Culture Negative (Sterile) Postoperative Endophthalmitis

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Given its high visual morbidity, postoperative endophthalmitis represents one of the most feared complications of intraocular surgery. This condition is most often encountered after cataract extraction, the most commonly performed operations. The incidence of postoperative endophthalmitis is approximately 0.1% after cataract surgery.

Patients with acute postoperative endophthalmitis presents with pain, photophobia, floaters, reduced vision, an inflamed anterior segment including a variable hypopyon, and vitritis. In the EVS, the median time to presentation to a study center was on postoperative day 6, and typical organisms included coagulase-negative staphylococci (46.9 %), other gram-positive organisms (15.5 %), and, much less commonly, gram-negative organisms (4.1 %). Culture-negative or culture-equivocal cases were also common in the EVS (17.9 % and 12.9 %, respectively) and may be due in part to the strict criteria for laboratory-confirmed growth in this multicenter study.

The culture-negative group had a significantly lower frequency of hypopyon on presentation (55 % vs. 85 %) and final outcome of no light perception (2 % vs. 18 %) (p < 0.01) than the culture-proven group.

We present a case of culture negative endophthalmitis managed surgically.

49 years old male patient, a known but well controlled diabetic and hypertensive, underwent an eventful phacoemulsification with foldable intraocular lens implantation under topical anesthesia in his right eye. The first postoperative review on the evening of the surgery showed a clear cornea, and a well centered IOL securely within the capsular bag. The postoperative regimen was discussed with him and he was advised review after 5 days.

On the 2nd post operative review, the patient complained of gross diminution of vision after a period of a good visual recovery lasting for 2 days. He was otherwise asymptomatic and did not have pain, lid edema, discharge or watering. Ocular examination revealed a vision of hand movements right eye and 6/6P in the left eye. Intra ocular pressure by noncontact applanation tonometry was 7 mm (OD) and 14 mm (OS). Slit lamp examination showed a clear cornea, and, moderately severe anterior chamber reaction with flare, cells and a 2 mm hypopyon. The IOL was not visible as it was covered with yellowish, dirty looking cocoon membrane (Fig.1).
sterile injection. It was also advised to continue systemic orally administered ciprofloxacin and tapering doses of oral steroids.

The patient tolerated the procedure well and had significant visual improvement to 6/9 (Fig. 5). Repeat smear and cultures were also sterile.

**Discussion**

On comparing factors associated with a positive culture isolate, presence of corneal infiltrates and hypopyon were significantly correlated to positive culture. Systemic diabetes, presence of surgical predisposing factors such as exposed knots, loose sutures, section gape or iris prolapse and secondary surgical procedures following cataract surgery, earlier onset of symptoms, poorer presenting vision, presence of corneal oedema, intraocular lens implantation and media haze at presentation were not significantly associated with culture positivity. Eyes with a positive culture were more likely to have an unfavourable visual outcome compared to culture-negative eyes (P=0.013).

Factors associated with an ‘unfavourable’ outcome included presenting visual acuity of light perception or worse, presence of corneal infiltrates, presence of fibrinous anterior chamber reaction, surgical section involvement, aphakia, hypopyon, media clarity at presentation grade IV or worse, vitreous tap smear positivity and systemic diabetes.

Cultures have demonstrated a couple of weaknesses against endophthalmitis. When you look at any study of endophthalmitis, you’ll get 25 to 30 percent rate of culture-negative endophthalmitis. These patients have endophthalmitis, but the cultures of their aqueous and vitreous are negative. There are several possible reasons for this. It may be that culture techniques aren’t sensitive enough or the sample that’s taken isn’t big enough to grow the bacteria. Hence in a fourth to a third of
endophthalmitis cases you don’t know what you’re treating. Another issue is that cultures aren’t immediate and there’s a period of time where you’re not sure what you’re treating. Culture negativity could also be due to an erroneous diagnosis as in post uveitic cataract, TASS, dropped lens fragments, Masquerade etc. Sample may be inadequate, the site of sampling may be inappropriate, there may have been an inordinate delay in transport and processing or the fault may lie with the poor sensitivity of tests.

Polymerase chain reaction offers several advantages over conventional cultures which are listed below

**Advantages of PCR over conventional microbiological tests**

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<thead>
<tr>
<th>Conventional tests</th>
<th>PCR tests</th>
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<td>Require larger clinical sample size</td>
<td>Does not require larger clinical sample size</td>
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<td>Require longer time for completion of the tests</td>
<td>Require less than 24 hours for completion of the tests to identify the required infectious agent</td>
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<td>Isolation and identification of an infectious agent needs more than 48 hours.</td>
<td>Prior antibiotic therapy does not interfere with the tests for detection of bacterial agents</td>
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<td>Viruses are liable and often their infectivity to tissue cultures is reduced in the clinical specimens during transport to the laboratory and storage of the same</td>
<td>Since DNA is stable its detection is not affected</td>
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**Fast Real-time PCR**

To overcome the disadvantages of cultures, Pablo Goldschmidt, and co-workers devised a new version of the PCR test that retains PCR’s high sensitivity but speeds up the already quick process. They recently published a study of their fast real-time PCR, or f-real-t PCR, in which they compared it to both culturing and direct exam by a microscope. In their study, the researchers equipped their PCR test with DNA of the usual suspects when it comes to endophthalmitis: *Staphylococci; Streptococci; Haemophilus; Pseudomonas; Enterobacteria; Acinetobacter; Propionibacteriaceae and Corynebacteria*. To put the PCR to the test, they then took 100-μl samples of vitreous fluid and 50 μl of aqueous humor from endophthalmitis cases, as well as vitreous fluid and aqueous from non-infective disorders after adding an internal control.

The f-real-t PCR was highly sensitive, detecting 0.01 colony forming units of bacteria per microliter with no confounding cross-reactivity with fungi. It correlated 100 percent with the culture-positive results. The samples from non-infective cases tested negative. It even caught organisms that culture missed; 60 percent of the endophthalmitis samples tested culture-positive, but 90 percent were positive on f-real-t PCR. What’s more, while it took several hours to a couple of days for the cultures to return identification, the f-real-t PCR was complete in 90 minutes.

Advances in investigational modalities may make identification of infective organism possible in all cases of infection.

**References:**


