

PARS PLANA VITRECTOMY IN POST-TRAUMATIC ENDOPHTHALMITIS IN CIPTO MANGUNKUSOMO HOSPITAL INDONESIA

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ABSTRACT

Introduction: Endophthalmitis is an inflammation of the intraocular tissues and fluid, and an emergency in ophthalmology. One of the most common causes of endophthalmitis is post-traumatic endophthalmitis. Post-traumatic endophthalmitis has a poorer prognosis than post-cataract surgery endophthalmitis. The immediate pars plana vitrectomy (PPV) surgery in post-traumatic endophthalmitis is beneficial for optimizing of final visual.

Methods: A retrospective descriptive study of post-traumatic endophthalmitis patients underwent pars plana vitrectomy in the Ciptomangunkusumo Hospital, Indonesia from January 2017 – June 2017.

Result: There were twelve cases of post-traumatic endophthalmitis undergoes pars plana vitrectomy within the period of January 2017-June 2017. The most frequently identified causative organism was *Staphylococcus* (33,3%). There was an improvement of final visual acuity after the procedure of pars plana vitrectomy in 58.3% post-traumatic endophthalmitis patients.

Conclusion: Early PPV leads to vision improvement and maintains visual acuity in post-traumatic endophthalmitis.

Keywords: Pars Plana Vitrectomy, Endophthalmitis, Post-traumatic

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INTRODUCTION

Endophthalmitis is a severe inflammation of the intraocular tissues and fluid, remaining a notable cause of poor visual outcome. Endophthalmitis can be classified as exogenous and endogenous endophthalmitis. Exogenous endophthalmitis is caused by the inoculation of the eye by microorganisms from an external environment. Causes of Endophthalmitis exogenous are post-traumatic, post-operative, bleb-related, and post-intravitreal injection.^{1,2} Endophthalmitis is a rare disorder but can lead to blindness. Therefore, diagnosis of endophthalmitis and immediate pars plana vitrectomy (PPV) can provide better final vision.¹ The incidence of post-traumatic endophthalmitis is 25% of the entire case of Endophthalmitis. Cases with perforation of the eyeballs have a risk of 7% for the occurrence of endophthalmitis.⁴ Risk of infection after penetrating ocular trauma is almost 100 times greater than after cataract surgery.⁵ Some risk factors are the presence of an intraocular foreign body, lens rupture, delayed treatment, wound size, age more than 50 years old, female gender, and injury in a rural setting.^{7,8}

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Visual prognosis of post-traumatic endophthalmitis is worse than post-operative endophthalmitis. It is due to the physical effects of the trauma.⁹ Besides, microorganisms that cause post-traumatic endophthalmitis are more diverse and virulent than other infectious endophthalmitis.¹⁰ Microorganisms usually found in post-traumatic endophthalmitis are more diverse and virulent than other infectious endophthalmitis.¹⁰ Microorganisms usually found in post-traumatic endophthalmitis are *Bacillus Sp.*, *Staphylococcus*, and *Streptococcus*.⁷ PPV treatment for post-traumatic endophthalmitis is an effective method which can help to get best-corrected visual acuity (BCVA) improvement in post-traumatic endophthalmitis. Although many factors affecting visual prognosis, immediate PPV has a significant benefit of obtaining a good final visual acuity.¹¹

There has been no data on visual outcomes after vitrectomy in post-traumatic endophthalmitis in Indonesia. This research aims to describe demographic data, causative microorganism, and visual outcome of PPV of post-traumatic endophthalmitis patients in Indonesia.

METHODS

This is a retrospective descriptive study of post-traumatic endophthalmitis patients in Cipto Mangunkusumo Hospital, Indonesia, who underwent PPV from January 2017 until December 2017. The data was collected from post-traumatic endophthalmitis patient's medical records. The collected data, including demographic data, treatment methods, causative organisms, functional outcomes, and factors associated with improved visual outcomes, were retrospectively reviewed.

The exclusion criteria were all other causes endophthalmitis and patients with incomplete medical records. The patients were classified as "improved" visual outcomes when their final BCVA was better than initial BCVA. The collected data were then processed descriptively, and all variables presented in the table and graphic.

RESULTS

There were twelve post-traumatic endophthalmitis cases that underwent PPV in the period of January 2017-December 2017. The distribution of patient's demographic data is shown in table 1.

The majority of post-traumatic endophthalmitis patients are male 75% and to be age ≥ 18 years old (58.3%). The initial visual acuity (VA) was $\leq 1/300$ (91.7%), and the onset mostly occurred within < 14 days (75%).

Table 1. Patient's Demographic Data

Variable	Frequency (n)	Percentage (%)
Age (n = 12)		
< 18	5	41.7
≥ 18	7	58.3
Gender (N=12)		
Male	9	75.0
Female	3	25.0
Initial VA (n= 12)		
NLP	2	16.7
LP	4	33.3
1/300	5	41.7
$> 3/60$	1	8.3
Onset (n = 12)		
< 24 hour	4	33.4
1 day - < 14 days	5	41.6
≥ 14 days	3	25

Table 2. Treatment Modalities and Retinal Condition

Variable	Frequency (n)	Percentage (%)
Procedure Type (n = 12)		
Vx + AB Intravitreal	8	66.7
Vx + AB Intravitreal + SO	4	33.3
PPV Period (n = 12)		
< 24h	6	50.0
24h – < 7 days	5	41.7
≥ 7 days	1	8.3
Retinal Condition (n = 12)		
Retinal Necrosis	8	66.7
Normal	4	33.3

Abbreviations: Vx, vitrectomy; AB IVT, antibiotic intravitreal (vancomycin 0,1 cc + ceftazidime 0,1 cc); SO, silicone oil

Table 2 summarized the treatment modalities and retinal condition. The most common treatment method was PPV with antibiotic intravitreal injection (66.7%), and all of the procedures were given antibiotic intravitreal injection. There were 8 (66.7%) cases of retinal necrosis found upon PPV procedure.

Table 3. Summary of Culture Result

Variable	Frequency (n)	Percentage (%)
<i>Klebsiella Pneumoniae</i>	3	25.0
<i>Staphylococcus Epidermidis</i>	2	16.7
<i>Staphylococcus alfaemolyticus</i>	1	8.3
<i>Staphylococcus Saprophyticus</i>	1	8.3
Negative Culture	5	41.7

Table 3 describes positive cultures found in 58,3% cases. The identified organisms were *Klebsiella Pneumoniae* (25%), and *Staphylococcus* (33,3%).

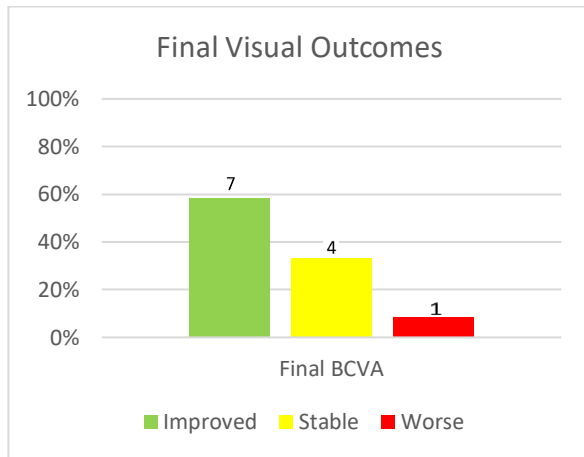


Figure 1. Functional Visual Outcomes

Figure 1 shows 7 (58.3%) cases had increased final BCVA, 4 (33.3%) cases were stable, and only 1 (8.4%) case had worse final visual acuity after emergent PPV surgery.

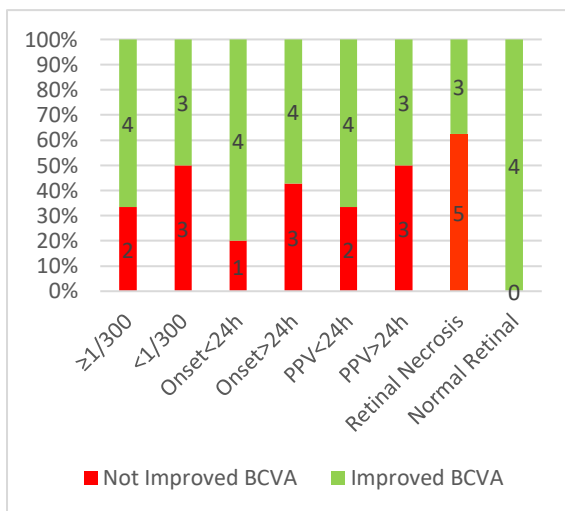


Figure 2. Frequency of Visual Acuity Based on Onset, PPV Period, and Retinal Condition

Factors associated with visual outcomes were demonstrated in Figure 2. It revealed that cases with presenting VA better than 1/300 could result in better final BCVA after PPV procedure (66.7%). All cases with normal retinal could get final BCVA improvement just after PPV surgery (100%). Trauma onset and time between trauma and PPV procedure were affecting factors of final BCVA.

Table 4. Factors Affecting the Final BCVA with Onset<24h

Onset <24 h	Normal Retinal	Retinal Necrosis	Percentage (%)
Improved Final BCVA	4	0	80
Not Improved Final BCVA	0	1	20

Table 4 shows all cases with onset <24 hours who had BCVA improvement were subjects with normal retina, and all subjects with retinal necrosis did not have better final BCVA.

DISCUSSION

Post-traumatic endophthalmitis is a devastating eye disease resulting from complications of ocular trauma.⁹ According to Safneck¹⁰ and Ramakrishnan¹², most endophthalmitis was exogenous, with 59% and 92.6% presentations. Nam *et al.*¹³ reported that trauma was one of the most common causes of exogenous endophthalmitis (15.2%), and around 51.6% of post-traumatic endophthalmitis was caused by corneal laceration. Jiang *et al.*¹⁴ revealed that the age ranged from 6 to 71 years, and all underwent pars plana vitrectomy. Age over 50 years old is a factor associated with an increased risk of post-traumatic endophthalmitis.⁹ In this study, patient's characteristics were found to be predominantly male ages >18 years old.

Vitrectomy aims to eliminate toxins, microorganisms, inflammatory debris in vitreous, and distribute intravitreal antibiotics. Vitrectomy is also performed to repair retinal detachment when it occurs and to remove intraocular foreign bodies.¹⁵ Besides vitrectomy, intravitreal antibiotics are also recommended for management of endophthalmitis. Nam *et al.*¹³ study reported that the most commonly used antibiotics combination for intravitreal injections is vancomycin and ceftazidime (68.1%). In this study, all subjects (100%) underwent PPV surgery and intravitreal antibiotics injection with a combination of vancomycin and ceftazidime. Approximately 33,3% of procedures use silicone oil tamponade. The previous study reported that vancomycin was effective in 100% of Gram-positive microorganisms, while ceftazidime has 89% effectiveness against gram-negative microorganisms in post-traumatic endophthalmitis.¹⁷

The time between trauma and PPV surgery less than 24 hours associated with better visual acuity outcomes.¹⁴ Delayed surgery and systemic antibiotics, especially more than 24 hours, is considered to be a risk factor for endophthalmitis and resulting in poor final visual acuity.^{9,16} The immediate PPV can prevent potentially destructive inflammatory responses and get significantly better visual recovery.

A study by Nicoara *et al.*¹⁷ found that 42,85% of cases had initial treatment in less than 24 hours, and 66,7% of them had final BCVA $\geq 6/60$. In this study, cases that performed PPV surgery in <24 hours have a better final visual prognosis (66.7%), meanwhile for those who had surgery in more than 24 hours only 50% improve final visual acuity. In this study, visual outcomes for those with onset <24 hours 80% had better final visual acuity, meanwhile cases with onset >24 hours only 66,7% could get visual improvement. Cases with onset <24 hours who have better final visual outcome showed normal retinal conditions. The retina condition is a significant factor determining the visual outcome in post-traumatic endophthalmitis.⁹ Damage to the retina of post-traumatic endophthalmitis patients did not allow the vision recovery.⁸ Brinton *et al.*¹⁸ reported 42% post-traumatic endophthalmitis with retinal detachment or retinal tear had final BCVA from NLP to 3/200. The study also found that cases without retinal detachment or retinal break 75% improve visual acuity after vitrectomy. In comparison, cases with retinal detachment or retinal break the success rate were 0%.¹⁸ In this study, all cases with normal retinal condition increased final visual acuity, whereas in cases with retinal necrosis only 37,5% had visual acuity improvement.

The final visual acuity in post-traumatic endophthalmitis is also affected by the virulence of the causative microorganisms.⁹ In this study, Culture from vitreous fluid in post-traumatic endophthalmitis had 58.3% positive microorganism. *Klebsiella Pneumoniae* was found in 25% of the subjects, while *Staphylococcus* was 33.3% with the most commonly isolated microorganisms were *Staphylococcus Epidermidis* (16.7%). Research by Jiang *et al.*¹⁴ found that *Staphylococcus Epidermidis* (41.5%) was the most common causative agent, followed by *Staphylococcus Aureus* (22.6%). Endophthalmitis Vitrectomy Study (EVS) reported that the visual prognosis for obtaining visual acuity of 6/30 or better is based on the causative microorganisms, namely *Staphylococcus Aureus* (50%), and *Streptococcus* (30%). Gram-positive bacteria with species other than those already mentioned, such as *Bacillus Sp*, and gram-negative bacteria are significantly related with poorer visual acuity.^{18,20}

Another factor affecting visual prognosis was better presenting visual acuity.¹⁴ In this study, most patients had initial visual acuity $\leq 1/300$ (91.7%). Subjects with initial VA better than 1/300 could get improvement in

final visual acuity by 66.7%, while initial VA worse than 1/300 only 50% of them had good final BCVA. Jiang *et al.*¹⁴ reported that 96% of subjects with initial VA better than LP had increased final visual acuity. Other studies by Omran *et al.*²¹ found that only 37% of cases with initial VA of counting fingers had good final visual acuity, whereas in cases with VA better than counting fingers 77.8% increase in final BCVA. This shows that better presenting visual acuity significantly improve functional visual outcome.

In this study, the success rate of visual outcome after PPV in post-traumatic endophthalmitis was 58.3%, and only 8.7% of subjects did not show better final BCVA due to the condition of retinal necrosis. Jiang *et al.*¹⁴ stated that 98% of subjects who underwent PPV within 24 hours had better final visual acuity, and 60% achieved better visual acuity than counting fingers. Although the visual prognosis in post-traumatic endophthalmitis is worse than that of post-operative endophthalmitis, prompt vitrectomy is proven to improve the final visual acuity.^{8,14}

CONCLUSION

The time between trauma and PPV treatment, trauma onset, causative microorganisms, retinal condition, and presenting VA are significant factors affecting visual outcome after PPV surgery in post-traumatic endophthalmitis. Although many factors contribute to the visual outcome of post-traumatic endophthalmitis, prompt PPV is an effective treatment that can improve or at least maintain visual acuity.

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