VISUAL OUTCOME OF EARLY VITRECTOMY AND INTRAVITREAL ANTIBIOTICS IN ACUTE POSTSURGICAL AND POSTINTRAVITREAL INJECTION ENDOPHTHALMITIS

European Vitreo-Retinal Society Endophthalmitis Study Report Two

MOHAMED KAMEL SOLIMAN, MD,* GIAMPAOLO GINI, MD,† FERENC KUHN, MD, PHD,‡ BARBARA PAROLINI, MD,§ SENGUL OZDEK, MD,¶ RON A. ADELMAN, MD,** AHMED B. SALLAM, MD, PHD, FRCOPHTH†† FOR THE EUROPEAN VITREO-RETINAL SOCIETY (EVRS) ENDOPHTHALMITIS STUDY GROUP

Purpose: To evaluate the visual outcome associated with intravitreal antibiotics (IVA) and pars plana vitrectomy (PPV) for acute postprocedure endophthalmitis.

Methods: Data from 237 eyes presenting with acute postprocedure endophthalmitis were collected from 57 retina specialists in 28 countries. All eyes were treated with IVA on the day of presentation. We classified eyes according to the method of treatment used as IVA and early PPV (IVA + PPV within 1 week of presentation) groups.

Results: After exclusion of ineligible eyes, data from 204 eyes were analyzed. The mean (SD) age of patients was 62.7 (21.8) years and 69.3 (12.7) years in the IVA and PPV groups, respectively ($P = 0.18$). Endophthalmitis secondary to cataract, intravitreal injections, PPV, and other intraocular procedures represented 64.2%, 16.2%, 13.7%, and 5.9% of cases, respectively. Intravitreal antibiotics alone were administered in 55 eyes (27.0%), and early PPV was performed in 149 eyes (73.0%). No difference was found between groups in the final visual acuity of ≥20/60 (43.6%, 65 eyes vs. 34.5%, 19 eyes) and ≤counting fingers (30.9%, 46 eyes vs. 36.4%, 20 eyes) for IVA versus early PPV groups, respectively. Vision of light perception (odds ratio = 12.2; 95% confidence interval: 2.0–72.6) and retinal detachment (odds ratio = 7.7; 95% confidence interval: 1.5–409) at baseline were predictive of vision of ≤counting fingers. Retinal detachment at baseline (odds ratio = 20.4; 95% confidence interval: 1.1–372.1) was predictive of final retinal detachment status.

Conclusion: The current retrospective multicenter cohort of eyes with acute postprocedure endophthalmitis reports similar outcomes after treatment with IVA alone when compared with IVA and early PPV within 1 week of presentation.

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Postsurgical infectious endophthalmitis is a rare ocular complication characterized by severe intraocular inflammation and a high risk of severe visual loss. The incidence of acute postcataract surgery, intravitreal injection, and post–pars plana vitrectomy (PPV) endophthalmitis ranges from 0.04% to 0.3%,[1–3] from 0.019% to 0.54%,[4,5] and from 0.11% to 0.03%,[6] respectively.

Despite the advances in surgical techniques and the introduction of new pharmacological agents, the optimal therapeutic strategy for the treatment of endophthalmitis is still debatable. The Endophthalmitis

Vitrectomy Study (EVS) found no benefit between immediate PPV and intravitreal antibiotics (IVA) without PPV in the treatment of postcataract surgery endophthalmitis, except when the presenting vision is light perception (LP) or worse.[7] However, nowadays because of improvement in vitrectomy instrumentations, restricted inclusion criteria of the EVS, and increased frequency of infectious endophthalmitis secondary to increased number of intravitreal injections given, retina specialists perform PPV more frequently than IVA alone regardless of the presenting vision or the cause of endophthalmitis.[8,9] Whether or not early PPV provides a visual benefit over IVA alone remains debatable. Few studies have reported excellent visual results with early PPV[10,11] while others demonstrated no benefits,[12,13] or worse visual outcomes.[14]

In a previous report,[9] we used retrospective data collected by the European Vitreo-Retinal Society to describe the current international treatment patterns of postsurgical procedure-related endophthalmitis, with emphasis on analyzing the rates of early PPV. In this report, we aim to evaluate the visual outcome associated with treatment with IVA and PPV. In addition, we aimed to identify the factors that may be predictive of favorable (20/60 vision or better) and unfavorable posttreatment visual outcomes (counting fingers [CF] or worse).

Methods

We described the methods used in the European Vitreo-Retinal Society for endophthalmitis in a previous report.[9] In brief, the European Vitreo-Retinal Society created a web-based portal through which retina specialists can retrospectively log anonymized clinical data of patients presenting with acute postsurgical endophthalmitis between April 2016 and April 2017. Fifty-seven retina specialists from 28 countries participated in the study. For the analysis, we excluded cases with follow-up less than 4 weeks of endophthalmitis treatment. The study was designed so that physicians are required to log the visual acuity data of each patient into one of the following ordinal levels of vision: no LP (NLP), LP, CF, >CF and 0.6 logarithm of the minimum angle of resolution ([logMAR]; Snellen equivalent [SE] >CF–20/80), between 0.5 and 0.2 logMAR (SE 20/60–20/30), and ≤0.1 logMAR (SE ≥20/25). We defined the change of two or more levels in vision as a significant visual change. In addition, the study collected information about patients' age, sex, etiology of endophthalmitis, status of crystalline lens, visual acuity, degree of anterior and posterior segment inflammation, retinal status, and the type and details of treatment followed.

We divided the study eyes into the following two groups based on whether early PPV surgery (defined as PPV within 1 week of presentation) was performed: The PPV group comprised eyes that received IVA on the day of presentation + early PPV within 1 week; the intravitreal injection of antibiotic (IVA) group comprised eyes that received IVA without early PPV. The European Vitreo-Retinal Society Research and Ethics Board designed the study adhering to tenets of the Declaration of Helsinki. Each participating physician was responsible for following the guidelines of their respective institutional research board for retrospective anonymized research, and all patients consented for treatment.

We analyzed categorical variables using the Fisher exact test and fitted multivariate regression models to predict factors associated with a favorable visual outcome (20/60 or better final vision), an unfavorable visual outcome (CF vision or worse), and the occurrence of retinal detachment (RD). We included clinically relevant variables in the models including baseline vision, time to presentation, preoperative retinal status, vitreous and corneal haziness, the severity of hypopyon, lens status, the etiology of endophthalmitis, and the method of treatment. A P value of <0.05 was considered statistically significant. Statistical analysis was performed using SPSS-PC version 10 statistical package (SPSS; Cary, NC) and GraphPad Prism version 8.0.2 (GraphPad Software Inc, San Jose, CA).

Results

Baseline Characteristics

Data from 204 eyes were analyzed in this study, contributed by 51 physicians from 25 countries over four continents. Eleven (22%) physicians contributed with cases treated with the two treatment regimens (IVA and PPV + IVA). The mean (SD) age of patients was 62.7 (21.8) years and 69.3 (12.7) years in the IVA

From the *Department of Ophthalmology, Faculty of Medicine, Assiut University, Assiut, Egypt; †Southampton University Hospital NHS Trust, United Kingdom; ‡Helen Keller Foundation, Birmingham, Alabama; §Retina Italy Clinic, Milano, Italy; ¶Department of Ophthalmology, Faculty of Medicine, Gazi University, Ankara, Turkey; **Department of Ophthalmology, Yale University, New Haven, Connecticut; and ††Jones Eye Institute, University of Arkansas for Medical Sciences, Arkansas

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Reprint requests: Ahmed B. Sallam, MD, PhD, FRCOphth, Jones Eye Institute, University of Arkansas for Medical Sciences, 4301 W. Markham Street, Little Rock, AR 72207; e-mail: ahmedsallam11@yahoo.com

and PPV groups, respectively (P = 0.179). Of these, 43.6% (n = 24) and 50.3% (n = 75) patients in the IVA and PPV groups, respectively, were women (P= 0.432). The primary cause of endophthalmitis was cataract (131 eyes), intravitreal injections (33 eyes), PPV (28 eyes), and other intraocular procedures, such as corneal and glaucoma surgeries (12 eyes). Pseudophakia was less frequent in the IVA group (60.0%) compared with the PPV group (77.8%, P = 0.013). Retinal detachment was present at baseline in three and nine eyes in the IVA and PPV groups (P= 0.013), respectively. The mean (SD) duration of follow-up was 206.1 (159.5) days. The baseline demographics of the study patients are represented in Table 1.

Treatment Groups

Overall, early PPV was performed in 149 eyes (73.0%); among them, surgery was performed on the same day of endophthalmitis diagnosis in 129 eyes (86.6%) of the cases. Surgery was performed in the remainder of the cases within 24 hours (16, 10.7%) and after 2 to 7 days (4, 2.7%) from the initial presentation. In eyes with endophthalmitis precipitated by cataract/secondary intraocular lens implant surgery and in post-intravitreal injection endophthalmitis, PPV was performed more frequently than IVA; 81.7% versus 18.3% and 72.7% versus 27.3%, respectively. By contrast, IVA treatment (57.1%) was more frequent than PPV (42.9%) in eyes with post-PPV endophthalmitis.

The majority of early PPVs (94 eyes, 63.1%) in treatment of endophthalmitis were performed using 23-g vitrectomy systems, whereas the remaining were performed using 25-g (35 eyes, 23.5%) and 20-g (20 eyes, 13.4%) vitrectomy systems. During PPV, posterior vitreous detachment (PVD) was present in 42 eyes (28.2%), and induction of PVD and shaving of the vitreous base were undertaken in 77 eyes (51.7%) and 65 eyes (43.6%), respectively.

Visual Acuity Outcome

Table 1 details the baseline vision of the study eyes. Overall, these visual acuity levels were similar between the two treatment groups (Table 1). Divided by the precipitating cause of endophthalmitis, we did not find differences in the presenting vision between the two treatment groups in eyes who had endophthalmitis secondary to intravitreal injections or those after PPV or other intraocular procedures. However, in case of endophthalmitis after cataract surgery, eyes with 0.5 to 0.2 logMAR (SE 20/60–20/30) vision were more frequently treated with IVA (25.0%) than with PPV (8.4%) (P = 0.03).

After treatment of endophthalmitis, the overall visual acuity did not differ between two treatment groups, except at a 20/25 visual level where more eyes belonged to the PPV group than the IVA group (14.7% vs. 3.6%, respectively; P = 0.028, Table 2). The proportion of eyes who had a ≥20/60 final vision was 34.5% (19 eyes) and 43.6% (65 eyes) in the IVA and PPV groups, respectively (P = 0.265). Twenty (36.4%) eyes in the IVA group and 46 eyes (30.9%) in the PPV group had a final vision of ≤CF (P = 0.501); of which, 6 cases in the IVA group and 8 cases in the early PPV group ended up with NLP vision.

Table 1. Study Groups Divided by Primary Treatment Modalities—Intravitreal Injections of Antibiotics Only versus PPV Within 1 Week

	IVA (55)	PPV (149)	P
Age	62.7 (21.8)	69.3 (12.7)	0.1798
Sex, women n (%)	24 (43.6)	75 (50.3)	0.4324
Cause of endophthalmitis			
Mean follow-up, days (SD)	170.8 (147.2)	219.2 (162.4)	0.0312*
Lens status, n			
Phakic	21 (38.2%)	30 (20.1%)	0.0108*
Pseudophakic	33 (60.0%)	116 (77.8%)	0.0132*
Aphakic	1 (1.8%)	3 (2.0%)	0.9999
Time from procedure to initial presentation, days (SD)	6.7 (7.3)	5.9 (6.8)	0.1854
RD at baseline	3 (5.4%)	9 (6.0%)	0.9999
Preoperative vision (logMAR)			
NLP	1 (1.8%)	1 (0.7%)	0.4675
LP	21 (38.2%)	67 (44.9%)	0.4280
CF	20 (36.4%)	62 (41.6%)	0.5240
>CF–0.6 (SE; >CF–20/80)	1 (1.8%)	0 (0%)	0.2696
0.5–0.2 (SE; 20/60–20/30)	7 (12.7%)	10 (6.7%)	0.2508
≤0.1 (SE; ≥20/25)	5 (9.1%)	9 (6.0%)	0.5328

*$P < 0.05$.

Table 2. Preoperative and Postoperative Vision in Eyes With Postsurgical and Postintravitreal Injection Endophthalmitis

Ocular Procedures Preceding the Development of Endophthalmitis (n = 204)						
	Cataract Surgery (n; 131)			Intravitreal Injections (n; 33)		
Variable	IVA (24)	PPV (107)	*P*	IVA (9)	PPV (24)	*P*
Preoperative VA						
NLP	0 (0)	0 (0)	—	0 (0)	1 (4.2%)	>0.999
LP	8 (33.3%)	48 (44.9%)	0.365	4 (44.4%)	10 (41.7%)	>0.999
CF	7 (29.2%)	46 (42.9%)	0.254	2 (22.2%)	9 (37.5%)	0.680
>CF–0.6 (SE; >CF–20/80)	1 (4.2%)	0 (0)	0.183	0 (0)	0 (0)	—
0.5–0.2 (SE; 20/60–20/30)	6 (25.0%)	9 (8.4%)	0.032*	1 (11.1%)	0 (0)	0.272
≤0.1 (SE; ≥20/25)	2 (8.3%)	4 (3.7%)	0.302	2 (22.2%)	4 (16.7%)	>0.999
Postoperative VA						
NLP	1 (4.2%)	5 (4.2%)	>0.999	0 (0)	0 (0)	—
LP	2 (8.3%)	8 (7.5%)	>0.999	0 (0)	2 (8.3%)	>0.999
CF	3 (12.5%)	19 (17.7%)	0.763	1 (11.1%)	5 (20.8%)	>0.999
>CF–0.6 (SE; >CF–20/80)	11 (45.8%)	33 (30.8%)	0.231	4 (44.4%)	3 (12.5%)	0.068
0.5–0.2 (SE; 20/60–20/30)	6 (25.0%)	31 (28.9%)	0.805	3 (33.3%)	8 (33.3%)	>0.999
≤0.1 (SE; ≥20/25)	1 (4.2%)	11(10.3%)	0.694	1 (11.1%)	6 (25.0%)	0.068

Ocular Procedures Preceding the Development of Endophthalmitis (n = 204)									
	PPV (n; 28)			Miscellaneous (n; 12)			Overall (n; 204)		
Variable	IVA (16)	PPV (12)	*P*	IVA (6)	PPV (6)	*P*	IVA (55)	PPV (149)	*P*
Preoperative VA									
NLP	1 (6.2%)	0 (0)	>0.999	0 (0%)	0 (0%)	—	1 (1.8%)	1 (0.7%)	0.4675
LP	4 (25.0%)	7 (58.3%)	0.121	5 (83.3%)	2 (33.3%)	0.242	21 (38.2%)	67 (44.9%)	0.4280
CF	10 (62.5%)	5 (41.7%)	0.445	1 (16.7%)	2 (33.3%)	>0.999	20 (36.4%)	62 (41.6%)	0.5240
>CF–0.6 (SE; >CF–20/80)	0 (0)	0 (0)	—	0 (0)	0 (0)	—	1 (1.8%)	0 (0%)	0.2696
0.5–0.2 (SE; 20/60–20/30)	0 (0)	0 (0)	—	0 (0)	1 (16.7%)	>0.999	7 (12.7%)	10 (6.7%)	0.2508
≤0.1 (SE; ≥20/25)	1 (6.2%)	0 (0)	>0.999	0 (0)	1 (16.7%)	>0.999	5 (9.1%)	9 (6.0%)	0.5328
Postoperative VA									
NLP	2 (12.5%)	3 (25.0%)	0.623	3 (50.0%)	0 (0%)	0.181	6 (10.9%)	8 (5.4%)	0.2102
LP	1 (6.2%)	0 (0)	>0.999	0 (0)	0 (0%)	—	3 (5.4%)	10 (6.7%)	>0.999
CF	5 (31.2%)	3 (25.0%)	>0.999	2 (33.3%)	1 (16.7%)	>0.999	11 (20.0%)	28 (18.8%)	0.8429
>CF–0.6 (SE; >CF–20/80)	1 (6.2%)	1 (8.3%)	>0.999	0 (0)	1 (16.7%)	>0.999	16 (29.1%)	38 (25.5%)	0.5968
0.5–0.2 (SE; 20/60–20/30)	7 (43.7%)	2 (16.7%)	0.223	1 (16.7%)	2 (33.3%)	>0.999	17 (30.9%)	43 (28.9%)	0.8627
≤0.1 (SE; ≥20/25)	0 (0)	3 (25.0%)	0.067	0 (0)	2 (33.3%)	0.4545	2 (3.6%)	22 (14.7%)	0.0282*

*$P < 0.05$.
VA = visual acuity.

Divided by the precipitating cause of endophthalmitis, we did not find differences in the posttreatment vision between the IVA and PPV groups.

Eyes gaining at least two steps in vision were not different in the PPV group (54.4%, 81 eyes) compared with the IVA group (41.8%, 23 eyes; $P = 0.1179$). There was also no difference in significant visual loss; 6 (10.9%) eyes in the IVA group had at least one step decrease in vision and eight eyes (5.4%) in the PPV group ($P = 0.2102$). The majority of eyes (87.1%) presenting with visual acuity ≥20/60 (n = 31) had at least one step decrease in vision, with only 9.7% (3 eyes) maintaining their baseline vision and 3.2% (1 eye) gaining vision.

Table 3 displays the results of our analysis of the factors associated with a favorable visual outcome (20/60 or better). It is of note that this outcome was not influenced by early PPV use. This remained true even when PPV was recategorized as immediate (within 24 hours) and nonimmediate (data not shown). Regarding the factors predictive of a poor visual outcome (CF vision or worse), we found baseline vision of LP (odds

Table 3. Multivariate Logistic Regression Results: Predictors of Visual Acuity CF Vision or Worse

Variable	*P*	Exponential β	95% Confidence Interval	
Age	0.053	1.040	0.999	1.081
Sex (reference = women)	0.380	0.673	0.279	1.628
Days to presentation	0.874	0.995	0.936	1.058
Precipitating cause of endophthalmitis (reference = cataract surgery)				
Intravitreal injection	0.343	0.529	0.142	1.976
PPV	0.228	2.345	0.586	9.385
Miscellaneous surgery	0.767	1.548	0.087	27.641
Treatment method (reference = IVA)	0.438	0.654	0.224	1.914
Baseline VA (reference = ≥20/60)				
NLP	1.000	40272,356,077.720	0.000	.
LP	0.006*	12.192	2.047	72.628
CF	0.146	3.716	0.632	21.854
>CF–0.6 logMAR (SE; >CF–20/80)	0.999	0.000	0.000	.
Pain (reference = no pain)				
Moderate pain	0.548	1.463	0.422	5.073
Severe pain	0.263	2.355	0.526	10.547
Cornea (reference = clear, mild edema)				
Moderate–severe cloudiness	0.219	1.882	0.686	5.159
Hypopyon (reference =1 mm or less)				
1–4 mm	0.898	1.062	0.425	2.652
4 mm or more	0.068	11.051	0.841	145.216
Disk and macula view (reference = view present)	0.208	0.436	0.120	1.585
Crystalline lens (reference = phakic)				
Pseudophakic	0.397	1.586	0.546	4.609
Culture yield (reference = positive yield)	0.172	0.531	0.214	1.318
Baseline retinal status (reference = attached retina)				
RD	0.016*	7.733	1.459	40.999

*$P < 0.05$.
VA = visual acuity.

ratio = 12.2; 95% confidence interval: 2.0–72.6) and the presence of RD at baseline (odds ratio = 7.7; 95% confidence interval: 1.5–409) to be predictive.

Retinal Detachment

Retinal detachment was present at baseline in three and nine eyes in the IVA and PPV groups (P= 0.999), respectively. Of those three eyes in the IVA group, one underwent PPV within 14 days of diagnosis, and the vision declined from LP to NLP; the remaining were not operated, and their vision decreased from CF to LP. In the PPV group, six eyes presented with LP vision, two eyes with CF vision, and one eye with 0.1 logMAR (SE 20/25). After endophthalmitis treatment, 17 eyes in the PPV group and two eyes in the IVA group remained silicone filled. Excluding silicone-filled eyes, RD was present in nine eyes (6.0%) in the PPV group and in four eyes (7.8%) in the IVA group (P= 0.751). Also, we did not find the use of PPV to confer an additional benefit on the final retinal status in our regression analysis model. Similarly, the presenting level of vision and the type of procedure precipitating the endophthalmitis were not predictive of the anatomical retinal status. We found the baseline retinal status to be the only factor predictive of the final retinal status (odds ratio = 20.4; 95% confidence interval: 1.1–372.1).

Discussion

In this multicenter study for eyes presenting with acute postoperative and postintravitreal injection endophthalmitis, we found that about half of the patients had at least two steps increase in their vision after treatment and approximately 7% suffered significant visual loss. The final level of vision was not different

between the IVA and the PPV treatment groups, and the use of early PPV was not predictive of favorable visual outcomes (visual acuity ≥20/60).

In this study, 41% of patients achieved a favorable visual outcome defined as ≥20/60 Snellen vision. In other studies, the proportion of patients achieving a similar level of vision after treatment of acute postoperative and postinjection endophthalmitis ranged from 28% to 91%.[7,8,15] In the EVS, 41% of eyes achieved 20/40 vision or better at 3 months. In a U.S. population-based study analyzing Medicare claims, 615 patients with acute endophthalmitis secondary to cataract surgery were identified; of these, 43% achieved 20/40 vision or better. Recently, a large database study from the American Academy of Ophthalmology IRIS Registry reported a similar outcome with 44% achieving 20/40 or better at 3 months.[3] However, another population-based study, the Endophthalmitis Population Study of Western Australia, reported a slightly lower rate of favorable vision; only 28% of patients achieved 20/60 or better final vision from 102 cases treated between 1995 and 2000. Discrepancies in visual outcomes between different studies may be due to several factors influencing the final vision. The visual acuity at presentation is a common predictor of a final visual outcome.[7,8,15–18] Other factors include the type of causative microorganism,[8, 15, 18]culture nature,[8,16–18] fundus visibility,[7,12,16] and patients' age.[13,16] In our study, poor visual acuity of LP and RD were predictive of a poor visual outcome (odds ratio; 12.2 and 7.7, respectively).

There has been a trend for increased use of PPV in the treatment of postsurgical procedure acute endophthalmitis, irrespective of whether the presenting vision is LP or better.[8,9] Outcomes measures such as visual acuity and RD rates are important metrics when assessing the benefits of early PPV. For eyes with postcataract surgery endophthalmitis and an initial vision of better than LP, the EVS did not show any difference in achieving a favorable outcome of 20/40 vision or better between eyes treated with PPV (66%) or without (62%). Criticisms for the EVS include the limited nature of vitrectomy performed and that because enrollment was based on vision and media clarity, disease with more virulent organisms may have been excluded from the study. Although discrepancies between study designs may limit direct comparisons with the EVS, results from more contemporary population studies with increased usage of PPV were not different. Gower et al[19] found that early PPV did not confer an additional benefit; in eyes with an initial acuity better than LP, 52% of those without vitrectomy achieved 20/40 or better acuity and 42% with PPV (P= 0.05). The Endophthalmitis Population Study of Western Australia also demonstrated similar odds for achieving a final visual acuity 20/60 between PPV and IVA.[8] Likewise, in this study, both IVA and PPV groups had a similar visual outcome, and early PPV use was not predictive of a favorable postoperative visual outcome (visual acuity ≥20/60). For eyes presenting with LP vision, the EVS showed that PPV was associated with a three times greater likelihood of achieving 20/40 or better vision than IVA.[7] By contrast, Gower et al[19] found no difference between the two treatment regimens in eyes presenting with this level of vision. Similarly, in this study, we did not find a difference between early PPV and IVA in patients presenting with LP vision. The EVS excluded patients with opaque cornea; however, in our cohort, 22% of eyes that had PPV exhibited moderate to severe corneal clouding, which may indicate more severe disease.

Regarding eyes with endophthalmitis secondary to intravitreal injections, we also found that early PPV and IVA without PPV had similar vision outcomes. This concurs with the findings of several previous studies. Kurniawan et al[12] showed no benefit from PPV surgery performed in 15% of their study group within 48 hours due to lack of improvement of streptococcal endophthalmitis in a retrospective study of 101 patients. In addition, Xu et al[13] showed that PPV performed on the same day was not different from IVA alone at 6-month follow-up in a smaller study of 40 eyes. There are also studies that suggested a possible worse outcome with PPV [14,20]: Chaudery et al [14] found that patients who underwent PPV had a worse visual outcome compared with those who had IVA alone. It is of note that 69% of their patients who underwent PPV had worsening of the inflammation after initial treatment with IVA, which may indicate a more advanced disease spectrum.

It has been suggested that the timing of PPV in endophthalmitis eyes that did not respond to initial IVA may influence the visual outcome. Different definitions of early PPV were used in previous studies; some authors considered PPV performed on the same day of presentation or the next as early PPV,[12,14,19] whereas others extended the duration up to 1 week.[19,21] In the EVS, repeat treatment with PPV and reinjection of antibiotics were performed within approximately 48 hours from the initial intravitreal injection (range = 36–60 hours). Kuhn and Gini,[11] in their consecutive case series of postcataract endophthalmitis (n = 47), performed earlier PPV (after 24 hours) for eyes that did not improve to initial IVA. They reported a more favorable visual outcome than the EVS, with 91% of patients achieving 20/40 vision (as compared to 53% in the EVS, $P < 0.001$). In our

study, although most eyes in the early PPV group (86.6%) underwent immediate PPV on the same day of diagnosis, some eyes underwent surgery within 24 hours (10.7%) and others after 2 to 7 days (2.7%). It is possible that the delay in performing PPV in these cases may have adversely influenced the visual outcomes.

In our study, the presence of RD before endophthalmitis treatment was the only predictive factor for the occurrence of RD at the final follow-up. However, in eyes with RD at baseline, certain characteristics such as the extent of RD or the grading of proliferative vitreoretinopathy were not available for analysis, which may potentially affect the results. In keeping with the results of the EVS,[22] we did not observe any difference in the rate of RD between the PPV and the IVA groups. Other studies reported a lower risk of RD with PPV usage; Kuhn and Gini[11] did not report any case of RD in their series of 47 patients. The authors attributed their improved anatomical success to a more thorough vitreous removal as compared to the EVS. However, although a more complete vitreous removal in the context of acute endophthalmitis reduces residual retinal traction, it may be associated with an increased risk of iatrogenic retinal trauma.

The results of this study should be interpreted with caution. Our study was retrospective and nonrandomized which makes it subject to different types of bias, including recall bias. There may also be a tendency for surgeons to treat more severe endophthalmitis with early PPV and the less aggressive ones with IVA. This may introduce a selection bias. In addition, participants may have opted to report selected cases based on their preferred method of treatment or better final vision. However, about one-fourth of the physicians who participated in the study reported cases managed with the two treatment approaches (PPV + IVA vs. IVA alone). Also, because treatment techniques are presented in comparison with each other, rather than as an individual result in this study, we expect biases to be nondifferential. As in other database studies, some of baseline and follow-up data were missing, and this can affect the quality of the results. Considering that a large number of physicians from more than 25 countries participated in this study makes the data representative of international retinal physicians' practice, as compared to small studies from selected institutions.

In conclusion, our study shows that despite a current increase in the usage of PPV in the treatment of acute postoperative endophthalmitis, the visual outcome after PPV versus IVA alone may be similar.

Key words: endophthalmitis, cataract surgery, pars plana vitrectomy, intravitreal injection.

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