

# Occupational eye hazard—a case of perforating industrial nail injury to the eye

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## Abstract

**Purpose:** To report the management and outcome of an unusual case of occupational perforating ocular industrial nail injury involving the posterior pole.

**Methods:** Observational case report.

A 48-year-old Chinese male construction worker presented with perforating industrial nail injury.

**Results:** The patient underwent primary globe repair and foreign body removal followed by staged pars plana vitrectomy with endophotocoagulation and cyclopropane gas tamponade for repair of the vitreous incarceration at the posterior exit wound, a subsequent laser retinopexy with silicone oil tamponade for an inferior retinal detachment extending from the perforation site and finally silicone oil removal with a scleral fixated intraocular lens implant. His best-corrected visual acuity improved to 20/100 six months after the initial injury.

**Conclusion:** Perforating ocular injuries involving the posterior pole often present with severe visual impairment and significant management challenges. We report a case of perforating ocular nail injury, which was managed successfully with staged surgical procedures.

**Keywords:** Penetrating eye injury, Occupational injury

## Case

Ocular trauma remains an important cause of monocular blindness globally.

We report a case of a 48-year-old Chinese male construction worker who presented with perforating industrial nail injury to his right eye. The 2.5 inch industrial nail propelled from his fellow worker's worksite and stabbed his right eye just as he was passing by. He was not using any eye protective device (EPD) at the time of injury.

A metallic industrial nail was seen protruding from the right eye (Figure 1a). The left eye was unremarkable. Visual acuity of the right eye was 20/800 and left eye was 20/20.

A computed tomography (CT) scan of the orbits (Figure 1b) showed that the nail had penetrated the cornea, the lower half of the lens, and exited the globe through

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the posterior pole with the tip of nail abutting the lateral rectus muscle.

An emergency primary globe repair and foreign body removal was performed under general anaesthesia. Despite disinsertion of the lateral rectus at its insertion and extensive globe exploration, the posterior exit site could not be reached. The metallic nail was then removed using a slow but steady force to avoid collateral damage to the intraocular structures to the extent possible. The prolapsed iris was excised and the corneal wound was repaired. An anterior vitrectomy and lensectomy were performed. As the posterior exit wound site appeared to have sealed internally with an overlying blood clot which covered the macula, it was decided not to disturb the site further at this stage.

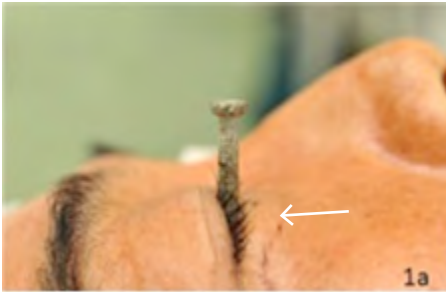


Fig 1a. Lateral view of the metallic industrial nail seen protruding from right eye.



Fig 1b. CT scan showing a perforating industrial nail injury with a true antero-posterior course through the right eye.

Two weeks after the primary repair, he underwent a pars plana vitrectomy (PPV) with endophotocoagulation and cyclopropane gas tamponade for repair of the vitreous incarceration at the posterior exit wound site. Despite the gas tamponade, two weeks after the second surgery, he developed an inferior retinal detachment extending from the perforation site. He subsequently underwent additional laser retinopexy and silicone oil tamponade.

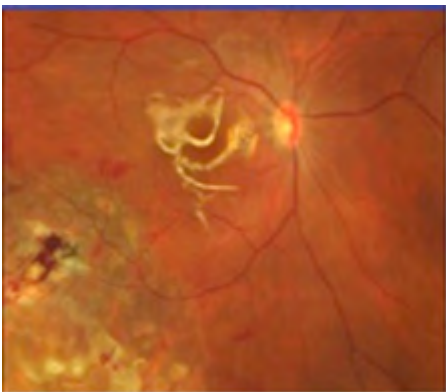


Figure 2. Fundus of the right eye showing an attached retina with silicone oil tamponade and the healed posterior perforation site inferotemporal to the macula.

The silicone oil was removed four months later and the eye received a scleral fixated intraocular lens. Six months after the initial injury, the best-corrected visual acuity of right eye was 20/100. Fundus examination revealed an attached retina with a healed posterior exit wound inferotemporal to the macula (Figure 2).

## Discussion

Perforating ocular injuries often present with significant visual impairment and have a guarded prognosis. The final visual outcome depends on the site of impact and ocular structure(s) involved. We describe a case of perforating nail injury, which was successfully managed with staged surgical procedures.

The visual prognosis of a perforating injury which involves the posterior pole of the eye is typically very poor. Other factors that prognosticate poor visual outcome are poor initial visual acuity and presence of a relative afferent pupillary defect<sup>1</sup>. Our patient presented with involvement of the posterior pole and poor initial vision. There was no reverse afferent pupillary defect.

The primary aim of initial surgical management is restoring anatomic integrity of globe and removal of the intraocular foreign body. Because of the true antero-posterior (AP) course of the nail through the eye in our case, the exit wound was not easily approachable externally and hence had to be left unrepaired after removal of the nail.

There are some controversies regarding the initial management of open-globe injuries involving the posterior segment<sup>2</sup>. One such controversy is early vitrectomy. Vitrectomy has improved the prognosis of perforating injuries, and a meta-analysis showed anatomical success in 69% and a visual acuity of  $\geq 5/200$  in 56% of the eyes<sup>3</sup>. The timing of vitrectomy for perforating injuries can be early (within 2 days), delayed (7-14 days) or late (after 30 days). Many studies advocate early vitrectomy for successful visual outcome especially if there is retinal detachment and concurrent vitreous haemorrhage, retained intraocular foreign body or traumatic endophthalmitis<sup>4</sup>. However, early vitrectomy often presents technical difficulties due to poor visibility, lack of posterior hyaloidal separation, bleeding and re-opening of the exit wound. As our patient had an unrepaired posterior exit wound, early vitrectomy was not attempted due to concern of reopening of the exit wound, the poor visibility and potential guarded prognosis associated due to suspected macular involvement. Multiple staged surgical procedures are often required for recovering visual function after the initial wound repair. Our patient underwent multiple staged procedures to restore the ocular anatomy and function.

Preventive measures such as use of EPDs are vital in light of limited surgical abilities to manage perforating ocular injuries involving the visual axis. Our patient was not using an EPD when the injury occurred. Woo *et al*<sup>5</sup> have reported that 75.3% of patients with work-related ocular trauma had not used an EPD. Preventive strategies such as overcoming language barriers, providing education to improve compliance of EPDs and increasing availability of EPDs to all workers should be implemented.

In summary, staged surgical procedures can restore anatomy and provide fairly good visual function in eyes with serious ocular perforating nail injuries involving

the posterior pole. However, preventive measures continue to be of paramount importance. Implementation and reinforcement of measures of EPD use and creation of awareness of proper use of hazardous tools such as the nail gun can potentially reduce occupation-related perforating ocular injuries.

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