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Case Report

Finding the missing bullet: A case report of an unusual trajectory from the left scapula into the left orbit

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ABSTRACT

Evaluating a traumatically injured patient requires a systematic evaluation that can rapidly detect life threatening injuries. When there is a discrepancy in the number of expected retained bullets, one must re-evaluate the initial work-up. This case consists of an extremely unusual trajectory course of a scapular wound where the ballistic then traversed off the scapula through the neck entering the para-pharyngeal space, travelling through the facial bones, and coming to rest within the left eye, itself. This case herein reinforces the importance for the evaluating provider to quickly recognize when the work-up is inconsistent with the initial assessment. Failure to recognize this discrepancy may lead to an inappropriate work-up with subsequent devastating life-threatening consequences.

Introduction

Firearm injuries, the third leading cause of injury-related death, result in almost 40,000 annual deaths per year [1]. When a gunshot wound presents to the trauma bay, the team performs an organized, systematic advanced trauma life support (ATLS) based approach that is driven by both hemodynamics and underline knowledge of ballistics. This approaches rapidly identifies life threatening injuries and it involves a primary survey, a secondary survey, adjunctive therapies, and definitive care [2]. For penetrating trauma, it is imperative to determine trajectory to identify underline structures at risk for perforation or penetration. This is accomplished by documenting the sites of penetrating wounds with metallic markers and tape. The summation of the number of wounds and retained bullets will add up to an even number, unless the patient has a retained ballistic from a prior gunshot wound. Ultimately in a hemodynamically stable patient, the injury pattern, physical examination, and imaging (x-ray and computer tomography (CT)) will guide the disposition by complementary determining trajectory. A misstep in trajectory identification may result in rapid decompensation if critical underline structures are injured. This unusual ballistic trajectory case highlights the need to maintain diligence in determining accurate trajectory when the ballistic pathway is uncertain.

Case presentation

A 28-year-old male presented to the trauma bay as a police drop-off after sustaining multiple gunshot wounds. Upon arrival he was

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awake and alert with a Glasgow Coma Scale (GCS) of 15. His airway, breathing, and circulation were intact. He had multiple deformities including the three wounds to the left lateral chest wall. He endorsed left facial pain and he had visual acuity loss in the left eye without any eyelid or periorbital lacerations; otherwise, the rest of his physical exam was unremarkable. His chest x-ray was negative for pneumothorax and a skull x-ray noted a retained bullet. He was hemodynamically stable, allowing him to go to the CT scanner. He underwent a CT of the head which revealed a retained ballistic in his left orbit without any external site of entry. He had a CT of the chest that revealed three gunshot wounds with two separate pathways. The first was a through and through the left lateral chest wall without any thoracic penetration; however, there was a lung contusion. The second bullet entered at the level of the left scapula then it was presumed that it travelled through the neck, the para-pharyngeal space, traversing through the facial bones and coming to rest within the left orbit (Fig. 1).

He then underwent a CT angiography (CTA) due to the presumed trajectory of the retained left orbital ballistic entering at the site of the scapular fracture. This CTA confirmed the course with continuation of the thoracic subcutaneous emphysema into the cervical region, asymmetric swelling of the left neck with obliteration of several fat planes that did not have a clear focal hematoma, and an enlarged left submandibular gland. There was no underline pseudoaneurysm or dissection of the cervical vasculature. His final injury pattern included a left scapular fracture, pulmonary contusion, significant subcutaneous emphysema, left globe rupture, fractures of the left zygomatic-sphenoid region and the anterior wall of the maxillary sinus with associated hemorrhages. He was taken to the operating room for emergent surgical exploration and his surgical team attempted to repair the ruptured globe; however, he had an extensive scleral laceration that was unamenable to repair posteriorly. He was ultimately offered the opportunity to undergo enucleation or evisceration by his ocular surgical team out of concern that he could develop sympathetic ophthalmia [3,4]. After discussion of the risks and the benefits of surgical intervention, he declined further operative intervention.

Discussion

Atypical ballistic pathways present a diagnostic conundrum as the type of imaging and the disposition are guided by the presumed ballistic course. In this patient, a series of initial screening x-rays were obtained including x-rays of the chest, abdomen, and skull. Even though the skull was without signs of ballistic entry, an x-ray of the skull was performed as the number of ballistic wounds did not correlate with the expected number of bullets. This x-ray revealed a retained bullet in the orbit, and he then went to the CT scanner, where he received a CT of the head and chest. After reviewing the imaging in real-time, a CTA of the neck was added on due to the presumed trajectory of the second ballistic. While this patient did not sustain any significant cervical injuries, penetrating cervical injuries are not without risk. Devastating injuries to the following structures may ensue: pharynx, trachea, esophagus, larynx, vocal cords, vascular (carotid artery, vertebral artery, internal jugular vein, external jugular vein, subclavian artery, subclavian vein), cartilage injury (cricoid, thyroid), nervous system (spinal cord, cranial nerves, brachial plexus and/or peripheral nerves) [5–7]. Many of these aforementioned injuries will require operative exploration or repair [5–7]. Furthermore, morbidity and mortality often occurs



Fig. 1. Three wounds and one retained ballistic, bullet trajectory one (narrow arrows) and bullet trajectory two (wide arrows).

as a result of these injuries [7–9].

Nonetheless the importance lies within identifying immediate life-threatening diagnoses. While this patient certainly had an injury mechanism that can lead to an expanding cervical hematoma, as his injury pattern traversed through several cervical fascial planes including the para-pharyngeal space, he was fortunate to not sustain this complication. An expanding cervical hematoma becomes a time sensitive diagnosis as bleeding into the fascial planes creates a taut compartment that expands into adjacent structures including the aerodigestive tract. This compression can ultimately lead to asphyxiation which may result in death [9,10].

The strength of this case report is that this study serves as an educational opportunity to provide new insight for future practicing clinicians of an unusual trajectory course in a traumatically injured patient. Nonetheless, this case report is not without limitations. First due to the subjective nature of a case report, it is subjected to both information bias and recall bias. Secondly, this was a retrospective study of a ballistic injury pathway and is not representative of all ballistic injuries that transverse the cervical region. Traumatically injured patients may present with a similar mechanism and ballistic trajectory; however, there may be other components of the history, the physical exam, or the radiological studies that are not depicted in this case.

Conclusion

A left globe rupture from a left scapular gunshot wound is an uncommon ballistic trajectory. Trajectory determination is key as many vital anatomical structures are in the planes between the orbit and the scapula. This case informs future practicing clinicians of an unusual ballistic pathway thus enforcing the vital concept of rapidly identifying penetrating ballistic trajectories and subsequently modifying the trauma work-up to rapidly identify potentially life-threatening injuries.

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CRediT authorship contribution statement

A.M.H designed the study, searched the literature, and prepared the article including drafting of the article and critically revising the article.

Declaration of competing interest

I do not have any personal relationships or financial interest with regards to the authorship and/or publications of this manuscript.

References

- [1] Centers for Disease Control and Prevention NC for IP and C, Web-based Injury Statistics Query and Reporting System (WISQARS) Fatal Injury Data, Accessed: October 4, 2021, 2020, https://www.cdc.gov/injury/wisqars/fatal_injury_reports.html.
- [2] American College of Surgeons Committee on Trauma, Advanced Trauma Life Support Manual, Tenth, American College of Surgeons, Chicago, IL, 2018.
- [3] A.M. Williams, A.M. Shepler, C.T. Chu, K.K. Nischal, Sympathetic ophthalmia presenting 5 days after penetrating injury, *Am. J. Ophthalmol. Case Rep.* 19 (2020), 100816.
- [4] D. Reed, A. Papp, W. Brundridge, Evisceration versus enucleation following ocular trauma, a retrospective analysis at a level one trauma center, *Mil. Med.* 185 (2020) 409–412.
- [5] discussion 47–8 D. Demetriades, D. Theodorou, E. Cornwell, et al., Evaluation of penetrating injuries of the neck: prospective study of 223 patients, *World J. Surg.* 21 (41–7) (1997).
- [6] J. Breeze, D.M. Bowley, J.G. Combes, et al., Outcomes following penetrating neck injury during the Iraq and Afghanistan conflicts: a comparison of treatment at US and United Kingdom medical treatment facilities, *J. Trauma Acute Care Surg.* 88 (2020) 696–703.
- [7] J. Brennan, M.D. Gibbons, M. Lopez, et al., Traumatic airway management in Operation Iraqi Freedom, *Otolaryngol. Head Neck Surg.* 144 (2011) 376–380.
- [8] J. Breeze, L.S. Allanson-Bailey, N.C. Hunt, R.S. Delaney, A.E. Hepper, J. Clasper, Mortality and morbidity from combat neck injury, *J. Trauma Acute Care Surg.* 72 (2012) 969–974.
- [9] B.J. Eastridge, R.L. Mabry, P. Seguin, et al., Death on the battlefield (2001–2011): implications for the future of combat casualty care, *J. Trauma Acute Care Surg.* 73 (2012) S431–S437.
- [10] S. Iizuka, S. Morita, H. Otsuka, et al., Sudden asphyxia caused by retropharyngeal hematoma after blunt thyrocervical artery injury, *J. Emerg. Med.* 43 (2012) 451–456.