

an important contributor to separation of the inner layers of the neural retina resulting in MF. Other investigators reported the possibility of treating MF without ILM peeling,⁵ because the ILM may not be solely responsible for MF. In addition, ILM detachment is not always observed in eyes with MF.

Because of the absence of histologic data, we did not confirm if the ILM simply detached from the ganglion cell layer in our patients. The presence of columns suggested that the ILM and ganglion cell layer separated, but it was not posterior vitreous detachment. Other findings also lead us to hypothesize that this was an ILM detachment. For instance, sub-ILM hemorrhage is sometimes seen and the ILM can be easily peeled using forceps during vitreous surgery.

In conclusion, tractional ILM detachment is a new and important finding from the standpoint of inducing macular diseases related to high myopia.

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Endophthalmitis After Open Globe Injury: Microbiologic Spectrum and Susceptibilities of Isolates

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PURPOSE: To present the microbiologic spectrum and susceptibilities of isolates in posttraumatic endophthalmitis, and to provide a review of the literature.

DESIGN: Retrospective consecutive case series.

METHODS: A review of 1182 consecutive open globe injuries was performed, identifying 10 patients with culture-proven endophthalmitis.

RESULTS: Thirteen organisms were isolated from 10 eyes with posttraumatic endophthalmitis. Isolated organisms included *Streptococcus* species (46.2%), coagulase-negative *Staphylococcus* (23.1%), and *Bacillus cereus* (15.4%). All organisms tested were susceptible to vancomycin and tobramycin. The most commonly isolated organisms from an aggregate posttraumatic endophthalmitis pool of 372 cases obtained by literature-based meta-analysis were coagulase-negative *Staphylococcus* (21.5%) and *Bacillus cereus* (18.5%).

CONCLUSION: We report a high prevalence of gram-positive pathogens and a notable prevalence of *Bacillus cereus* in posttraumatic endophthalmitis. Susceptibility results suggest that posttraumatic endophthalmitis isolates are generally susceptible to vancomycin and tobramycin. (*Am J Ophthalmol* 2006;142:852–854. © 2006 by Elsevier Inc. All rights reserved.)

POSTTRAUMATIC ENDOPHTHALMITIS IS A SEVERE COMPLICATION of open globe injury. Previous studies have demonstrated that the microbiologic spectrum of posttraumatic endophthalmitis is unique from other types of endophthalmitis, such as postsurgical or bleb-associated endophthalmitis.^{1–7} However, susceptibility data of pathogens in this setting are limited. In this study, we review the microbiologic and susceptibility data from 10 consecutive cases of culture-proven posttraumatic endophthalmitis seen at one institution.

After obtaining institutional review board approval, 1182 consecutive cases of open globe injuries presenting at Wills Eye Hospital Emergency Room between January 1991 and June 2002 were reviewed. From this data set, 10 patients with culture-proven endophthalmitis clinically consistent with posttraumatic endophthalmitis were identified. Organisms from these cases were isolated primarily from undiluted aqueous or vitreous samples (Table 1). The samples were cultured and analyzed using standard techniques, as previously reported.⁷ Susceptibility testing was performed using the Kirby-Bauer disk diffusion method.

A total of 13 microorganisms were isolated from 10 eyes in our study (Table 1). In eight eyes, a single microorganism was identified, and in two eyes (20%), polymicrobial infection was present. The most common microbe isolated was *Streptococcus* species, which represented six of 13 microorganisms (46.2%). Viridans-group *Streptococcus* accounted for five of these six cases. The next most common microbe isolated was *Staphylococcus* species (four of 13, or 30.1%), including three coagulase-negative *Staphylococcus*

TABLE 1. Susceptibility of Microorganisms Isolated from 10 Patients With Culture-Proven Endophthalmitis After Open Globe Injury

Isolate	Patient	Pathogen	Source	Cefazolin	Chloramphenicol	Ciprofloxacin	Gentamicin	Tobramycin	Vancomycin
1	A	<i>Staphylococcus epidermidis</i>	Vitreous aspirate	S	—	S	S	—	S
2	B	<i>Staphylococcus epidermidis</i>	Intraocular foreign body	S	—	S	S	—	S
3	C	<i>Staphylococcus haemolyticus</i>	Anterior chamber fluid	S	—	S	—	S	S
4	D	<i>Staphylococcus aureus</i>	Anterior chamber fluid	S	—	S	—	S	S
5	E	<i>Streptococcus sanguis II</i> (viridans group)	Vitreous aspirate	S	S	S	S	—	S
6	F	<i>Streptococcus sanguis II</i> (viridans group)	Anterior chamber fluid	S	—	S	S	—	S
7	G	<i>Streptococcus mutans</i> (viridans group)	Vitreous aspirate	S	S	S	S	—	S
8	G	<i>Streptococcus constellatus</i> (viridans group)	Vitreous aspirate	S	S	R	S	—	S
9	G	<i>Streptococcus salivarius</i> (viridans group)	Vitreous aspirate	S	S	R	S	—	S
10	H	<i>Streptococcus mitis</i> (viridans group)	Vitreous aspirate	S	S	R	R	S	S
11	I	<i>Bacillus cereus</i>	Pus extruding from corneal lac	R	—	S	—	S	S
12	J	<i>Bacillus cereus</i>	Vitreous aspirate	—	—	—	—	—	—
13	B	<i>Enterobacter amnigenus II</i>	Vitreous aspirate	S	—	S	S	S	—

S = sensitive; R = resistant.

(23.1%) isolates and one *Staphylococcus aureus* (7.7%). *Bacillus cereus* represented two of the 13 microorganisms (15.4%), and the single gram-negative organism in this series was *Enterobacter* species (7.7%).

Previous studies have identified coagulase-negative *Staphylococcus* and *Bacillus* species as the most common microbes in posttraumatic endophthalmitis. Kunimoto and associates compiled a large series of 139 posttraumatic endophthalmitis isolates, and these were combined with seven other case series (individual case reports were excluded) to yield a total data set of 372 isolates in posttraumatic endophthalmitis (Table 2). Infections were caused by gram-positive bacteria in 61.0% of cases, by gram-negative bacteria in 10.2% of cases, by fungi in 8.3% of cases, and polymicrobial infections in 15.6% of cases. The most common gram-positive microbes were coagulase-negative *Staphylococcus* (21.5%) and *Bacillus* species (18.5%), followed by *Streptococcus* species (14.8%) and *Staphylococcus aureus* (6.2%).

Susceptibility testing was performed on 12 of 13 isolates (Table 1). All of the tested microorganisms were found to be susceptible to the commonly used endophthalmitis antibiotics vancomycin and tobramycin. The single gram-negative organism isolated was also susceptible to gentamicin, suggesting that there may be class-equivalence for treating gram-negatives with aminoglycosides in this setting.

Limitations of this study includes the *in vitro* nature of susceptibility data, which does not necessarily translate to *in vivo* efficacy. There is also the potential of selection bias in our population of referred patients, who may represent more severe cases at higher risk of infection. Last, it should be mentioned that our methodology may not have captured all patients with posttraumatic endophthalmitis, because some patients (though none in this series) were primarily enucleated and some patients were lost to follow-up immediately post-repair.

Resistance was observed to ciprofloxacin by several isolates (each of which were *Streptococcus* species), and therefore monotherapy with ciprofloxacin cannot be recommended by this study. In fact, monotherapy with any antibiotic tested is unlikely to provide comprehensive coverage. Susceptibility results are not available for ceftazidime, amikacin, or fourth-generation fluoroquinolones. The authors' own empiric treatment of posttraumatic endophthalmitis includes intravitreal vancomycin for gram-positive coverage and ceftazidime or amikacin/tobramycin for gram-negative coverage. This combination would cover the isolates in the current series, based on *in vitro* susceptibility. Last, although no fungal infections were identified in this series, our review indicates that fungi are not uncommon pathogens, especially in tropical or subtropical climates.^{4,7}

TABLE 2. Organisms Isolated in Posttraumatic Endophthalmitis

Organism	Kunimoto et al. ⁷ (n = 139)	Parrish and O'Day* (n = 110)	Thompson J et al. ² (n = 22)	Alfaro et al. ³ (n = 21)	Thompson WS et al. ⁴ (n = 41)	Duch-Samper et al. ⁵ (n = 10)	Sabaci et al. ⁶ (n = 19)	Current Series (n = 10)	Total (n = 372)
<i>Staphylococcus aureus</i>	3 (2.2%)	9 (8.2%)	2 (9.1%)	2 (9.5%)	2 (4.9%)	0 (0%)	4 (21.1%)	1 (10.0%)	23 (6.2%)
Coagulase-negative <i>Staphylococcus</i> [†]	21 (15.1%)	26 (23.6%)	8 (36.4%)	1 (4.8%)	11 (26.8%)	3 (30.0%)	8 (42.1%)	2 (20.0%)	80 (21.5%)
<i>Streptococcus</i> species	28 (20.1%)	14 (12.7%)	1 (4.5%)	1 (4.8%)	5 (12.2%)	0 (0%)	2 (10.5%)	4 (40.0%)	55 (14.8%)
<i>Bacillus</i> species	17 (12.2%)	24 (21.8%)	8 (36.4%)	4 (19.0%)	10 (24.4%)	2 (20.0%)	2 (10.5%)	2 (20.0%)	69 (18.5%)
Gram-negative bacteria	19 (13.7%)	12 (10.9%)	0 (0%)	2 (9.5%)	3 (7.3%)	0 (0%)	2 (10.5%)	0 (0%)	38 (10.2%)
Mixed infections [‡]	23 (16.5%)	12 (10.9%)	3 (13.6%)	10 (47.6%)	5 (12.2%)	3 (30.0%)	1 (5.3%)	1 (10.0%)	58 (15.6%)
Fungi	20 (14.4%)	9 (8.2%)	0 (0%)	0 (0%)	2 (4.9%)	0 (0%)	0 (0%)	0 (0%)	31 (8.3%)
Other	8 (5.8%)	4 (3.6%)	0 (0%)	1 (4.8%)	3 (7.3%)	2 (20.0%)	0 (0%)	0 (0%)	18 (4.8%)

*The Parrish and O'Day series combined eight traumatic endophthalmitis studies (Brinton and associates, Schemmer and Driebe, Rowsey and associates, Puliafito and associates, Bohigian and Olk, Peyman and associates, Forster and associates, and Affeldt and associates).

[†]Coagulase-negative *Staphylococcus* includes *Staphylococcus epidermidis*.

[‡]Mixed infections are defined as cultures that grew out more than one genus of microorganism, as defined in previous studies in the literature. Therefore, in the current series, patient G had three isolates that were each of the genus *Streptococcus* and was categorized as a *Streptococcus* species infection rather than mixed infection.

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Photophobia Associated With a Demyelinating Lesion of the Retrochiasmal Visual Pathway

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PURPOSE: To present two patients in whom photophobia was a predominant presenting symptom of retrochiasmal demyelination.

DESIGN: Observational case report.

METHODS: Two women who experienced an acute onset of photophobia underwent neuroophthalmic examination and investigations at a single institution.

RESULTS: Examination revealed a homonymous visual field defect in both patients. Magnetic resonance imaging (MRI) demonstrated a hyperintense lesion in the area of the right posterior thalamus in one patient and enhancing lesions in the deep white matter of the temporal lobes bilaterally with contrast enhancement of the right optic tract in the second patient. Additional investigations, including lesion biopsy in the first patient, revealed demyelination as the most likely etiology. Improvement of photophobia, visual field defect, and radiographic abnormalities was documented over the next three to

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