The initial management of ocular chemical burns in an academic hospital

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Abstract

Purpose: **To report the clinical findings of a case of ocular chemical burns following cement alkali burn to both eyes to illustrate the importance of using protective eye wear and the need for immediate treatment following chemical injury to the eyes.**

Methods: **Case report.**

Results: **A 31-year-old man had a delayed presentation with an occupational injury due to cement in both eyes. He had a Grade 3 chemical burn in his right eye and Grade 1 burn in his left eye. Immediate irrigation was done but his right eye required surgical debridement.**

Conclusions: **This case illustrates the consequences of not using protective eye wear when working with chemical substances and the need for immediate and effective irrigation following chemical injury to the eyes.**

Key words: chemical burns, irrigation, occupational injury

Introduction

Chemical burns of the eye are an ophthalmological emergency and prompt and appropriate management is important to prevent the potentially visually disabling complications of this ocular injury. The purpose of this case study is to illustrate the consequences of not using protective eye wear when working with chemical substances and the need for immediate and effective irrigation following chemical injury to the eyes.

Irrigation of the eye.

Case study

A 31-year-old male patient presented to Chris Hani Baragwanath Hospital with a history of cement burns to both eyes. He was working as a casual labourer on a building site and while mixing cement some of the cement powder entered his eyes. He immediately put his head into a bucket filled with tap water to wash out the cement. He still had remnants of the cement in his eyes and when he went home and he washed his eyes with sugar water. He presented to hospital 23 hours after the initial injury.

On initial assessment, the pH of the conjunctiva in the inferior fornix was 9 in both eyes. Both eyes were irrigated with 500 ml Diphoterine®, a first aid eye wash, and residual cement particles were removed from both conjunctivae. Most of the cement particles from his right eye were removed and the pH was 7 after irrigation. We were unable to remove all the cement particles in his left eye as they were embedded in the conjunctiva and his pH remained 9 after irrigation. Further irrigation was withheld as the patient needed surgical debridement.

On subsequent examination, his visual acuity in the right eye was hand movements and 6/12 in his left eye which improved to 6/6 with pinhole occluder. His lids on the right eye were swollen but he had no burns of the skin. Both conjunctivae were injected and his right eye had cement particles adherent to the conjunctiva under his upper lid. He had four clock hours of limbal ischaemia superonasally in his right eye and no limbal ischaemia in his left eye. His entire right cornea had stromal haze with iris details poorly visible through the cornea. His left cornea was clear with an epithelial defect

of a quarter of the corneal area inferonasally. The anterior chamber of the right eye could not be assessed due to the corneal haze but the anterior chamber in his left eye had no signs of inflammation. The intraocular pressure in his right eye was 18 mm Hg and 10 mm Hg in his left eye. His hazy cornea prevented a view of the lens, vitreous and fundus of his right eye. The media were clear in his left eye and fundoscopy was normal. His injuries were graded according to severity.[1] His right eye had a Grade 3 burn, which indicates three to six clock hours of limbal involvement and 30-50% conjunctival involvement. His left eye had a Grade 1 burn, which has the best prognosis with only corneal involvement and no limbal or conjunctival involvement. He was started on prednisolone acetate 1% drops 4 times a day, atropine sulphate 1% twice a day and chloromycetin ointment 1% three times a day in both eyes. In addition he received oral doxycycline 100 mg twice a day and oral ascorbic acid 2 g four times a day. Due to the residual cement remnants in his right eye medical therapy alone was insufficient and he was taken to theatre for surgical debridement of the remaining cement particles.

Discussion

Chemical burns of the eye form a small fraction of ocular trauma.[2] The majority of injuries are occupational injuries and, because of their more frequent presence in household cleaning agents and industrial and building materials, alkali injuries are more common than acid injuries.[3,4] The injuries caused by chemical burns to the eye can range from mild unilateral conjunctival or corneal epithelial damage to sight threatening bilateral burns. The severity of the injury is related to the surface area of contact, the degree of penetration and the concentration and nature of the agent involved.[5] Injuries caused by alkalis are usually more severe as they penetrate the cornea more effectively than acids. Immediate and thorough irrigation is the most important intervention affecting the prognosis and outcome of ocular chemical burns.[3,6,7] Water or saline is commonly the initial irrigating fluid used but it may not be the most effective fluid to use as large quantities are required to dilute the chemical.[8] New agents, such as Diphoterine®, have been developed which effectively remove the chemical from the eye and neutralise both the acid and alkali.[3,7-9]

Conclusion

Prevention of ocular injury is important when working with chemicals and protective eye wear should always be used. In the occupational setting, factories and building sites should have eye wash solutions readily available. In the event of an injury to the eye/s, immediate and prolonged irrigation of the eye/s should be undertaken. Patients should be taken to their nearest hospital as soon as possible to ascertain the degree of injury. With early treatment some of the blinding complications can be prevented.

Ethics

Ethics approval was obtained from the University of the Witwatersrand Human Research Ethics Committee. The patient signed informed consent after the initial irrigation was performed, having been given an information sheet and an opportunity to ask questions.

"Chemical burns of the eye are an ophthalmological emergency and prompt and appropriate management is important . . ."

Lessons learned

1. The severity of the injury is related to the surface area of contact, the degree of penetration and the concentration and nature of the agent involved.
2. Alkali injuries are more common than acid injuries, and are usually more severe as they penetrate the cornea more effectively than acids.
3. Immediate and prolonged irrigation is the most important intervention.
4. Water or saline is commonly the initial irrigating fluid used but new agents may be more effective.
5. Patients should be taken to their nearest hospital as soon as possible to ascertain the degree of injury.

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