

# Endophthalmitis Prevention, Diagnostic Procedures and Treatment

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## Abstract

Endophthalmitis is a severe inflammation of the inner eye's structures, caused by an exogenous or endogenous infection with microorganisms which can multiply rapidly. It occurs most frequently after intraocular surgery. Moreover, it can also be a consequence of a penetrant eye injury or a hematogenous dissemination of microorganisms. The most common pathogens of this inflammation are bacteria, next to fungi and less frequently parasites. The occurrence, severity and clinical presentation of endophthalmitis depend on the way of infection, the number and virulence of pathogenic bacteria, as well as the patient's immunity state. The type of endophthalmitis can suggest the possible causative agent. Furthermore, it can help determine therapeutic approach or antibiotics to choose. The more virulent are the causative agents, the early the symptoms and signs of endophthalmitis appear. Such types of endophthalmitis have a bad course and poor prognosis concerning visual function. In these cases the red fundus reflex is lost quite at the beginning of the disease. Patients treated with prompt vitrectomy and intravitreal injections of antibiotics have statistically better visual outcomes and less likelihood of severe visual loss.



barrier they enter the retina and the vitreous [1-3]. This form of endophthalmitis is the rarest form (5-10% of all endophthalmitis) [2], yet, it has the worst prognosis regarding visual function [3]. Only about 40% of patients having endogenous endophthalmitis maintain visual acuity better than counting fingers [1,6]. Majority of them have associated systemic disease(s) and are immunocompromised (e.g. receive systemic immunosuppressive therapy, or have cancer, AIDS) or use intravenous drugs [1-3]. The sources of infection can be anywhere

The second choice of antibiotics is [5,7-10]:

(a) Vancomycin 1 mg/0.1 ml;

(b) Amikacin 0.4 mg/0.1 ml (effective against Gram-negative bacteria).

It should be noted that Amikacin is retinotoxic, being the option of choice in cases of hypersensitivity to  $\beta$ -lactams and cefazidime.

If any endophthalmitis is suspected to have fungal origin, in addition to the above antibiotics, it is recommended to inject amphotericin B (5-10  $\mu$ g/0.1 ml) or voriconazole (100  $\mu$ g/0.1 ml) to the treatment regimen [5,7]. Drugs are generally injected slowly (over 1-2 min), each of them being given separately to avoid drug precipitation [5].

**Anti-inflammatory drugs:** The use of systemic and intravitreal corticosteroids is controversial for the treatment of endophthalmitis, since there is not sufficient evidence of their effectiveness [5,6]. Intravitreal injection of dexamethasone reduces the early inflammatory response of bacterial endophthalmitis, without affecting the final visual acuity [2,5,6,10]. Intravitreal administration of dexamethasone is at concentration of 0.4 mg/0.1 ml [2,5].

Intravitreal or systemic use of corticosteroid is contraindicated in case of fungal endophthalmitis [5,10]. Use of topical corticosteroids is part of the standard post-operative therapy, as it inhibits the inflammatory response and reduces secondary tissue damage [2,4].

**Systemic antibiotics:** A key to a successful treatment of endophthalmitis is the use of intravitreal antibiotics. Besides those, systemic antibiotics can be used as well [4,5]. Initially, broad-spectrum antibiotics are being given for endophthalmitis treatment, which can later be changed according to results obtained by the antibiogram. The antibiotic of first choice is usually the one which has been already administered intravitreally; the therapeutic intravitreal concentration of the antibiotic can be maintained for longer periods, due to a reduced concentration gradient across the hemato-ocular barrier [5].

Systemic antibiotic treatment usually lasts 10 days [10]. In the case of endogenous endophthalmitis, the source should be sought after and treated appropriately [2,3,7].

Endophthalmitis caused by fungi, in addition to intravitreal antifungal injections, also requires several weeks of long systemic treatment with fluconazole or voriconazole [7].

**Topical therapy:** Topical therapy is initiated right after the diagnosis is made. It can be prescribed according to the following rules:

(a) Use of an antibiotic that achieves therapeutic concentrations in the anterior segment should be initiated [5,6,10]; a broad spectrum antibiotic such as fluoroquinolones (moxifloxacin [6] or ciprofloxacin) or fortified antibiotics can be used [10];

attention should be paid to the incision wound construction. Risk is higher in cataract surgery with clear cornea incision when compared to scleral tunnel incision [5,10,19].

The incidence of endophthalmitis after cataract surgery is reduced by intracameral injection of broad-spectrum antibiotics at the end of the operation. For that purpose, the ESCRS study showed that prophylactic use of intracameral cefuroxime (1 mg/0.1 ml) reduces the incidence of endophthalmitis approximately 5 times. Good results have also been shown with using intracameral vancomycin (1 mg/0.1 ml) as well.

#### Postoperative measures

Postoperative topical antibiotic prescription in order to reduce the possibility of microbial inoculation through operative wound is recommended for at least one week.

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