Original Article

Early Vitrectomy: An Effective Treatment for Acute Postcataract Surgery Endophthalmitis

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Abstract

Background: Endophthalmitis is a rare but a high morbid complication after cataract surgery, and a gold standard treatment is not recommended yet. In this study, we aim to evaluate the effect of early vitrectomy on the visual acuity of patients with postcataract endophthalmitis.

Materials and Methods: This study was a single-arm clinical trial on 27 patients with postcataract surgery endophthalmitis. Early vitrectomy was the intervention. Visual acuity as the primary outcome was evaluated and compared at baseline, at discharge, and 1 and 3 months after the intervention.

Results: From 27 patients who included in our study, six patients gain favorable visual acuity of 5/10 and above (success rate = 22%), and four of them have no improvement in their visual acuity. Retinal detachment was reported as a complication in just one case. Negative culture was a predictor for success in terms of visual acuity after the surgery. All patients who gain favorable results, presented in the first 15 days after the cataract surgery.

Conclusion: The result of our study showed that, considering complete, early vitrectomy for the treatment of postcataract surgery endophthalmitis, especially for those who presented in the first 15 days of cataract surgery and for those who have negative culture is promising.

Keywords: Cataract surgery, early vitrectomy, endophthalmitis, vitrectomy

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Introduction

Cataract surgery is one of the most prevalent eye surgeries and while communities get older, need for this surgery increases too. The cataract surgery rate which is calculated by the number of cataract surgery in a year in million was 1331 in Iran in 2006 which is elevated by 153% comparing to 2000.[1] Endophthalmitis which is a severe, purulent intraocular inflammation of the eye is a serious complication of cataract surgery which could cause severe decrease in visual acuity.[2,3] In America and Europe, the main infectious agent is bacterial, while in a tropical area like India in 10%–20% of cases it is fungal.[4] The source of endophthalmitis could be blood infection, but it is almost always have external reasons such as trauma or surgery.[5] The global incidence of postcataract surgery endophthalmitis is estimated to be about 0.02%–0.26% which is decreased by improvement in surgical techniques and sterilization procedures.[4] Endophthalmitis if not treated could be resulted in the loss of vision and also loss of the eye; so the main goal is the removal of infectious organism and control of intraocular inflammation by blockage of inflammation cascade as soon as possible.[6] Evidences shows that prophylactic intracameral antibiotic could be effective for the prevention of postcataract surgery endophthalmitis.[7]

In the early 1990s, Endophthalmitis Vitrectomy Study (EVS) was designed as a randomized clinical trial on 420 patients with a 9-month follow-up. The results of that study shows that systemic antibiotics are not effective on visual acuity or media clarity, and vitrectomy is just indicated when the visual acuity is light perception.[8] There are conflicting results

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considering the treatment options for endophthalmitis; some studies recommend early vitrectomy for all the severity of postcataract surgery endophthalmitis.[6,9] Therefore, the need for re-evaluation of EVS guideline is suggested.[10]

The standard treatment for postcataract surgery endophthalmitis is still challenging. Years after the EVS guideline and progress in surgical techniques and approaches, it is questionable that should we still follow EVS guideline or changes are needed? In this study, we aim to evaluate the effect of early vitrectomy on the visual acuity of patients with postcataract endophthalmitis.

Materials and Methods

This is a single-arm clinical trial on patients with postcataract surgery endophthalmitis. In this study, 27 patients who had diagnosed with postcataract surgery endophthalmitis were included. Postcataract surgery was defined by the appearance of signs and symptoms of endophthalmitis after a cataract surgery, regardless of positive/negative culture. Patients who had cataract surgery plus any other ocular surgery and those who had undergone other interventions such as intravitreal antibiotics injection were excluded.

The early vitrectomy was done for patients who signed informed consent. Three-port pars plana 23G vitrectomy was performed, and the main goal was to remove the posterior hyaloid and as much and as safely purulent vitreous as possible. In severe necrotic retina and if retinal detachment seen primarily, silicone injection was performed, and all the patients received one dose of intravitreal vancomycin and ceftazidime.

The primary outcome was final visual acuity which was measured using Snellen chart 1 and 3 months postoperative. Other complications such as enucleation, evisceration, expulsive hemorrhage, and retinal detachment are also evaluated. Data were analyzed using SPSS (Chicago, IL, USA. Version 16). Visual acuity was normalized to LogMAR index; t-paired and repeated measure analysis of variance was performed to compare the mean at different times. In another analysis, visual acuity of 5/10 and more at 3-month follow-up was considered a favorable outcome. The Chi-square test was used to compare success rate across different variables. The significance level was applied at 0.05.

This study was approved by the Ethics Committee of Isfahan University of Medical Sciences (IR.MUI.MED.REC.1399.648) and is registered in the Iranian Registry of Clinical trials (IRCT20201103049247N1).

Results

In this single-arm clinical trial, 27 patients who had diagnosed with postcataract endophthalmitis have been included. The mean age (±standard deviation) of the study sample was 63.8 ± 11.32. Most of them were male (74%) and had endophthalmitis on their left eye (70%). The duration between cataract surgery and diagnosis of endophthalmitis was 8.3 ± 7.42 (median: 6 days). Twenty-five of 27 patients were presented with hand motion or less [Table 1], in which 70% positive culture was observed. In total, 33% of the cultures were negative, in the positive cultures staphylococcus was the most prevalent (55.5%). Silicone injection was performed for 15 patients (55.5%). Table 2 shows the result for visual acuity at baseline (before the intervention), at discharge, and at follow-ups (1 month and 3 months after the intervention). The success rate was 22.2%, all of which presented in primary 15 days and most of them were culture negative [Table 3], but the result of repeated measure shows that the visual acuity was improved after the surgery (F = 33.6, $P = 0.000$) [Figure 1].

We have not expulsive hemorrhage and none of our patients developed no light perception vision and enucleation or evisceration is not needed at all. Retinal detachment was detected in one patient who was a 74-year-old male and presented with endophthalmitis after 32 days from cataract surgery; the result of culture was positive for *Escherichia coli,* and his final visual acuity was hand motion.

Discussion

The result of our study shows that early vitrectomy can improve the visual acuity of patients with postcataract surgery endophthalmitis. Studies recommend vitrectomy for acute postcataract surgery endophthalmitis which is defined as endophthalmitis in 21 days after cataract surgery; in the other hand, Tap is recommended for delayed cases and also cases with counting fingers and better visual acuity.[11] The EVS was undoubtedly a pioneer study in the field of postcataract endophthalmitis and revealed a new understanding of this field. In the EVS study, the frequency of visual loss decreased by 50% in those who underwent variable injection timing (VIT) in comparison to the control group (20% vs. 47%); and 33% of patients with light perception visual acuity who underwent VIT achieved 20/40 and above in comparison to 11% for TAP.[8] We performed vitrectomy for all cases regardless of their presenting visual acuity and time of presentation. In this study, our success rate (achieving visual acuity of 20/40 and above) was 22%, which is below the previous reported success rates,[8,12] but interestingly, all of which who achieve good vision presented within 15 days of cataract surgery and this could be a confirm for recommendations. In another study by Yospaiboon *et al*. on 45 eyes with endophthalmitis, the only

Table 1: Visual acuity at presentation, discharge, 1 month, and 3 months follow-up

	Light perception and hand motion, *n* (%)	Between hand motion and 4/10, *n* (%)	5/10 and above, *n* (%)
Visual acuity baseline	25 (92.5)	2 (7.5)	-
Visual acuity at discharge	18 (66.6)	9 (33.3)	-
Visual acuity 1 month later	5 (18.5)	21 (77.8)	1 (3.7)
Visual acuity 3 months later	4 (15)	17 (63)	6 (22)

Table 2: Visual acuity before and after the intervention

	Visual acuity** (mean±SD)	Difference between baseline and follow ups		Difference between discharge and follow ups		Difference between 1month and 3months follow up	
		Mean difference±SD	*P**	Mean difference±SD	*P**	Mean difference±SD	*P**
At presentation	2.5±0.46						
At discharge	2.1±0.49	0.37±0.39	0.000				
1 month after the intervention	1.4±0.71	1.03±0.63	0.000	0.6±0.52	0.000		
3 months after the intervention	0.9±0.80	1.5±0.75	0.000	1.1±0.71	0.000	0.5±0.46	0.000

*Paired *t*-test, **Visual acuity is presented in Logmar index. SD: Standard deviation

Table 3: Favorable visual acuity considering different variables

	Favorable visual acuity after 3 months, *n* (%)		*P*
	No	Yes	
Sex			0.1*
Female	4 (19)	3 (50)	
Male	17 (81)	3 (50)	
Culture			0.003*
Positive	17 (81)	1 (16.7)	
Negative	4 (19)	5 (83.3)	
Time of presentation			0.4**
In 15 days	18 (85.7)	6 (100)	
Day 16 and above	3 (14.3)	0	

*Pearson χ^2, **Fisher's exact test

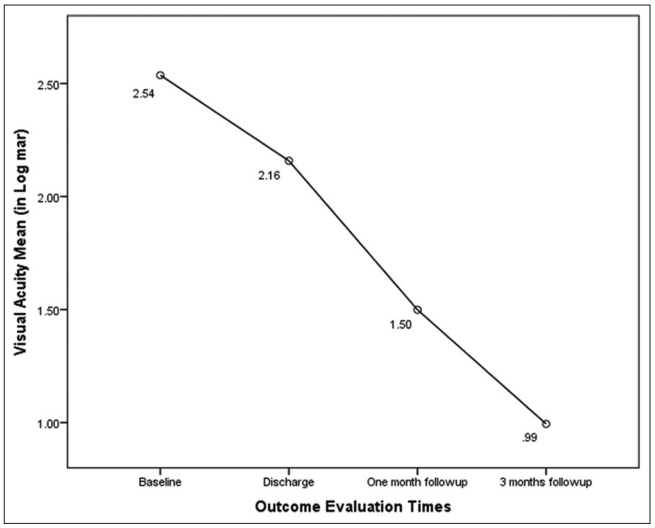

Figure 1: Visual acuity (in Logmar) at baseline, discharge, and 1 month and 3 months follow-up

predictor of favorable visual acuity was the time of performing vitrectomy (under 3 days from presentation); other factors such as type of endophthalmitis, organism, and treatment choice had no association with improvement in visual acuity.[13] This factor is not a confounding factor in our study as we performed vitrectomy within 24 h of presentation.

Negative culture is a predictive factor of success in our study as the culture of five of six patients who gained favorable visual acuity was negative. This is in line with the result of Combey de Lambert *et al*.[14] Studies show that retinal damage is due to bacterial toxins as the removal of bacteria in animal studies did not stop the inflammatory process;[15] which means that early and complete clearance of purulence is a promising key factor in VIT.

Recent studies are in favor of vitrectomy rather than TAP,[16] which could be due to the progress in surgical techniques and decreases in complications.[17] In the EVS study, retinal detachment has an incident rate of 8.3% and associated with virulence of the organism, visual acuity at presentation, open posterior capsule, and previous procedures for the management of endophthalmitis.[18] In our study, just one patient got retinal detachment, and no other complications for any other patient were reported.

Conclusion

In the time of advanced surgical methods, based on the results of our study, we think that the result of complete and early vitrectomy is promising for the treatment of postcataract surgery endophthalmitis.

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Conflicts of interest

There are no conflicts of interest.

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