Sandwell and West Birmingham Hospitals NHS
NHS Trust

GUIDELINES FOR THE MANAGEMENT OF ENDOGENOUS ENDOPHTHALMITIS

Policy author	Antibiotic Advisory Group with guidance from Consultant Ophthalmologist
Accountable Executive Lead	Clinical Director
Approving body	Directorate Governance Group Drug and Therapeutics Committee
Policy reference	SWBH/BMEC/Ophth/046

Overall purpose of the guideline
Management of endogenous endophthalmitis

Principal target audience
Ophthalmologists

Application
Adult patients

Scope
Patients presenting at SWBH Trust with symptoms and signs indicative of endogenous endophthalmitis Patients less than 16 years of age. Patients who are pregnant or breastfeeding

National Guidance incorporated N/A
n/a

DOCUMENT CONTROL AND HISTORY

Version No	Date Approved	Date of implementation	Next Review Date	Reason for change (e.g. full rewrite, amendment to reflect new legislation, updated flowchart, etc.)
1	May 2011	May 2011	May 2013	
2	May 2014	June 2014	June 2017	Routine review

Drugs marked in red contain penicillin and are contra-indicated in penicillin allergy; drugs marked in orange should be used with caution in penicillin allergy and avoided if there is any history of anaphylaxis to penicillin; drugs marked in green are safe in penicillin allergy

Guidelines for the management of Endogenous Endophthalmitis

1. Introduction

Endogenous endophthalmitis, also termed metastatic endophthalmitis, is a rare condition in which there is blood-borne spread from an extraocular site to the eye. It accounts for 2-8% of all cases of endophthalmitis.

It is potentially both life-threatening (mortality of 10%) and sight-threatening.

The best outcome is associated with early diagnosis, so a high index of suspicion must be maintained for this condition.

Management must be in conjunction with physicians, and the advice of microbiologists should be sought.

An accurate ocular and systemic history is essential as it is often associated with a diagnosed underlying medical condition.

Underlying risk factors must be investigated (e.g. diabetes mellitus).

The source of infection must be sought.

Systemic antimicrobial therapy is essential.

The administration of intravitreal antibiotics and the use of vitrectomy depend upon the severity of ocular involvement.

Eye involvement is bilateral in 25% of cases.

2. Bacterial

This almost always occurs in the context of a sick patient. Medical risk factors for bacterial endogenous endophthalmitis include diabetes mellitus, heart disease (e.g. valvular vegetations), gastrointestinal disorders, malignancies, renal failure, liver disease, in-dwelling catheters, intravenous drug abuse)

2.1 Organisms

- Any bacterium could potentially give rise to this condition
- Gram positive organisms are most frequent, including streptococci (Group B streptococci and *Streptococcus pneumoniae* especially), *Staphylococcus aureus* and less commonly *Clostridium* species and *Bacillus cereus*
- Gram negative organisms include *Escherichia coli* (most common), *Klebsiella pneumoniae*, *Neisseria menigitidis, Serratia marcescens. Pseudomonas aeruginosa* is rarely seen in the western world except in neonates
- Visual outcomes following endogenous endophthalmitis have been poor particularly when the causative organism is identified as one of the *Klebsiella* species

3. Sites of infection

- Any extraocular site could harbour the infection

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- Most common sources of infection are: endocarditis, kidneys and urinary tract, GI abscess, liver abscess, cellulitis, meningitis, indwelling catheters and fistulae, pneumonia.

3.1 Investigation of causative organism and site of infection

- This must be in conjunction with physicians
- Cultures: blood (three, from separate sites at separate times – at least one before antibiotics if possible) and urine mandatory
- +/- anterior chamber & vitreous tap (see Ophthalmic Operational Guidelines (Endophthalmitis) - Intraocular Fluid Sampling (BMEC/Ophth/038) (SWBH)
    - +/- lumbar puncture for cerebrospinal fluid
    - any other specimen relating to the underlying cause

Other investigations to consider:

- echocardiogram, endoscopy, chest X-ray, and other radiological investigations where indicated, e.g. renal ultrasound, orbital MRI

4. Treatment

This must always be in conjunction with the physicians. Systemic antibiotics should be used.

4.1 Systemic antibiotics:

These are mandatory and should be continued for up to 3 weeks

Before definite culture results are available, the initial antimicrobial therapy must be broad spectrum:

- **Vancomycin** given by intravenous infusion (for Gram positive organisms; loading dose based on actual body weight, maintenance doses based on renal function; see vancomycin guide on intranet for details), plus
- **ceftazidime** 2 g intravenously twice a day (for Gram negative organisms). In true cephalosporin allergy or in patients who have had an anaphylactic reaction to penicillin, use oral ciprofloxacin 750 mg twice daily.

Once cultures and sensitivities are known, treatment should be modified on discussion with the microbiologists

4.2 Intra-vitreal therapy:

- Antibiotics are always used in the management of endogenous endophthalmitis
- Recommended antibiotics are:
- **vancomycin** 1000 micrograms in 0.1 ml* (available in ready diluted form) *plus*
- **ceftazidime** 2 mg in 0.1ml* (not available in ready-diluted form) or in true cephalosporin allergy or in patients who have had an anaphylactic reaction to penicillin **amikacin** 400 micrograms in 0.1 ml* (available in ready-diluted form)

To prepare ceftazidime intravitreal injection 2mg in 0.1ml

- Reconstitute a vial of ceftazidime 500mg with 4ml Water for

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injections
- Shake vial thoroughly to dissolve
- Withdraw the entire contents and make up to 5ml with Water for Injections = 100mg/ml
- Shake syringe thoroughly to mix
- Inject 1ml back into the vial and add 4ml of sodium chloride 0.9% injection = 20mg/ml
- Shake vial thoroughly to mix
- Withdraw approximately 0.2ml (excess to facilitate priming) into a 1ml syringe.
- When ready to inject fit a 27 - 30 gauge needle of length 12-15mm and discard all but 0.1ml of the solution
- Administer 2mg in 0.1ml.
- Intravitreal corticosteroid may be given at the discretion of the surgeon, dexamethasone 400 micrograms in 0.1 ml* or triamcinolone acetonide 4 mg in 0.1 ml*

* = unlicensed use

4.3 Topical antibiotics:
There is no evidence to support the use of intensive topical antibiotics.

4.4 Vitrectomy
The patient should be referred to a vitreoretinal team at an early stage for their opinion.

4.5 Evisceration
Following treatment, if an eye has no visual potential and undergoes phthisis, referral for evisceration should be considered to minimise risks of widespread infection.

4.6 Oral steroids:
This should only be considered once the infection (both systemic and ocular) is deemed to be under control and after liaison with the physicians. Use prednisolone 500 micrograms to 1 mg/kg/day in conjunction with an H_2-antagonist (ranitidine), or proton-pump inhibitor (lansoprazole).

Further management depends upon the clinical response. If there is no clinical response further advice should be sought from the microbiology department.

4.7 Fungal
The causative agent is most frequently *Candida albicans*. Patients fall into 2 main groups:
- Intravenous drug users who inject the organism direct into the blood stream as a result of contaminated lemon juice
- A medically sick patient, often on ITU, who develops the candidaemia from an indwelling catheter or line.

Infections from other fungal species may occur occasionally. The underlying cause is usually intravenous drug abuse, immunosuppression, endocarditis or pneumonia.

4.7.1 Intravenous drug users
- Anterior chamber, vitreous tap and blood cultures can be taken for culture and

sensitivities.

- A pars plana vitrectomy should be considered where there is a heavy vitritis.

If a patient is suspected/proven to have candida endophthalmitis, and is otherwise clinically and systemically well, two sets of blood cultures should be taken prior to starting therapy with oral fluconazole, 400 mg daily for a minimum of four weeks, then proceed according to the clinical response.

An urgent outpatient transthoracic echocardiogram should be requested with the cardiology department. If the blood cultures are subsequently positive, the microbiologist will inform the ophthalmology team - it is the ophthalmologist's responsibility to contact and arrange referral to the cardiology department if endocarditis is suspected.

If additional or alternative therapy is indicated, contact the microbiology department.

4.7.2 Medically sick patients-

Take anterior chamber, vitreous tap and blood cultures for culture & sensitivities

A pars plana vitrectomy should be considered where there is a heavy vitritis.

Systemic antifungals are necessary: initiate treatment with oral voriconazole** 400 mg twice a day on the first day then 200 mg twice a day. In patients in whom oral absorption is reduced, administer voriconazole** by intravenous infusion at a maximum rate of 3 mg/kg per hour at a dose of 6 mg/kg every 12 hours (for the first 24 hours) then 4 mg/kg twice daily. If voriconazole is not tolerated use intravenous liposomal amphotericin** in liaison with physicians and microbiologists.

If the organism is identified as *Candida albicans* or other Candida species susceptible to fluconazole, alter therapy to oral fluconazole 400 mg daily.

Anti-fungal therapy should be continued until resolution of signs, a minimum of four weeks for intravenous drug users but up to six months for other cases.

**Restricted, requires microbiology approval.