




## CASE REPORT

# Navigating Recurrent Corneal Injury: Addressing Challenges in Lawnmower-Related Ocular Trauma

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## Abstract

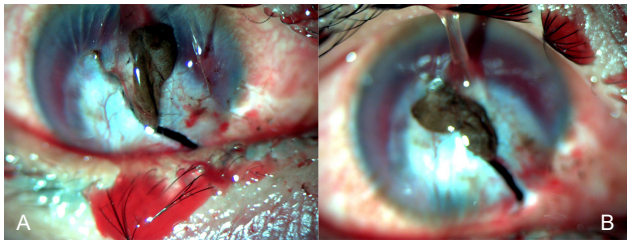
**Introduction:** Ocular trauma resulting from workplace accidents, such as those involving lawnmowers, can cause severe eye injuries, potentially leading to significant visual impairment. **Case Presentation:** A 42-year-old male presented with sudden vision loss, redness, and pain in the right eye following a workplace accident. Examination revealed a full-thickness corneal laceration, hyphema, and anterior chamber prolapse of the iris and vitreous. The patient underwent a surgical repair. However, recurrent injuries necessitated additional intervention, ultimately resulting in a corneal leucoma. Although postoperative symptoms initially improved, wound dehiscence led to recurrent vitreous leakage, complicating recovery. This case highlights the challenges associated with managing recurrent corneal injuries and underscores the importance of precise surgical techniques to optimize outcomes. **Conclusion:** This case emphasizes the complexity of recurrent ocular trauma, particularly in workplace-related injuries such as lawnmower accidents. A comprehensive patient history, individualized management approach, and multidisciplinary collaboration are essential for improving visual prognosis and surgical success.

**Keywords:** full-thickness corneal injury; lawnmower trauma; iris prolapse; vitreous hemorrhage; wound dehiscence

## Introduction

Annually, 1.6 million cases of blindness and 2.3 million cases of low vision are attributed to eye injuries. Within the demographic aged 25-49 years, ocular injuries are most prevalent, with a higher incidence among males.<sup>[1]</sup> According to a population-based study<sup>[2]</sup>, workplace-related incidents contribute significantly to these injuries, often exacerbated by a lack of eye protection. A meticulous assessment of the injury is imperative, necessitating an analysis and classification of the trauma based on the ocular trauma classification group. This classification encompasses factors such as the mechanism of injury, initial visual acuity, pupillary involvement, and, predominantly, the posterior location of the wound. It is essential to maintain awareness regarding the potential presence of intraocular foreign bodies (IOFB), given their association with 40% of globe ruptures.<sup>[3]</sup> Open globe injuries, encompassing full-thickness defects of the eyewall (cornea, limbus, and sclera), represent critical ocular emergencies resulting in substantial visual morbidity.<sup>[4]</sup> Immediate intervention is imperative to prevent irreversible vision loss. The injuries that are induced by sharp or blunt trauma can lead to hemorrhage and extrusion of intraocular content, including vitreous, lens, iris, and retina. Severe cases may compromise the eye's structural integrity, causing expulsive choroidal hemorrhage and increasing the risk of endophthalmitis, particularly in the presence of retained intraocular foreign bodies.<sup>[5],[6]</sup>

The cornea is a transparent structure in front of the eye that allows light to enter the center of the fovea, forming an imaginary line of the visual axis. A minor cornea abrasion has a good prognosis because the healing response to a corneal abrasion depends on the defect size and depth. However, severe damage, which causes opacity of the structures along the visual axis, is associated with poor prognosis.<sup>[7]</sup> Corneal healing involves cellular migration, proliferation,



**Figure 1.** (A) Full-thickness corneal laceration with iris prolapse; and (B) a gel-like substance suspected as vitreous.

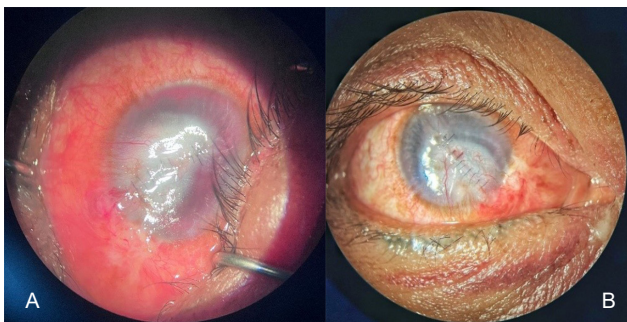
differentiation, and extracellular matrix remodeling. Limbal stem cells are crucial in regenerating the corneal epithelium, covering defects, and restoring normal thickness through basal layer proliferation. This process may take up to six weeks. Incomplete healing can lead to recurrent corneal erosions. More profound injuries transform keratocytes into fibroblasts and myofibroblasts, potentially causing opacification and scarring.<sup>[8]</sup>

This study presents an exceptional case involving recurrent open ocular injury at the same site, highlighting the unique challenges in surgical repair posed by a cornea marked by a leucoma.

## Case presentation

### Patient's history

A 42-year-old male was presented to the emergency department with visual loss, redness, and pain in the right eye for three hours after an injury during landscaping with a lawnmower. The patient was wearing a glass of goggles when the incident occurred. It was suspected that the particle of glass caused the injury. The best visual acuity of the right eye was light perception in four quadrants and 6/6 in the left eye, respectively. Extraocular muscle movements of both eyes were unremarkable. Slit-lamp microscopic examination revealed an 8-mm full-thickness oblique laceration from the superior-temporal to inferior-nasal aspect of the cornea 1 mm from the limbus and grade-4 hyphema. The iris prolapse was presented with a gel-like substance, suspected as vitreous extruded (Figure 1). Some minor abrasion of the inferior palpebra was presented. The subsequent examinations of the posterior segment and optic nerve head were difficult and omitted to be performed.



**Figure 2.** (A) Full-thickness corneal laceration after repair with simple interrupted sutures; and (B) Upon admission on the first day, the patient exhibited diminished conjunctival redness and the presence of hyphema.

The patient had a penetrating ocular injury in the right eye ten years ago, leaving a permanent corneal leucoma with a 5 mm diameter extending from the inferior limbus to the pupil. There was neovascularization on the corneal surface. The patient's general vital signs were stable. His medical history was unremarkable.

### Treatment

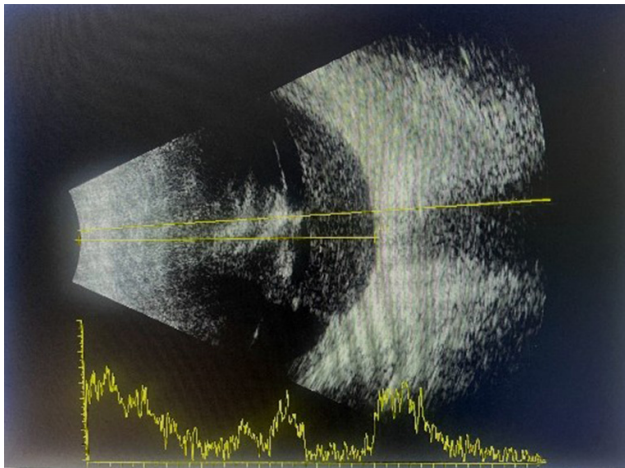
To prevent contamination, compound eye drops containing antibiotics and corticosteroids were administered, and then a patch was applied to immobilize the traumatic eye. Immediate surgery was scheduled. Before surgery, the patient needed to be informed of several issues regarding the visual potential, such as the eye having no perception of light and the risk of sympathetic ophthalmia. Therefore, surgery could not be conducted, and evisceration was the only option to manage this issue. After careful examination with a microscope in the operating room, the patient underwent wound debridement, iridectomy, and repair of a corneal laceration under general anesthesia. The wound was repaired with 10-0 nylon interrupted sutures (Figure 2A). After surgery, the patient was hospitalized for three days. The surgical procedure was effective, resulting in the resolution of hyphema and the absence of any indications of post-operative infection.

During hospitalization, the patient received cefuroxime 1 g injection twice a day (BID), tranexamic acid 500 mg oral three times a day (TID), mefenamic acid 500 mg TID, eyedrops of tobramycin 3 mg and dexamethasone 1 mg six times a day at the right eye, atropin sulfate 0.5% eyedrop BID in the right eye. The conjunctival redness and hyphema were reduced. Nevertheless, leukoma and corneal opacity are consequences of previous injuries (Figure 2B).

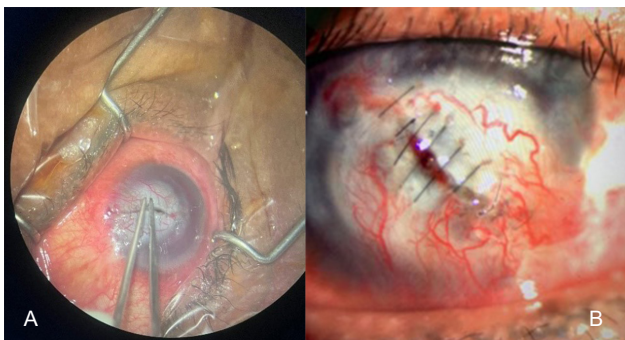
Ocular ultrasonography was conducted 24 hours after surgery and revealed opacity of the anterior segment of the eye and vitreous hemorrhage in the right eye, located at the central and peripherally in the inferior quadrant. The peripheral hemorrhage measured approximately 8 mm in height and 5 mm in width, demonstrating homogeneous echogenicity attached to the posterior retina. It was more hypochoic than the central hemorrhage (Figure 3). No lens dislocation, scleral rupture, IOFB, or retinal and choroidal detachment were noted.

### Follow-up

One-week post-discharge, the patient attended a follow-up clinic visit. No reports of pain or conjunctival redness were noted. Unfortunately, there was wound dehiscence and discharge of a gel-like substance reminiscent of the previous incident (Figure 4). Therefore, anterior vitrectomy and wound closure of the cornea were re-performed for the patient on the next day with local anesthesia. Following a re-surgery to address wound closure, notable neovascularization of the cornea was observed.



**Figure 3.** Ocular ultrasonography of the right eye revealed dense and uniform echoes in the posterior segment, which could indicate a vitreous or retinal pathology, such as a vitreous hemorrhage or retinal detachment.



**Figure 4.** (A) A week after surgery of the right eye with wound dehiscence on the cornea; and (B) Following a re-surgery to address wound closure, notable neovascularization of the cornea was observed.

## Discussion and conclusions

Ocular injuries represent frequently encountered clinical cases in the emergency room. A study in Indonesia on the 5-year incidence of ocular trauma reveals that ocular trauma predominantly occurred in the 21–30 years age group (20.9%).<sup>[9]</sup> The incidence is higher in workplaces that demand high eye exposure, such as landscaping and mechanical industry, domestic accidents, or sports. Even wearing an eye-protection aid is linked to a higher occurrence of injuries caused by shattered glass. Consequently, it is not recommended to utilize glass spectacles and preferably be integrated into safer material polycarbonate protective eyewear.<sup>[10]</sup>

Lawnmower injuries are typically classified into two categories: direct and missile injuries. The predominant cause of injury stems from direct contact with the lawnmower blade, with the extremities noted as the most vulnerable regions of the body. On the other hand, Missile injuries result from flying objects propelled by the rotating blades. Notably, the incidence of missile injuries to the eye is considerably higher compared to other areas of the body surface.<sup>[11]</sup> In this instance, the patient's right eye sustained an impact from glass fragments originating from protective eyewear, breaking due to a reperussion

of a rock propelled by a lawnmower. Consequently, a full-thickness corneal laceration presented with full hyphema, extrusion of the iris and vitreous, and vitreous hemorrhage. The injury occurred in the same eye that had experienced a similar traumatic incident in the previous decade with a corneal opacity known as leucoma. However, their kinetic energy determines the severity of injury caused by foreign bodies.

Spontaneous post-operative wound dehiscence is a critical ocular emergency that can complicate corneal surgery. The emergency re-suturing of the wound, ensuring proper apposition of its edges, is essential to preserve the anatomical and visual function. The ultimate visual outcome depends on factors such as the cause of dehiscence, the force of the injury leading to dehiscence, involvement of intraocular structures, and any associated ocular morbidities.<sup>[12]</sup> Wound dehiscence can be caused by factors such as a compromised corneal surface with leucoma, which could impact the suture's stability, the elevated IOP that pushed the wound forward, systemic condition, or surgical technique.

The cornea's ability to heal effectively becomes compromised, particularly in previously repaired wounds. Each episode of trauma disrupts the delicate balance of the wound-healing process, including the migration of epithelial cells, stromal remodeling, and collagen deposition. Scar tissue that forms due to corneal injury is biomechanically weaker than normal corneal tissue, and subsequent injuries further compromise its structural integrity.<sup>[13]</sup> This results in a cycle of healing failure, in which the corneal wound is perpetually at risk of dehiscence due to structural fragility, chronic inflammation, and repeated mechanical stress. The high-speed projection of debris causes trauma that significantly impacts the cornea's biomechanical stability. This disrupts the wound-healing process by activating inflammatory pathways and upregulating enzymes such as matrix metalloproteinases (MMPs), which are responsible for degrading the extracellular matrix.<sup>[14]</sup>

In our case, the open injury was addressed using interrupted sutures. In other research<sup>[15]</sup>, continuous sutures are preferable because they are more effective than interrupted sutures in maintaining global integrity, resulting in fewer complications. However, limited studies report the incidence of wound dehiscence on the cornea with leucoma. A further factor that leads to wound dehiscence could be the existence of an IOFB, which we did not find through ultrasonography, leading to delayed wound healing and an increase in IOP. In up to 40% of penetrating eye injuries, complications arise due to the existence of an IOFB.<sup>[16]</sup> In this case, the patient exhibited wide corneal leucoma and initial compromised visual acuity indicative of an unfavorable visual prognosis.



The presented case underscores the multifaceted nature of ocular injuries, particularly in the context of workplace-related trauma and the unique challenges posed by lawnmower accidents. The recurrence of injury in the same eye, coupled with the presence of corneal leucoma, accentuates the importance of comprehensive patient history and ongoing surveillance in managing ocular trauma cases. Furthermore, the discussion sheds light on the intricate interplay of factors influencing wound healing and surgical outcomes, emphasizing the need for tailored approaches in addressing corneal injuries, particularly in cases involving pre-existing corneal pathologies. While further research is warranted to elucidate optimal surgical techniques and management strategies, this case serves as a poignant reminder of the critical importance of vigilance, early intervention, and multidisciplinary collaboration in mitigating the impact of ocular trauma on patient outcomes and visual prognosis.

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