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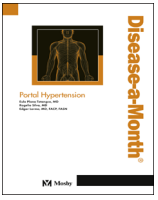

Endophthalmitis

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Endophthalmitis is a serious, potentially blinding condition, for which timely treatment can greatly impact the final outcome. Frequently, emergency or internal medicine physicians may be the first to see a patient with endophthalmitis as the patient may present with severe pain. With the increase in ophthalmic procedures both in the clinic as well as the operating room, it is imperative for all medical practitioners to become familiar with the presentation of this potentially devastating complication.

Endophthalmitis, whether endogenous or exogenous, is inflammation involving the entire eye, both anterior and posterior segments, typically resulting from an infection. Endogenous endophthalmitis is typically due to hematogenous spread whereas exogenous endophthalmitis is far more common and is secondary to inoculation following direct penetration, a surgical procedure or intraocular injection.[1]

Initial evaluation includes patient history focused on recent ocular trauma or ophthalmic intervention such as surgery or an injection. Symptoms vary based on the etiology but commonly include severe eye pain, redness, and decreased visual acuity. Mild irritation, redness, and foreign body sensation can be expected in most individuals for 24–72 h following an ocular procedure due to the anesthetics and sterilizing solutions used. Povidone–iodine (betadine) solution, while caustic to the corneal epithelium and tear film surface, is used for the prevention of endophthalmitis. None of the anesthetics or sterilization products used, however, should result in severe pain or decreased vision.

Prompt recognition, leading to timely diagnosis, is the single most important factor in preventing devastating visual complications in cases of endophthalmitis.[2] Visual deficits are the most common long-term manifestation and occasionally enucleation (removal of the eye) is ultimately required. If a diagnosis of endophthalmitis is being considered, referral to an ophthalmologist for further evaluation should be made within hours. The clinical outcome depends on both the virulence of the causative organism and the speed of diagnosis and subsequent treatment.

Treatment of bacterial endophthalmitis should be handled by an ophthalmologist and should not be attempted by other medical personnel. Intravitreal cultures are obtained by introduction of a needle into the vitreous cavity and aspiration of vitreous humor. After cultures are obtained, antimicrobial agents are delivered into the vitreous cavity in a similar fashion. In cases of severe vision loss, the patient is also taken to the operating room for immediate vitrectomy.

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Types of endophthalmitis

Endogenous endophthalmitis is rare, representing only 5–15% of endophthalmitis and most often occurs via hematogenous spread secondary to a compromised blood–ocular barrier.[2] Damage to ocular tissue can be mediated directly by the invading organism itself or by inflammatory byproducts. The right eye is affected more often in unilateral cases due to direct flow from the right brachiocephalic artery to the right carotid artery.[2]

Bacterial and fungal organisms mainly cause endogenous endophthalmitis while viral infections typically present differently. Endogenous bacterial endophthalmitis often begins as a focal chorioretinal lesion that breaks into and seeds the vitreous.[1] A wide range of bacteria are potentially culpable, and an underlying etiology should always be sought. Common infectious foci systemically include the heart (endocarditis), gastrointestinal system, and urinary tract.[1] In North America and Europe, cases of endogenous endophthalmitis are caused by *Streptococcal* species more commonly than *Staphylococcus aureus* or Gram-negative bacilli.[3]

Fungal infections cause up to 50% of all endogenous endophthalmitis, with *Candida albicans* (yeast) and *Aspergillus* (mold) being the most common agents.[4] Patients who present with *Candida* endophthalmitis frequently have a history of immunosuppression, long-term indwelling catheters, diabetes, or recent abdominal surgery. Patients with *Aspergillus* endophthalmitis are often immunosuppressed or intravenous drug users.[5]

As previously mentioned, the majority of endophthalmitis is exogenous and due to direct inoculation of the eye from outside organisms via trauma, surgery, or as an extension of a superficial ocular infection. Endophthalmitis following cataract extraction is the most studied presentation of exogenous endophthalmitis and follows 0.1–0.3% of cataract surgeries, with an increasing incidence recently (1992–2003).[2] Given that over 2 million cataract operations are performed in the United States, with an emphasis to be more minimally invasive, endophthalmitis should be considered in any post-operative patient. The Endophthalmitis Vitrectomy Study (EVS), a multicenter, National Institute of Health (NIH) sponsored prospective study of 420 patients with post-cataract surgery endophthalmitis found that bacterial endophthalmitis is most commonly caused by coagulase-negative staphylococci (~70%), a species which normally colonizes the eyelid.[6]

Acute endophthalmitis (presentation within 6 weeks of an inciting surgery or trauma) is the most common type in the United States and it is typically bacterial. Cataract surgery is most often performed through clear corneal incisions, which can result in a transient bacterial contamination of the aqueous humor by the patient's normal eyelid flora. Studies have shown that bacteria can be isolated from the anterior chamber in 7–43% of patients after cataract surgery.[5] Fortunately, based on quantitative studies, the bacterial load is small, and is most often able to be cleared by the local immune system and typical post-operative antibiotic drop regimen.[5]

Chronic (or delayed-onset) endophthalmitis is defined as occurring greater than 6 weeks after surgery and is most commonly caused by *Propionibacterium acnes*. A key clinical finding to aid in the diagnosis of this organism is the finding of a white plaque within the capsular bag near the implanted intraocular lens. This organism tends to cause a more indolent course of infection, occasionally requiring complete surgical removal of the entire capsular bag and intraocular lens.[1]

Other forms of ophthalmic surgery such as retinal or glaucoma surgery can also cause contamination of the eye leading to endophthalmitis. For example, bleb-associated endophthalmitis is the infection that follows a common glaucoma surgery called trabeculectomy, in which a defect is created in the sclera to allow drainage of intraocular fluid. Bleb-related endophthalmitis often presents with a purulent bleb along with inflammation of the anterior and posterior compartments of the eye. This is a distinct entity from blebitis (inflammation of the bleb only and not the entire eyeball), for which the treatment is drastically different, and only requires topical antibiotic therapy. This distinction can be subtle and requires a detailed slit lamp and dilated examination. The most common causative organisms, *Streptococcus* and *Haemophilus*, are more virulent than those frequently encountered after cataract surgery.[1]

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