

Unusual route of a bullet: From scapula to eye

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Herein, an awkward case of globe perforation with a bullet-entering from the right posterior scapular region and leaving the body from the right orbit through the eye - is reported. Route of the bullet could be devastating - as it passed through the neck and the maxillofacial region-however by chance no vital damage occurred. Its path was assessed by plain radiography and computed tomography scans. Sometimes prediction of the trajectory is very difficult without additional radiological investigations. Especially, in the case of any high velocity projectile wounding, physician must be aware of the fact that the bullet's course will not be a linear but most probably a complicated one. Prognosis of the injury depends on the path of the bullet or shrapnel fragment, close clinical observation, an open-minded approach, and the multidisciplinary care. Moreover, even the crime investigation might be needed.

Key words: Bullet injury, globe perforation, gunshot injury, penetrating eye trauma

Gunshot injuries (GSIs) to the neck, the maxillofacial and the orbital region are associated with high morbidity and mortality due to the complex anatomy and presence of various vital structures in this region. The trachea, the esophagus, the carotid and the vertebral arteries, the cervical spine and the spinal cord, the phrenic nerve, and the brachial plexus are all vulnerable to injury with neck trauma.^[1,2] Cranio-orbital injury and fractures involving the anterior skull base and orbit also often end-up with devastating results involving critical structures, such as the contents of the superior orbital fissure and optic nerve. Complications associated with orbitocranial injuries include infectious complications (ocular infection, meningitis, meningoencephalitis, and brain abscess), traumatic arteriovenous fistula, intracranial hemorrhage, oculorrhea, loss of mental and motor function due to severe damage to the brain parenchyma, ocular motility problems, cranial nerve palsies, total loss of vision/globe, and various cosmetic problems in which interdisciplinary surgical approach was needed.^[3-6] Moreover, it was also reported that spinal fractures could be observed with 10% of maxillary injuries and in 20% of orbital injuries.^[7] The complication rate is higher in orbitocranial injuries, twice the rate as that of penetrating cranial injury not affecting the orbit.^[6] Overall, the mortality rate of maxillofacial gunshot wounds was reported up to 11.0% in some series and multiple wounds were reported in 36% of these cases.^[5,7]

Extent of the damage depends on a number of factors, such as, velocity of the bullet, magnitude and direction of energy transferred, distance travelled by the missile, form and hardness of bullet, and the structures encountered before and on penetration.^[8-10] Entrance profile, path traveled through the

body, and the biologic characteristics of the tissues also affect the extend of injury.^[11] Internal lacerations, compression of the tissues or temporary cavitation along the projectile path were possible devastating results.^[12]

In rare GSI cases, the bullet enters with no visible exit wound or vice versa.^[1,8,10,12] In such situations, the bullet's trajectory and final destination may be unpredictable.^[13] To the best of our knowledge, no bullet to exit from the eye was reported in literature. The aim of this presentation is to report an unusual route of a bullet-entering from the right posterior scapular area and leaving the body by perforating the right eye.

Case Report

A 17-year-old male was referred to emergency department immediately after a GSI. On arrival, he was conscious, the vital signs were within normal limits, and no neurological deficit was noted. The right globe was ruptured and light perception was negative on the right eye. On physical examination, a single bullet entry hole on the right posterior scapular area was detected [Fig. 1a].

The only detectable exit wound was the right orbit. Direct radiography of the skull and the chest revealed no bullet in the body. The route of the bullet was identified by computed tomography (CT) scans obtained in several projections and signs of the damage along the path of the bullet entering from the right scapular region and leaving the body from the right orbit were confirmed [Fig. 1b and c]. Identified route was;

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entrance from the right posterior scapular region, passing neighboring to right lung, moving upward to the cranium by side of the carotid artery and the vein, fracturing lateral and posterior wall of the maxillar sinus, entering the orbit fracturing the orbital floor, and leaving the body through the orbit perforating the right eye [Fig. 2].

Primary reparation under general anesthesia was performed. However, as the double perforation was so severe no postoperative visual function was preserved.

Discussion

Unusual presentations of bullet trajectory in GSI can create surgical and/or medico-legal diagnostic problems.^[2,14,15] Since the face and neck region is packed with the vital structures in a relatively small volume of space, even the smallest of movements by a penetrating missile may injure a major vein, artery, and main nerve trunk simultaneously. Moreover, especially the injuries to the neck and maxillofacial region could end with high morbidity and mortality.^[1-7,9,10,12] GSI to the orbit, especially the ones penetrating the globe could have devastating effects on all intra- and peri-orbital structures.^[2-5,16] As the bullet has both forward and rotatory movements, it possesses much higher amounts of kinetic energy to cause more damage in the eye. The energy is dissipated as the bullet slows within the soft tissues or the orbit. High-velocity injuries also cause secondary damage due to the fragmentation of bone, which is shattered by the missile on impact and enhance the injury. These secondary injuries can cause more damage than the bullet itself.^[14,17] Nature and severity of the damage and preservation of visual function depends on the direction of impact and the part of globe involved.^[14] In case of perforating injury, loss of vision is common as in our case or even loss of eyeball and late enophthalmos in many cases.^[14,18,19] Primary evisceration may be needed in cases with severely ruptured globe if reconstruction is not possible.^[18,20] On the other hand in closed injuries, globe concussion, retinal detachment, optic nerve avulsion, or chorioretinal lacerations could be the reason for the loss of vision.^[14,18,21]

Some unusual routes of bullet in GSI are reported in the literature.^[8,10,13,14] In these awkward injuries, the prediction of



Figure 1: (a) Particular appearance of skin including small contusion, skin introflexion, and simple ecchymosis with frayed margins in the right posterior scapular area. (b and c) The preoperative appearances of the globe in emergency and operation room

the trajectory is very difficult without additional radiological investigations. Especially in case of any high velocity projectile wounding, the physician must be aware of the fact that the bullet's course will not be a linear but most probably a complicated one. The entry wound and the exit wound should be both carefully explored. Over-concern with the entry wound may sometimes lead to ignorance of the exit wound. CT is the procedure of choice to detect any hemorrhage, air, bullet, bone fragments, hemothorax, nerve lesion, musculoskeletal lesions, and vessels injuries. CT imaging is also useful for assessing the missile path and the anatomical structures at risk.^[2]

Prognosis of the injury depends on the course of the bullet or shrapnel fragment and the multidisciplinary team approach. Moreover, even the crime investigation might be enlightened by the demonstration of the bullet's route. Herein, a very unusual route of a bullet entering from the scapular area, passing through the neck and ending with eye perforation is reported. The accurate detection of entrance and exit wounds, path and extent of tissue damage were difficult. Therefore, additional radiological examination was required. Although the area pierced by the bullet was rich in neurovascular structures-many of which are extremely important-by chance the patient did not suffer any life-threatening injury. As the dynamics of the shot was investigated, he was thought to be injured with a trajectory from below to above while he was running away from the gunshot.

Conclusion

The knowledge of the path of the missile, an open-minded approach, interdisciplinary care, and close clinical observation of the patient are critical for the assessment of management in atypical gunshot wounds.

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Conflicts of interest

There are no conflicts of interest.

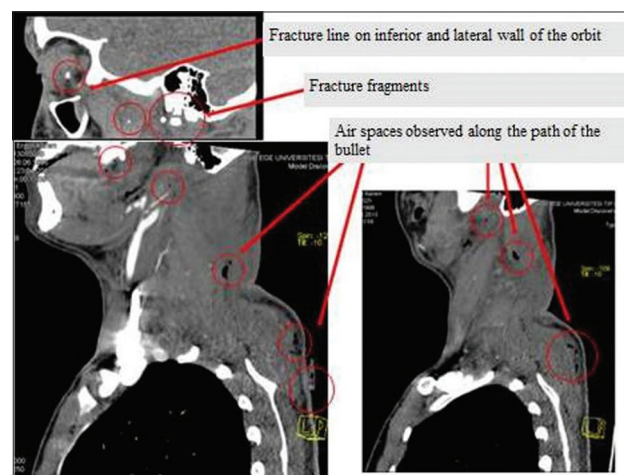


Figure 2: Orbital computed tomography, sagittal section; along the path of the bullet, there were signs of emphysema and hematoma in the soft tissue and at the right parapharyngeal, the masticator and the inferiortemporal muscles due to penetrating injury. Furthermore, bone fracture fragments were observed along this path, especially in the lateral and the posterior wall of the maxillar sinus

References

1. Godhi S, Mittal GS, Kukreja P. Gunshot injury in the neck with an atypical bullet trajectory. *J Maxillofac Oral Surg* 2011;10:80-4.
2. Reginelli A, Russo A, Maresca D, Martiniello C, Cappabianca S, Brunese L. Imaging assessment of gunshot wounds. *Semin Ultrasound CT MR* 2015;36:57-67.
3. Gönül E, Erdogan E, Tasar M, Yetiser S, Akay KM, Düz B, *et al.* Penetrating orbitocranial gunshot injuries. *Surg Neurol* 2005;63:24-30.
4. Roden D, Cleary P, Eustace P. A five-year survey of ocular shotgun injuries in Ireland. *Br J Ophthalmol* 1987;71:449-53.
5. Hollier L, Grantcharova EP, Kattash M. Facial gunshot wounds: A 4-year experience. *J Oral Maxillofac Surg* 2001;59:277-82.
6. Shuker ST. Management of transcranial orbital penetrating shrapnel/bullet war injuries. *J Oral Maxillofac Surg* 2008;66:1927-31.
7. Maurin O, de Régloix S, Dubourdieu S, Lefort H, Boizat S, Houze B, *et al.* Maxillofacial gunshot wounds. *Prehosp Disaster Med* 2015;30:316-9.
8. Inchingolo F, Tatullo M, Marrelli M, Inchingolo AD, Pinto G, Inchingolo AM, *et al.* Short report of an unusual ballistic trauma. *Int J Surg Case Rep* 2011;2:272-4.
9. Kakkar A, Kochhar LK. Missile injuries of face and neck: Our experience. *Indian J Otolaryngol Head Neck Surg* 2000;52:334-9.
10. Ongom PA, Kijambu SC, Jombwe J. Atypical gunshot injury to the right side of the face with the bullet lodged in the carotid sheath: A case report. *J Med Case Rep* 2014;8:29.
11. Bartlett CS. Clinical update: Gunshot wound ballistics. *Clin Orthop Relat Res* 2003;408:28-57.
12. Reiss M, Reiss G, Pilling E. Gunshot injuries in the head-neck area – Basic principles, diagnosis and management. *Praxis (Bern 1994)* 1998;87:832-8.
13. Sari A, Sari A, Aksoy A, Basterzi Y. Unexpected route of a bullet: From the frontal sinus to the gastrointestinal tract. *Ann Plast Surg* 2006;57:119-20.
14. Angra SK, Padhy SC, Venkateswarlu K, Kalra VK. Bilateral orbital perforation. (A single bullet injury). *Indian J Ophthalmol* 1985;33:99-103.
15. Gürses MS, Akan O, Eren B, Durak D, Türkmen N, Cetin S. Medicolegal aspects of atypical firearm injuries: A case report. *Soud Lek* 2014;59:10-2.
16. Pawar SS, Rhee JS, Wells TS. Reconstructive and rehabilitation challenges following a cranio-orbital gunshot wound. *Ear Nose Throat J* 2015;94:E21-6.
17. Dunya IM, Rubin PA, Shore JW. Penetrating orbital trauma. *Int Ophthalmol Clin* 1995;35:25-36.
18. Ben Simon GJ, Moisseiev J, Rosen N, Alhalel A. Gunshot wound to the eye and orbit: A descriptive case series and literature review. *J Trauma* 2011;71:771-8.
19. Jovanovic MB. Eye injuries caused by shotgun and air-rifles treated at the University Eye Clinic in Belgrade 2000-2009. *Srp Arh Celok Lek* 2014;142:6-9.
20. Lauer SA, Rizzuto PR, Goodrich J, Adamo A. Orbitocraniofacial gunshot wounds: Craniofacial reconstruction and preparation of the anophthalmic socket. *J Craniomaxillofac Trauma* 1995;1:21-7.
21. Tárca Rde A. Traumatic optic nerve avulsion by high caliber bullet: Case report. *Arq Bras Oftalmol* 2006;69:417-20.