

Carbide Gun Injury : An Ophthalmic Perspective



Carbide gun injuries represented an uncommon yet serious form of blast-related ocular and facial trauma, frequently reported in rural or semi-urban settings where calcium carbide is misused to generate acetylene gas for recreational or agricultural purposes. The resulting explosion produces a combination of thermal, chemical, and mechanical injuries, often with devastating effects on the eyes and adnexa.¹⁻³ This year during the festival of lights, that is Diwali, embarked by sudden explosion of injury by this carbide gun (Figure 1) that was sold freely without any check. It emerged as a menace, injuring large number of children across the whole country.

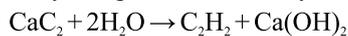
The eye is particularly susceptible because of its exposed position and sensitivity to both thermal and alkali damage. Moreover, the children got specially injured when they tried to peeped into the gun as it did not explode or it exploded suddenly without giving due time to remove it away from the body. The combined effect of flame, pressure, and chemical insult lead to complex injuries that threatened vision and cosmesis.²⁻⁵ Early ophthalmic evaluation and coordinated multi disciplinary care are therefore essential to educate and treat this problem.⁵⁻⁸



Figure 1 : Carbide Gun

Pathophysiology of Ocular Injury:

Calcium carbide reacts exothermically with water to produce acetylene gas and calcium hydroxide:



When ignited, acetylene burns at temperatures approaching 3000°C.⁸

The resulting ocular damage arises from three concurrent mechanisms:

1. **Thermal injury:** Causes corneal burns and eyelid burns & contractures.
2. **Mechanical (blast) injury:** Leads to globe rupture, intraocular hemorrhage, and orbital fractures.²
3. **Chemical injury:** Calcium hydroxide, a strong alkali, penetrates corneal tissue causing liquefactive necrosis

and limbal stem cell destruction.^{5,9,10}

This triad explains the rapid and profound tissue destruction often seen in these cases.

Clinical Features

The spectrum of ocular involvement in carbide gun injuries ranges from mild surface burns to irreversible blindness. Common ocular manifestations include:

- Periocular burns and lid lacerations (Figure 2)



Figure 2 : Periocular burn with 360 degree limbal ischemia with diffuse corneal haze

- Conjunctival congestion, ischemia, and chemosis
- Diffuse corneal edema, haze and defect (Figure 3)



Figure 2 : Diffuse cornea haze with limbal ischemia and calcium particles

- Corneal epithelial defects, stromal opacities,

descemetocoele, or perforation

- Limbal ischemia and symblepharon formation
- Anterior segment injuries: hyphema, lens dislocation
- Posterior segment involvement: vitreous hemorrhage, retinal detachment^{1,2,6}

Associated facial fractures, tympanic membrane rupture, and hand trauma frequently accompany ocular damage due to the blast's multidirectional nature.^{3,7}

Management

Management of carbide gun ocular injuries requires urgent and multidisciplinary coordination.^{6,7}

1. Initial and Emergency Care

- Immediate and thorough ocular irrigation.¹¹
- Removal of debris and calcium deposits under slit-lamp visualization. Its important to double evert the eyelids.

2. Ophthalmic Evaluation

- Document visual acuity and perform slit-lamp and fundus examinations.
- Use Seidel Test to detect corneal leaks.
- Obtain CT orbit/facial bones for suspected fractures or foreign bodies.

3. Medical Management

- Topical broad-spectrum antibiotics,(preferable is Chloramphenicol) cycloplegics, and lubricants.
- Topical and systemic corticosteroids to control inflammation is used judiciously
- Ascorbate and citrate drops to reduce corneal melting.⁹
- IOP control with antiglaucoma agents when needed.

4. Surgical Interventions

- Corneal or scleral repair, amniotic membrane transplantation (AMT) for ocular surface restoration.^{6,9}
- Tenonplasty or limbal stem cell transplantation in cases of severe limbal ischemia.^{5,7}
- Eyelid reconstruction and skin grafting in collaboration with plastic surgeons.
- Penetrating keratoplasty or ocular prosthesis for long-term rehabilitation.

5. Long-term Care

Regular follow-up for chronic sequelae such as symblepharon, cicatricial entropion, dry eye, and secondary glaucoma is crucial.^{10,11}

Psychological counselling and visual rehabilitation significantly improves quality of life in these patients.

Conclusion

Carbide gun injuries are a preventable cause of severe ocular morbidity. Their combined thermal, mechanical, and alkali mechanisms make them among the most destructive forms of ocular trauma.

Public education, strict regulation of calcium carbide sales, and community awareness campaigns can substantially reduce the incidence of these injuries.^{4,8} Ophthalmologists should remain vigilant and advocate preventive measures.

I congratulate the organising committee for putting mammoth efforts for the conference and wish them all the success.

Happy Reading till then.

Warm Regards

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