MEDICAL TREATMENT OF ENDOPHTHALMITIS

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Endophthalmitis refers to intraocular inflammation predominantly involving the anterior chamber and the vitreous cavity of the eye. The term is usually associated with an infectious process or noninfectious stimulus such as retained lens material or toxic substance introduced into the eye during trauma or intraocular surgery.

Signs And Symptoms.

The most common signs of endophthalmitis are

1. Decreased vision
2. Mild to moderate anterior chamber reaction
3. Hypopyon
4. Vitritis
5. Pain is variable.
6. Conjunctival hyperemia
7. Chemosis
8. Lid oedema
9. Corneal oedema
10. Poor fundal glow.

Infectious endophthalmitis can be categorized according to the circumstances by which the infecting organism is introduced into the eye. In most cases the organism enters the eye from the external environment (exogenous): through surgical incision, a traumatic laceration or a conjunctival filtering bleb. A Miscellaneous category includes cases associated with suture removal . In wound infection, microbial keratitis, wound leaks and infectious scleritis, organisms gain access to the eye hematogenously. The Current incidence of post operative endophthalmitis is between 0.1% to 0.4% & post traumatic endophthalmitis is between 2%-4%.

The primary source of infection in postoperative endophthalmitis is the eyelids and conjunctiva and organisms responsible may represent normal ocular surface flora such as staphylococcus species and propionibacterium acnes. Other sources of contamination include secondary infections from other sites such as the lacrimal system or contaminated eye drops, contaminated surgical instrument or irrigating fluids or toxic agents irrigated into the eye.

In almost all cases of post-operative endophthalmitis the causative organism is exogenously introduced into the eye at the time of surgery with clinical signs developing from 24 hours to 2 years or more. Acute postoperative endophthalmitis develops within 1-14 days of intraocular surgery. In general the more prolonged and complicated the surgery, the greater the risk of developing endophthalmitis.

Mild cases are less painful, have fair visual acuity and may present as late as 14 days postoperatively in which staphylococcus epidermidis is the organism most commonly recovered.

Early Post Operative Endophthalmitis

Severe acute postoperative endophthalmitis usually presents within 1-4 days after surgery. Vision is poor with pain and marked vitritis. The organisms are Staphylococcus aureus, Streptococcus and gram-negative organisms such as Serratia marcescens, Proteus and Pseudomonas.

Primary source of infection

Eyelid
Conjunctiva
Sac system
Contaminated - Drops
Surgical instruments
Irrigation fluids
Intraocular lenses.

Patients present with

1. Decreased visual acuity
2. Pain, Ciliary injection, chemosis
3. Afferent pupillary defect
4. Corneal oedema
5. Corneal infiltrates
6. Fibrinoid anterior chamber response
7. Vitreous inflammation

Points to remember

1.Gram +ve, and coagulase positive micrococci & gram negative organisms are associated with poor visual outcomes.

2. P Acnes endophthalmitis — may require multiple interventions.

Chronic Post Operative Endophthalmitis

Chronic postoperative endophthalmitis develops usually after 2 weeks.

Onset of signs and symptoms is gradual and it has to be distinguished from toxic lens syndrome.

1. Minimal pain
2. Hypopyon
3. Mild vitritis
4. Granular KP

S. Epidermidis presents within 6 weeks of surgery with non-granulomatous infection. Fungal endophthalmitis begins usually within 3 months after surgery and is caused by candida species.

Propionobacterium acnes endophthalmitis usually develops from 2 months to 2 years and has been

reported after Yag laser capsulotomy that allowed dissemination of sequestered pathogens from capsular bag into vitreous.

Post traumatic Endophthalmitis

Occurs after penetrating ocular injuries.
Common agents are S. epidermidis, bacillus species, streptococcus species S.aureus, and various fungi. Removal of retained IOFB within 24 hours of injury reduces the risk.

Endophthalmitis associated with filtering blebs.

Bacteria enter the eye through intact or leaking conjunctival filtering blebs Streptococcus, Pneumococcus and Haemophilus influenzae are some of the organisms.

Culture and Lab evaluation of intraocular specimens.

Vitreous specimens should be promptly inoculated directly onto culture media. Drops of the sample should be placed onto blood agar (aerobic medium), Sabrourauds agar, chocolate agar and thioglycolate broth.
In chronic post operative endophthalmitis the anaerobic culture is kept for 2 weeks because P. acnes grows in that time. One drop of aqueous & vitreous sample placed on clean slides for gram and Giemsa stains for bacteria and fungi.

Treatment

Management depends on the state of the cornea, severity and extent of inflammation.
Objectives of Treatment: -

A) Primary objectives
   1. Control/ eradicate infection
   2. Manage complications
   3. Restoration of vision.
   4. Obtain material for lab diagnosis

B) Secondary objectives
   1. Symptomatic relief
   2. Prevent panophthalmitis
   3. Maintain globe integrity
   4. Debulking
   5. Improve blood retinal barrier.

I) Medical:

Broad-spectrum coverage for gram positive and gram-negative organisms is generally required:
Vancomycin against gram positive organisms
Aminoglycosides against gram negative organisms:
Gentamycin, Tobramycin and Amikacin.
Ciprofloxacin given orally shows excellent intraocular penetration.

Antibiotic is administered by the topical, subconjunctival, intravitreal and intravenous routes.

Modalities of treatment

a) Anti microbial therapy — Intra-vitreal
— Topical
— Peribulbar
—Systemic

b) Anti inflammatory therapy (NSAIDS & corticosteroids)
— Intra-vitreal, topical and systemic

c) Supportive therapy — Anti glaucoma medication
—Corneal edema
—Vitamins

II) Surgical

Vitrectomy

A} Antimicrobial therapy

A) Intravitreal injection: - Despite presence of a compromised blood ocular barrier in endophthamitis, antibiotics given systemically do not achieve the minimum inhibitory concentration necessary within the vitreous cavity, the exceptions being ciprofloxacin
sparfloxacin
pefloxacin
However, the disease progresses so rapidly in bacterial endophthalmitis that the concentration may still be inadequate to further prevent the growth of organisms.

Intra-vitreal injection allows direct administration of antibiotics into the vitreous cavity. This is the preferred modality of treatment
Before giving intra-vitreal injections

1. Infected suture abscess should be removed.
2. Status of the lens assessed
   a) in an aphakic patient with broken vitreal face a translimbal route is adopted
   b) If vitreous incarceration in the wound is present, limited anterior vitrectomy and wound revision should be planned.

3) Ensure that the intraocular pressure before the injection is not high.
4) USG

Anaesthesia: -
-Topical anaesthesia suffices
Procedure: -
Peri-ocular region painted with povidone-iodine and cul-de- sac washed with a solution of the same.
Marking the injection site from the limbus — 3 mm if aphakic, 3.5mm if pseudophakic, 4 mm if phakic
Vitreous aspiration (0.2 -0.3 ml) with a 22/23 G needle is done. The fixation forceps may cause tearingof the inflamed conjunctiva/ haemorrhage & a cotton tipped applicator can be used instead.

A 26-30 G needle on a tuberculin syringe containing the prepared during is inserted with the bevel of the needle facing upwards towards ant/mid vitreous. The drug should be injected slowly in a drop by drop manner and avoid gel formation. The 2nd injection should be given through the initial needle with a separate syringe to avoid antibiotic precipitation with the bevel of the needle facing posteriorly and a supine position for the patient after the injection. Delivery of the drug over the macula should be avoided.

Drug: -

1st choice

Vancomycin 1 mg/01ml
+
Ceftaxidime 2.25 mg /01ml

2nd choice

Vancomycin 1 mg/0.1ml
+
Amikacin 4.00 mgm/0.1ml

3rd choice

Vancomycin 1mg/0.1ml
+
Gentamycin 200 mg/0.1ml

Vancomycin

This is a macrolide antibiotic
Effective against gram +ve organism
Including methicillin and cephalosporin resistant strains
Coagulase negative staphylococci

Ceftazidime

3rd generation Cephalosporin, bactericidal against gram negative organisms including pseudomonas.

Amikacin

Effective against gram negative organism resistant to other aminoglycosides
Retinal toxicity is 4 times less than that with gentamycin

Quinolones

Their half-life in the vitreous cavity is less. Therefore repeat injection is necessary within 12-24 hours.

Risk of intra vitreal injections

Intraocular haemorrhage
Drug induced retinal toxicity
R.D.
In phakic eyes, added risk of cataract.
Glaucoma

B Intravenous antibiotics

-Have a supportive and not a primary role
-May help in augmenting and sustaining an adequate concentration of antibiotics in the vitreous cavity for a more prolonged period.

Drug	Dosage
Vancomycin	1 g iv 12 hrly
Ciprofloxacin	750 mg oral 12 hrly
Ceftazidime	2 g iv 8 hrly
Amikacin	240 mg 8 hrly
Gentamycin	80 mg 8 hrly
Ofloxacin	200 mg oral 12 hrly

C)Topical & subconjunctival antibiotics and antiinflammatory agents

- Combination of 2 drugs
- Frequency of administration is every hour with each drug used alternately.

Anti-inflammatory therapy

Role of corticosteroids

Bacterial endophthalmitis causes the release of inflammatory mediators due to

i. Invasion by the organisms &
ii. release of endotoxins by them.
|
Stimulation of complement pathway and arachidonic pathway.
|
release of leukotrienes & prostaglandins
|
attract WBCs & macrophages into the vitreous cavity
|
release of proteolytic and collagenolytic enzymes

Anti Fungals

Preferred Drugs: -
Ketoconazole - 400 mg/day in divided doses.
Fluconazole - 200 mg/day in 2 divided doses.

Disadvantages:
Not as effective as Amphotericin
Resistance may develop rapidly
Antagonistic effect when combined with Amphotericin B.

If no response to these drugs is seen within 5 - 10 days, one should change to Amphotericin B.

Polyenes

Flucytosine used alone leads to rapid development of drug resistance. Synergism exists with Amphotericin B & Miconazole.

Dosage: -
50-100 mg/kg/day I 4 divided doses.

Intra-vitreal anti-fungal therapy: -
Acts only as an adjunct to systemic therapy since fungi multiply slowly as compared to bacteria; therefore treatment here requires a prolonged duration.

Amphotericin B is used intra-vitreally at the dose of 5-10 ugm/0.1 ml
Fluconazole: 25 ugm/0.1 ml.

Special cases

Propionobacterium endophthalmitis

- Virulence of the organism is zero.
- Does not produce a severe inflammatory response
- It is difficult to eradicate it, as it can remain sequestered within the capsular bag.

Treatment approaches: -

- Intra-vitreal vancomycin 1mg / 0.1 ml
- Has to be given into the capsular bag.
- May have to be combined with vitrectomy, total capsulectomy and IOL explantation.

Posttraumatic endophthalmitis

1. Disorganization of anatomy may cause difficulty in assessing the clinical features.
2. Organisms associated are more virulent

B. Cereus is resistant to caphalosporins. Vancomycin, clindamycin, gentamycin & amikacin are effective against B. Cereus. Combinations of clindamycin & gentamicin are also synergistic. However, early vitrectomy has been advocated.

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William Osler, 1894
The important thing is to make the lesson of each case tell on your education. The value of experience is not in seeing much, but in seeing wisely.