

# Eye emergency during wars; Take-home message for soldiers

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## To the Editor-in-Chief

War is an organized and prolonged armed dispute between states or nations (1). It is characterized by high mortality, violence, and social or economic costs. There are multiple causes of war and conflict, including extreme poverty, high unemployment, and social, political, or economic disparities. The incidence of wars has increased since 1950, especially between states (2). Small Arms Survey reports that warfare kills nearly 133,750 persons, yearly (3). The rates of disability and death caused by war are more than many major diseases globally. It destroys the healthcare systems and public health services of the included states or societies, which results in more diseases and deaths (4).

Despite the progress in modern wars, ocular trauma constitutes a significant proportion of wartime injuries (5). It varies between bruises, scratches, serious lacerations, and fractures (6). Penetrating ocular trauma causes devastating damage to the injured eye. It may result in complete visual impairment in the injured eye and subsequent damage to the contralateral one (7). The incidence of ocular trauma has been rising since the American conflicts in the 19th century. It was up to 1%, then extended to 2-2.5% during World War I and World War II, increased to 6-9.5% during the Vietnam conflict, and reached 13% during Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF) between 2002 and 2007. Harvey et al. reported that 30% of the patients with combat ocular injuries became blind in their affected eyes. Furthermore, the lens, retina, anterior segment, and posterior segment injuries have poor visual prognosis. With modern advancements in war weapons and techniques, causes of ocular injuries have changed from gunshots in World War I to high-energy explosives devices in OIF and OEF. Explosive devices resulted in 51-73% of ocular injuries during OIF and OEF (5). Ocular injuries include phthisis bulbi, retinal detachments, direct optic neuropathy, open globe, closed globe, and intraocular foreign body (IOFB) (8). Open globe injury is the commonest ocular injury (9). The aim of this letter is to present this problem to the community and give a message to soldiers about methods of eye protection and first

aid measures during wars. As shown in figure 1, soldiers must wear safety glasses during war, which was recommended by the American National Standards Institute (ANSI). If an injury occurs, they mustn't remove any foreign body stuck to their eyes, they mustn't rub their eyes, they mustn't apply any medication to their eyes, and they mustn't clean their eyes, and if needed, they must use clean water until being visited by a specialist. Management of combat ocular injuries poses a great challenge to the present ophthalmologists, who primarily remove the injured non-functional eyes, preventing the feasibility of cosmetic or visual rehabilitation (5). There are multiple life-saving surgeries for this management, including enucleation, evisceration, IOFB removal, pars plana lensectomy, pars plana vitrectomy, penetrating keratoplasty, laser retinopexy, scleral buckle, cataract extraction, and grafting (8). Enucleation and evisceration are two common surgeries for removing the completely blind painful eye in case of failure of eye salvage. The choice of either enucleation or evisceration in a clinical setting depends on the hospital, geographic location, and surgeon's experience. Enucleation is the surgical removal of the whole eyeball with its intraocular components, leaving periorbital and orbital structures intact. On the contrary, evisceration is the surgical removal of intraocular contents only leaving the sclera, eye muscles, and orbital adnexa.

Despite the increasing severity of ocular injuries in modern wars, enucleation has steadily decreased since World War I. However, the clinical choice of evisceration has increased in managing ocular injuries. Evisceration has multiple advantages and greater significance for both the surgeon and the patient, including being a safe alternative for enucleation, and having lower complication rate, better implant motility, shorter surgery duration, and improved patient outcomes (7). Interestingly, Harvey et al. reported that the use of other eye-sparing surgeries had increased as well. During OIF/OEF, the use of pars plana vitrectomy (22.13%) was more common than pars plana lensectomy (13.37%), then IOFB removal (13.26%), and all of them were more common than enucleation (12.25%). Furthermore, retinal and posterior segment



**Figure 1** Methods for protection of soldiers' eyes and first aid measures during wars

surgeries reached 22.81%. Additionally, other oculoplastic surgeries, including fracture repair, lid reconstruction, nasolacrimal system repair, and ptosis surgery, made up 11.35% of all eye surgeries. Meanwhile, cataract extraction and posterior lens implantation comprised 7.54% of total eye surgeries (5).

## Declarations

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### Authors' contribution

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### Conflict of interest

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