



CORNEAL ULCERATION FOLLOWING DELAYED INTERVENTION OF A METALLIC FOREIGN BODY: A CASE STUDY ANALYSIS

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ABSTRACT

The 42-year-old male patient industrial worker suffered complications in eyes due to delayed treatment for foreign metallic body which was residing in the cornea; the patient first tried an attempt of self-medication by washing with tap water after exposure of iron in a metal fabricating industry which worsened his complaint and further delay professional advice. On examination, a metallic foreign body was found in his right cornea along with surrounding stromal edema and a corneal ulcer measuring 1.5 mm x 1.2 mm. Delay in presentation allowed the colonisation of pathogens leading to mild, sterile corneal ulcer and anterior chamber reaction. Treatment included the immediate removal of the foreign body under slit-lamp view, with a treatment regimen that was to be followed using Moxifloxacin 0.5% to cover bacterial infection and Natamycin 5% to address possible fungal contamination. The patient was further treated with a cycloplegic agent in addition to lubricating eye drops for inflammation reduction as well as healing of the cornea. He was also instructed on proper usage of first aid measures with particular reference to wearing of protective eyewear during industrial work as preventive measures against this similar occurrence from happening in the future. This case highlights the very high risks of delayed intervention in ocular injuries and the high incidence of complications from improper self-management, especially in an industrial setup. If foreign bodies had not been removed promptly and targeted antimicrobial therapy was not used, the prognosis for this patient would have been much worse as seen in the complete resolution of the ulcer and restoration of 6/6 visual acuity in both eyes. The report would point out the work-place safety protocols, protective equipment, and early professional intervention in preventing long-term ocular morbidity.

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INTRODUCTION

Corneal foreign body injuries are common occurrences during industrial exposure, which frequently lead to significant ocular morbidity such as abrasions, infections, and potentially blindness.¹ This should be treated promptly and appropriately in a bid to avoid complications such as corneal scarring and prolonged recovery.² Ocular trauma accounts for about 15% of work-related injuries; many are due to exposure to metal and dust, such as those associated with construction and manufacturing industries.³ It is seen from a study that, while foreign bodies are the most common cause of ocular injuries in industrial settings at 71.3%, still so much has to be done and can be done in the management of these cases to help prevent complications.⁴ In cases with metallic foreign bodies,

delayed treatment tends to cause major complications to occur, such as infections.⁵ Even inappropriate first aid, like washing the eye with tap water, increases the chances of such complications and prolongs the duration of recovery.⁶ This case report of a 42-year-old male industrial worker who had ill-managed first aid and presented late with corneal foreign body injury. It should be appreciated that such complications would be well avoided by immediate medical intervention. It also reminds that prevention is critical, as in the case of safety glasses, which are still under-accepted. The percentage of workers who did not wear goggles at the time of injury is 57%.⁵ Educational programs on eye safety are also very important in reducing the incidence of this kind of injury dramatically.^{3,4} Underlining the significance of time and preventive measures, this report needs to bring out awareness in reducing the rate of occurrence as well as the effects of corneal foreign body injuries within risky industrial environments.⁷

METHODS

This case report examines a 42-year-old male industrial worker who presented with a corneal foreign body injury. The patient initially self-medicated by washing his eye with tap water after iron particles entered his right eye while working at a metal fabrication facility. Upon presentation at the hospital, a detailed slit-lamp examination was performed to assess the extent of the injury. The patient's visual acuity, corneal condition, and the presence of a metallic foreign body with surrounding stromal edema were documented. The treatment regimen included the removal of the foreign body under topical anesthesia, followed by a combination of antibiotic and antifungal therapy to prevent infection. Lubricating eye drops and cycloplegic agents were also prescribed to aid in healing and reduce inflammation. The patient was educated on proper first aid measures and the importance of wearing protective eyewear during industrial work to prevent future injuries.

RESULTS AND DISCUSSION

Case Report:

A 42-year-old male industrial worker arrived with a major complaint of foreign body feeling, redness, wetness, and minor discomfort in his right eye (R/E) that began on September 24, 2024. On September 23, 2024, the patient stated that an iron particle had entered his right eye while working at a metal fabrication facility. Initially in pain, he sought to wash his eye with tap water, hoping this would relieve his symptoms. However, during the next 24 hours, he noticed a worsening of his symptoms, including redness, tearing, and a gritty sensation. By the next morning, he had photophobia and hazy vision, causing him to seek immediate medical attention.

Examination:

- Visual Acuity:
 - Right Eye (R/E): 6/12 unaided, worsening with pinhole correction to 6/18
 - Left Eye (L/E): 6/6 unaided
- Slit Lamp Examination:
 - Right Eye (R/E): A metallic foreign body was noted embedded in the peripheral cornea with surrounding stromal edema and a mild, sterile corneal ulcer measuring 1.5 mm x 1.2 mm. The ulcer showed no signs of stromal thinning, but there was notable conjunctival hyperemia and mild anterior chamber reaction (+1 cells).
 - Left Eye (L/E): Clear cornea, no signs of trauma or inflammation.



Figure 1: slit lamp image of the right eye a corneal ulcer with an embedded metallic foreign body and surrounding oedema

Procedure:

On 24th September 2024, foreign body removal was performed under topical anaesthesia using Proparacaine HCL 0.5%. The iron particle was carefully removed using a sterile spud under slit lamp visualization. Post-procedure, fluorescein staining revealed a persistent epithelial defect and early signs of stromal infiltration, suggestive of a secondary corneal ulcer due to delayed presentation and prolonged exposure to the foreign body.

Given the presence of the ulcer and the risk of infection, an aggressive treatment plan was initiated. A combination of antibiotic and antifungal therapy was started, alongside lubricants and a cycloplegic agent.

Treatment

Following the procedure, the patient was given a unique combination of medications to aid in the recovery process. This included E/D Milflox 1 drop in the right eye (R/E) every two hours for the first 48 hours, and then tapered to 6 times a day for the next week (Moxifloxacin 0.5%). Since the metallic foreign body was suspected of having fungal involvement as well, E/D Natamet (Natamycin 5%) was indicated 1 drop, 6 times a day for 7 days. Also, to prevent ciliary spasm and photophobia E/D Homide (Homatropine 2%) was given once every night for four days. E/D Refresh Tears (lubricating eye drops) were prescribed for use at the rate of 1 drop, 4 times a day for 14 days so as to enhance corneal healing and relieve discomfort secondary to the procedure. The patient was instructed to keep resting and refrain from any forms of eye trauma or irritants within his working conditions, as well as taught on the need to wear safety goggles as a way of preventing these injuries from happening again.

Follow-Up:

In the follow-up visit after a week, the slit lamp examination revealed that the epithelial defect had entirely healed and the corneal ulcer had resolved without any residual infiltration of the stroma. The anterior chamber reaction was resolved, R/E was clear and showed no evidence of either neovascularization or scarring. L/E was normal. In both eyes, visual acuity was noted at 6/6 without aids which was suggestive of complete recovery. The patient maintained the intensive topical regimen for an extra three days, during which the antifungal drops were tapered off. To discourage further ocular injuries, protective ocular helmet was also issued to the patient. Lastly, final prescription indicated refractive error of Plano / +0.50 × 180 degrees for both eyes, plus +1.50 for reading. Glasses were given to the patient for both distance and near vision. The patient was advised to stop all medications except for Refresh Tears, which were to be used for another two weeks to aid in corneal healing and facilitate comfort.

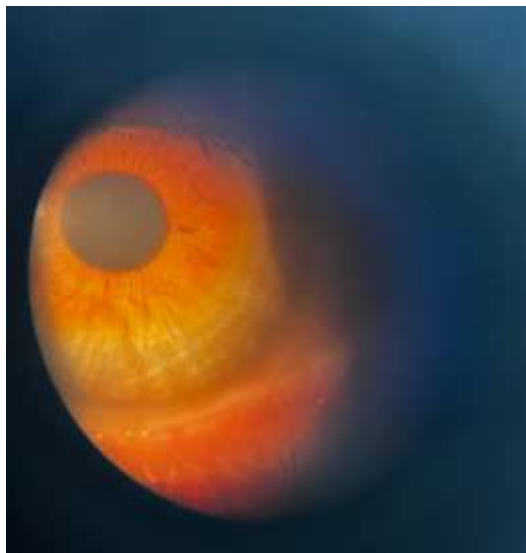


Figure 2: Slit Lamp Image of the Right Eye Following Foreign Body Removal, Showing Resolving Corneal ulcer and Reduced Inflammation.

Work-related threats such as corneal foreign body injuries are quite common in job areas engaged in metal manufacturing^{5,8}. Delayed intervention in cases of corneal foreign body injuries, especially those metallic in nature, allows the pathogens to settle infections, with bacterial and fungal being the most common. Bacterial infections are frequently caused by *Staphylococcus aureus* and *Pseudomonas aeruginosa*, while *Aspergillus* and *Fusarium* species are commonly seen in cases of fungal keratitis, especially when the foreign body was organic or when the care was delayed initially. Treatment of corneal ulcers includes broad-spectrum antibiotics along with antifungal agents such as Natamycin and Voriconazole if the suspicion is that it is a fungal cause. Lubricating eye drops and cycloplegics ensure comfort and minimize inflammation; prevention by ensuring consistent wearing of PPE prevents that initial injury. Education toward proper first aid, particularly avoiding tap water and arriving in the emergency department ASAP, could help minimize complications as well.

The case report here focuses on complications due to delayed medical attention and inappropriate self-medication practices such as lavage with tap water for the eye. Such measures can invite pathogens into the eye, leading to infections that are likely to be bacterial or fungal in etiology, especially when metallic agents are used. Prompt professional treatment will prevent graver effects such as corneal ulcers or even vision loss.

In this patient, a sterile corneal ulcer and an anterior chamber reaction had developed due to prolonged contact with the foreign object and an inflammatory reaction. However, timely removal of the foreign body and broad-spectrum antibiotics along with antifungal therapy prevented further complications. Thus, the full recovery of the patient with restituted 6/6 visual acuity upholds the concept of early and appropriate treatment. Such injuries can be prevented by ensuring that the individuals involved receive proper education on the use of protective eyewear in industries. ⁹The use of safety goggles and ocular helmets can help prevent foreign body entry into the eye, hence reducing complications; they can be part of regular protocols for safety¹⁰. Education about the need to seek immediate medical care after eye injuries can also reduce complications from those injuries.⁵

Other advanced diagnostic tools like AS-OCT are very useful in detecting and treating corneal foreign bodies ¹¹The AS-OCT imaging technique allows for good resolution of the cornea, which is helpful in the management of more complicated cases.¹¹ Intraocular foreign bodies also require a timely diagnosis to avoid, if possible, the loss of vision or the globe, and strategies in the treatment of IOFBs vary with regard to the material, site, and size of the foreign body.^{12,13}

It would probably require prevention, early diagnosis, and judicious treatment appropriately adjusted to the patient's clinical settings for favorable outcomes and relief of some burden of ocular injuries within high-risk environments.^{7,12,14}

CONCLUSION

The need of prompt intervention and appropriate therapy of ocular foreign body injuries is underscored by this instance, particularly for industrial workers who are susceptible to such accidents.¹² Self-management techniques and delayed therapy can have serious side effects, such as secondary infections and corneal ulcers, which can eventually impair eyesight. Improving recovery outcomes and averting future events can be achieved by implementing a complete approach that involves prompt removal of foreign bodies, proper antibiotic medication, and full patient education on ocular safety^{10,15}. In order to reduce the hazards associated with ocular foreign bodies in work settings, healthcare providers are reminded by this instance of the importance of protective eyewear and timely medical attention.^{3,9} The patient's full recovery highlights the need of early detection and treatment in maintaining eye health and function.

DECLARATION OF PATIENT CONSENT

The authors have stated that informed written consent has been taken from the patient before publishing this case report, along with all related medical information, clinical images, and examination findings. All feasible measures have been carried out to ensure that the patient's anonymity is protected based on the ongoing consent process, and the patient has been assured that personal information shall not be published. The patient knows that this case report will be published for academic, scientific, and educational purposes and has given full consent to its dissemination.

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