

Facial and eye injury following a fridge cylinder gas explosion

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Introduction

Fridge cylinders contain liquefied petroleum gas (LPG), an inflammable gas of mixture of propane and butane [1]. It's colourless but odourised to give warning during leakage. Injury from accidental fridge cylinder explosion is similar to any other blast injuries in terms of the release of hot gases, blast wave and metal fragments resulting in extensive skin burns, abrasions, penetrating injury and tissue loss [2-4]. Ocular trauma following gas cylinder explosion is rare however, Babar et al reported 20% of ocular trauma to be secondary to gas cylinder and battery explosion [2].

To our knowledge, this is the first case of facial and eye injury following a fridge cylinder gas explosion reported in the literature.

A case report

A 14-year old male welder apprentice presented at our clinic on account of left sided facial burns with left eye (LE) poor vision following a fridge gas cylinder explosion one hour prior to presentation. He was trying to weld an empty leaking fridge cylinder without protective glasses when it suddenly exploded. There was associated left facial burn, reduction in LE vision, tearing, ocular redness and pain. There was no loss of consciousness and no other ocular symptoms. He had no visual impairment prior to the accident.

The other co-workers immediately applied water to his face, wrapped his head with a cloth and brought him to our hospital.

Examination revealed a young boy in painful distress, fully conscious, alert, acyanosed and not in any respiratory distress. He had a left facial first degree burn (2%) and abrasion that respected the mid-line. Visual Acuity (VA) of the right eye (RE) and left eye (LE) was 6/6 and 6/30 respectively. There was LE periorbital oedema with mechanical ptosis and both eyes (BE) were mildly hyperaemic (LE>RE).

There were central cornea and inferior cornea ulcer stained with fluorescein in LE and RE respectively. However, the anterior chambers (AC) in BE were normal.

Pupils in BE were round and reactive (but sluggishly in the LE). Lenses were clear in BE. Fundus examination

revealed a glimpse of a pink disc in the RE. While, LE revealed glimpse of retinal (red reflex) only (Figure 1). A diagnosis of first degree facial burn and BE corneal ulcer was made.

Patient was admitted and managed with copious irrigation of face and both eyes with normal saline and intramuscular tetanus toxoid 0.5ml. To both eyes were also applied flurbiprofen (Ivyflur) drops 8 hourly, tropicamide (Mydriacyl) drops 8 hourly and chloramphenicol ointment at night.

For 48 hours intravenous ceftaxidime 500mg 12 hourly and metronidazole (Flagyl) 250mg 8hourly and then diclofenac (Cataflam) tablets 50mg 8 hourly, metronidazole tablets 200mg 8 hourly and cefuroxime (Zinnat) tablets 250mg 12 hourly. Vitamin C tablets 200mg 8 hourly.

Facial wound was dressed with dermazine (1% silver sulfadiazine) cream 8 hourly.

8 days later the facial wound and cornea ulcer healed without complication (Figure 2). Left eye VA improved to 6/9 on 5 days and then 6/6 on 8 days after admission.

The patient was followed up one week after discharge (15 days after the incident). The facial wound had healed without complications and VA in BE were 6/6 (Figure 3).

Discussion

This case illustrates the danger associated with accidental gas explosion. The mechanism of cylinder gas explosion injury are mainly divided into 4 stages [1].

1. Primary injury -sudden change in the environment caused by blast wave.
2. Secondary injury -flying fragment.
3. Tertiary injury- against stationary object.
4. Quaternary injuries (miscellaneous blast related injuries) encompass injuries caused by collisions, falling masonry, buildings, or beams.

The possible mechanism in this case was primary injury. This was in agreement with Babar et al [2] who reported two cases of ocular trauma from blast burn wave of (LPG) cylinder explosion. The explosion in our case



Figure 1. Patient at presentation (credit Dr Monsudi Kehinde)



Figure 2. Patient 8 days after admission (credit Dr Monsudi Kehinde)



Figure 3. 15 days after the incident (credit Dr Monsudi Kehinde)

might be due to either leakage of gas from the fault valve or rusting cylinder and building of pressure inside the hot cylinder during welding of the cylinder. However, the assumption by the patient that the gas cylinder was empty might have encourage him to try to weld the cylinder.

Another possible mechanism may be secondary injury. Facial abrasion from flying fragment of the gas cylinder. The left part of the face and the eyes were mainly affected by this injury; this might be because the boy was using his right hand to weld the cylinder in closer proximity to locate the leaking area during the welding without using protective glasses.

The use of protective devices has been advocated by many authors [5-7] to be the best way of preventing eye injury in the high risk occupation workers including welders. Gordon et al reported 85% of ocular injuries in Hong Kong at the workplace occurred among individuals who refused to wear protective devices despite knowledge about the risks involved [5].

The management of facial and ocular fridge cylinder gas explosion is similar to other explosion heath injury. It is dependent on the extent of injury and the involvement of life threatening conditions (brain, respiratory and vascular system). In this patient, there was no loss of consciousness or a life threatening condition. Copious irrigation with water at accident site and copious irrigation with normal saline at hospital help to reduce contact time between gas and tissue, and also decreased the chemical effect of the gas from further damaging the tissue. Furthermore, it also reduced pain experienced by the patient.

Early hospital presentation and prompt eye care helped in restoring vision and wound healing in this patient without complications. The systemic and topical antibiotics prevent secondary bacterial infection. Health education about the danger of gas explosions, wearing protective glasses, hand gloves and precautions when handling fridge gas cylinders are important ways of preventing injury from gas explosions.

Conclusions

Gas cylinder explosions may result in life threatening and severe ocular injury if not properly managed. Early presentation and effective management resulted in good facial healing and vision in this patient. Public enlightenment on the dangers of cylinder gas explosions and safety precaution in handling gas cylinders are crucial to the prevention of further incidents?

References

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