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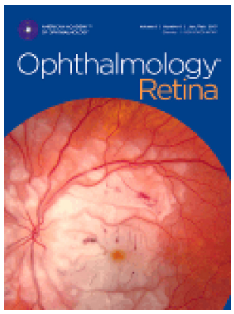

International Practice Patterns for the Management of Acute Postsurgical and Postintravitreal Injection Endophthalmitis – European Vitreo-Retinal Society Endophthalmitis Study Report 1

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Running head: Practice Patterns in Postsurgical Endophthalmitis

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Abstract

Objective:
To study the practice patterns for the management of acute postoperative and postinjection endophthalmitis

Design:
Retrospective, interventional, non-randomized, multicenter study

Participants:
Data on 237 eyes diagnosed with acute endophthalmitis occurring after intraocular surgery/ procedures provided by 57 retina specialists from 28 countries.

Main Outcomes and Measures:
Rates of pars plana vitrectomy, repeat intravitreal injection and adjunctive therapeutic regimens (local and systemic antibiotics and steroids).

Results
Of 237 analyzed eyes, acute endophthalmitis secondary to cataract surgery/secondary lens implant represented 64.6 % (153 eyes) of cases, while the remaining were secondary to intravitreal injections (35 eyes, 14.8%), pars plana vitrectomy (PPV) (29 eyes, 12.2%) and other intraocular surgeries (20 eyes, 8.4%). All eyes received intravitreal antibiotics on the same day of diagnosis. Overall, early PPV was employed within the first week of presentation in 176 eyes (74.3%). There was no statistical difference in the proportion of eyes requiring a second intravitreal injection of antibiotics whether the eye was managed primarily with intravitreal antibiotics alone vs. early PPV + intravitreal antibiotics (29.5% 18 eyes vs. 25.0%, 44 eyes, respectively). Adjunctive therapies in the form of intravitreal steroids, systemic steroids and systemic antibiotics were used in 25.3%, 21.9% and 66.6% of eyes, respectively. The absence of disc or macular view and endophthalmitis following cataract surgery were associated with an increased likelihood for early PPV (OR = 4.1; 5.1, respectively).

Conclusion and Relevance:
Pars plana vitrectomy was frequently performed regardless of the presenting vision in eyes developing endophthalmitis post cataract surgery and post intravitreal injections. Increased vitreous opacification was associated with a higher probability for performing PPV.

Introduction

Endophthalmitis is a sight-threatening intraocular inflammation that may lead to severe visual loss or blindness. Infection commonly occurs secondary to ocular surgery or intraocular injections, penetrating trauma, and less commonly due to spread of infection from remote septic focus. In the early 1990s, the endophthalmitis vitrectomy study (EVS) group provided level I evidence regarding the management of patients presenting with acute endophthalmitis following cataract and secondary intraocular lens (IOL) implant surgery.[1] The study showed that immediate pars plana vitrectomy (PPV) was associated with improved visual outcome for patients with light perception vision at presentation, with no added benefit over intravitreal antibiotics alone, if vision was hand motion or better. Limitations of the EVS study include the use of non-contemporary vitrectomy equipment and the conservative nature of PPV where induction of posterior vitreous detachment (PVD) and complete vitreous removal were not attempted, which may have minimized the benefit of vitrectomy surgery. Further, the EVS study did not address the benefit of intravitreal corticosteroids for endophthalmitis, thus their role is still debatable.[2, 3] Finally, little is known about the optimal approach for management of other forms of endophthalmitis occurring after intraocular injections or ocular surgery other than cataract or secondary IOL implant surgeries. Such cases that were not enrolled in the EVS, are caused by more virulent organisms and thus may benefit more from early PPV.[4, 5] Nowadays, due to the shortcomings of the EVS and more recent innovations in intraocular surgery techniques such as wide-angle viewing and transconjunctival 23-27-g vitrectomy systems, introduction of new antibiotics, ophthalmologists may use different treatment strategies and the trend of managing endophthalmitis may have shifted toward more frequent use of PPV.[6-9] With this in mind, we conducted this multicenter study to describe the current treatment patterns of exogenous endophthalmitis with emphasis on analyzing the rates of PPV, intravitreal steroids and repeat intravitreal injection of antibiotics. We also aimed to analyze the driving factors behind the use of PPV vs. intravitreal injection of antibiotics alone for the primary treatment of acute postoperative endophthalmitis.

Methods:

The European Vitreo-Retinal Society (EVRS) endophthalmitis study was a retrospective, multicenter study of the practice patterns of management of endophthalmitis among retina specialists worldwide. In 2016, The EVRS made a request for all the members of the EVRS to report the outcome of cases of acute (within 6 weeks) postsurgical endophthalmitis that they encountered from April 2016 through April 2017. A portal was created on the EVRS website that contained the reporting questionnaires to be filled out for each study patient treated. By the cutoff date of July 2017, the study organizers received data on 253 cases, by 57 contributors, from 28 countries. Data collected included patients' age, gender, type of primary procedure, crystalline lens status, intraoperative complications and antibiotic prophylaxis for cataract surgery, visual acuity at presentation and at the final follow up, degree of anterior and posterior segment inflammation and the treatment employed for each designated case.

Patients enrolled in this retrospective study were consented for the procedure to treat endophthalmitis following discussion of the benefits, and the potential risks. Because the study

was conducted in different countries, each participant center was responsible for following the guidelines of their respective ethical and health research review board. The study design and ethical content were approved by the EVRS research committee and adhered to the tenets of the Declaration of Helsinki.

We used descriptive statistics to analyze baseline demographics data and chi-square for the differences in proportions. We fitted a multivariate logistic regression model to evaluate the association between a dichotomous outcome of pars plana vitrectomy use vs. intravitreal injection of antibiotics only and multiple different variables including: patients' age, gender, preoperative visual acuity (VA) level, the degree of corneal clarity, the presence of pain and the state of disc and macular view, in addition to the cause of post surgery endophthalmitis. For all tests, we considered a *p* value of less than 0.05 to be statistically significant. We performed all statistical analyses using the SPSS-PC Version 10 statistical package (SPSS; Cary, NC).

Results

Baseline characteristics

Overall, a total of 57 retina specialists from 28 countries on 4 continents (Europe, Africa, Asia and South America) participated in the study. A total of 237 cases of endophthalmitis were included in the study after exclusion of 16 cases with insufficient data. Endophthalmitis secondary to cataract or secondary IOL surgery accounted for 153 eyes (64.6 %). The remaining cases were secondary to intravitreal injections (35 eyes, 14.8%), PPV (29 eyes, 12.2%) and other intraocular surgery (20, 8.4%) including glaucoma and corneal procedures. The mean age (SD) of our study patients was 67.7 years (±16.4), and 52.5% were males. Ninety-seven (40.9%) patients presented with light perception (LP) vision at the initial presentation whereas 136 eyes (57.4%) had vision better than LP at the initial visit. The baseline characteristics of the study patients are summarized in Table 1. Regarding cases of post cataract surgery endophthalmitis, 57 eyes (37.2 %) were given intracameral antibiotics prophylaxis at the time of the initial cataract surgery. Intraoperative complications during cataract surgery including posterior capsular rupture, vitreous loss, retained nuclear or IOL in the vitreous cavity were documented in 27 eyes (17.6%). In the post intravitreal injection group, 14.2% (5 eyes) of endophthalmitis occurred after a single injection, 8.6% (3 eyes) had between 2-3 injections and 62.9% (22 eyes) had more than 3 intravitreal injections prior to the development of endophthalmitis.

Primary Treatment of endophthalmitis

All eyes received intravitreal antibiotics on the same day of presentation with data on the choice of antibiotics being available in 210 eyes. Of these, 206 (98.0%) were treated with vancomycin, 186 (88.6%) were treated with ceftazidime and 9 (4.3%) were treated with amikacin. One hundred and ninety-one eyes (90.9%), received a combination of 2 drugs, the most common being vancomycin and ceftazidime (183 eyes; 95.8%).

For analysis, we divided the study eyes based on whether early PPV surgery (defined as PPV within 1 week of presentation) was performed into: PPV group and intravitreal injection of antibiotic group. The PPV group comprised eyes that received intravitreal antibiotics on the day

of presentation + early PPV within 1 week of presentation; the intravitreal injection of antibiotic group comprised eyes that received intravitreal antibiotics without early PPV, Table 2. We found that overall early PPV was employed in 176 eyes (74.3%) in our study. Regarding the rate of PPV use per the cause of endophthalmitis, early PPV was more frequently used than intravitreal injection of antibiotic in cases of cataract/ secondary IOL implant surgery (126 eyes, 82.4% vs. 27 eyes, 17.6%) and for post intravitreal injection endophthalmitis (26 eyes, 74.3% vs. 9 eyes, 25.7%). For post PPV endophthalmitis, the use of PPV was less frequent than intravitreal injections alone (13 eyes, 44.8% vs. 16 eyes, 55.2%). Regarding the timing of early PPV, surgery was performed on the same day of initial presentation in 76.7% (135 eyes), vs. within 1 day and after 2-7 days from presentation in 10.8% (19 eyes) and 11.4% (20 eyes) of eyes, respectively. Among eyes treated with PPV, same day PPV was performed in 81.6% (62 eyes) of cases with LP vision and in 74.5% (73 eyes) of cases with vision better than LP.

Our analysis of the use of PPV across the different level of presenting VA showed that early PPV was more commonly used than intravitreal antibiotics injection in eyes with vision of LP (76 eyes, 78.3% vs. 21 eyes, 21.7%), counting fingers (CF) (76 eyes, 76.0% vs. 24 eyes, 24.0%), , 0.5-0.2 logMAR (Snellen equivalent [SE], 20/30-20/60; 11 eyes, 57.9% vs. 8 eyes, 42.1%), and ≤0.1 logMAR (SE, ≥20/25;10 eyes, 66.6% vs. 5 eyes, 33.3%). For eyes with vision > CF-0.6 logMAR (SE, CF-20/80; 1 eye in each group) and those with no light perception (NLP; 2 eyes in each group), early PPV and intravitreal injection of antibiotic rates were similar.

The majority of early PPV (119 eyes, 67.6%) for treatment of endophthalmitis was performed using 23-g vitrectomy systems, while the remaining were performed using 25-g (37 eyes, 21.0%) and 20-g (20 eyes, 11.4%). During PPV, PVD was present in 56 eyes (31.8%), and induction of PVD and shaving of vitreous base was undertaken in 82 eyes (46.6%) and 77 eyes (43.7%), respectively. Antibiotics were added to the infusion fluid in 52 eyes (29.5%) eyes. At the conclusion of surgery, intraocular tamponade in the form of air or gas was used in 18 eyes (10.2%) and silicone oil in 49 eyes (27.8%). Overall, microbial cultures from the vitreous were obtained in 86.9% of cases treated with intravitreal antibiotics and all eyes that underwent vitrectomy. Culture yielded positive results in 54.0% of eyes in the PPV treatment group and in 45.3% of eyes in the intravitreal group. Gram positive bacteria represented the majority in both group, 68% and 75%, respectively.

Systemic antibiotics were used in 158 eyes (66.6%) with the most common medications used being fluoroquinolones (55.5%), followed by cephalosporins (34.8%) and vancomycin (24.7%). Systemic corticosteroids were used in 50 eyes (21.1%). Intravitreal steroids were used in 25.3% that included dexamethasone in 76.6% and triamcinolone acetonide in 23.3%.

We found the fitted regression model for the prediction of early PPV vs intravitreal antibiotics alone for treatment of endophthalmitis to be statistically significant ($p < 0.0001$). The model explained 36.4% (Nagelkerke *R2*) of the variance in primary treatment use, and correctly classified 80.4% of cases. Of the tested variables, we only found two variables to be statistically significant: the cause of post surgery endophthalmitis and the inability to visualize the disc or the macula during clinical examination at presentation (Table 3) Specifically, the likelihood for receiving early vitrectomy surgery was higher (odds ratio = 5.1; 95% CI: 1.624-16.015) if infection developed as a complication of cataract surgery as compared to infection post PPV surgery. The absence of disc or macular view at initial presentation was associated with an increased likelihood of requiring PPV (odds ratio = 4.1; 95% CI: 1.289-13.051).

Repeat injection and Late pars plana vitrectomy

Regarding the rate of intravitreal antibiotic reinjection, we found that a second and third intravitreal injection of antibiotics were, respectively, used in 18 (29.5%) and 11 (18.0%) eyes in the cohort managed primarily with intravitreal antibiotics. In the early PPV treatment group, repeat injections were performed in 44 (25.0%) and 18 (10.2%) eyes, respectively. Overall there were no differences in the proportions of eyes requiring repeat intravitreal injections between the 2 treatment groups (p = 0.1168). Late PPV surgery (defined as PPV more than 1 week from presentation) was performed in a comparable proportion of eyes in the intravitreal antibiotic group (3 eyes, 6.8%) and the early PPV group (12 eyes, 4.9%) (p = 0.765%).

Discussion

This multicenter study looked at the current practice patterns for treating postoperative and post injection endophthalmitis. Overall, we found that PPV use in the first week of surgery was employed more frequently than intravitreal injection of antibiotics alone as the primary treatment regimen (74.3% vs. 25.7%). Specifically, the proportions of early PPV were higher than intravitreal antibiotics alone for treatment of post cataract surgery (82.4% vs. 17.6%) and post intravitreal injections (74.3% vs. 25.7%) but not for cases with post PPV endophthalmitis (44.8% vs. 55.2%). We found the use of PPV not to be limited to eyes with baseline vision of LP; a crucially important philosophical difference relative to the EVS recommendation in our study is that the visibility of the posterior pole by clinical examination was the primary decisive factor in choosing the therapy, not the level of vision at presentation.

We found the odds of performing early PPV for treatment of post-surgery endophthalmitis to be 5-fold higher in post cataract surgery eyes compared to cases were endophthalmitis occurred as a complication of PPV surgery. This may be possibly explained by the absence of loculated vitreous collections (vitreous abscess) in eyes that had prior vitrectomy surgery, providing a rationale for using intravitreal injection of antibiotics alone as the first line of treatment, and agrees with treatment patterns used in previously published series of post PPV endophthalmitis.[10, 11]

Regarding the effect of presenting level of vision on the surgeon choice for primary treatment of endophthalmitis, we did not find this to be a main predicting factor for opting to early PPV in our regression analysis model. Further, in our study, a large proportion of eyes with vision better than LP were managed by PPV; 59.1 % of all eyes and 75.9% in the post cataract surgery group. Our study agrees with data from the Endophthalmitis Population Study of Western Australia (EPSWA) study that showed a high rate of PPV use (73%) at the same visual acuity level[12] and also with the findings of US and French population-based series, where approximately 40% of eyes with vision better than LP underwent PPV in both studies.[6, 13] The EVS recommended intravitreal injection of antibiotics as the main line of treatment of post cataract surgery endophthalmitis with PPV being reserved only for eyes with LP vision. However, the increased uptake for PPV in the treatment of endophthalmitis regardless of the presenting vision noted in this study and others[6,12,13] may have stemmed from several factors including that PPV may help to reduce infection load, clear vitreous opacification and facilitate obtaining a larger specimen for microbiology examination.[13] Moreover, evolution of PPV with smaller gauges may have increased the safety of vitrectomy surgery, reducing the risk of post PPV retinal detachment.[14, 15]

The EVS excluded patients with NLP, thus management of these patients remain under-investigated. In the present study, the rate of early PPV was not different from intravitreal injections of antibiotics alone for eyes with NLP vision. Perhaps the poor visual prognosis in this cohort may have influenced the decision of not favoring PPV; however, the number of eyes in this group is too small to draw a firm conclusion.

In a prior survey, factors other than presenting vision such as poor red reflex and vitreous opacification were considered by many retina specialists as an indication to select PPV rather than following the EVS recommendation.[16] Our study of real-world management of post surgical endophthalmitis confirmed this approach: we found the odds of performing PPV to be 4-fold higher in eyes where the disc and macula were not visualized. The degree of corneal opacification and anterior chamber reaction were not found to be predictive of the use of PPV in our model. As such, we postulate that the poor view of the posterior pole mainly reflects dense vitreous haze.

Because variation in the healthcare systems set up and expenditure between countries might influence surgeons' choices for treatment, and the cost of PPV surgery is considerably higher than an outpatient intravitreal injection, we expected to observe some global differences in the use of PPV vs. intravitreal antibiotics injection alone for primary treatment of endophthalmitis. However, this was not the case in our series, and surgeon's global region of practice had no effect on the uptake of PPV (Table 3). Several factors may have contributed to this finding, including the higher rate of reuse of disposable supplies in underdeveloped countries[17] that may have helped offset some of the cost of PPV surgery.

Subsequent management of acute bacterial endophthalmitis depends on the clinical course after the initial treatment: a second intravitreal injection of antibiotics may be required after 36-48 hours if there was no improvement. In our series, reinjection of intravitreal antibiotics was observed in nearly one-third (32.8%) of the cases. This is substantially different from EVS antibiotic re-injection rate of approximately 7%.[18] However a recent self-reporting survey of predominantly North American retina specialists found a high rate of reinjection of intravitreal antibiotics (31%), in keeping with our findings.[19] Furthermore, some studies, conducted after the EVS, proposed benefits for repeating intravitreal vancomycin injection, since its antibacterial activity is mainly dependent on the length of time its concentration is maintained above the minimum inhibitory concentration (MIC) and not the drug concentration in the tissues (i.e. time-dependent rather than concentration-dependent pharmacodynamics).[20, 21] This may have also contributed to the current observed trend for repeat injection.

Inflammation during infection is necessary for the clearance of organisms but can result in increased ocular damage.[22] Adjunctive use of systemic and intravitreal steroids in endophthalmitis management remains controversial. In our study, systemic steroids were used in about one-fifth of the cases (21.1%) and, one quarter (25.3%) of cases received intravitreal steroids. Oral steroids were used in the EVS, but the benefit was not evaluated. A recent survey of retina specialists mainly practicing in the US reported a similar rate (22%) of intravitreal steroids use for presumed bacterial endophthalmitis treatment.[19] Existing evidence on the role of intravitreal steroids in the treatment of bacterial endophthalmitis is insufficient to draw firm conclusions.[23] Studies have shown mixed benefit on the final visual outcome, with some showing higher probability for vision improvement with the addition of intravitreal steroids,[24] and others showing no difference[25] or worse outcomes.[26]

Although EVS did not show any benefit of intravenous ceftazidime and amikacin, the study did not investigate other systemic antimicrobial agents.[1] Systemic quinolones were found to achieve intraocular concentration above the MIC of a number of microbes associated with endophthalmitis in later studies.[21,22] In our study, systemic antibiotics were used in about two-thirds of cases of endophthalmitis (66.6%) with fluoroquinolones being the most commonly used systemic antibiotics group (55.5%).

The results of our study need to be interpreted with caution. The uncontrolled retrospective design makes it subject to several types of bias including selection bias. As with other database studies, our study has missing data and this may affect the quality of the results. Further, we did not analyze patients'outcomes such as visual acuity and retinal detachment rates in this report; outcomes measures are more important than describing proportion of treatments performed, when assessing the benefits of early vitrectomy for treatment of acute endophthalmitis. Finally, because this study did not include centers from North America, our results may not be directly applicable to US practice and further studies from the US are warranted. Despite these limitations, our study is a useful examination of contemporary practice patterns for treatment of postsurgical endophthalmitis from a large number of retina centers, well distributed globally, and as such, representative of the current clinical practice.

In summary, our study highlighted that early pars plana vitrectomy is usually employed in the treatment of acute endophthalmitis following cataract surgery or post intravitreal injection, irrespective of whether the presenting vision is LP or better. Our data extend the current evidence that there is a rise in the rate of repeat intravitreal injection of antibiotics between physicians. Systemic quinolones appear to be a common adjunctive therapy in endophthalmitis management. Taken together, these findings demonstrate that retina specialists do not adhere to the guidelines of EVS and underscore the need for contemporary studies to guide the management of endophthalmitis.

Tables title

Table 1. Pretreatment characteristics for post surgical and post intravitreal injection endophthalmitis

Table 2. Primary treatment patterns for post surgical and post intravitreal injection endophthalmitis

Table 3: Logistic regression predicting the likelihood of pars plana vitrectomy vs. intravitreal injection for treatment of post surgical and post intravitreal injection endophthalmitis

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Table 1.

Variable (n)	Ocular procedures preceding the development of endophthalmitis (n =237)			
	Cataract surgery (153)	**IVT (35)**	**PPV (29)**	**Miscellaneous (20)**
Age (SD)	69 (12)	76.7 (11.7)	59.9 (15.5)	46.9 (33.4)
Sex				
– **Male, n (%)**	73 (47.7%)	17 (48.6%)	21 (72.4%)	12 (60%)
– **Female, n (%)**	80 (53.3%)	18 (51.4%)	8 (28.6%)	8 (40%)
Visual acuity				
– **NLP**	0 (0.0%)	1 (2.9%)	1 (3.4%)	2 (10%)
– **LP**	61 (24.1%)	16 (45.7%)	11 (37.9%)	9 (45%)
– **CF**	66 (26.1%)	11 (31.4%)	16 (55.2%)	7 (35%)
– **CF-0.6 logMAR**	2 (0.8%)	0 (0.0%)	0 (0.0%)	0 (0.0)
– **0.5-0.2 logMAR**	17 (6.7%)	1 (2.9%)	0 (0.0%)	1 (5%)
– **≤0.1 logMAR**	7 (2.8%)	6 (17.1%)	1 (3.4%)	1 (5%)
Pain				
– **No**	24 (9.5%)	11 (31.4%)	4 (13.8%)	3 (15%)
– **Present**	129 (51.0%)	24 (68.6%)	24 (82.8%)	17 (85%)
Corneal clarity				
– **Clear**	26 (10.3%)	10 (28.6%)	8 (27.6%)	5 (25%)
– **Cloudy**	127 (50.2%)	25 (71.4%)	21 (72.4%)	15 (75%)
Hypopyon				
– **<1 mm**	62 (24.5%)	21 (60.0%)	10 (0.0%)	10 (50%)
– **1 – 4 mm**	87 (34.4%)	13 (37.1%)	17 (100%)	6 (30%)
– **≥4 mm**	4 (1.6%)	1 (2.9%)	2 (0.0%)	4 (20%)
Lens status				
– **Aphakic**	2 (0.8%)	0 (0.0%)	1 (3.4%)	2 (10%)
– **Phakic**	23 (9.1%)	15 (42.9%)	12 (41.4%)	10 (50%)
– **Pseudophakic**	128 (50.6%)	20 (57.1%)	16 (55.2%)	8 (40%)
Red reflex				
– **Present**	58 (22.9%)	24 (68.6%)	7 (24.1%)	10 (50%)
– **Absent**	100 (39.5%)	11 (31.4%)	22 (75.9%)	10 (50%)
Disc and macula view				
– **Visible**	32 (12.6%)	9 (25.7%)	3 (10.3%)	3 (15%)
– **Not visible**	121 (47.8%)	26 (74.3%)	26 (89.7%)	17 (85%)
Vitreous cultures				
– **Culture positive**	86 (56.9%)	10 (28.6%)	11 (42.3%)	11 (73.3%)
– **Culture negative**	65 (43.1%)	25 (71.4%)	15 (57.7%)	4 (26.7%)
– **Missing data (n)**	2	0	3	5

CF = counting fingers; HM = hand motion; LP = light perception, NLP = no light perception; SD standard deviation; IVT =

intravitreal injection; PPV = pars plana vitrectomy

Table 2. Primary treatment patterns for postsurgical and postinjection endophthalmitis

Ocular procedure (n)	**Cataract surgery (153)**	**IVT (35)**	**PPV (29)**	**Miscellaneous (20)**	**Overall (237)**
IVT or early PPV Treatment:					
– **IVT antibiotics** – **PPV + IVT antibiotic**	27 126	9 26	16 13	9 11	61 176
IVT antibiotics medication – **Vancomycin** – **Ceftazidime** – **Amikacin** – **Missing data**	 128 119 7 21	 34 25 1 1	 27 25 1 2	 17 17 0 3	 206 186 9 27
Other Treatment:					
Systemic antibiotics - **Quinolones** - **Cephalosporins** - **Vancomycin** - **Others**	 53 34 21 23	 11 10 13 10	 16 6 1 1	 3 5 4 1	 83 55 39 35
Periocular antibiotics	72	24	16	9	121
Systemic corticosteroids	28	10	9	3	50
Intravitreal corticosteroids – **Triamcinolone acetate** – **Dexamethasone**	 8 34	 0 4	 4 6	 2 2	 14 46
IVT = intravitreal injection; PPV = pars plana vitrectomy					

Table 3:

Variable	Exponential β	95% Confidence Interval		P value
Age	1.000	0.973	1.027	0.985
Gender (reference = female)	0.632	0.289	1.383	0.251
Surgery/ procedure prior to endophthalmitis (reference = PPV)				
- **Cataract surgery**	5.100	1.624	16.015	**0.005**
- **Intravitreal injection**	2.233	0.588	8.478	0.238
- **Miscellaneous surgery**	1.536	0.289	8.155	0.614
Baseline VA (reference = LP)				
- **NLP**	0.529	0.020	13.887	0.702
- **CF**	0.768	0.318	1.855	0.558
- **CF-0.6 logMAR**	0.285	0.062	1.310	0.107
- **0.5-0.2 logMAR**	0.216	0.008	5.661	0.375
- **≤0.1 logMAR**	0.342	0.060	1.951	0.227
Pain (reference = no pain)	0.531	0.175	1.615	0.265
Cornea (reference = clear cornea)				
- **Mild cloudiness**	1.464	0.549	3.907	0.446
- **Moderate -severe cloudiness**	0.404	0.125	1.305	0.130
- **Opaque cornea**	0.110	0.006	2.045	0.139
Hypopyon (reference =1 mm or less)				
- **1-4mm**	0.754	0.308	1.843	0.535
- **4mm or more**	2.718	0.167	44.367	0.483
Disc and macula view (reference = view present)	4.102	1.289	13.051	**0.017**
Crystalline lens (reference = phakic)				
- **Pseudophakic**	1.768	0.695	4.494	0.231
- **Aphakic**	616621836.000	0.000		0.999
Surgeon region of practice (reference = Europe)				
- **Africa**	0.127	0.009	1.735	0.122
- **Asia**	1.375	0.550	3.439	0.496
- **South America**	4.167	0.392	44.292	0.237

CF = counting fingers; HM = hand motion; LP = light perception, NLP = no light perception; SD standard deviation; PPV = pars plana vitrectomy

This study highlights that international retina specialists employ vitrectomy as the primary treatment for acute postoperative endophthalmitis irrespective of the presenting vision. Repeat intravitreal injection of antibiotics is frequently performed.