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## Case Report

# Post-Ocular Trauma Corneal Staphyloma in a Child Living in an Underdeveloped Region of Eastern Indonesia

Ratna Sitompul Gladys Kusumowidagdo Eiko B. Matiur  
Julie D. Barliana Rita S. Sitorus Saleha Sungkar

Faculty of Medicine, Universitas Indonesia – Cipto Mangunkusumo Hospital,  
Jakarta, Indonesia

## Keywords

Corneal staphyloma · Trauma · Complications · Underdeveloped regions · Indonesia

## Abstract

Ocular trauma occurring in children often leads to visual impairment or blindness when it is not properly managed. This often occurs in underdeveloped regions with difficult access to professional care at local health facilities. We report a case of post-trauma corneal staphyloma in an underdeveloped region of eastern Indonesia to illustrate the importance of proper management of ocular trauma in areas lacking such expertise and where patients have difficulty accessing even basic health care. During a community health outreach in Southwest Sumba, eastern Indonesia in May 2017, a 7-year-old boy presented with white protrusion of the left eye of 3 years' duration following an event of sharp trauma. The patient lived in an inaccessible and impoverished area. Upon contemporary examination, visual acuity of the left eye was 1/300 while that of the right eye was 6/6. Anterior examination revealed corneal staphyloma of the left eye, and its posterior segment could not be evaluated. The patient was transported to an eye care center in Jakarta, receiving a stock prosthesis implant while awaiting a corneal evisceration procedure with dermofat graft. Ocular trauma is one of the most common causes of visual impairment in children. This case illustrates the consequences of inadequate post-trauma management and the importance of prevention of infection.

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## Introduction

Ocular trauma is one of the most common causes of unilateral childhood blindness. There have been no studies on the incidence of ocular trauma morbidity in Indonesia. Reports from the USA showed that 25.4% of childhood ocular trauma events required prompt treatment, often with hospitalization [1]. Studies from Pakistan and Israel showed that most children suffering ocular trauma belonged to the 6- to 11-year-old age group [2, 3].

Abbott and Shaw [4] estimated that 3.9 million people suffer blindness due to childhood ocular trauma, and 18 million suffered from visual impairment, ranging from 8.85 to 15.2 events per 100,000 children per year. Blindness or impaired vision carries heavy psychological and financial burdens, significantly decreasing quality of life. The primary and most effective means of preventing this morbidity and its consequences is the prompt and effective treatment of acute ocular trauma and its clinical management to full recovery.

The impoverished rural poor have difficulty accessing such care, and the risk of irreversible loss of sight or visual acuity with ocular trauma may be greatly elevated. Southwest Sumba in eastern Indonesia suffers geographic isolation and undeveloped economic activity, underpinning inadequate delivery of health care services. There is a single hospital serving the 1,445-km<sup>2</sup> regency with 319,199 residents. That hospital does not employ an ophthalmologist nor is it equipped with basic ophthalmologic tools and equipment. Apart from great distances (and the cost of travel), residents are often reluctant to go to hospital unless the condition deteriorates to what they consider as seriously threatening. Moreover, their environment includes difficult access to clean water and poor sanitation and hygiene conditions [5].

During a community health outreach in Southwest Sumba, we encountered a boy with a history of ocular trauma suffering from corneal staphyloma of the left eye and unilateral blindness. The progression to blindness in this case could almost certainly have been prevented with proper ocular management of trauma. This case report illustrates the importance of that treatment principle and the consequences of lack of facilities and difficult access to health care.

## Case Description

The Faculty of Medicine at Universitas Indonesia conducted an ophthalmologic health outreach clinic in a remote area of Sumba Island in eastern Indonesia in May 2017. A 7-year-old boy presented with a whitish protrusion of the left eye of 3 years' duration following an event of sharp trauma to that eye – the patient's mother reported an accidental cut to his left eye while he played with a kitchen knife 3 years previously. Immediately after the accident he was brought to the local hospital in Southwest Sumba and seen by a general practitioner. The patient complained of a red eye, pain, and loss of vision. He was given an eye patch, eye drops, and oral antibiotics and managed as an outpatient, i.e., sent home. Two months after the injury, the patient complained of an enlarging whitish protrusion of his left eye. He was then brought to the local community health center and was given oral medication. The protrusion stopped enlarging after the visit to the community health center, and the patient sought no further medical assistance until presenting to us.

Upon examination on May 16th, 2017, visual acuity of the left eye was hand movement while that of right eye was 6/6. Anterior examination revealed corneal staphyloma of the left

eye, and its posterior segment could not be evaluated. Arrangements were made for the patient to travel to Jakarta for further examination, assessment, and treatment.

Ocular ultrasonography showed vitreous opacity. The patient was referred for corneal evisceration with dermofat graft. While waiting for a custom prosthesis, the patient received a stock prosthesis implant. The surgery was carried out by an experienced pediatric ophthalmologist on May 30th, 2017, and was successful. The cosmetic appearance of the patient was dramatically improved by the loss of the disfigured and dysfunctional eye. The injury and its physical consequences had caused the boy to become shy, reclusive, and unhappy. After surgery he became more outgoing, engaging, and happy. For illustration purposes, photos of the patient before and after surgery are shown in this paper (Fig. 1, 2, 3, 4). Permission to attach the patient's photos was obtained from the parents.

## Discussion

Approximately 1.4 million children around the globe suffer childhood blindness of various causes [6]. Most of them live in low-income countries where many residents are impoverished and have poor access to limited health care delivery services [5]. Childhood blindness may be avoidable or unavoidable. Most common causes in low-income countries include corneal scarring (mostly due to vitamin A deficiency), measles, ophthalmia neonatorum, and as a consequence of traditional medicine [7]. Although not included in the focus of the Vision 2020 Program, childhood blindness due to trauma should be considered. While trauma may not be preventable in the public health or clinical sense, the progression to blindness with trauma is very often preventable.

Ocular trauma at home is one of the most common causes of unilateral blindness in children. In the case reported here, trauma indeed occurred at home in a period without parental supervision. Despite immediately seeking medical attention, the child did not receive appropriate care and management, resulting in the anterior corneal staphyloma and, ultimately, loss of the eye. A study in Egypt showed that open globe injuries are the most common compared to other injuries to the eye, with clinical presentations dominated by ruptured globes and lacerations, consisting of penetrating injuries, intraocular foreign bodies, and perforating injuries [8]. This study also identified boys older than 5 years without parental/adult supervision and being active in outdoor activities as risk factors of pediatric ocular trauma [8]. Another study in China by Cao et al. [9] showed similar findings in 1,018 patients over a 10-year period, with open globe injuries being the most common followed by closed globe, chemical, and thermal injuries. A further study in Turkey showed that from 94 children undergoing surgical intervention for open globe injuries, the most common causes of the injury were metal objects like knife and scissors, or wood, glass, and others [10].

The trauma occurred in this patient led to perforation of the ocular globe causing protrusion of uveal tissue in the cornea. Anterior staphyloma, such as in our case, occurs due to untreated corneal perforation due to penetrating injury. Such etiologies will penetrate the iris and anterior chamber leading to adhesion of the iris to the cornea. When the cornea perforates, the iris plugs the wound and a pseudocornea forms over the wound. Due to intraocular pressure, the wound will protrude. The slightest disruption to this wound could lead to rupture and phthisis [11]. Keratitis, or inflammation of the cornea, usually caused by microorganisms such as bacteria, viral, or fungi, may worsen the patient's condition. Untreated, this leads to destruction of the corneal layer, as occurred in our patient. Among those etiologic agents, fungi are the most virulent and damaging (OR = 5.86; 95% CI: 2.06–16.69), and

most commonly caused by trauma, especially in developing countries [12]. Fungal invasion of the corneal layer may lead to necrosis and tissue damage, scarring, and opacification, which will eventually disrupt the visual axis. When treated promptly and effectively, and with follow-up management of these wounds, very serious complications leading to blindness or visual impairment may be completely avoided.

The history and consequences of the case we report here illustrate the vital importance of this treatment principle. Ocular trauma is not preventable, but its consequences are. Diagnosis and treatment of these conditions is extremely important. What occurred in this case represents one of many consequences suffered by people living without access to good health care. Geographic isolation and rural poverty (as was the case of our patient) carry other disadvantages important to health, i.e., people living below the poverty line along with poor hygiene practices and poor education. Their district suffers from a high prevalence of helminthiasis – evidence of poor hygiene practices. Residents rarely wash their hands and bathe due to the scarcity of clean water. They also practice open defecation and live closely with domesticated household and farm animals. Such an environment, combined with traumatic injury to the eye, would often end as our case did, but without the surgical cosmetic rescue.

The WHO Vision 2020 noble objective emphasizes the importance of bringing basic eye care to remote areas as an essential human right. This case report stresses the importance of the success of that vision. It is important for governments along with nongovernmental organizations and other charities to recognize the importance of providing health facilities with basic ophthalmologic capacities. If permanent placement in such remote areas proves too challenging, periodic visitations by nearby ophthalmologists may save the vision of many. For patients requiring emergency treatment, the government must provide the funds for referral to available ophthalmic centers, even if several thousand kilometers distant, as in our case.

## Conclusion

Ocular trauma is one of the most common causes of visual loss or impairment in children. We present a case of pediatric ocular trauma resulting in anterior corneal staphyloma following inadequate clinical care and management. This case stresses the importance of post-trauma management and prevention of infection.

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## Statement of Ethics

Ethical approval was obtained from the ethical committee of the Faculty of Medicine, Universitas Indonesia (clearance No. 877/UN2.F1/ETIK/2016, protocol No. 16281). Photos were taken with parental permission.

### Disclosure Statement

The authors have no conflicts of interest to disclose.

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**Fig. 1.** The patient's condition prior to surgery. In the left eye, conjunctival injection is present along with thinning of the corneal layer, causing almost all of the intraocular tissue to protrude forward. Other intra-ocular structures could not be assessed.



**Fig. 2.** The patient's condition on day 1 after surgery. The left eyelid seems to be mildly edematous and hyperemic. The eyeball is no longer protruding. Both left eyelids are temporarily fixated.



**Fig. 3.** The patient's condition 1 week after surgery with temporary prosthesis implant. Parts of the left eyelids are still edematous.



**Fig. 4.** The patient's condition 1 month after surgery with custom prosthesis implant. Both eyes look symmetrical with similar color of conjunctivae and cornea along with similar interpalpebral distance. The left eyelid is still mildly edematous.