WAEPS 2016: Eye disease in developing countries

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Objectives

• Learn about the magnitude of blindness in developing countries

• Learn about common eye diseases in developing countries.

• Describe differences between manual small incision cataract surgery and phacoemulsification.
Christian Blind Mission International - CBMI

- **Vision:**
  - Reduce the prevalence of diseases that cause impairments
  - Minimize the conditions that lead to disability.

- Works in the most disadvantaged societies irrespective of race, gender or religion.

- 672 projects have been funded in 65 countries

- More info: www.cbmus.org
Blindness statistics

- 39 Million people are blind worldwide*.
- 80% of all visual impairment can be prevented or cured
- 90% of World’s blind live in developing countries.
- Around 1% of Africans are blind (BJO, 2001)
- 60% of Africa’s blind are women.
- Africa has 1 Ophthalmologist per 1 Million population.**

*WHO Website
**Anecdotally
Cataract Blindness

- Cataract is still the leading cause of blindness worldwide (20 Million affected per WHO estimate 1998).
- Globally at least 100 Million eyes have VA <20/200 due to cataract.
- Annually at least 25 Million eyes develop VA <20/200 due to cataract.
- Globally the need for cataract operations is 30 Million per year, but only around 10 Million are performed annually.
Global Blindness

- Cataract: 46%
- Childhood blindness (all causes): 3.3%
- Trachoma: 12.5%
- Onchocerciasis: 0.6%
- Others (glaucoma, diab. Ret. Trauma etc.): 37.5%
CSR = Number of cataract surgeries per year per one million population

Cataract Surgical Rate – Global Overview

The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.
Other causes of Blindness

• Together Cataract, trachoma and glaucoma are responsible for 70% of global blindness.

• Vitamin A deficiency is the leading cause of blindness in children.

• 18 Million people are infected with onchocerciasis of whom 99% are in Africa, and 270,000 are blind.

• Diabetes, ocular injuries and leprosy are other significant causes of blindness.
Common eye diseases in developing countries
Couching – An ancient form of cataract surgery

Sanskrit manuscripts from the 5th century B.C. describe the earliest type of cataract surgery known as couching. In this procedure, the cataractous lens was displaced away from the pupil to lie in the vitreous cavity in the back of the eye. The displacement of the lens enabled the patient to see better. Vision, however, was still blurred due to the unavailability of corrective lenses.

Recent excavations in Iraq, Greece and Egypt have uncovered bronze instruments that would have been used for cataract surgery. In 29 A.D., the practice of needling or discission was noted in De Medicinae. This technique breaks up the cataract into smaller particles, thereby facilitating their absorption.
Couching study

• 19 patients, 25 eyes.

• 14 males, 5 females.

• Method of couching:
  – 8 – Sharp, quick.
  – 11 – Slow, push, circular motion.
  – 6 – Unable to determine.

• BCVA outcomes: NLP=2, LP=7, HM=6, CF=2, 20/200=2, 20/120=2, 20/40=1, 20/30=3.
Couching Study: complications

- Uveitis: 8 eyes (32%)
- Retinal Detachment: 7 eyes (28%)
- Corneal opacity: 5 eyes (20%)
- Glaucoma: 3 eyes (12%)
- Endophthalmitis: 1 eye (4%)
Glaucoma

- Very common
- Not unusual for a patient to present with IOPs of 50 and LP or NLP vision
- Only drops available in Nigeria were Pilocarpine and timolol
- Trabeculectomies commonly done
Xerophthalmia – Vitamin A Deficiency

• Rare in the United States, but may be seen in cases of malabsorption, liver disease or dietary deprivation associated with alcoholism.

• Highest incidence in South India, Bangladesh, Indonesia where rice is the staple food.

• VERY PREVENTABLE
Xerophthalmia - Epidemiology

- Closely associated with poverty.
- Young children between 6 months and 3 years are at risk for corneal complications.
- Breastfeeding is generally protective.
- In Africa the early signs of xerophthalmia are uncommon, but measles plays an important role (the reverse is true in India and Indonesia).
Xerophthalmia – Clinical Manifestations

• “Xerophthalmia” means dry eyes.

• Tears are produced, but the conjunctiva and cornea resist wetting.

• Later conjunctival xerosis and keratinization with blepharitis occur.

• The earliest symptom is night blindness.

• Keratomalacia is the last and most severe sign.
Classification of Xerophthalmia

• Primary signs:
  – X1A Conjunctival Xerosis
  – X1B Bitot’s spot with Xerosis
  – X2 Corneal xerosis
  – X3A Corneal ulceration with xerosis
  – X3B Keratomalacia

• Secondary signs:
  – XN Night Blindness
  – XF Xerophthalmia fundus
  – XS Xerophthalmia scars
Fig. 9.2 Corneal ulcers in malnourished children are usually caused by several different factors working together to damage the cornea. Some of the more important causes are shown in the diagram.
Acute Trachoma

- One of the most common human infections, approximately 400 million people infected.
- A leading cause of preventable blindness.
- Much more common in communities with poor hygiene and sanitation.
Acute Trachoma, Epidemiology

- Endemic in the middle east.
- Prevalent among the native. American indians in the southwest.
- Spread by fingers, fomites, water, flies.
- Spread in Africa has been decreased with hand and face washing.
- Repeated infections is probably necessary to develop Trachoma.
Acute Trachoma, presentation

- Foreign body sensation, irritation, redness, lid edema.
- Symptoms may be mild, and children often will not complain.
- Follicular conjunctivitis present, may be obscured by papillary reaction.
- Vascular congestion at limbus with possible infiltration, edema and follicles.
- May have epithelial keratitis.
Trachoma, pathogenesis

- Collections of lymphocytes seen early.
- Lymphoid follicles appear to infiltrate the conjunctival epithelium leading to scarring and tissue remodeling.
- Herbert’s pits form at sites of previous limbal follicles.
- Conjunctival scarring can eventually lead to trichiasis and corneal scarring.
Complications of Trachoma

- Conjunctival scarring with shortened fornices and symblepharon.
- Scarring may destroy the accessory lacrimal grands of Krause and Wolfring.
- Decreased goblet cells, mucous deficiency.
- Nasolacrimal duct obstruction
- Entropion and trichiasis.
More Trachoma complications

- Trichiasis, aqueous tear deficiency and mucous deficiency can all lead to corneal epithelial breakdown and microbial keratitis (esp *Staph aureus* or *Strep pneumoniae*).

- Salzmann’s nodular degeneration commonly seen.
Treatment of Trachoma

- Doxycycline 100mg PO BID for 3 weeks.
- Tetracycline 1.5 to 2.0gm PO Qday in four doses for 3 weeks.
- Topical tetracycline 1% or erythromycin ung BID for two months (can be used in pregnancy)
- Azithromycin 20mg/Kg/Day PO, 1 dose or 1gm PO for adults.
More Rx for Trachoma

- Surgical correction of entropion and trichiasis.
- Few rubbing lashes best treated by epilation or cryotherapy
- Lubrication.
- Remove concretions from upper lids.
- Cornea transplant only if tear function/blink adequate and if close follow up is available.
Onchocerciasis

- **Skin:**
  - Onchocercaomata, subQ nodules of adult worms.
  - Dermatitis with itching.

- **Ocular:**
  - Cornea may contain live filaria, leads to sclerosing keratitis.
  - AC may contain live filaria
  - Iritis, Glaucoma
  - Chorioretinal atrophy
  - Optic atrophy
Onchocerca volvulus

Blackfly Stages

1. Blackfly (genus Simulium) takes a blood meal (L3 larvae enter bite wound)
2. Subcutaneous tissues
3. Adults in subcutaneous nodule
4. Adults produce unsheathed microfilariae that typically are found in skin and in lymphatics of connective tissues, but also occasionally in peripheral blood, urine, and sputum.
5. Blackfly takes a blood meal (ingests microfilariae)
6. Microfilariae penetrate blackfly’s midgut and migrate to thoracic muscles
7. L1 larvae
8. L3 larvae
9. Migrate to head and blackfly’s proboscis

Human Stages

i = Infective Stage
D = Diagnostic Stage
Adult worm

Black Fly
Fig. 15.4 A papular rash, and scratch marks.
Onchocerciasis

- Ivermectin is an effective microfilaricidal drug.
- Merck has donated Ivermectin to developing countries for distribution.
- Ivermectin is not effective against the adult worms which may live for 25 years or more.
- There is not yet an effective macrofilaricidal drug that is safe for mass distribution.
Eye complications of HIV

- Infections: Herpes Zoster, Herpes Simplex, CMV, Syphilis, Toxoplasmosis, Pneumocystis, fungal
- Uveitis
- Malignancies: Kaposi’s sarcoma, Carcinoma of the conjunctiva
Mooren’s Ulcer

- Chronic, painful, peripheral corneal ulceration, progressing circumferentially and centrally in the absence of infection or systemic collagen vascular disease. Can be unilateral or bilateral.

- Pathogenesis is unknown, but there is an association with parasitic infections in Africa, and Hepatitis C in America.

- Some cases are relentlessly progressive.
30 year old woman
11 year old boy
Treatment of Mooren’s ulcer

• Surgical
  – Corneal graft; large, crescent, or patch.
  – Amniotic membrane.
  – Conjunctival peritomy, conjunctival flap.
  – Cyanoacrylate adhesive.

• Medical
  – Cyclosporin topical and/or systemic.
  – Systemic immunesuppresion; MTX, cyclophosphamide, IV steroids, Interferon.
  – Topical FK506.
Climatic Droplet Keratopathy

- Also termed Labrador keratopathy, chronic actinic keratopathy, oil droplet keratopathy, elastoid degeneration, etc.
- Cause is unknown, but strongly associated with solar radiation.
- Superficial keratectomy may be needed.
18 year old canned at school
OD is normal
Common surgeries performed in developing countries

• Cataract
• Trabeculectomy
• Enucleation/Evisceration
• Entropion repair, correction of trichiasis
• Repair of ruptured globe
Manual small incision cataract surgery (MSICS)

- This may be the only option for surgery in some parts of the world.

- SICS has been shown to provide comparable visual results to phaco and is less expensive to perform

Advantages of MSICS

- Less expensive.
- A foldable IOL is not needed.
- No need to purchase or maintain a phaco machine.
- Simple IV tubing can be used for manual I/A.
- Can be done quickly.
MSICS or SICS
MSICS

- Anesthesia: peribulbar or retrobulbar
- Standard prep and drape
- Usually wire lid speculum
- Viscoelastic: can use 2% methylcellulose
- Capsulotomy
  - Can opener
  - Capsulorrhexis
MSCIS

- **Conjunctival peritomy:**
  approx 4 clock hours.

- **Wound:**
  - 5.5 to 6.5 mm in length
  - Can be straight, frown, or with backward extensions
  - Tunnel extends 2 – 2.5 mm into cornea
MSICS

- AC maintainer can be used.
- Lactated Ringer’s solution can be used instead of BSS.
- The challenge for American surgeons who have done scleral tunnels will be nucleus prolapse into the AC and nucleus delivery.
MSICS – Nucleus delivery

- Viscoelastic
- Irrigating vectis
- Needle bent to a “fish-hook”
- See http://missioneyes.net/
- Phacosandwich with Sinskey hook above and vectis below
- Phacofracture with a bisector or trisector
- Sheet’s lens glide
MSICS

- Cortical cleanup with manual I/A
- PMMA IOL
- Consider giving subconjunctival injections in conjunctival flap
Thank You!