

Bacterial Keratitis - Prof. Dr. Navneet Saxena

This CME was presented by Prof. Dr. Navneet Saxena, NSCB Medical College and Hospital Jabalpur at Hotel Krishna in a session on February 18, 2007. The session was sponsored by Warren.

Protocol for the diagnosis and management of Microbial Keratitis

Examination of a Corneal Ulcer

Look at the lids.
Measure the infiltrates & epithelial defect.
Note the surrounding stromal edema.
AC reaction.
Limbal / scleral involvement.
Fundus / USG B scan to note vitreous reaction

Stages of a Corneal Ulcer

Progressive stage
Regressive stage
Healing stage

Importance of microbial analysis

Accurate etiological diagnosis.

Modification of therapy.

Samples can be taken from -

Eye lid, Corneal, Conjunctival swabs.
Corneal scrapings (most valuable).
Corneal biopsy.
AC tap.

Sample can be collected using -

Platinum spatula.
26 gauge needle.
Hypodermic needle.
B.P. Blade no.57
Surgical blade no.15
Kimura spatula.
Calcium alginate swab

Samples can be transported using -

Directly on to the agar plate and slides.

Liquid transport culture media

Corneal Scraping

Under LA (0.5% Proparacaine)

Lid speculum.

Seated in front of slit lamp.

Any mucous or debris on & around the ulcer is carefully cleaned with a sterile swab stick.

Scrapings are taken from leading edges & base with the help of Kimura spatula or B. P. knife 15 no.

Multiple scrapings must be obtained to enhance yield of bacteria.

Microbiological investigations

Smears are prepared by scraping the ulcer and gently transferring the material on to the glass slide.

At least 4 slides are prepared

1 for Gram staining.

1 for KOH preparation.

1 for viral antigen detection.

Gram's staining to differentiate between gram +ve and -ve

Geimsa staining to differentiate between bacteria and fungi, also identifies chlamydia and acanthamoeba. Bacteria appear dark blue, yeasts and fungal hyphae appear purple.

Ziehl-Neelsen acid fast stain for

1. Mycobacterium
2. Actinomyces
3. Nocardia

KOH wet-mount preparation:

One drop of 10% KOH solution is put on scraping and slide cover is placed.

Examined under conventional microscope.

Stains fungal filament in light yellow color.

Very handy can be performed in OPD.

Sensitivity 92% and specificity 96%.

Blood Agar

It's a standard medium for isolation of Aerobic bacteria at 35° C.

Also support the growth of most saprophytic fungi at room temp.

Chocolate Agar

Essential for growth of

1. Haemophilus,
2. Neisseria
3. Moraxella

Sabouroud's Agar

This is glucose and peptone agar universal non – selective media for fungus

Thyoglycate broth

supports the growth of aerobic and anaerobic bacteria at 35° C and no. of saprophytic fungi

Confocal Microscopy

Capable of providing Corneal epithelial,stromal,endothelial details and make it possible to observe micro organism in vivo with out the use of dyes,stains or tissue fixation.

Duration for isolation of organisms

Most aerobic bacteria for keratitis are seen on standard culture media with in 48 hrs. In some cases pathogen may be recognized in 12 to 15 hrs.

Aerobic culture should be held for 7 days.

Anaerobic culture for 7 to 14 days.

Mycobacterial & fungal culture for 4 to 6 wks

Positive Culture

A reported culture positive rate in presumed infectious keratitis varies from 40 to 73 %.

Criteria for a significant positive culture include the clinical sings of keratitis plus one of the following.

Growth of organism in two or more media.

Confluent growth of known bacteria in one solid media. (10 or more colonies)

Corneal Biopsy

Indicated in deep stromal infiltrates like intra stromal abscess and deep mycotic keratitis

Anterior Chamber Tap

Indication- Scanty corneal infiltrates with thick hypopyon.

Done with the help of 26 gauge needle

Treatment of Bacterial Keratitis

Combination therapy is preferred

Fortified Aminoglycosides and fortified cefazoline 5 %.

Newer generation of Fluoroquinolones like Lomefloxacin,Moxifloxacin,Gatifloxacin

Generally agreed that frequent (half hourly) instillation of fortified antibiotics drops is preferred method of drug delivery, over sub- conjunctival injection.

Sub-conjunctival injection produces high tissue drug peak followed by a low trough.

Continual eye drops instillation resulted in moderate but sustain tissue level.

FORTIFIED ANTIBIOTICS ARE PREPARED BY ADDING INTRAVENOUS ANTIBIOTICS PREPARATION INTO ARTIFICIAL TEARS.

Frequency of instillation

Depends on amount of infiltrates .

In case of dense infiltrate.

Antibiotic drops are given-

every 1 min. for next 5 min.

every 5 min. for next half an hour.

then every half an hour.

To load with intensive antibiotics during the initial 48 hrs. and after that reduce the frequency to avoid surface toxicity.

Common antibiotics used for specific infections

Staphylococcus----- Cefazolin (50mg/ml)

Streptococcus----Penicillin G (10000U/ml)

Mycobacterium--- Amikacin(40-100mg/ml)

Neisseria----- Ceftriaxone (50mg/ml)

Pseudomonas----- Ceftazidime (50mg/ml)

Acanthamoeba--- Chlorhexidine (0.02%)

Treatment for fungal keratitis

Systemic Itraconazole 100mg twice a day for 1 to 2 weeks.

Ketaconazole 200 mg twice a day for 1 to 2 weeks.

Recently newer generation of Triazoles such as Voriconazole,Ravuconazole,Posaconazole

Daily debridement of epithelium must be done to enhance penetration of drug & removal of superficial infiltrate will reduce fungal load

Signs of improvement

Subjective improvement.

Reduced lid swelling.

Reduced conjunctival congestion.

Reduced chemosis.

Reduced size of epithelial defect.

Reduced size of infiltrate.
Reduced density of infiltrate.
Reduced surrounding stromal edema.
Reduced AC reaction.
Onset of scarring

If the ulcer shows no improvement then the therapy should be changed according to sensitivity report.
If no organism recovered from initial scraping & infiltrate not responding to treatment then REPEAT CORNEAL SCRAPING or CORNEAL BIOPSY is performed.

Surgical management

For severe thinning (80 to 90 %) & small perforations (< 2mm)
Cyanacrylate glue application is performed with or without BSCL.
For large perforations
Therapeutic Penetrating Keratoplasty

Common causes for non-healing corneal ulcer

Wrong medication.
Inadequate dosage.
Mixed infection.
Secondary Glaucoma.
Chronic dacryocystitis.
Lagophthalmos
Dry eye.
Neurotrophic cornea.
Drug toxicity
Poor compliance by the patient.
Diabetes mellitus

Protocol in a nutshell

Thorough History.
Thorough Clinical evaluation.
Different Microbiological investigations.
Treatment accordingly.