

'BOMBILE' [Blast of Mobile Battery in Living Eye] Eye Injury – A Newer Threat to Sight

Arvind Kumar, Prabha Gupta, Abha Shukla

Department of Ophthalmology, Gajra Raja Medical College, Gwalior, Madhya Pradesh, India

Summary

Mobile battery blast is a highly underestimated etiology for severe ocular morbidity. We present a series of four eyes of three patients with morbidity ranging from corneal burn to open globe injuries, leading to blindness. Cases of mobile blast are increasing due to poor quality equipments and mishandling (over & faulty charging of batteries). There is urgent need to create awareness in society for safe and proper handling of mobile phone, reducing the incidence of preventable blinding trauma.

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Introduction

In parallel with technological improvements, humankind encounter equipment/devices transforming chemical energy to electrical energy such as the mobile phone.¹ Indiscriminate usage of mobile phones makes us vulnerable to the associated risks including accidental burns and blast injuries.² Low-quality products and user negligence increase the risks.³ Lithium-ion batteries, commonly used to power these devices are known for explosion hazards.^{4,5} Explosions involving Smartphone batteries are sparsely reported.^{4,5} The face and eyes are particularly prone to injury while using these phones. These batteries may overheat during charging leading to "thermal runaway," an unregulated increase in internal battery temperature leading to blast.⁵

Case 1

A 19-year-old man sustained injury to the right eye (RE) due to mobile phone battery blast while charging its battery separately outside the mobile via a wire. At presentation, his RE had open globe injury with a corneal tear involving the pupillary area and associated lid tear (Figure 1). On examination, his vision was perception of light (PL) with inaccurate projection of rays in the RE and 6/6 in the LE. Lid and corneal tear repair was done in the RE. At 6 months follow up, vision in the RE was Hand Movements (HM) with projection of light inaccurate. No evidence of sympathetic ophthalmia was seen in the LE during the follow up period of 6 months. The LE was within normal limit.



Figure 1: Right eye globe rupture by mobile battery blast

Case 2

A 13-year-old boy sustained injury to both eyes due to mobile phone battery blast while charging its battery keeping the mobile in his hands. He sustained open globe injury in the RE with a corneal tear involving the pupillary area associated with lid tear and the LE had corneal burn associated with lid tear (Figure 2 a&b). On examination his vision was perception of light with inaccurate projection of rays in the RE and in the LE, vision was FC (finger counting) at 1 feet. Lid and corneal tear repair was done for the RE and lid tear repair done for the LE. He was put on conservative treatment for corneal oedema in the LE. At 6 months follow up, his vision was HM (hand movements) with inaccurate PR (projection of rays) in the RE and Finger counting at 4 feet was in the LE.



Figure 2: (a) Right eye globe rupture by mobile battery blast; (b) Left eye lid tear and corneal burn following trauma by mobile battery blast

Case 3

A 3-year-old girl sustained injury to the LE due to mobile phone blast during charging when she was playing near the mobile. She sustained a globe rupture with corneal tear involving the pupillary area and associated with upper lid tear in the LE (Figure 3). Her RE was normal. On examination, her vision was PL (Perception of light) in the LE. Lid and Corneal tear repair was done in her LE. Till follow up at 3 months she had visual acuity of PL, there was no evidence of sympathetic ophthalmia in her RE.



Figure 3: Left eye lid tear and globe rupture following trauma by mobile battery blast

Discussion

Lithium-ion batteries may overheat during charging leading to “thermal runaway,” an unregulated increase in internal battery temperature.⁴ Inside the main line of defence against short circuiting is a thin and porous slip of polypropylene that keeps the electrodes from touching. If that separator is breached, the electrodes come in contact, and things get very hot very quickly. The batteries are also filled with a flammable electrolyte, one that can combust when it heats up, then really get going once oxygen hits it. Thus the mechanism of injury from battery blast could be a combination of mechanical (battery pieces), thermal, and chemical injuries.⁵

The present data on ocular injury by mobile blast is insufficient. Few case reports published from India had presented good outcome on timely and proper management of cases. A case report from India published by Narang et al,⁶ has reported grade 1 ocular surface burn with multiple soot particles over cornea and conjunctiva with charred eye. Similar ocular injuries due to mobile blast were reported by Ohri et al.⁷ Data present on morbidity due to mobile blast is underestimated as reported cases from India.^{6,7} had presented good outcome on timely and proper management of cases. Ours is the first case series from India reporting severe ocular morbidity due to globe rupture with resultant vision of perception of light. Only 1 of the 4 eyes could attain the visual acuity of counting finger at 4 feet.

Our case series of mobile blast demonstrate very severe consequences of battery blast. Faulty method of charging the

battery and poor quality of mobile phone are the causes of battery blast.

Conclusion

The need of the hour is to increase the public awareness about the potential hazards of mobile phone usage. It is recommended that instructions of manufacturer of mobile phones be followed. Overcharging and faulty methods of battery charging should be avoided.

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Address for correspondence

Abha Shukla MS

Department of Ophthalmology,
Gajra Raja Medical College, Gwalior,
Madhya Pradesh, India
Email id: drashukla26@gmail.com



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