Optometry and Tropical Disease

Mike Radoiu
OD, FAAO, Diplomate (PC)

Why Worry About Tropical Diseases?
- You’re Encountering It Overseas
- You’re Encountering It Here
- Optometry’s Role in Global Healthcare

Increased Contact with Tropical Disease
- Overseas Travel
- Trade and Globalization
- Immigration from the Developing World
- Conflict & Disaster - Displaced Persons/Refugees
- Disease Range Changes (Natural vs Manmade)

Overseas Travel
- Adventure Tourism
- Business Travel
- Humanitarian/Medical Missions
- Military/NGO
- Overseas Visitors to US

Globalization

Immigration
- US and Global Immigration Patterns

1/7/2014
Disaster Relief/ Humanitarian Operations
Haiti (2010)

Increased Range of Tropical Disease
- Human and Vector Migration Patterns
- Infrastructure Degradation
- Neglected Preventative Measures
- Climate Change

Disease Range Changes
Dengue Fever (1970-2010)

Malaria
- Current Range in 2014 (yellow)
- Projected Range in 2060 (red)

Understanding and Managing Tropical Disease
- Importance of Medical Planning
- Knowledge of Public Health and Preventative Medicine
- Working With Host Nation and NGOs
- Cultural/History/Language Training
- Importance of Infrastructure Development
- Role of Regional Conflict & Social Upheaval

Epidemiology
- Patterns/Trends/Effects
- Populations
- Medical Geography
- "At Risk" Regions
Medical Geography

- Incidence of Neglected Tropical Diseases

Falciparum Malaria

- Pakistan
- Vietnam
- Afghanistan

Bangladesh

- Malaria
- Avitaminosis

Eye Care in the Developing World

- Access
- Visual Impairment / Low Vision
- Global Eye Disease
- Ocular Manifestations of Tropical Disease

Tropical Disease

- Arbo-viruses (arthropod borne)
- Viruses
- Bacteria
- Protozoan
- Helminths
- Malnutrition

Arbo-Viruses (arthropod-borne)

- Dengue *
- Chikungunya *
- Yellow Fever
- Japanese Encephalitis Virus (JEV)
- West Nile Virus

* ocular manifestations
Dengue
- Flavovirus - Aedes Aegypti Mosquito vector
- Urban, Poor Sanitation, Daytime Risk
- Ocular Signs - Petechial Hemorrhage
- Phase 1 - Fever >40°C
- Phase 2 - plasma leakage, arthralgia, rash
- Treatment: Supportive/ No vaccine

Dengue
- "Blood Meal"

Dengue
- Signs and Symptoms

Chikungunya
- Alphavirus - Aedes Mosquito vector
- Fever (40°C), Arthralgia, nausea, malaise
- Ocular signs - conjunctivitis, photophobia, iridocyclitis
- Treatment - Supportive, no vaccine

Viruses
- Rotoviruses (diarrheal disease)
- HIV/AIDS *
- Poliomyelitis
- Measles *
- Ebola/Marburg/Lassa Virus *

*ocular manifestations

HIV/AIDS (Global Incidence)
Bacterial

- Tuberculosis*
- Trachoma (NTD)*
- Cholera
- Leptospirosis
- Hansen's Disease (Leprosy)

*ocular manifestations
NTD-Neglected Tropical Disease

Tuberculosis

- 13.7 M active cases globally
- 10% Active / 90% Latent Infection Incidence
- 50% Mortality in Active Infections
- 80% + PPD in many Asian & African nations
- 5-10% + PPD in US
- Pulmonary (85%) / Extrapulmonary (15%)
- Link with HIV (Immunosuppression)
- Risks/Transmission
- Prevention/Management

Tuberculosis

- Ocular Signs
- Choroiditis
- Phlyctenular Conjunctivitis

Trachoma

- 40-80M affected Globally
- Chlamydia Trachomatis
- Leading Cause of Blindness in Developing World
- McCallum’s Grading Scale
- WHO Grading Scale
- Signs/ Symptoms
- Prevention - hygiene
- Treatment – Antibiotics, surgical (tarsal rotation)

Trachoma

- McCallum’s Grading Scale
- Stage I- Incipient- immature follicles
- Stage II- Established –mature follicles
- Stage III- Cicatrised – scarring
- Stage IV- Healed - cicatrisation sequelae
Trachoma

- WHO Classification
- Follicles (TF) - > 5 Follicles
- Intense (TI) - Immature conj thickening
- Scarring (TS) - Tarsal conj scarring
- Trichiasis (TT) - mechanical corneal injury
- Corneal Opacity (CO) - corneal scarring

Protozoa

- Chagas (NW Trypanosoma) * NTD
- Malaria (Falciparum, Ovale, Vivax)
- African Trypanosoma (Sleeping Sickness)
- Leishmaniasis ("Baghdad Boil")

* ocular manifestations
NTD- Neglected Tropical Diseases

Chagas Disease

- Trypanosoma Cruzi vector – "kissing bug"
- Non-Rain Forest/ Sylvatic Habitat
- 4-8 M affected worldwide
- Detection- Giemsa stain & antibody detection
- Acute - (3-8 weeks) - Fever, fatigue, enlarged spleen, myalgia, rash, Romaña sign
- Chronic- Myocarditis, cardiac arrhythmias, meningio-encephalopathy
- Treatment - Benzanidazole

Chagas Disease

- Triatominae “Kissing Bug” vector
Chagas Disease

- Romaña Sign

Helminths

- Onchocerciasis (River Blindness) * NTD
- Loaasis (Loa Loa) * NTD
- Schistosomiasis NTD
- Dracunculiasis (Guinea Worm) NTD
- Ascariasis NTD
  * ocular manifestations
  NTD- Neglected Tropical Disease

Onchoceriasis

- Black Fly vector
- Onchocerca volvulus worm
- 2nd most common cause of blindness after Trachoma in developing world
- Onchodermatitis (pruritic papules), "Lizard Skin", skin atrophy, sclerosing keratitis, uveitis, secondary glaucoma, retinitis
- Treatment – Ivermectin, Doxycycline, Surgery

Onchocerciasis Prevalence

Loaasis (Loa Loa microfilaria)

- Mango Fly vector
- 9-70% infection rate in endemic areas
- Conjunctival filariasis, Lymphedema, Calabar lesion,
- Treatment- Prevention, Diethylcarbamazine, Surgery
Loa Loa

- Range in Africa

Malnutrition/ Avitaminosis

- Vitamin A Deficiency - 20K to 100K new cases of childhood blindness per year
- Xerophthalmia - lack of retinoic acid
- Bitot’s Spot, Sclerokeratitis
- Nyctalopia - “Night Blindness”
- Treatment - ocular lubricants, Vitamin A supplements 200,000 IU q 6 m

Malnutrition %

“Back to the Future” Diseases

- Measles - Leading cause of pediatric deaths in developing nations (90% infection rate)
- Polio – Resurgence in South Asia (Pakistan)
- Small Pox - “Not Dead Yet”??

Developing World Challenges

- Poverty
- Hunger
- Underdeveloped Healthcare Systems
- Education/ Illiteracy
- Poor Infrastructure
- Corruption
- Social Immobility
- Social Insecurity/Conflict

Preventative Health

- EDUCATION
- SANITATION
- Immunization and Medication
- Water Purification (filtration, halogens, ROPU)
- Vector Abatement (nets, spraying, monitoring)
ROPU
- Reverse Osmosis Purification Unit

Lessons Learned/Looking Forward
- Avoid putting "a square peg in a round hole"
- "Hit and Run" Medical Missions Ineffective
- Value of Subject Matter Expertise Exchanges
- Joint Planning is Vital
- Thinking Long Term vs Short Term
- Research and Study the Region & Culture
- Keep an Open Mind
- Learn To Think Out of the Box

Expeditionary Medical Team
Chinandega Province (2005)

Gabon (2007)
- Local Clinic
- Local Kitchen

Joint Missions
- Koh Kong Camp– Thai Border

Cambodia /Vietnam (2012)
Resources

- World Council of Optometry
- World Health Organization (WHO)
- American Society of Tropical Medicine and Hygiene
- Community Eye Health Journal

Bibliography

- Manson’s Tropical Medicine
- Eye Disease in Hot Climates, (John Sandford-Smith, MD)
- Eye Diseases in the Tropics (F.C. Rodger)
- American Journal of Tropical Medicine
- Political Order and Political Decay, Francis Fukuyama
- Why Nations Fail: The Origins of Power, Prosperity and Poverty, (Daron Acemoglu, James A. Robinson)

Questions ?????

-
ANTERIOR SEGMENT MANIFESTATIONS OF IMMUNE SYSTEM DYSFUNCTION

COURSE DESCRIPTION

This 2-hour case-based interactive lecture will enable the practitioner develop an understanding of the ocular involvement in immune system dysfunction. The focus will be on immune-mediated anterior segment conditions associated with clinical immunological disorders such as immune hypersensitivity disorders, autoimmune diseases, and immunodeficiency. Anterior segment manifestations in the eye in individuals with immunodeficiency will be discussed highlighting a few cases of recurrent ocular infections. Ocular conditions associated with autoimmune disorders and hypersensitivity immune reactions usually present with significant inflammatory reactions.

LEARNING OBJECTIVES

The eye care professional will develop the following learning goals:

1. Understand the immunopathological mechanisms of disorders of the anterior segment of the eye involved in immune dysfunction.
2. Knowledge of integrating basic science concepts in clinical care of anterior segment diseases associated with clinical immunological disorders.
3. Comprehend clinical, diagnostic, and therapeutic correlations relevant to diseases of the anterior eye linked to disorders of the immune system.

COURSE OUTLINE

A. OCULAR INVOLVEMENT IN HYPERSENSITIVITY REACTIONS

Hypersensitivity response is an overreaction of the immune system to innocuous substances. Types I through type III hypersensitivity reactions are antibody mediated immune response whereas type IV is a T-cell mediated immune reaction.

Seasonal and perennial allergic conjunctivitis

- Type I hypersensitivity mediated ocular inflammation
- Clinical-pathological correlations
- Clinical-diagnostic correlations
- Clinical management with emphasis on clinicotherapeutic correlations
Vernal keratoconjunctivitis

- Predominantly type IV immunopathological mechanism
- Clinical-pathological correlations
- Clinical-diagnostic correlations
- Clinical management with emphasis on clinicotherapeutic correlations

Microbial-associated immunogenic keratoconjunctivitis

- Predominantly type IV immunopathological mechanism
- Clinical-pathological correlations
- Clinical-diagnostic correlations
- Clinical management with emphasis on clinicotherapeutic correlations

Granulomatous anterior uveitis

- Predominantly type IV immunopathological mechanism
- Histopathological features
- Clinical features and underlying pathological mechanisms
- Clinical-diagnostic correlations
- Clinical management with emphasis on clinicotherapeutic correlations

B. OCULAR INVOLVEMENT IN AUTOIMMUNE DISORDERS

Autoimmunity is the loss of the mechanism that regulates the immune system from reaction against self. Autoimmune disorders result from the breakdown of the regulatory mechanisms of self-tolerance, which may lead to humoral or cell-mediated immune response against the host's own tissues. Autoimmune disorders are usually categorized based on immunopathological mechanisms that cause tissue damage.

Autoimmune conjunctivitis -

- Type II immunopathological mechanism
- Immunopathogenesis
- Clinical-diagnostic correlations
- Clinical management with emphasis on clinicotherapeutic correlations
Autoimmune peripheral keratitis associated with non-necrotizing scleritis

- Type III and IV immunopathological mechanisms
- Immunopathogenesis
- Clinical-pathological correlations
- Clinical-diagnostic correlations
- Clinical management with emphasis on clinicotherapeutic correlations

C. OCULAR INVOLVEMENT IN IMMUNODEFICIENCY

Immunodeficiency occurs when the immune system is inadequate or unresponsive to mainly microbes. It is suspected when a patient presents with unexplained recurrent ocular infection. Patients presenting with unexplained recurrent ocular infections should have laboratory tests to rule out immunodeficiency.

**Primary immunodeficiency**

1. Disorders of humoral immunity
2. Cellular immunodeficiency
3. Combined immunodeficiency
4. Defect of phagocytic function
5. Complement disorder

**Secondary immunodeficiency**

1. HIV infection depletes CD4 T cells and macrophage.
2. Protein-calorie malnutrition causes cell-mediated immune dysfunction.
4. Cancer metastases and leukemia involving bone marrow leads to generation of immature or atypical leukocytes.
5. Immunosuppression for transplant and autoimmune disease reduces lymphocyte activation.
6. Removal of spleen increases susceptibility to infection by encapsulated bacteria such as Streptococcus pneumoniae.
Specific types of anterior eye disorders associated with immunodeficiency

1. Recurrent HSV ocular infection (epithelial keratitis)
   Diagnostic correlations and laboratory tests
   Therapy

2. Recurrent internal hordeolum secondary to Streptococcus pneumoniae
   Laboratory tests
   Clinical management

3. Recurrent preseptal cellulitis secondary to Staphylococcus aureus
   Diagnostic tests
   Pharmacotherapy

4. Recurrent fungal keratitis secondary to Candida albicans
   Diagnostic correlations
   Therapeutic management

5. Recurrent angioedema without urticaria
   Workup
   Management

6. Molluscum contagiosum ocular infection that is resistant to therapy
   Diagnostic correlation and specific laboratory tests
   Management

General immunological work up for immunodeficiency disorders

1. WBC with differential
2. Delayed type hypersensitivity skin test
3. Quantitative immunoglobulin measurement
4. Nitroblue tetrazolium test
5. HIV testing
6. Total hemolytic complement assay (serum CH50 level).
7. Lymphocyte immunophenotyping
Macular Assessment Utilizing OCT
Tara Brown, O.D.

Objectives:
1. Provide a brief overview of the history of OCT
2. Discuss OCT diagnostic capability and purposes of use
3. Review macular anatomical features
4. Discuss OCT interpretation of different macular disorders

Abstract:
OCT has revolutionized diagnosis of macular diseases which has led to pharmacotherapeutic advances and more timely and effective disease management. This course provides an brief overview of OCT history and retinal anatomy and then discusses the role of OCT in macular assessment of macular disorders. Examples are provided to educate the optometrist on the quantitative assessment of macular alterations.

Outline:

I. History and development of OCT
   a. Time domain OCT
   b. Spectral domain OCT

II. Retinal anatomy review
   a. Choroid
   b. Retinal layers
   c. Vitreo-retinal interface

III. Vitreo-Retinal Disorders
   a. Epiretinal Membrane (ERM)
   b. Vitreo-Macular Adhesions (VMA/VMT)
   c. Posterior Vitreous Detachment (PVD)
   d. Macular Holes

IV. Macular Disorders
   a. Cystoid Macular Edema (CME)
   b. Diabetic Clinically significant macular edema (CSME)
   c. Central serous chorioretinopathy (CSR)
   d. Nonexudative Age-related macular degeneration (NEAMD)
   e. Exudative Age-related macular degeneration (EAMD)
   f. Pigment Epithelial Detachment (PED)
V. Choroid Disorders
   a. Choroidal thinning
   b. Choroidal neovascular membrane (CNVM)
   c. Choroidal nevus
   d. Choroidal melanoma

VI. Conclusion
Title: The Criticality of IOP in Glaucoma.
Author: Christopher Lievens, OD, MS, FAAO

Keys
- Glaucoma
- Review of landmark studies
- Pharmacology comparison
- Patient Cases

Glaucoma
- A disease of the eye characterized by increased intraocular pressure, excavation, and atrophy of the optic nerve; produces defects in the field of vision

What is Glaucoma
- Glaucoma describes a number of diseases that have common traits
- High IOP
- Elevated IOP does not always mean you have glaucoma
- You can have glaucoma and be normal IOPs
- Damage to the optic nerve
- Loss of visual field from “the outside in”
- Traditionally glaucoma has been treated by reducing the patients IOP

Diagnostic Tests
- Gonioscopy 92020
- Threshold Perimetry 92083
- Ophthalmoscopy
- Tonometry
- Random test
- Serial/diurnal measurement 92100
- HRT/GdX/OCT/Talia 92135
- Pachymetry 76514

Pharmacology comparison
- XLT Study
- Summary
- Mean IOP at baseline not significantly different
- Mean IOP at week 12 not significantly different
- No racial difference between racial groups were noted

Ocular and systemic side effects of Alphagan .2% in children
- There have been occasional reports of systemic adverse effects in children including apparent central nervous system depression.
- In this study, 18% of children had systemic adverse effects sufficient to necessitate stopping the drug

History
• Pilocarpine Usage
• Beta Blocker Standard of Care
• Launch of Prostaglandin Analog
  o Launch of Subsequent Prostaglandin Analogs
• Combination Drugs

Aqueous Outflow Pharmaceuticals
Aqueous Production Pharmaceuticals

Maximum Medical Therapy
• What is it?
• Is it patient dependant?
• How does the provider know when to consider surgery?

Ocular Surface Effects of Topical Pharmaceuticals
• BAK
• OSD and GLC
• Effect on Trab

AGIS (Advanced Glaucoma Intervention Study)
  ▪ 591 pts, 789 eyes
  ▪ Known pts with unstable VF and/or ONH’s
  ▪ Randomized trial to compare laser first to surgery first
  ▪ Main result: No difference
  ▪ Important finding: Eyes with 100% of visits with IOP <18mmHg over 6 years had a VF defect score (from baseline) close to zero
  ▪ Important finding: Eyes with 50% of visits with IOP <18mmHg over 6 years showed VF progression

CIGTS (Collaborative Initial Glaucoma Treatment Study)
  ▪ 607 newly dx’ed pts
  ▪ Randomized to medical tx or trab.
  ▪ VF is primary outcome observed
  ▪ 5-year outcome: No difference in patient quality of life
  ▪ Still ongoing
  ▪ Medical group
  ▪ Average IOP = 17-18
  ▪ Surgical group
  ▪ Average IOP = 14-15
  ▪ Increase risk? Greater SE’s?

CNTGS (Collaborative Normal Tension Glaucoma Study)
  ▪ 145 eyes randomized to observation or 30% IOP lowering
  ▪ Using any drops, ALT, or trab
  ▪ 10 IOP readings – none>24mmHg
  ▪ Diurnals very important
  ▪ 61 pts treated / 79 untreated
- **Outcome**
  - 80% observation group progressed at 5 years
  - 40% treated eyes progressed at 5 years

**EMGT (Early Manifest Glaucoma Trial)**
- Compare effect of:
  - IOP tx
  - NO tx
  - Delayed tx
  - 50-80 y/o’s
  - 255 new glc patients
  - Randomized to:
    - ALT
    - Betoptic
    - Observation
  - 3mo f/u for 10 years (VF or ONH Δ’s are outcome)
  - IOP reduced by average of 25% in treatment groups
  - 45% progressed in tx groups
  - 62% progressed in observation group
  - Each 1mm of decrease related to 10% decrease of risk of progression

**OHTS (Ocular Hypertension Treatment Study)**
- Prospective study, 40-80 y/o’s
- 1636 patients randomized to 20% IOP lowering or observation
- IOP between 21-32
- Normal SLE, ONH’s, VF
- Results
  - Lowering IOP by 20% reduces risk by 50% over 5 years
  - 90% untreated did NOT progress
  - 95.6% treated did NOT progress
  - Need to treat 100 people per year to prevent 1 from getting GLC
- Risk Factors identified
  - Age: 22% increased risk per decade
  - Race (African-American)
  - Higher initial IOP: 10% increased risk per 1mmHg
  - Thinner corneas: 71% increased risk per 40 microns thinner
  - Larger C/D’s: 32% increased risk with 0.1 size increase
  - Heart disease
  - PSD on HVF

**Tonometry**
- measurement of the tension of a part e.g. ocular tension. The test is used to screen for glaucoma which, if left untreated, may cause blindness
- A procedure that measures the pressure inside the eye
- Several ways to measure pressure
- Indentation
- Schiotz tonometer
- Applanation
- Goldmann, NCT, TonoPen XL tonometry
- Pressure Phosphene Induction
- Proview Eye Pressure Monitor

Targeting IOP and Adding medications

Factors to consider
- Age
- Race
- ONH
- VF
- Systemic Health
- Baseline IOP
- Initial target: reduce by 30%
- From highest IOP
- Mild GLC 30%
- Moderate GLC 40%
- Severe GLC 50+%
Define Legal Blindness and Low Vision
Define Low Vision Rehabilitation
Discuss Low Vision Management
Consider Goals for Successful Rehabilitation
Outline a Comprehensive Low Vision Examination
Discuss Vision Rehabilitation
Multidisciplinary Team Approach

Discuss Optical/Non-Optical Enhancement
Vision Challenges
Contrast Sensitivity
Low contrast acuity
Slow light adaptation
Marked effects of glare
Increased color confusion
Visual Complaints/Difficulties
Detail at Distance & Near
Recognizing faces
Detecting curbs, judging step height
Adaptation to different lighting conditions
Fluctuations in Vision & Refractive Changes
Complexity of Vision Loss
Visual Demands of Disease Management
Effects of Multisystem Losses
Visual Demands of Disease Management
Dietary
Optical Devices
Non Optical Aids

Multidisciplinary Team Approach
Optometrist’s Role in Rehabilitation
  Monitoring disease progression
  Optical and non-optical solutions
  Patient education
  Adaptive approaches
  Support
  Liaison to community activities
Legal Blindness
Low Vision Management
Detection & Management of Eye Disease
Visual Rehabilitation
Complete ocular examination
   Including dilated fundus evaluation
   Visual field testing
   Review of medical/surgical record
   Optical Services
   Careful refraction
   Distance evaluation
   Near evaluation
   Glare control
   Binocular status
   Ocular-motor testing
   Balance assessment

Education
   A patient’s understanding of their visual condition and prognosis directly influences the
   success of their rehabilitation
   Family member’s must be included

Modification of the environment
Team approach to care
Involves much more than optical aids
Goals of Low Vision for Successful Rehabilitation
Patient Goals for Low Vision

Low Vision Intake Form
Patient Information
Diagnosis
ETDRS/Ferris-Bailey Chart
Designs for Vision
Eccentric Viewing
Lighthouse “continuous text” card
Direct vs. indirect illumination
Quality of near vision
Amsler Grid testing

Referral Sources
Rehabilitation Counseling
Rehabilitation Teaching
Educational Assistance
Orientation & Mobility Instruction
Low Vision Device Distributors
Recreational/Social Activities/Peer Groups
Advocacy Services
Vocational Assistance
Kristin Anderson, OD
Complicated Refractive Cases and their Management

Refractive Data Analysis Review
- Visual acuity
- Distance retinoscopy & subjective refraction
- Distance and near-point binocular analysis
- Accommodation

Assessment & Management of Ametropia
- Complaints and vision problems
- Clinical findings
- Assessment
- Management options
- Myopia
  - Etiology and Development
  - Other classifications
  - Pseudo Myopia
  - Pathological and Transitory Myopia
  - Patient Cases
    - Over minusing
    - Lack of control during refraction
    - Use of Automated Refraction Systems
- Hyperopia
  - Clinical Considerations
  - Identifying via case history and patient complaint
  - Patient Cases
    - Patient without complaint w/ 8D latent hyperopia
    - Lack of plus acceptance
    - Diplopia
- Astigmatism
  - Regular astigmatism
  - Irregular astigmatism
  - Etiology
  - Patient Cases
    - Accomodative disorder inucing cylinder
    - Masking of astigmatism with normal spectacles and spherical contact lenses

Assessment & Management of Refractive Conditions
- Complaints and vision problems
- Clinical findings
- Assessment
- Management options
- Patient Cases
  - Ocular complaints and asthenopia
  - Fatigued patient with nonspecific complaints
  - Drug use

Assessment & Management of Binocular Anomalies
- Complaints and vision problems
- Clinical findings
- Assessment
- Management options
- Patient Education
- Overview of Accommodative Testing
  - NRA/PRA: What does it really mean?
    - Errors in optometric testing
    - Errors by the patient response
    - How to predict values based on vergences and accommodation
    - How to best manage
  - Accommodative Facility Testing
    - Is it reliable?
    - Control of suppression
    - Unilateral and/or bilateral testing
  - Patient Cases
    - When the PRA/NRA does not agree with anticipated results
    - How to interpret the facility results
    - How to co-manage with vision therapy and spectacle wear

Assessment & Management of Complicated Case Presentations
- Ocular disease/trauma
  - Aphakia
  - Low Vision mgmt
- Refractive/binocular anomalies
  - Strabismus
  - Diplopia
- Complaints and history
- Clinical findings
- Assessment
- Management options
- Patient Education