



Endophthalmitis Post Traumatic Corneal Laceration: A COVID-19 Delayed Treatment Impact, What Should We Do?

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KEYWORDS

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ABSTRACT:

Introduction: Endophthalmitis can occur through trauma. One of its risk factors are rural trauma, wound size, and delayed repair.

Objectives: Lacinia at quis risus sed vulputate odio ut enim. Orci porta non pulvinar neque laoreet suspendisse interdum. Consequat mauris nunc congue nisi vitae suscipit. Morbi quis commodo odio aenean.

Methods: Three years old girl's left eye was stabbed by scissors. Initially, this patient was handled by a general practitioner and given antibiotic eye drops. Three days later, she had decreased vision and COVID-19 symptoms then were referred to our center. The patient has a 0.5x10mm full-thickness corneal laceration, corneal melting, and thick fibrin membrane in her left eye. Following the COVID-19 screening result found negative, corneal suturing was performed in the ER operating room. After surgery, LE USG has shown vitreous opacity and persistent corneal white membrane. Therefore, the patient was given ceftazidime intravitreal afterward. The white membrane was no longer active one month after surgery, but the left eye was no light perception. Similar results were obtained in 6 months and 1 year postoperatively.

Results: Delay in the initial action of more than 24 hours is a risk factor for post-traumatic endophthalmitis and COVID-19 often causing delays because of patient afraid of going to hospital or referral problems. The presence of hypopyon/fibrin membranes in the anterior and a vitreous opacity in the posterior segment are markers for enforcing endophthalmitis. Daily postoperative follow-up is needed, and intravitreal antibiotics may be considered if there is no improvement within 48-72 hours.

Conclusions: Early intravitreal antibiotics may be a solution for this condition. In addition, hospital referral management needs to be modified to adapt to changing global conditions that occur today.

1. Introduction

Laceration is a pattern of injury of which tissues are torn or cut.¹ Corneal laceration, as part of corneal injury and ocular trauma, is defined as a cut in the cornea commonly caused by high-speed objects penetrating the eyes.^{2,3} Corneal laceration size and shape vary from partial to full-thickness and from simple linear to complex stellate form.⁴ It can be diagnosed from the presence of ocular pain, decreased vision, positive Seidel test, irregular pupil, intraocular foreign body, and intraocular contents prolapse that might show after the trauma.⁴

In the case of penetrating eye injury, prompt diagnosis, immediate referral, removal of the intraocular foreign body (IOFB), if present, and surgical repair are needed to be performed quickly in order to preserve patient visual acuity.⁵ The treatment goal of corneal laceration is to get

watertight closure repairment, normal anatomy restoration and prevention of case progression. Urgent repairment is required to reduce the risk of further complications, the risk of infection and to reduce the rate of tissue necrosis, and also to alleviate patient discomfort or pain.⁴ Referral should be done forthwith to a facility which provides ophthalmic surgeons, imaging facilities, such as orbital x-ray and ultrasound or CT scan, and an operation room which is capable of removing IOFB, giving intravitreal antibiotic and surgical repair done immediately.⁵

Corneal laceration can progress and develop complications such as posttraumatic endophthalmitis, retained intraocular foreign body, wound leak, suture issues, iris damage, cataract, infectious keratitis, retinal detachment, posttraumatic glaucoma, sympathetic



ophthalmia and even vision loss. These complication can be avoided by proper treatment, from giving antibiotic pre and post operative to intraoperative surgical technique.⁴ In the era of COVID-19 pandemic, a delayed presentation and treatment due to the fear of the pandemic itself or hospital referral management system is another challenge to be concerned about.^{6,7}

This report presents a case of a toddler who suffered from corneal laceration of which was complicated by posttraumatic endophthalmitis. Though surgery was delayed related to COVID-19 pandemic, corneal repairment was successfully performed.

2. Objectives

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3. Methods

A 3-year-old girl was presented with a history of penetrating injury by a scissor on her left eye 4 days

prior. Following the incident, the patient developed pains, scratches without bleeding on the lid of the left eye and was given a warm compress. The day after, the patient was brought to a general practitioner with additional signs and symptoms which are eyelid oedema, difficulty to open the eye, discharge, and white spot in the centre of her left eye. She was treated with antibiotic syrup, painkiller and an antibiotic eyedrops. The parents were not able to present the specific names of the medicines as the they had forgotten them. The patient was then referred to a specialist the following day. Due to insurance matter, the referral was delayed for another day. At the ophthalmologist, the left eye was found to have developed pus and, therefore, the patient needed to be referred to the tertiary hospital to get examined by a more skilled clinical expert. For the time being, she was given gatifloxacin hemihydrate eyedrops every hour. At the fourth day post-incident, there was also a delay in the referral system due to COVID-19 lockdown at the appointed hospital and, consequently, the patient needed to be sent to another hospital.

At arrival, patient was not cooperative during vision and ocular motility test in both eyes and complained about decreased vision. Intraocular pressure on both eyes were normal in palpation. Left eye examination showed inflamed and spasm of palpebra. Conjunctiva showed positive corneal vascular injection (CVI) and pericorneal vascular injection (PCVI). There was no chemosis. The corneal examination found oedema and a 0.5 x 10 mm full-thickness corneal laceration, corneal melting with thick fibrin membrane covering corneal laceration. Laceration edge, Seidel test, pupil and lens were not able to be evaluated. Fundal reflex was diminished. Otherwise, fellow eye examination was normal.

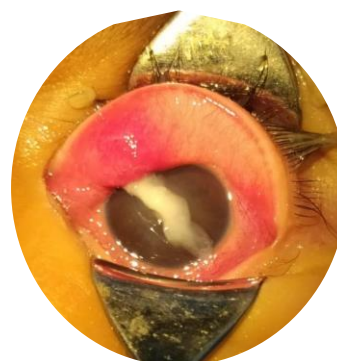


Fig 1. Left eye showing positive CVI and PCVI with thick fibrin membrane



She was diagnosed with endophthalmitis post traumatic corneal laceration. The affected eye was cleaned and was given injection. She had been planned to be hospitalized and to be done exploration of the eye and corneal repairment with general anaesthesia when her laboratory and chest x-ray results led to suspicion of COVID-19 infection. The patient had had history of fever 3 days prior, improved without medicine. Cold, cough, short breathed and recent history of out of town were denied. The patient was then sent to another hospital which treated COVID-19 for screening which then resulted negative.

The following day, the patient was brought back to the operation room and underwent left eye examination under general anaesthesia. On exploration, full thickness corneal laceration was found, covered with 10 mm fibrin obscuring visual axis from direction 5 to 11 o'clock. Afterwards, corneal suturing was conducted using 10.0 nylon suture. Post-operatively, the patient was given levofloxacin, fluorometholone, homatropine in form of eyedrops. In addition, she was given oral dexamethasone 0.6 milligram and paracetamol syrup 5 ml and intravenous injection of ceftriaxone 400 milligram.

During the follow up period, two days post operative, ocular ultrasound was obtained and showed vitreous echogenic lesion in form of membrane and particles 50-60 retina, choroid, and sclera (RCS) complex with mild-moderate mobility and choroid thickening. These indicated vitreous opacity in the left eye suspected due to endophthalmitis. She was given ceftazidime intravitreal. One month postoperative, the white membrane was no longer active, but unfortunately the affected eye was left with no light perception. This result is similar with the 6 months and 1 year follow up post operative result.

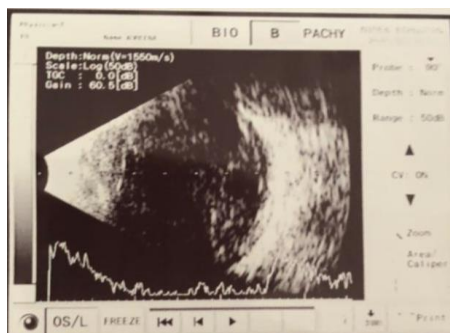


Fig 2. Ocular ultrasound showing opacity in the vitreous body indicating endophthalmitis

One year post corneal laceration repairment, patient's parents were worried about the affected eye cosmetically and requested further examination on the right eye. Apart from the look, no other complaint was raised. Visual acuity test on the right eye was 6/12, then become 6/9 after the cycloplegic administration and using additional lens S+0.75. Other examinations on the right eye were normal: normal intraocular pressure per palpation; no oedema or spasm on the palpebra; no hyperemic conjunctiva; clear cornea; deep anterior chamber; radial iris; 3 mm round pupil with positive light reflex; clear lens; and positive fundal reflex. However, fundal details were unable to be evaluated.

The left eye examinations were similar with the previous follow up result but without oedema and spasmed palpebra, also without hyperemia on the conjunctival. The palpebra had phthisis. Visual acuity showed no light perception, soft intraocular pressure per palpation. Leukoma was seen, showing the same direction with the previous examination and branching to the direction of 1 o'clock. Anterior chamber depth, iris, pupil and funduscopy test were not able to be obtained.

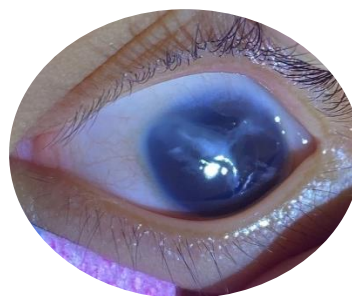


Fig 3. One-year follow up left eye examination

4. Results and Discussion

Based on *Riset Kesehatan Dasar (Riskesdas) 2018*, the eye is one of most commonly affected body part in a trauma. The proportion of ocular trauma in Indonesia is 0,5%.⁸ Ocular trauma is one of the most common causes of monocular blindness, ocular morbidity and visual disturbance in pediatric age group following cataract. Children under preschool age often run into ocular trauma at home and during play time.⁹ The mechanism of injury might be caused by sharp objects, blunt objects and traffic accidents. These mechanisms are remarkably associated with worse initial uncorrected visual acuity.



Visual prognosis is better in closed globe injury compared to open globe injury.¹⁰

Corneal laceration is one of ocular trauma types. Birmingham Eye Trauma Terminology (BETT), a group of standardized terminology in describing mechanical eye injuries, describes laceration as a full-thickness wound of the eyewall, cause by sharp objects which occurs at the impact site in an outside-in mechanism. It is then classified further base on the present of exit wound or IOFB. When an exit wound is found, it is called perforating injury. Whereas only entrance wound is found, it is termed penetrating injury.¹¹

Treatment of ocular trauma in pediatric, especially in younger age group, needs several considerations. First, evaluation and treatment might become more challenging because the patient does not cooperate well. Topical anesthesia and reducing patient anxiety may help. If primary survey shows operative treatment is needed soon, delaying complete eye examination until patient is arrived in the operation room and being in general anesthesia is allowed. Second issue in pediatric treatment of ocular trauma is the possibility of blindness or amblyopia due to the trauma itself or the treatment.⁹

It should be kept in mind; the priority of treatment focus might be different in every stage. In primary therapy, the focus is the trauma itself. Whereas in secondary treatment, improving visual disturbance is the priority. Nevertheless, reducing time between incidence of trauma and recovering by optimizing visual acuity in optical media should be aimed at every ocular trauma.⁹ Children under 7 year of age should be focused on aggressive treatment to avoid amblyopia.¹²

When receiving patient with corneal laceration, or any other penetrating eye injuries, there are several remedies and immediate management that can be performed in the emergency room. Right after finishing the examination, the eye should be protected using an eye shield.⁵ Local and systemic pain control is needed as prior treatment. Antiemetic might be used to prevent vomiting and inadvertently increase in intraocular pressure.¹² Prophylaxis broad spectrum antibiotic should be administered, intravitreal or systemically. Some studies showed zero to very low rates of endophthalmitis in open globe injury cases that were given intravitreal antibiotics. Patient tetanus prophylaxis also needs to be updated.

Patient is prepared for surgery and should have nothing per oral.^{5,13}

Surgery is considered when wound cannot be re-approximated without causing corneal deformity. If the wound is 1-2 mm, fibrin glue is a better option than using sutures to prevent introducing further injury and to prevent the increase of points of infection. Sutures, if required, can be done using 10-0 nylon with very meticulous corneal re-approximation.¹² It was done to the patient in this case.

A devastating complication from penetrating injury is posttraumatic endophthalmitis, one of the notable causes of poor visual outcome.⁴ The incidence of this complication is 3.3% to 17%.⁴ The presence of cells and flare in the anterior chamber, hypopyon and vitreous exudates are signs of posttraumatic endophthalmitis.¹⁴ This patient primary repairment was delayed more than 24 hours which might become the rational of such complication. A delayed primary surgical repair is one of the primary risk factors of posttraumatic endophthalmitis in penetrating trauma. After an open globe injury, it is recommended to do primary repair within 24 hours. Repairment which is delayed more than 24 hours is related with higher risk of port-traumatic endophthalmitis without intraocular foreign body.¹⁵

In all patients with history of eye trauma, physicians should always consider endophthalmitis as the onset of symptoms are highly variable. Some patients might present with signs of infection right after the injury, but some might develop endophthlamitis within weeks to years after. In order to prevent case progression, as mentioned above, prophylaxis antibiotic should be given. Either oral, intravenous or intraocular antibiotic has shown success in preventing the occurrence of posttraumatic endophthalmitis in open globe injuries.¹⁵ In a high risk patient in developing endophthalmitis, intravitreal antibiotics is preferred.¹⁶ This study is aligned with a meta-analysis which shows that there is a reduction in risk in developing endophthalmitis post-open globe injuries by giving intravitreal antibiotics.¹⁷ Broad spectrum antibiotic such as vancomycin and ceftazidime given intravitreal can be used against Gram negative and positive organism, including MRSA or methicillin resistant *Staphylococcus aureus*. After receiving culture and sensitivity reports, definitive antibiotics treatment should be chosen. Commonly used



broad spectrum antibiotics used in this case are intravitreal vancomycin and ceftazidime. If ceftazidime resistance in Gram negative endophthalmitis is found, intravitreal imipenem 50 microgram/0.1 ml might be used.¹⁴ In comparison to other route, intravitreal antibiotics is considered better in delivering drugs since it can afford highest concentration in vitreous humor.¹⁵

COVID-19 pandemic effects healthcare system practice pattern, including the practice at the eye department. From the perspective of number, there is a significant decline in the number of patient with ocular trauma presenting in the emergency department.⁶ This might be different in countries where lockdown restriction is comparatively weaker than in other countries in the same period or in countries where the number of COVID-19 is low, for example, in Australia. The number of patients presenting to the emergency department with ophthalmic presentations might differ.¹⁸ A study by Agrawal et al. during COVID-19 pandemic observed that patients with ocular trauma had a delayed presentation. This might be due to the nationwide strict lockdown and fear of the pandemic itself. In this study, delayed presentation related with disease progression of corneal ulcer of which could have been treated medically in the patients presented in early stage.⁶

Therefore, a guideline for ophthalmology care as a form adaptation during COVID-19 pandemic is needed. Indonesia ophthalmologist association, *Perhimpunan Dokter Spesialis Mata Indonesia (PERDAMI)*, has released a specific guideline in 2021. Based on the guideline, ocular trauma, referring to this case, is classified as priority 1. This means, the case is considered as an emergency with risk of blindness within 3 months. Surgery in trauma cases, even in the pandemic period, should not be postponed. Another concern is the need to separate every patient who needs to be in the operation room based on their COVID-19 status. If the patient is confirmed or suspected, it is recommended that those patients operation be done in hospitals with COVID-19 care facilities.^{7,19} As mentioned above, patient in this case was sent to another hospital due to suspicion of COVID-19 infection based on her laboratory and chest x-ray result, which caused further delay on her corneal repairment. As a form of adaptation, follow up in ocular trauma surgery can be conducted by operating surgeon at day 1 postoperative. Routine postoperative follow up is

required and need to be scheduled at the discretion of the surgeon. Follow up schedule which minimizes times of visits without compromising the treatment outcome is advised. The use of telemedicine in follow up post operative patient might become a promising way.¹⁹ Therefore, hospital referral management during pandemic needs to adjust the implementation of the provided guidelines in Indonesia, specifically in ophthalmologic care, to achieve optimal care.

5. Conclusion

This case reports a 3-year-old child with corneal laceration caused by scissors with posttraumatic endophthalmitis as the complication. Exploration and corneal repairment was performed, although delayed, successfully by using 10-0 nylon suture. Follow up ultrasound showed signs of endophthalmitis and therefore ceftazidime was injected via intravitreal route. During follow up in one, six months and 1-year postoperative, white membrane was not active but affected eye showed no light perception. Complications in this case might be due to delayed primary repair more than 24 hours since the incidence of trauma due to COVID-19 pandemic. On one hand, early intravitreal antibiotics may become the solution in this case to prevent endophthalmitis development as well to prevent further visual disturbance as it allows drug delivery in its highest dose concentration on site. On the other hand, from healthcare system perspective, adaptation and implementation of guideline in eye care system is required to be able to achieve better performance and to reduce the risk of case progression.

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