

Successful Management of Double Penetrating Ocular Trauma with Retinal Detachment and Traumatic Endophthalmitis in a Child

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The prognosis of double penetrating ocular trauma in children is usually guarded. We report the good anatomic and functional outcome in a child with double penetrating ocular trauma associated with retinal detachment and traumatic endophthalmitis. A 5-year-old boy presented to the emergency room with pain and tearing in his left eye after a penetrating ocular injury by a rusted steel wire. After examination under anesthesia, both entrance and exit wounds in the sclera were found, and were complicated with inferior retinal detachment. There were signs of infection such as corneal edema, increased cell, flare and hypopyon in the anterior chamber, and vitreous opacity. The post-traumatic endophthalmitis was successfully treated with prompt intravenous and intravitreal antibiotics injection. The patient subsequently underwent scleral buckling and transpupillary indirect laser photocoagulation operation on the 10th day after trauma. The retina was completely reattached 2 weeks later, and his vision recovered to 6/10 in his left eye after a 6-month follow-up. Prompt use of antibiotics and meticulous surgical intervention are essential in the successful management of such patients. [*J Chin Med Assoc* 2008;71(3):159–162]

Key Words: penetrating ocular injury, traumatic endophthalmitis, traumatic retinal detachment

Introduction

Eye injuries are the leading cause of monocular visual disability and blindness in children. Between 29% and 35% of ocular injuries occur in children;¹ children thus represent a disproportionately large percentage of total ocular trauma. The evaluation of children is often hindered by poor cooperation and inadequate trauma history during preoperative ocular examination. Difficulties in the examination of young children persist in the follow-up period. Therefore, there are few studies regarding the final outcome following eye injury in children in both Eastern and Western reports. Herein, we report a case of successful management of double penetrating ocular trauma associated with retinal detachment and traumatic endophthalmitis in a child.

Case Report

A 5-year-old boy presented to our emergency room with eye pain and tearing after a penetrating ocular injury of his left eye by a rusted steel wire. The initial best-corrected visual acuity was 6/7.5 in the right eye and 6/8.6 in the left eye. There was a penetrating wound over the left lower eyelid corresponding to the primary conjunctival and scleral entrance wound at the 5 o'clock location. The Seidel test was negative. Slit-lamp biomicroscopy revealed flare ++, cell +++ and hypopyon in the anterior chamber. There were also moderate corneal edema and severe conjunctival congestion and chemosis in the left eye. The lens was clear without damage. On examination under anesthesia, both the entrance (3.5 mm from limbus, 2.5 mm in



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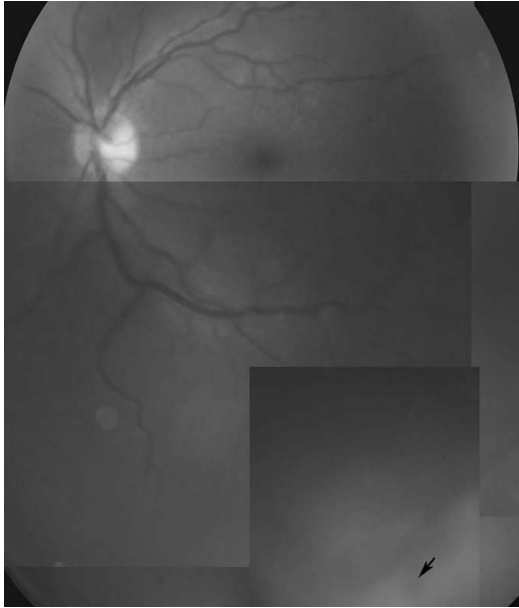


Figure 1. Fundus examination reveals a traumatic retinal hole (arrow) associated with surrounding retinal edema, retinal hemorrhage, and inferior retinal detachment.

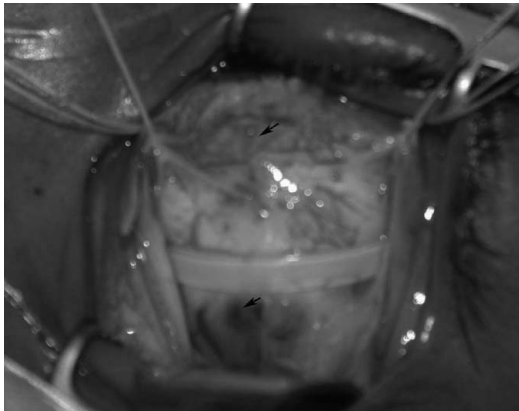


Figure 2. Both the entrance and exit scleral wounds were noted at the 5 o'clock location during scleral buckling operation. The entrance wound (top arrow), 2.5 mm in length, was located 3.5 mm from the limbus. The exit wound (bottom arrow), 1 mm in length, was located 15 mm from the limbus.

length) and exit (15 mm from limbus, 1 mm in length) scleral wounds were found at the 5 o'clock location. This penetrating injury was complicated with severe retinal edema, and a traumatic retinal hole associated with inferior retinal detachment (Figure 1). Post-traumatic endophthalmitis was diagnosed by the presentation of increased hypopyon and vitreous opacity the next day. Aqueous and vitreous specimens were obtained for microorganism culture.

Endophthalmitis was treated by an immediate intravitreal antibiotics injection (vancomycin 1 mg/0.1 mL and ceftazidime 2 mg/0.1 mL). One repeat

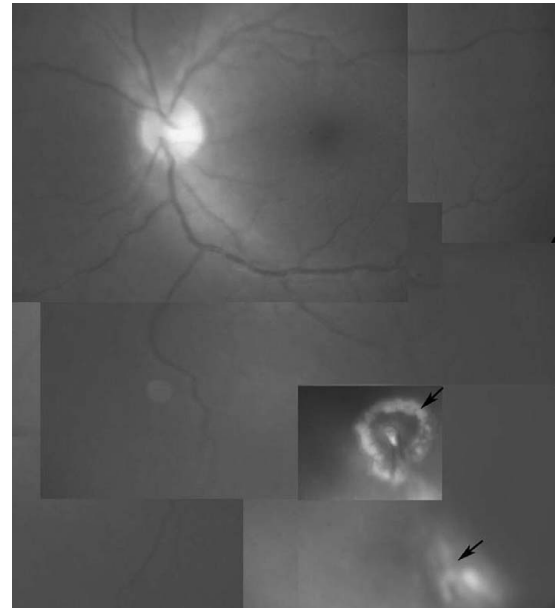


Figure 3. Fundus photograph shows the retina to be well attached after a 6-month follow-up. The retinal hole was sealed by the prior laser photocoagulation (top arrow). There was pigmented chorioretinal atrophic change (bottom arrow) at the peripheral retina between the entrance and exit wounds.

injection was given 2 days later. The intravenous regimen of antibiotics was vancomycin 200 mg Q6H and ceftazidime 1,000 mg Q8H. The initial topical antibiotics instillation was 5% vancomycin every 30 minutes alternating with 5% ceftazidime eye drops, and gradually tapered within 2 weeks according to the clinical signs of the endophthalmitis. Skull X-ray and computed tomography (CT) scan revealed no radio-opaque intraocular foreign body (IOFB). The microbiologic culture of aqueous and vitreous disclosed no bacteria or fungus growth 1 week later. After the endophthalmitis was controlled, retina examination revealed persistent subretinal fluid with increased vitreous degenerative change. The patient underwent scleral buckling operation and transpupillary indirect laser photocoagulation around the retinal hole on the 10th day after trauma (Figure 2). The retina was completely reattached 2 weeks later, and his vision recovered to 6/10 in the left eye after a 6-month follow-up (Figure 3).

Discussion

Penetrating ocular injuries, caused by a sharp object trauma, often cause significant visual impairment and remain one of the leading causes of noncongenital unilateral blindness in children.¹ Double penetrating injury (also called perforating injury) is defined as 2

full-thickness lacerations with entrance and exit wounds. Surgical exploration and detailed vitreoretinal evaluation should be performed for penetrating ocular injuries in children. Imaging studies, such as CT scan and ultrasonography, are useful tools to detect any retained IOFB. Vitrectomy is indicated in the repair of penetrating ocular injuries if there is retinal detachment and concurrent vitreous hemorrhage, retained IOFB, or traumatic endophthalmitis with progression.²

Post-traumatic endophthalmitis is an important complication of ocular penetrating injuries. This devastating complication occurs following 2–7% of penetrating injuries; its incidence is higher in association with IOFB and in rural settings. *Bacillus cereus* infection accounts for almost 25% of cases of post-traumatic endophthalmitis. *B. cereus* endophthalmitis most commonly occurs in soil-contaminated ocular injuries. A rapid and fulminating clinical course may lead to severe visual loss. The independent risk factors associated with post-traumatic endophthalmitis are dirty wound, ruptured lens capsule, and delay in primary repair of more than 24 hours.³

The mainstream treatment of post-traumatic endophthalmitis is prompt intravitreal antibiotics injection. Some patients are given a repeat injection in 48 hours if the endophthalmitis is still active and the patients are doing poorly. Because of the relative virulence of possible organisms, it would be appropriate to consider vitrectomy in some of these patients. Early emergency vitrectomy, to remove the infecting microbiologic load and allow better diffusion of antibiotics within the eye, may be helpful in retaining useful vision. However, vitrectomy in the early post-traumatic period may be more difficult and risky due to the edematous cornea and increased vitreoretinal adhesions, particularly at the vitreous base. Some reports suggested that a therapeutic vitrectomy is indicated if there is no therapeutic response 48 hours after the first intravitreal antibiotic administration, or dramatic deterioration within 24 hours.³ In our case, the endophthalmitis was much improved after the initial intravitreal antibiotics and was brought under control with the repeat injection and continued usage of intravenous and topical antibiotics.

Retinal detachment is another significant factor associated with poor visual outcome after ocular penetrating trauma in children. Moreover, proliferative vitreoretinopathy and scarring process are more extensive in children, leading to preretinal membrane formation and retinal tractional detachment, with a poor reattachment rate of 9–46%.^{1,4} Some authors recommend that eyes undergoing primary repair for open-globe injuries should have prophylactic encircling scleral buckle placed at the time of surgery, even if retinal

detachment is not present.⁵ In addition, prophylactic scleral buckle is an important adjunct procedure during vitrectomy for retained IOFB to prevent subsequent occurrence of retinal detachment.⁶ However, as there are limited data regarding the use of the scleral buckle in pediatric traumatic retinal detachment, the decision should be made individually, as in the current case.

The mechanism of penetrating trauma in children often differs from that in adults.^{7,8} The particularly devastating settings in children are missile injuries from BB or air guns. Their visual outcome is usually poor, with a high enucleation rate. Farr et al⁹ reported that 22% of ruptured globes in children resulted from BB/air gun accidents. Sternberg et al¹⁰ reported that 86% of patients with penetrating BB injuries underwent enucleation. The current case of double penetrating injury presenting with both entry and exit wounds is another common penetrating trauma in children. In our case, fortunately, the anterior entry scleral wound was located at the pars plana area and self-sealed without uvea tissue protrusion. The posterior scleral exit wound was allowed to heal spontaneously without suture. Experimental animal studies have shown that scleral wounds are closed with fibrosis by day 7 after injury.¹¹ Attempts at posterior wound closure are difficult, and may increase the risk of iatrogenic damage to the eye. We performed transpupillary indirect laser photocoagulation around the traumatic retinal hole on the 10th day after trauma to enhance the absorption of subretinal fluid.

Our case fortunately had good anatomic and visual outcome, which is rare in the literature.^{1,4,9} The visual outcome of perforating trauma in children is generally disappointing. Previous studies showed that patients under 4 years of age had the worst outcome, with 63% of cases achieving final vision less than 5/200.⁹ Other poor prognostic factors included late surgery, severe vitreous hemorrhage, poor visual acuity at presentation, large laceration wounds greater than 10 mm, missile and BB injuries, and presence of retinal detachment.¹

In conclusion, we present a typical case of double penetrating ocular injury associated with retinal detachment and traumatic endophthalmitis in a 5-year-old child. Prompt use of antibiotics and meticulous surgical intervention are essential in the successful management of such patients.

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