1 **Management of Ocular Infection: The Next Generation**

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2 **EVERY RED EYE DESERVES AN ANTIBIOTIC ???**

3 **Most common causes of ACUTE Conjunctivitis**

- Toxic or chemical
- Viral
- Chlamydial
- Bacterial

4 **Viral conjunctivitis is the #1 Cause of ACUTE INFECTIOUS Conjunctivitis**

- Adenovirus
- Enterovirus
- Herpes FAMILY of Viruses
- Miscellaneous

5 **Adenovirus Family**

- DNA Viruses
- At least 35 different serotypes
- Type 8 Classic EKC
- Types 10, 13, 19, and 37 new EKC
- Pharyngoconjunctival fever (PCF) Type 3 and 7

6 **Case #1**

S: 17 Y/O Female with c/o itching , watering red OD X 4 days associated with flu-like symptoms.

O: "Mixed" conjunctivitis
Right Pre-Auricular node
Watery discharge with erythema OU
Pseudomembrane OD

7 **Differential DX**

- H. Simplex
- Allergy
- Vernal/atopic
- GPC
- Bacterial
- Chlamydial
- Molluscum
- Moraxella
- Medicamatosa

8 **Adenoviral Symptoms**

- FB sensation
- Watering
- EKC-Photophobia and Pain
- Blurred vision
- PCF-Pharyngitis and pyrexia

9 **Adenoviral Signs**

- Follicular conjunctivitis-Variable most common in lower fornix
- Mild to moderate chemosis
- Lid swelling with mild ptosis
- Lymphadenopathy in 66%

10 **EKC SIGNS**

- Papillary response of upper tarsal conj.
- Subconj. Heme
- Pseudomembrane and conjunctival scarring-Severe form
- Subepithelial infiltrates-Severe form

11 **REMEMBER**

ADENOVIRAL DISEASE IS BILATERAL

12 **Treatment@@@@**

- Cool compresses and ASA
- Lubrication
- Decongestants
- Steroids (infiltrates, membranes, inflammation)@@@@
- Membrane removal
- Antibiotics??
- Cycloplegia??
- A Cure??

13 **HOW ABOUT A CURE**

1 HERE
1 ON THE WAY

- Current topical antiviral agents (Viroptic) are not effective@@@@
- Povidone Iodine 5%: Swish and spit!!
- Cidovovir will cure the common cold-OF THE EYE

14 **Enteroviruses**

- EHC-Epidemic Hemorrhagic Conjunctivitis
- AHC_Acute hemorrhagic conjunctivitis
- Called Apollo 11 disease after outbreak in Africa from 1969-70
- Enterovirus type 70

15 **EHC Symptoms**

- Marked conjunctival hemorrhage
- Bilateral
- Follicular conjunctivitis
- MINIMAL SPK
- PA Nodes common

16 **Herpes Family of Viruses@@@@**

- Herpes simplex
- Herpes zoster
- Epstein Barr-Infectious mononucleosis
- CMV-Cytomegalovirus

17 **Herpes Simplex**

- Type I Above waist-Trigeminal ganglia
- Type II below waist-most severe in eye infection-Saccral ganglia@@@@
- 50% reoccurrence within 2 years
- Multiple triggers@@@@
- 90% carry antibodies by age 10

18 **Herpes Simplex**

- Primary disease
- Recurrent disease
  - Conjunctivitis
    - Keratitis

- Stromal disease

19 **Primary H. simplex**
- @@@@
- Pre-auricular node common
- Vesicles
- Follicles
- No dendrite
- Self-limiting disease-BUT-Treat aggressively to prevent recurrence

20 **Recurrent H. simplex**
- Pre-auricular node rare
- Virus involves deeper tissues with each episode
- 50% get recurrence within 2 years
- Steroids will exacerbate infectious H. simplex disease
- Contra-indicated in purely infectious disease

21 **QUICK QUIZ**
ANYONE THAT WOULD TX HERPES SIMPLEX OCULAR DISEASE WITH TOPICAL STEROIDS WOULD BE CLASSIFIED AS WHAT?
A. A GENIUS
B. A HERO
C. ONLY A PERSON WITH SBS WOULD USE STEROIDS ON HERPES SIMPLEX

22 **Stromal H. simplex-**
A whole new ball game
- Mechanism is primarily inflammation@@@@
- Stromal infiltrates are the critical sign
- Balanced use of topical steroid (FML) with anti-viral cover@@@@
- Consider oral acyclovir at this point in time

23 **Characteristics of Herpes Viruses**
- Latency
- Recurrence

24 **Antiviral Therapy**
Symptomatic TX
- Cool compresses
- Decongestants
- Cycloplegics

• ASA or tylenol

25 **Idoxuridine**

- Indications-H. Simplex
- Problem -Poor ocular penetration
- Dosage:

YOU MUST BE KIDDING - one drop q 1h daytime and q 2h ATC

OR

- Every minute X 5 doses every 4H ATC
- Ointment used 5X daily ATC

26 **Idoxuridine dosage forms**

- Herplex 0.1%-15cc by Allergan (Also available in the handy 50 gallon economy size)
- Stoxil 0.1% -15cc-SKF
- Stoxcil 0.5% Ophthal. Oint 4gm

27 **Adenine arabinoside**

- Indications-Herpes simplex
- Caution-May be mutagenic
- Dosage-Instill Ointment 3-5X daily
- Problem-ONLY available as ointment
- VIRA-A 3% 3.5gm tube-PD

28 **Trifluorothymidine@@@**

- FORMER drug of choice for topical management of Herpes simplex ocular disease.@@@@@
- Rapid absorption
- Toxicity occurs when used over 21 days
- Dosage-5-8X daily
- Viroptic 1%-7.5cc-Burroughs

29 **Meet Zirgan**

- NEW DOC for H.simplex
- Selective toxicity
- Gel dosage form

30 **CLINICAL PEARL ALERT**

- If treatment failure with one product switch to another-generally no cross toxicity or sensitivity occurs
- Use Viroptic daily and Vira-A oint HS for best effect

31 **Acycloguanosine**
(Acyclovir)

- The “Jewish Penicillin” of the anti-viral products
- A pro-drug-minimal side-effects
- Topical agent no more effective than viroptic
- Standard of care for H. Zoster and resistant H. simplex

32 **Zovirax (Burroughs)**

- Oral dosage form 200, 400 and 800mg tablets and 200mg/5cc suspension
- H. simplex 400mg TID@@@@
- H. Zoster-”Chickenpox”-200-400mg QID X 10D
- Recurrent-800mg 5 times daily X 10-14 days@@@@

33 **For ALL Herpes It’s the Drug of Choice**

- Recurrent or resistant simplex
- ALL Zoster patients over 50

34 **Famvir**
Famcyclovir

- Third generation anti-viral medication
- Pro-drug
- Selective toxicity
- Excellent anti-herpetic activity
- Quite expensive

35 **Famvir**
Indications/Dosage forms

- Indications:
- Resistant ocular simplex or Type II simplex
- 125-250mg BID
- Hepes zoster 500mg TID
- Dosage forms:
- 125/250/500mg tablets

36 **ANTI-VIRAL**
PHARMACOLOGY

Anti-viral agents function by inhibiting viral DNA synthesis. This is accomplished by blocking the key enzymes:

- Thymidine kinase
- DNA polymerase
- Deoxycytidine kinase
- Thymidylate synthetase

37 **Case 2**

S:54 y/o with red eye X 72H
FB sensation with sticky discharge in AM
O: Mixed conjunctivitis
- No PA Nodes
- Mild chemosis
- Yellow/green discharge
- Min SPK
- No corneal infiltrates

38

Conjunctivitis-An Ocular Emergency??
- Environmental
- Viral
- Bacterial
- Other

39 **Tests**
- Cultures
- Diff-Quick
- Gram Stain

40 **Diff-Quick Technique**
Even a "DIP" Can Do It
Dip 5 times for one second into:
- The fixative
- Solution I
- Solution II
- Rinse in distilled
 water
- Air dry

41 **Differentiates White Blood Cell Types@@@@**
- Poly's: Polymorphonucleocytes (PMN's): Bacterial infection@@@@
- Lymphocytes: Viral infection
- Eosinophils: Allergic disease

42 **Gram Stain**
- Differentiates bacteria by differences in cell wall morphology@@@@
- Designates bacteria as Gram (+) or (-)@@@@

43 **Gram Stain Solutions**

- Gram crystal violet:All stain blue
- Gram iodine: All cells stay blue
- Decolorizer: Gram (+) cells “seal” in blue color, Gram (-) cells are colorless with holes in cell wall
- Safranin counterstain: Stains Gram
(-)cells red

44 **Culturette Etiquette**

- Choose proper culturette: Bacterial vs Viral
- Break solution bulb BEFORE swabbing
- Avoid pus-Dead
 cells only
- Plate ASAP

45 **Plating Etiquette**

- Blood agar: Detects hemolysis: a sign of greater pathogenicity
- Chocolate agar:Heated blood agar: Provides nutrients for Hemophilus growth
- Sabouraud’s: Fungal growth media
- Overlaid E-Coli plate: Culture media for acanthamoeba

46 **Let’s Start with the Kids: Pediatric conjunctivitis plays by different rules**

Don’t treat pediatric conjunctivitis without first:

- Check history
- Check ears
- Check throat
- Check temperature

47 **Kids Conjunctivitis-NO drops alone if…..**

- Recurrent or active otitis media
- Fever
- Sore throat
- Generally ill
- Treat with Polytrim/fluoroquinolone and effective oral anti H. Flu

48 **Why treat conjunctivitis:**

- Prevent conversion to chronic disease
- Hasten cure
- Prevent spread to other ocular structures or sinus
- Reduce contagion

- Prevent complications

49 **Treatment Agents**
- Polytrim
- Fluoroquinolone
- Antibiotic Steroid
- Rarely orals (Exc. Pediatric)

50 **15 Y/O female presents with mom-C/O red eye-Simple Right??**
- Has seen one nurse practitioner
- Has seen Two Optometrists
- Tx with Ciloxan
- Tx with Tobradex
- Mom wonders why nobody can cure her daughter

51 **Zithromax**
Azithromcin
- Broad spectrum activity
- 68 hour 1/2 life
- DOC in penicillin sensitive patients
- Effective in pediatric Hemophilus
- Mild-medium GI side effects
- Excellent compliance (5 day TX) (1 day for chlamydia)
- Moderate cost
- Drug Interactions??

52 **The Killer Conjunctivitis**
- Neonatal conjunctivitis is different
- Chemical vs infectious cause
- Chemical: Crede prophylaxis with silver nitrate is no big deal
- Infectious IS A BIG DEAL

53 **Neonatal Conjunctivitis**
- Ophthalmia Neonatorum
- Any conjunctivitis in the first month of life
- Chemical vs infectious

54 **Neonatal Conjunctivitis**
- Always an emergency
- Tx presumptively
- Always culture to R/O gonococci

55 **Neonatal Conjunctivitis**
Infectious Types
- Neisseria gonorrhea
- Neisseria meningidis
- Chlamydia trachomatis
- Staph. Aureus
- Strep. Pyogenes
- Strep. pneumoniae

56 **Chlamydial Conjunctivitis**
- Most common cause of CHRONIC conjunctivitis in all age groups
- STD
- Mother should be checked prior to birth
- Onset in 2nd week post-partum
- Potential conjunctival scarring
- Systemic complications

57 **Chlamydia**
Clinical signs
- Moderate mucopurulant discharge
- Papillary conjunctivitis
- Possible pseudomembranes

58 **Chlamydia**
Treatment
- Both topical and systemic
- Treat parents and friends also
- The family that gets treated together stays together
- Erythromycin ophth. Oint
- Zithromax 10mg/kg/day X 1 day, then 5mg/kg/D X 4 days
- Adults: 1 gm (4 tablets)

59 **Neisseria Conjunctivitis-**
A TRUE Ocular Emergency
- Onset within first week of life
- HYPER-purulent conjunctivitis
- Marked inflammation of eye and lids
- STD
- Delayed treatment/loss of eye/potentially fatal infection

60 **Neisseria**
Lab Work-up
- Labs are mandatory-STAT
- Fastest is gram stain-don't wait for cultures
- Confirmatory culture

61 **Neisseria Treatment**
- Ocular irrigation with antibiotic solutions
- IV Pen or cephalosporin-Dose by weight
- TX parents
- Multiple infections possible with several STD's

62 **Maternal Herpes simplex-Type II- Genital herpes**
- High incidence of infant mortality
- Mother must be pre-tx with oral acyclovir

63 **The "Like-New" 3 year old SCL**
- 37 yowf with eye pain-"thinks she scratched her eye
- Wears the "30" day XSCL
- Orders them through the mail
- No local eye doctor
- Current pair 3 years old
- HX of frequent "pink-eye"

64 **Infectious Keratitis**

65 **Treated at Urgent Care**
- Urgent care doctor agreed and treated as an abrasion
- Pressure patched X 3 days
- Erythromycin Ointment
- Suffered significant VA loss
- Patient won settlement prior to trial

66 **Moral:**
NEVER PATCH AN INFECTED EYE

In other words:
NEVER PATCH A PAINFUL EYE WITH A HX OF CL WEAR

67 **Respond To This Statement**

The current standard of care is to culture ALL suspected bacterial corneal ulcers

A. TRUE
B. FALSE

68 **Culturing: The 1,2,3,4 Rule**

- 1: Less than +1 anterior chamber RX
- 2: Less than 2 mm in size
- 3: At least 3mm from optic axis
- 4: Less than 1/4 depth of cornea

69 **Bacterial Keratitis TX**

- Cephalexin 50mg/cc + Tobramycin 13.5mg/cc
- Fluoroquinolone
- Fluoroquinolone + Cephalexin
- Vancomycin 50mg/cc for MRSA
- LASIK Ulcers: Vancomycin + Amikacin

70 **Bacterial Ulcer Guidelines**

- Always culture if you have the means
- Patients that get better never sue-those that don't-DO
- Consider the 1-2-3-4 rule
- Fluoroquinolone mono-therapy is not fool-proof
- Grade the ulcer-Location, location, etc
- Step TX based on cultures

71 **The Newest Fluoroquinolones**

- Besivance: Besifloxacin: 1st chloro-fluoroquinolone: better against MRST Never used orally
- Moxifloxacin 0.5%: 4th gen Moxeza
- Gatifloxacin: 4th gen