
SCCA – Squamous Cell Carcinoma (Invasive)

Clinical Signs of OSSN
- Leukoplakia
- Highly Vascular
- Raised
- Irregular Borders
- Pigmentation possible

Often involves the cornea

Treatment can involve:
1) Excisional biopsy
2) Topical chemotherapy (e.g. 5-FU)

http://iceh.lshtm.ac.uk/

“Swollen Bulging Eye”

Am I seeing?
- Chemosis,
- Eyelid Edema
- Proptosis or other displacement
- Large Globe

Differential Diagnosis

Severe Conjunctivitis

Orbital Inflammation, Cellulitis
Adjacent Sinus Inflammation or Mass

Orbital Tumor

Buphthalmos – e.g. Glaucoma, Congenital Anomaly

Imaging – e.g. CT orbits

Referral for Hospital Consultation and Treatment
Eye Treatment Kits

Basics – Medical

1. Irrigating Solution - Saline - NS, LR, D5-1/2NS
2. BSS (Balanced Salt Solution – EYE)
3. Artificial Tears / Lubricating Eye Drops
4. Antibiotic Drops – e.g. Polytrim, Fluoroquinolones ...
5. Antibiotic Ointment – e.g. Erythromycin, Bacitracin
6. Steroid / Antibiotic drops and ointment??
7. Oral antibiotics (e.g. Amoxicillin, Keflex, Ciprofloxacin)
9. Betadine Solution (5%)

Basic Eye Therapy

1. Tape and Eye Patches and Shields
2. Shampoo (baby shampoo – Lid Hygiene)
3. Medications:
   Topical Anesthetic
   Artificial Tears (Lubricant – preserved or NP)
   Topical Antibiotic – drops and ointment
4. OTC Reading Glasses
5. Donated Glasses – already read
Refractive Errors and Treatment

• Main Obstacles:
  1) Obtaining the refraction
  2) Obtaining the correct glasses

Refractive Errors Equipment Options

• Eye Chart
• Near Card
• Retinoscope
• Basic Trial lens set or Lens Rack
• Sets of basic plus and minus glasses
• Portable Phoropter

<table>
<thead>
<tr>
<th>Near Card Numbers</th>
<th>Snellen Chart at 20’ and at 10’</th>
</tr>
</thead>
<tbody>
<tr>
<td>20/800</td>
<td>20/50</td>
</tr>
<tr>
<td>20/400</td>
<td>20/25</td>
</tr>
<tr>
<td>20/200</td>
<td>20/13</td>
</tr>
<tr>
<td></td>
<td>20/25</td>
</tr>
</tbody>
</table>
Refractive Errors and Treatment

- Working with limited resources
- Working in limited space, facility

- Refraction and Estimations
- Presbyopia
- Spherical Equivalent
- Donated Glasses

- **Portable devices** - EyeNetra, Retinoscopy

- **ReSpectacle.org** – catalog for donated glasses
  - *some international form?*

Cataract Blindness

- Screening patients
  - Flashlights
  - Near Cards

- Probability of Successful outcome - ~95%
  - 5% - complications
    - unseen retinal or optic nerve disease
Tests for good candidate
- good Pupil Reaction and no RAPD

Tests for surgical candidate
Pupil Reaction  RAPD

Causes for a + RAPD
- Retinal Damage
  Ischemia
  Inflammatory
  Severe Retinal Detachment
  Trauma

- Optic Nerve Damage
  Ischemia
  Optic Neuritis
  Prolonged high ICP
  Trauma
**Cataract Surgery Primer**

**Small Incision Cataract Extraction**

Steps:

1) Peritomy
2) Corneal Incision
3) Opening of Lens Capsule
4) Preparation for Removal of Nucleus of Lens
5) Extraction
6) Cortical Clean up
7) Placement of IOL
8) Removal of Viscoelastic
9) Closure on Conjunctiva over self sealing wound

---

**Phacoemulsification**

– only really an option when in a hospital or urban setting

---

**Community Development**

- Working with existing medical community
- Western Influence – be careful

- Masters in Public Health- Can be helpful
- Not seeing all disease from clinical perspective only – but a broader one
Can download PDF for free

A little of my story
4th Year Medical Student
Guatemala March 1989

Decision to do Ophthalmology

Ophthalmology Residency:
1990-1993

Private Practice
1993-1995

Guatemala 1995

Orphanage in Villa Nueva
Medical and Surgical
Fellowship
Neuro-ophthalmology and Oculoplastics
1995-1996

Private Practice
1996 – 2000
Central Georgia

Volunteer Faculty with
Mercer Medical School

Texas Tech University Health Sciences Center

Department of Ophthalmology and Visual Sciences

Faculty:
2000 - Present
Tarahumara Indians
Sierra Madre
Chihuahua Mexico
Eye, Medical and
Dental Clinics
Support Missionaries
And local churches
Family members
Medical Students
Residents
Fellow Faculty
Freedom to integrate Professional and Spiritual Life

2008 My wife and Interviewed

Sabbatical Year - Visiting Professor

Important Questions to ask yourself?

Compartmentalization? Secular vs. Sacred?

Are you adding missions to your schedule or are you on a mission?

“One need only contemplate the difference it no doubt would have made in the impact of C. S. Lewis had he withdrawn from the university to go into "full-time Christian ministry."

From Daryl McCarthy
Teaching Abroad
Values

To bring **glory to God** in all situations

View every issue from **perspective** of the Lordship of Christ

To **respect** the culture of the host country and citizens

To teach and perform every task with **excellence**

To make worship, prayer and God’s Word the **priority** of each day

To **love** students and colleagues and welcome them in our home

---

March 2009
The email ➔
Cambodia???
Exploratory Trip
June 2009

Obstacles:
- Support Letter
- Physical Exams, Immunizations
- Family Members – Medical Issues
- Arranging for Sabbatical Year
- Presentations to Church and my Department
- Housing in Phnom Penh
- Airline Tickets for Six!

Be still before the Lord and wait patiently for Him.
Psalm 37:7

2009 Orientation and Training
He provided this apartment for us to live in for the first two weeks
Overwhelming

The Lord's Provision
Cambodia’s Difficult History

Religion and Culture
Cambodia - Medical

1979 - 39 doctors left,
One ophthalmologist survived

Present - “eye doctors” - no real subspecialists

Health Care Expenditure $4/year

Infant Mortality 66/1000
Child (<5) Mortality 83/1000
Literacy 74%

Khmer Rouge 1975-1979
Genocide 2 Million
Years of Civil War until 2000

The Killing Fields
More Commonly Encountered Conditions

Congenital Abnormalities
Leukocoria: RB and other
Trauma – Chemical and Optic Nerve
CSR, but not ARMD
Myasthenia Gravis

Teaching in Clinic, Operating Room and Classroom
For I am the Lord your God who takes hold of your right hand and says to you, Do not fear, I will help you

Isaiah 41:13

Cambodian Ophthalmological Society

December 18-19, 2009, June 25-26, 2010

Phnom Penh, Cambodia
Sharing our Lives and our Faith

Cambodian (Khmer) Church
Ho Chi Minh City (Saigon)  
Vietnam  

Opportunity at  
Ho Chi Minh City  
Eye Hospital
Christmas and New Year Holidays

Angkor Wat
Visas Expiring

Rabies?

IRS Audit

Losing Health Insurance

The Lord is my light and my salvation, whom shall I fear

Psalm 27:1
What a blessing to my family

Crazy! ?

... no... Normal

Most of the World
“Types” of Medical and Eye Missions
Clinical Outreach and Education

1. Quick: 2-3 day Clinics/ Screenings
2. Short: 1-2 week - Clinic / Surgical Camp
3. Short Term: 2- 4 weeks
   Surgical Camp
   Volunteer Missions Hospital – *maybe some teaching*

4. “Long” Term: 6 months to 2 years – clinical *and teaching*
5. Career – Clinical *and teaching*

Ophthalmic Subspecialties and Missions

Clinical / Camp Setting
1. Refraction
2. Cataract and Anterior Segment
3. Oculoplastics
4. Strabismus

*Academic Setting*

*All specialties needed!*
*Subspecialists Critically needed in Developing Nations*

*Could be Frustrating:*
Glaucoma
Neuro-Ophthalmology
Retina
Uveitis
Corneal and Refractive Surgery

*– for reasons of technical support and follow-up care:*
Teaching in the International Setting

1. Many institutions and governments are looking for professionals

2. In most cases you can teach in English

3. Opportunities are vast

4. Wide diversity of experiences and adventures

5. All sub-specialities
Freedom to integrate Professional and Spiritual Life

- Physical Needs
- Spiritual Needs
Questions:

Is there something worse than Physical Blindness?

....Spiritual Blindness

What really is “Missions” anyway?

What attracts doctors, students to it?

What is our task?
  Alleviating Suffering?
  Is that the highest goal?

What are the rewards?
Motivations in Medical Missions

✓ To Do Some Eternal Good?
✓ To Teach Someone Else To Do Good
✓ To Do Some Good for Someone

✓ To Feel Good About Myself
✓ To Make Myself Look Good

What is your Mission?

Concluding Questions

✓ Can I really make a difference?
✓ How and When will you Begin this Journey?
✓ Will you go it alone?
✓ Are you willing to go out of your comfort zone?
✓ Clinical Service and / or Teaching?
✓ What Sustains You?
How do you respond to or, 
How do you process?

Human suffering when you encounter it?

Your own personal trials and suffering?

Where does one find the strength to continue?

Love for Humanity?
Love for God?

His Love for You?
What will really matter when I come to the end of my life?

Missions / Medicine will cause you to either:

- think about what your life really means
- to become hardened / disillusioned?

I Have No Greater Joy than to hear that my Children are walking in the Truth ...

He who has the most stuff when he dies – wins?

3 John 4
You will show me the path of life:
In Your presence is fullness of joy
Psalm 16:11