

# Accidental Tear Gas Injuries in Security Agents

1. Olaitan P. B., 2. Ubah J. N.

Departments of 1. Surgery and 2. Ophthalmology, LAUTECH Teaching Hospital, Osogbo, Osun state, Nigeria.

### ABSTRACT

**BACKGROUND:** Tear gas is a noxious vapour used in quelling civil disturbances. The law enforcement agents who usually handle this are well trained and rarely injured by the use of this weapon especially during peace times.

**METHODS:** We report injuries sustained by two policemen handling tear gas as a result of accidents. Case notes of the patients were the source of information.

**RESULTS:** Two policemen were injured while handling tear gas. The equipment accidentally dropped and exploded on attempting to pick them. The mechanisms of injuries and parts of the body injured were similar ie the hands and face with traumatic cataract of an eye in one patient.

**CONCLUSION:** We conclude that proper training of the law enforcement agents will go a long way in reducing these types of morbidity from tear gas use.

Key words: Tear Gas, accident, injuries, security agents.

### INTRODUCTION

Tear gases are used as riot control agents on account of their irritant properties. Their use has gained widespread acceptance as a means of controlling civilian crowds and subduing barricaded criminals. It has been used over decades in quelling civilian riot but not without associated reported civilian injuries.

Tear gas injury could be very severe. Injuries to the police personnel from this weapon have not been widely reported as the personnel are usually well trained to handle the weapon. Such injuries from the tear gas to the police usually sustained when the instrument is being used to quell riots and include dermatitis, allergic or irritative reactions.

Tear gas injuries have however been seen in our current report as a result of poor knowledge of its use and handling and these occurred in peace times.

### MATERIALS AND METHOD

Case notes of two policemen who sustained injuries from tear gas and were treated at our centre within a

period of six month were reviewed. Information obtained include the biodata, type and source of injuries, treatment as well as the outcome of the treatment.

### REPORTS OF CASES

#### CASE 1

A 26 year old right handed police officer, who has been in the service of the Nigerian Police for one year and actively handling weapons, presented to our unit a day after he sustained injuries to his right hand, left eye, chest and the legs following a 'tear gas' explosion.

He was well until a day before presentation when he came back from a check point and was trying to remove his clothes when the tear gas he was carrying fell off. Attempt to pick up the 'tear gas' led to explosion with injuries to the right hand, face, chest and the lower limbs. He bled profusely from the hand and subsequently presented to a private hospital where he was referred to our unit.

Examination revealed a young man, who was in pain (on both eyes), afebrile and not pale.

There was bilateral blepharospasm. Visual acuity was 6/6 in both eyes. The right conjunctiva showed mild diffuse injection with some punctate keratitis on fluorescein staining. The anterior chambers were of normal depth. The pupils were round and reacting to light. The lenses were clear and there was no abnormalities on fundoscopy.

There were multiple patchy areas of skin marks on the face, chest and the limbs.

There was almost total amputation of the right little finger at the level of the proximal phalanx with destruction of the phalanges and tip amputation of the right ring finger.

He had wound debridement, refashioning of the amputated ring finger with full thickness graft cover and completion of the little finger amputation at the metacarpal level. He also had chloramphenicol ointment application to the right eye and dressing of the legs and chest till the wounds healed. Vision remained normal on discharge two weeks later.

#### CASE 2

A 35 year old right handed police man accidentally sustained injuries to the left hand and right eye following an explosion of the tear gas canister he was carrying in his pocket. There was an immediate visual loss in the right eye. The canister had accidentally dropped and attempt to pick

it led to explosion with injuries in the parts of the face and left hand. He presented to us about 2 hours after the injuries.

He had joined the force about a year before the injuries and had been handling tear gas canisters since he joined the force without any previous problem. His education on the use of this instrument was however brief.

On examination, he was a young man, not pale afebrile and apprehensive. Examination of the eye showed a normal left eye with a visual acuity of 6/6.

The right eye showed a visual acuity of Hand Movement with accurate projection of light in all quadrants. There was mild blepharospasm and diffused conjunctival injection. There was also a 3mm horizontal ragged corneal laceration about 3mm from the limbus at the 6 o'clock position and a foreign body on the wound. Anterior chamber was of normal depth with clotted hyphema at the inferior one third. The

pupil was round, dilated with a dense cataract with ruptured anterior capsule. There was a faint Fundal glow on fundoscopy.

There was an associated abrasion injury on the right cheek.

There was also a partial thickness skin loss over the volar surface of the left thumb, index and middle fingers which was patchy with no tendon or bony lesions but with maceration of the index finger.

Right eye ultrasonography was requested to rule out intraocular foreign body but was not done although x-ray of the skull did not show any opaque foreign body.

Patient had a wound debridement, removal of a metallic foreign body and repair of the cornea laceration. Patient was nursed in Fowler's position. The wound healed well and visual acuity remained hand movement in the right eye. Patient was discharge 14 days after the injuries at which time the hyphaema had resolved considerably leaving only a tiny bit at the inferior papillary margin. The hand injuries had also healed.



Fig.1. Appearance of the hand a week after surgery. Note the loss of the little finger.



Fig. 3. Macerated index finger and ulceration of the palmar surface of the thumb and middle finger at presentation of case 2.



Fig. 2. Note the healed wound with the hand in a flexed position.



Fig. 4. The right eye of patients 2 showing hyphema, cornea tear with cataract and foreign body.

## DISCUSSION

Tear gas has gained widespread acceptance as a means of controlling civilian crowds and subduing barricaded criminals<sup>1</sup> and its use is accepted practice by government authority worldwide<sup>2</sup>.

Injuries from Tear Gas use has been widely reported<sup>3-8</sup> The compound in tear gases is supplied as a white solid, which when disseminated characteristically forms a smoke of minute droplets or particles. The toxic basis of its effect is not certain but it is believed to result from release of highly reactive chlorine atoms on to the skin, and mucous membranes. The pronounced irritation is caused by the local formation of hydrochloric acids<sup>3</sup>.

Injuries from tear gas have been reported among the civilians with fewer incidences among the police officers handling them especially at peace times.

Gas used in blast-dispersions cartridges is actually a stable fine powder with a particle size of about forty micra. The cartridge containing this material has as a propellant standard shotgun primer<sup>9</sup>.

Injuries from the explosion may therefore be more than tear gas only<sup>10</sup>. The forces of tear gas are so great that conjunctiva tearing may occur. Cornea stromal oedema and later deep vascularisation may ensue, and multitude of complications have been reported including symblepharon, pseudopterygium, infective keratitis, trophic keratopathy, posterior synechia, secondary glaucoma, cataract, hyphema, vitreous haemorrhage, and traumatic optic neuropathy<sup>11</sup>. Tear-gas pens discharge with sufficient force that, if held at short range, the cartridge will penetrate the humans hand<sup>9</sup>.

Tear gas injuries among the security agents have not been widely reported especially in our environment.

The injuries sustained by the security agents in this study are similar in both instances with the eyes, the face, and the hands being the areas involved in the injuries. There were patchy areas of injuries on the chest and the thighs.

It should be noted that injuries from the tear gas to the police is rare and is usually sustained when the instrument is being used to quell riots. Such injuries usually include dermatitis, allergic or irritative reactions<sup>8, 10</sup>.

This report is therefore meant to highlight the fact that the weapon could constitute a job hazards to the security officers handling them not only when in action but also at peace times. It has been observed that various features of the tear gas weapon such as the

blast force, the propellant charge, the wadding and the age of the cartridge, in addition to chemical injuries itself are important in evaluating the extent of the injuries<sup>9</sup>. The type of tear gas used in the two cases were not indicated in the case notes reviewed and it is therefore difficult to get the manufacturers' prescribed method of picking this device when accidentally dropped.

## PREVENTION IMPLICATION

In the first case described above, the tear gas was actually an expired weapon and the corp in this accident was not experienced as he had just been recruited less than a year when the incident occurred, similar to the second man who also had not spent a long time in the force. Inexperience could have been the problem with the two men. Policemen and indeed law enforcement agents handling such a dangerous agent should be educated on its use and the use limited to only those experienced in handling such weapons. Learning what to do in such instances as when the canister drops accidentally should be part of the training.

The close range at which the firing occurred contributed immensely to the severity of the injuries in the two cases.

There is therefore a need to train men who handle these weapons on how to handle them with regular refresher courses. Manufacturers of canisters should indicate the process of handling it and what to do in case of a drop should be explicitly indicated on the canister. Expired weapons should also be discarded as soon as they expire as this may be the reason why the first weapon exploded so easily and injured the officer.

Attention to these suggestions will not only reduce such injuries among the men of the police force but also unsuspecting members of the civilian public commonly exposed to these weapon as they are carried by the policemen from one part of the city to the other.

In all, an improvement in the safety measures in occupational 2-Chloroacetophenone gas has been suggested<sup>11</sup>. This will prevent untoward effects in security and law enforcement agents handling tear gas.

## REFERENCES

1. Anderson PJ, Lau GS, Taylor WR. et al. Acute effects of potent lacrimatoro-hlorobenzyliden malononitrile (CS)tear gas. *Human Exper Toxicol* 1996; 15(6):461-5.
2. Hu H, Fine J, Epstein P. et al. Tear Gas- Harassing Agent or Toxic Chemical Weapon? *JAMA* 1989;262(4):660-3
3. Gray PJ, Murray V. Treating CS gas injuries to the Eye. Exposure at close range is particularly dangerous. *BMJ* 1995; 311(7009):871.

3. Karallidde L, Wheeler H, Maclehose R et al. Possible and immediate long term health Effects following exposure to chemical warfare agents. *Pubic health* 2000; 114(4):238-48.
5. Weir E. The health impact of crowd Control agents. *CMAJ* 2001; 164(13):1889-90
6. Zekri AM, King WW, Yeung R.et al. Acute mass burns caused by o-Chlorobenzylidene malononitrile (CS) tear gas. *Burns* 1995; 21(8):586-9.
7. Krasagakis K, Orfanos CE. Occupational contact dermatitis due to 2-chloracetophenone tear gas. *British Journal of Dermatology* 1999; 140(3): 531-534.
8. Varma S, Holt PJ. A Severe cutaneous reaction to CS gas. *Clinical and Experimental Dermatology* 2001; 26(3):248-250.
9. Adam JP, Fee N, Kenmore PI. Tear Gas injuries: A clinical study of hand injuries and an experimental study of its effects on peripheral nerves and skeletal muscles in rabbits. *J Bone Joint Surg Am* 1966; 48:435-442
10. Levin RA, Stahl CJ. Eye injuries caused by tear gas. *American Journal of Ophthalmology* 1968; 65(4):497-508.
11. Hoffman DH. Eye burns caused by tear gas. *Br J of Ophthalmology* 1967; 51:263-7.