

Bodily and Ocular Injuries following Tear Gas Canister Explosion

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Abstract

A 25 year old male prison officer who sustained bodily and left eye (LE) injuries following accidental tear gas canister explosion. There was associated pain with LE tearing, swelling, redness and photophobia but no significant reduction in vision. General examination revealed facial and limbal injuries and associated bleeds. The visual acuities were 6/5 RE, 6/9 LE. On the LE were mild periorbital oedema, ciliary injection and a 2 mm intracornea metallic foreign body (FB). The LE was copious irrigated with cold water and cornea FB was removed under general anaesthesia. The post-operative management included guttae tropicamide 0.5%, ofloxalab, ivotoflur, and ointment chloramphenicol. The patient was discharged 2 days later with VA of 6/9 and this had improved to 6/6 after a week follow up. Tear gas canister explosion can result in bodily injuries particularly ocular morbidity. Early presentation and appropriate management would prevent untoward complications. Regular training of personnel handling tear gas canisters on safety precautions and compliance to its use underscored.

Keywords: Tear gas canister, Eye injury, security personnel

Introduction

Tear gas is a lacrimator and aerosol dispersed chemical that causes irritation of the eye, nose, mouth, skin and respiratory tract.¹ The tear gas canister is usually filled with 1-chloroacetophenone (CN), 2-chlorobenzylidene malononitrile (CS) or dibenz[b,f]-1,4-oxazepine (CR). CN is the most toxic lacrimator and the acute effect in the eye includes lacrimation, blepharospasm, conjunctival erythema, periorbital oedema, corneal epithelial damage and chemosis.¹ Longer term potential problems include cataracts, vitreous haemorrhage and traumatic optic neuropathy.² The effects of lacrimator are of rapid onset and short lived (15-30 minutes) if individuals are moved into fresh air.³ The importance of copious ocular cold water irrigation in reducing the ocular effect by preventing the conversion of powder particle of tear gas into vapor and barrier nursing to prevent contamination/secondary complication by the managing health workers are documented by previous studies.^{4,5} Furthermore, direct blowing of the eye with electric fan would reduce the eye contamination.¹

The tear gas is highly pressurized and its uncontrolled escape as in accidental explosion would cause damage to bodily tissue it comes in contact. Therefore tear gas canister explosion is a potential health hazard among security personnel's who handle it especially the police and the prison staffs. We report a case of bodily and ocular injuries following tear gas canister explosion in a young prison officer.

Case Report

A 25 year old prison officer presented at the Accident and Emergency unit of our hospital on accounts of LE pain following tear gas canister explosion 3 hours before presentation. He had earlier been engaged in packing the expired tear gas canisters (Figure 1) from the store for disposal. In the process he inadvertently removed the safety pin of one of the canisters and it then exploded on him injuring his left upper limb, face and LE (Figure 2). There were immediate bodily and ocular injuries with associated pain and bleeds. Also, were LE tearing, mild swelling, redness and photophobia. There were no associated significant reduction in vision, loss of consciousness or difficulty in breathing.

He had initial treatment at the prison clinic including pipe borne water eye irrigation and dressings of the facial and left upper limb wounds before being referred to our hospital.

General examination showed a young man in painful distress, left palm and wrist bleeds (Figure 2) and dressings on the chin and right upper lid. The LE was further copiously irrigated with cold water.

The eye examination revealed visual acuities 6/5 RE, 6/9 LE. The RE was essentially normal except a 2 mm laceration on the lateral aspect of its upper lid. However; the LE was remarkable including mild ciliary injection, an intrastroma cornea metal which was located temporal about 2 mm to the lateral limbus. The metal was about 2 mm in size and one end was exposed. The entry point stained with fluorescein but no aqueous egress (Figure 2). The anterior chamber (AC) was of normal depth. The posterior segment was essentially normal. A diagnosis of tear gas explosion injuries with LE cornea FB and multiple facial and upper limb wounds was made. The patient was admitted, had intramuscular tetanus toxoid and wound dressing. He subsequently had examination under anaesthesia (EUA) and cornea foreign body removal. The operative findings include intrastroma cornea metal fragment about 2 mm with nil aqueous leakage. He was managed post operatively with guttae ofloxalab, ivyflur, tropicamide 0.5%, and ointment chloramphenicol. Other medications include tablets ciproxin 500mg q 12 hrs for 7 days, ascorbic acid 200 mg q 8 hrs for 2 weeks and diclofenac sodium 50 mg q 12 hrs for 5 days. The iodine solution dressing was used for facial and limb wounds. The patient was discharged 2 days later with LE visual acuity of 6/9.

Subsequent follow up in our eye clinic showed VA of 6/6, LE maculae (moderate corneal opacity at the site of healed cornea wound) and multiple mild facial and upper limb scars (Figure 2).

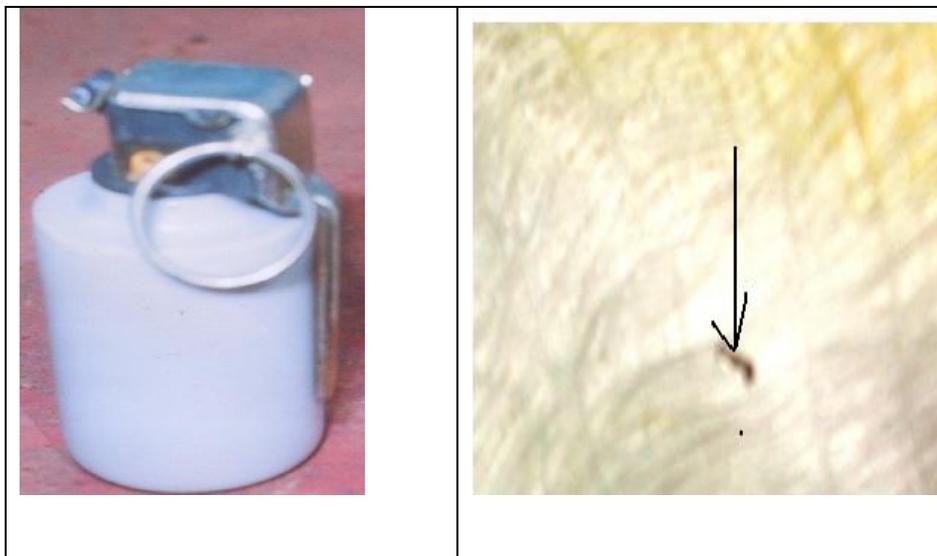


Figure 1: Tear gas canister (Left) and metal pellet removed from the patient's cornea (Right)

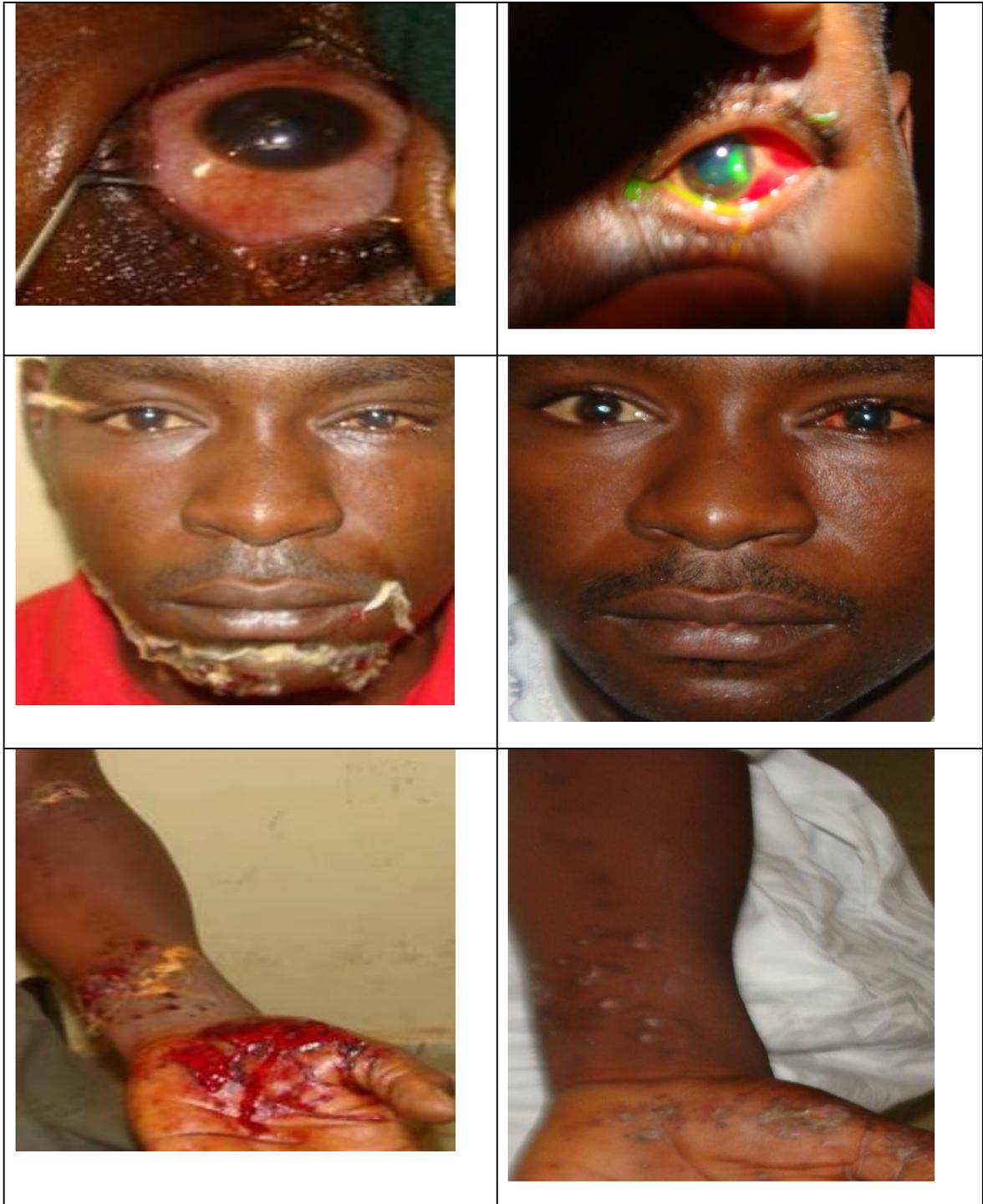


Figure 2: Affected body regions following tear gas explosive injury

Top Left, injured left eye. Top Right, stained site of intracornea foreign metallic object.

Middle Left, facial injuries. Middle Right, healed facial wounds.

Lower Left, injured left palm/arm. Lower Right, healing left palm/arm scars

Discussion

This case underscores the significance of early presentation, prompt and effective management of body injuries especially eye injury. This undoubtedly enhanced successful outcome in the patient devoid of untoward complication that might occur should the tear gas canister explosive injuries not appropriately managed. In our clinical experience many patients with a like intracornea foreign body but who reported late for appropriate management came with eye complication that compromise the vision or globe.

The explosion occurred while the patient was holding the canister on his left hand hence the injury was localized mainly to the left side of the body (left hand/arm, eye and facial regions). The accident was actually triggered by the patient as he believed the tear gas had expired thus removed the safety pin while still holding it in his left hand. There is a health message in this for the public especially those involved in handling supposedly expired canisters to always take the necessary precautions while in contact with tear gas canisters.

Further eye health message borders on doing the appropriate thing rightly. The copious irrigation of the LE at the prison clinic before presenting at our hospital reduced the contact of the powder from the pieces of the tear gas canister that penetrated the cornea and this contributed to improved final visual outcome. Moreover, further irrigation of the LE with cold water at the eye clinic contributed to better visual outcome, it is known that cold water prevents the conversion of powder tear gas to vapors compare to warm water.^{4,5} Additionally, the prompt removal of the pieces of the tear gas canister from the cornea within 2 hours of presenting at our hospital also contributed to better visual outcome. Finally, barrier nursing by the health personnel at the first presentation of the patient by proper gloving and removal of the patient's clothes helped to prevent secondary contamination.

Conclusion

Tear gas canister explosion can result in bodily injuries particularly ocular morbidity. Early presentation and appropriate management would prevent untoward complications. Regular training of personnel handling tear gas canisters on safety precautions and compliance to its use underscored.

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