

Pinpoint size port d'Entrée as a predictor for better clinical outcome in pediatric endophthalmitis: A case series

Andi Arus Victor, Triana Hardianti Gunardi, Mefina Aulia Mufidah

From Department of Ophthalmology, Dr. Cipto Mangunkusumo Hospital, Faculty of Medicine University of Indonesia, Indonesia

ABSTRACT

Endophthalmitis is an intraocular inflammation involving both posterior and anterior segments, caused by bacterial or fungal infections. Here, we present a case series of five cases presented to the National Referral Hospital from January to December 2017. Five eyes were identified, including exogenous and endogenous odontogenic causes. All eyes were managed with vitrectomy, intravitreal antibiotics, and systemic antibiotics. Documented final best VA were 20/40 (20%), 1/300 (40%), and no light perception with phthisis bulbi (40%). Despite aggressive timely treatments, visual prognosis are poor in both endogenous and exogenous endophthalmitis. The best final VA 6/12 was found in the smallest port d'entrée size (pinpoint). Other characteristics did not show any significant clinical difference. Pinpoint size or smaller port d'entrée suggests better visual outcomes in pediatric endophthalmitis.

Key words: Intravitreal antibiotics, Pediatric endophthalmitis, Visual prognosis, Vitrectomy

Endophthalmitis is an intraocular inflammation involving both posterior and anterior segments, caused by bacterial or fungal infections [1,2]. The incidence of endophthalmitis ranged widely from 2% to 41% due to geographic, alimentary, and genetic factors [3]. According to the transmission route, endophthalmitis is divided into endogenous (inoculation of the pathogen in the intraocular region following hematogenous dissemination through blood-ocular barrier) and exogenous (direct pathogen inoculation into the eye, e.g., penetrating injury and intraocular surgery) [4]. Approximately 90% of endophthalmitis cases were due to exogenous causes.³ Prompt diagnosis and treatment of infection source are important factors in the endophthalmitis approach. Pediatric endophthalmitis presents with great challenges, due to delayed presentation, the complexity of gaining accurate history, and a tendency of highly contaminated causative agents [5,6]. Despite aggressive and prompt treatments, the visual prognosis of endogenous endophthalmitis remains poor [2,4] In a systematic review involving 342 endogenous endophthalmitis [2], 41% of cases achieved a visual acuity (VA) 20/200 or better, 35% had it worse than 20/200, and 19% required either evisceration or enucleation. During the past decades, studies and research have been looking for potential factors affecting the final visual outcome, with large heterogeneity results among studies.

Published literature on pediatric endophthalmitis in Indonesia is still scarce. This case series conducted in a National Referral Hospital (RSCM) in Jakarta, Indonesia, was intended to elucidate this topic.

CASE SERIES

A case series was conducted using medical and microbiological records of all pediatric endophthalmitis patients treated in RSCM, Jakarta, Indonesia, from January 1, 2017, to December 1, 2017. A total of five pediatric patients were documented; four of exogenous causes (80%) and one of endogenous cause (20%). All exogenous endophthalmitis were preceded by solid trauma: Wire, scissors, metal ruler, and palm leaf rib.

Case 1


A 7-year-old boy was struck by a wire in his left eye while playing with his friends. He was admitted to the hospital with complaints of corneal rupture and endophthalmitis. The patient presents with VA light perception with disturbed projection (LPDP). He underwent corneal rupture repair and pars plana vitrectomy (PPV). The patient was also given antibiotics through intravitreal and intravenous route; thus has a final AV no light perception (NLP) on a 6-month follow-up.

Case 2

A 5-year-old girl presented with corneal rupture after accidentally stabbed her own right eye with a scissor. She

Correspondence to: Andi Arus Victor, Jalan Kimia No. 8-10, Jakarta Pusat, Indonesia. E-mail: arvimadao@yahoo.com

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was admitted to the hospital with modal AV of LPDP. After undergoing corneal rupture repair, PPV, and antibiotics administration via intravitreal and intravenous injection, her 6-month monitoring AV was 1/300.

Case 3

An 11-year-old boy had punctured his left eye with a metal ruler while studying in school. He was presented with a hypopyon and AV of 1/300 DP. He underwent corneal rupture repair surgery, PPV, intravitreal, as well as, intravenous antibiotics. However, his final AV at 6-month did not show any difference.

Case 4

An 8-year-old girl had a palm leaf rib pointed to his left eye and presented with AV 1/300 WP. She underwent PPV and antibiotics injections through the intravitreal and intravenous routes. At the 6-month follow-up, her final AV improved to 20/40.

Case 5

A 14-year-old boy was admitted to the emergency department with complaints of blurred vision with previous dental infection. His presenting AV was LPWP. After undergoing PPV, intravitreal, and intravenous antibiotics, his final AV at a 6-month follow-up was NLP.

Of all the patients, specimen cultures were extracted from vitreous humor (exogenous) and corneal scrap (endogenous). The microorganisms found in cultures were *Staphylococcus epidermidis* (coagulase-negative *Staphylococcus*) (40%), *Klebsiella pneumoniae* (20%), and *Acinetobacter lwoffli* (20%).

Mechanical trauma of exogeneous endophthalmitis was classified based on the Birmingham Eye Trauma Terminology [7] as penetrating trauma. Further classification based on Ocular Trauma Classification Group [8,9], included presenting VA, RAPD status, and involved zone. Some RAPD status could not be assessed due to hypopyon. The involved zone was classified into the zone I (the whole cornea including corneoscleral limbus), II (corneoscleral limbus to a point 5 mm posterior into the sclera), and III (posterior to the anterior 5 mm of the sclera) [8,9]. Onset to hospital admission and procedures varied between the patients. All patients underwent PPV and received both intravitreal also systemic antibiotics. Among all patients, only one patient (20%) had a VA of 20/40, while other patients had a VA of 1/300 or worse. Details of the cases are summarized in Table 1.

DISCUSSION

Endogenous endophthalmitis is responsible for 2–8% of endophthalmitis incidence [10]. In Thordsen *et al.* [6], pediatric endogenous endophthalmitis accounted for 12.5% in two distinct patients; both were immunocompromised (leukemia and infant with *Candida* sepsis) [6]. Immunocompromised patients are prone to higher risks, emphasized with predisposing conditions

such as diabetes mellitus (33%), intravenous drug use (5%), HIV infection (3%), malignancy (3%), autoimmune disease (3%), and others [2].

Sources of endogenous infection should be identified and treated promptly. Some of the most prevalent included liver abscess (19%), lung infections (8%), endocarditis (8%), soft tissue infection (7%), urinary tract infection (6%), meningitis (6%), and others.² *Klebsiella* infections in liver abscess, accounted for 60% of endogenous endophthalmitis throughout Asia [4]. In our series, one endogenous endophthalmitis was presented with an odontogenic source. The patient came with poor oral hygiene including multiple caries. He experienced gradual blindness 1 week before hospital admission. The delayed presentation might play a role in the NLP final VA outcome in this patient. Approximately 90% of endophthalmitis cases were of exogenous cause [3]. A 10-year collected data from 1995 to 2005 [6] revealed that 87.5% of pediatric endophthalmitis were exogenous, with ocular trauma (44%) and previous ocular surgery (38%) as the most common etiologies. Our series found similar results with 80% of the cases being of exogenous cause.

Both endogenous and exogenous endophthalmitis are medical emergencies. Available managements for endophthalmitis are intravitreal antibiotics (IVTab), intravitreal corticosteroids, and vitrectomy [2-6,11]. Although received timely aggressive treatments, the clinical outcome for endophthalmitis patients remained poor [2,4]. Weng *et al.* [4] reported the mortality rate of endophthalmitis inpatients was 0.97%. A systematic review that included 342 endogenous endophthalmitis [2] showed that 41% achieved final VA 20/200 or better, 35% had it worse than 20/200, and 19% required evisceration or enucleation. Clavell *et al.* [12] reported that none of the patients had a final useful visual function. Around 57.1% of patients who received vitrectomy and IVTab had a visual outcome of NLP, 14.3% of patients needed to undergo enucleation, and the rest treated with IVTab or systemic antibiotic had a final VA of 20/200 (14.3%), 20/400 (14.3%), and 20/240 (14.3%) [12]. In our series, all patients underwent PPV, IVTab, and systemic antibiotics with varied final VA. Almost all patients had a final VA of 1/300 or worse, yet we found one patient with a final VA of 20/40. These findings were in concordance with Sridhar *et al.* [13] who reported that there was no statistically significant correlation between the underlying etiology nor the timing of surgery and the VA outcome. All patients underwent vitrectomy and received intravitreal antibiotics, with 95.7% of patients had a final VA of counting fingers (20/1500) or worse.

The visual outcome of endophthalmitis was correlated with the causative microorganism. A review by Durand *et al.* [11] stated that the chance of visual recovery was poor with Streptococci species. Best visual outcomes occurred in either culture-negative specimens or caused by coagulase-negative Staphylococci [11]. Kuriyan *et al.* [14] found that the most common organisms of endophthalmitis were Streptococcus species (27.1%) and coagulase-negative Staphylococcus (20%), with 97% of cases were exogenous. Almost all patients received IVTab and underwent vitrectomy with 75% had a final VA of <20/400, while the other 25% underwent either evisceration or enucleation [14].

Table 1: Summary of pediatric endophthalmitis cases at the National Referral Hospital in Jakarta, Indonesia, from January 2017 to December 2017

| Age/ gender | Risk Factor | Onset to hospital admission | Hospital presentation to Procedure | Presenting VA | RAPD | Zone | Port d'entree | Follow-up duration | Etiology/ culture Specimen | Procedure | Final VA |
|----------------|-----------------------------|-----------------------------------|---|--|----------------------|------|------------------|-----------------------|--|---|---------------------------|
| 7/M | Ex (wire) | 11 h | 10 h | LPDP | Neg | I | 4.3 mm | 6 months | Klebsiella pneumoniae/ VH | Corneal rupture repair PPV+IVT ab+IV ab | NLP, Phthisis Bulbi |
| 5/F | Ex (scissors) | 3 days | 18 h | LPDP (lensa fragmented, keruh-katarak traumatika) | Neg | II | 3.5 mm | 6 months | N/A | Corneal rupture repair PPV+IVT ab+IV ab | 1/300 |
| 11/M | Ex (metal ruler) | 4 days | <24 h 5 days | 1/300 DP | N/A e.c. hypopyon | II | 5.5 mm | 6 months | Staphylococcus epidermidis/ VH | Corneal rupture repair PPV+IVT ab+IV ab | 1/300 |
| 8/F | Ex (palm leaf rib) | 1 day | 12 h | 1/300 WP | N/A e.c. hypopyon | I | pinpoint | 1 months | Staphylococcus epidermidis/ VH | PPV+IVT ab+IV ab | 20/40 |
| 14/M | Ed (dental infection) | 7 days | 44 h | LPWP | Neg | N/A | N/A | 6 months | Acinetobacter lwoffii/Corneal swab | PPV+IVT ab+IV ab | NLP |

Ex: Exogen, Ed: Endogen, LPDP: Light perception with disturbed projection, DP: Disturbed projection, LP: Light perception with projection, Neg: Negative, N/A: Not available (difficult to assessed due to corneal haziness/hypopyon), VH: Vitreous humour, PPV: Pars plana vitrectomy, IVT ab: Intravitreal antibiotics injection, NLP: No light perception

Sridhar *et al.* [13] found Streptococcus (19%), Coagulase-negative Staphylococcus (14%), and MRSA (Methicillin-resistant *Staphylococcus aureus*) (4%) as the most common causative agents. In our study, the microbe found in one patient with the best final VA (20/40) was *S. epidermidis* (coagulase-negative Staphylococcus). Another patient who also had *S. epidermidis* in his specimen had a final VA 1/300 and was presented with the largest size of port d'entree of 5.5 mm (causative agent: metal ruler) and the latest hospital admission (4 days).

Studies reporting the size of port d'entree for endophthalmitis were very limited, most of which evaluated gauge port's size during vitrectomy. Park *et al.* [15] reported that gauge port sizes were unrelated to endophthalmitis prognosis. In our study, one patient with the best final VA of 20/40 was found with the smallest port d'entree (pinpoint) from a penetrating trauma of the palm leaf rib and was admitted to the hospital 1 day after the onset. Cultures showed *S. epidermidis* (coagulase-negative Staphylococcus), which had been found for having the best visual outcomes in endophthalmitis beside culture-negative. There was one patient with shorter onset to hospital admission (11 h) yet had a final VA of 1/300, and presented with a larger port d'entree of 4.3 mm from direct penetration of wire. Cultures showed *K. pneumoniae*, known as the most prevalent microorganism in endogenous endophthalmitis with poor visual outcome [4].

CONCLUSION

Despite aggressive timely treatments, visual prognosis is poor in both endogenous and exogenous endophthalmitis.

The best final VA 6/12 was found in the smallest port d'entree size (pinpoint). Other characteristics did not show any significant clinical difference. Pinpoint size or smaller port d'entree suggests better visual outcomes in pediatric endophthalmitis.

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