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Case Report

Do lodged foreign bodies in the neck need to be removed? No defined criteria in 2020. Fluoroscopy role and review of literature: A case report

Cesar Reategui

Missouri Delta Medical Center, General Surgery Department, 1008 N Main St, Sikeston, MO 63801, United States of America

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ABSTRACT

Penetrating neck wounds can be fatal and require prompt attention. The trauma literature is flooded with management protocols for penetrating wounds to the neck; however, in the absence of hard signs the definitive management of lodged foreign bodies beyond the platysma is less clear. This report describes a work-related injury of a Caucasian 33-year-old male who arrived in the Emergency Department (ER) with a 1 cm metallic foreign body (FB) lodged in zone II of the neck, 7 mm antero-lateral to the right internal carotid artery. The technical aspects of its retrieval are discussed as well as a literature review of the current management of embedded FBs in the neck. The patient was taken to the operating room and the FB was removed via a 3 cm incision. Fluoroscopy was used for exact localization of and to allow a precise skin incision overlying the FB. The FB was retrieved uneventfully; a fiberoptic esophagoscopy and bronchoscopy showed normal findings. The patient was discharged home the next day. At 15 months follow-up he is doing well without sequela. The use of fluoroscopy is strongly encouraged for FB removal in asymptomatic patients. The management of lodged foreign bodies in the neck should be part of future guidelines.

Introduction

In the United States, penetrating neck injuries contributed to less than 2% of all reported injuries in 2013. Despite the relative infrequency, severe neck injuries are associated with a high case fatality rate [1]. The management of these wounds depends on whether on primary survey the patient demonstrates “hard signs” or hemodynamic instability. Hard signs include: airway compromise, air bubbling wound, expanding or pulsatile hematoma, active bleeding, hypovolemic shock, hematemesis and neural deficits. These patients require prompt transfer to the operating room. Different Societies have published guidelines to address penetrating neck trauma; however, none of these addresses the need or timing for removal of a retained foreign body (FB) in the neck of an asymptomatic patient [2].

Case presentation

A 31-year-old Caucasian male patient with no significant medical history presented to our ER after accidental right neck impaction of a metallic fragment while hammering metal at work. On physical exam he seemed comfortable; talking without difficulties, yet had some discomfort in the area. There was no hematoma or active bleeding, a 1 cm wound in zone II of the neck over the

E-mail address: cors6790@gmail.com.

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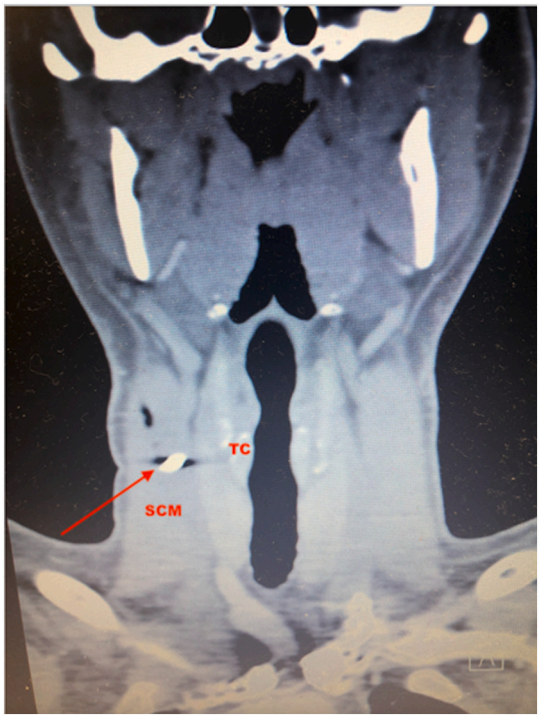

Fig. 1. CT Scan Coronal Cut. Notice the FB (arrow) lateral to the thyroid cartiladge (TC). It can be seen embeded in the SCM muscle with small amount of air surrounding it.

right sternal head of the sternocleidomastoid muscle was visible. His temperature was 37 °C, his heart rate was 96 bpm, his respiratory rate was 20 per minute, his blood pressure was 160/90 mmHg and oxygen saturation 98% on room air. Laboratory evaluation showed a WBC count of 9600 cells/mm^3, a hemoglobin of 16.4 g/dl and a hematocrit of 46.8%. A CT angiography of the neck reported a 9 mm metallic fragment imbedded in the right sternocleidomastoid muscle (SCM) with associated soft tissue air, no hematoma or evidence of vascular injury. The metallic fragment was located 7.4 mm anterolateral to the right common carotid artery, at the level of the lower aspect of the thyroid cartilage (Figs. 1 and 2).

The patient was taken to the operating room for FB removal with fluoroscopic guidance, fiberoptic esophagoscopy and bronchoscopy. The CT angiography was carefully analyzed and helped to assess the proximity of the FB to vital structures. He was positioned supine on the table and given general anesthesia. Using the C-arm the object was localized in the coronal and sagittal planes at a 90° angle. A DeBakey forceps was placed over the skin with its tip over the FB and the site was marked in both axes. This gave us it's exact depth and allowed us to make a very precise incision over the FB (Fig. 3).

A 3 cm skin incision was made on the marked location, dissection was carried in the direction of the sternocleidomastoid fibers, which were spread bluntly. Upon approaching the FB, a small hematoma and distortion of the tissue could be appreciated. Using a

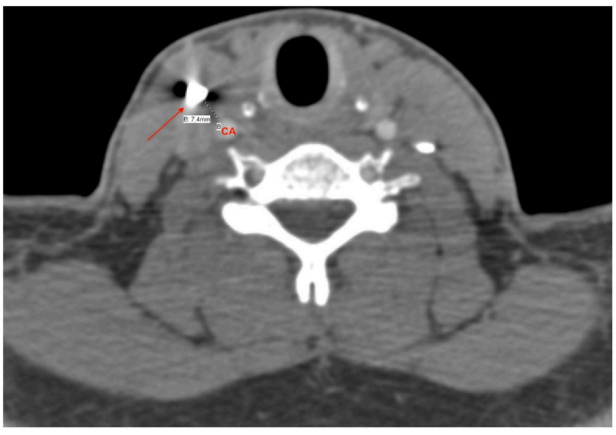

Fig. 2. CT scan axial cut. Notice the FB (arrow) 7.4 mm antero lateral to the right common carotid artery (CA).

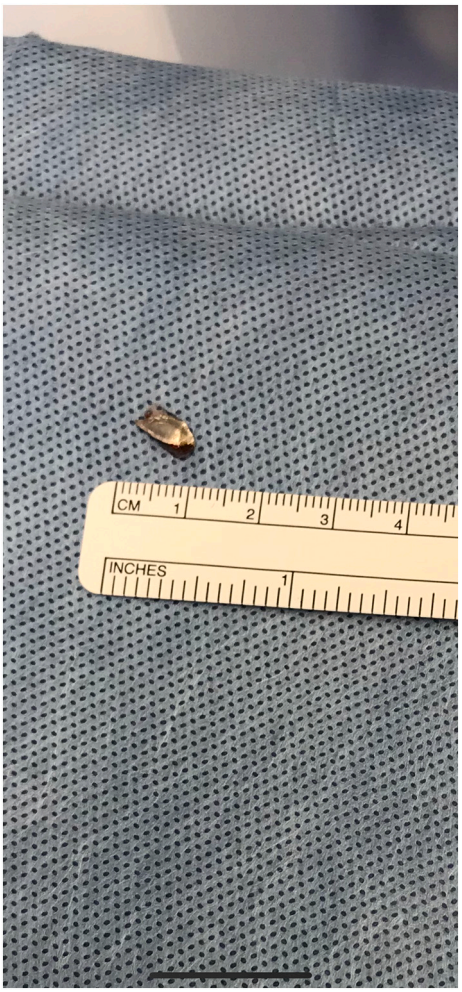

Fig. 3. FB retrieved during surgery. A. flat metalic fragment of 1 x 0.5 cm.

Fig. 4. Anterolateral view of patient's neck. The 2 blue marks were used for location. The 2 planes were provided by the c arm at 90 degrees. 1 cm deep to where both lines join the FB was found.

Fig. 5. Anterior view of patient's neck the day after surgery, right before discharge.

Frazier suction device aspiration was performed, the object was found and removed with a DeBakey forceps. The FB was located about 3.5 cm from entrance wound. The trajectory seemed to follow an antero-posterior and cranio-caudal course. The wound was irrigated and the skin closed with 4 stitches of 3-0 Nylon. Esophagoscopy and Bronchoscopy were within normal limits. There were no intraoperative complications, the patient was discharged home the following day (Figs. 4 and 5).

Discussion

Multiple guidelines are available for the management of penetrating neck trauma; classically the presence of hard signs mandates explorative surgery [2]. However, retained FBs in asymptomatic patients represent a controversial entity and its management requires careful analysis and decision making. Unfortunately, FBs are not addressed in current guidelines. In asymptomatic patients there is no consensus regarding indications or timing for removal. Due to potential complications most of the literature seems to favor early extraction. Complications can include:

1) Infection. Mediastinitis, parapharyngeal and neck abscess formation has been reported secondary to ingested animal bones, glass, metal and dental prosthesis. The author reports 67 neck abscesses in 121 patients who swallowed FBs. All patients underwent incision and drainage. 61 of the FBs were extracted by fiberoptic esophagoscopy, the remaining via lateral cervical incision during abscess drainage [3].
2) Vascular complications. Pseudoaneurysm formation and carotid artery rupture secondary to ingested FBs has been reported by several authors; Wang et al. reported nine cases (7 fishbones, 1 chicken bone, 1 needle) [4]. A case of FB embolism and migration to the heart via the jugular vein after a penetrating injury due to a labor accident has been described. Interestingly the FB remained in the heart and the patient was reported to be asymptomatic five years after [5]. Carotid-esophageal fistula has also been reported due to accidental ingestion of a small (~2 cm) piece of steel wire; the patient developed hemiparesis due to late diagnosis [6].
3) Complications due to retained missiles. Patients with retained bullet fragments are at risk of lead poisoning; those with blood lead levels above 5 μg/dl should have the fragment removed [7]. Malignant transformation such as metastatic high-grade rhabdomyosarcoma has been reported in rats implanted with tungsten alloy (WA)-based ammunition [8]. WAs replaced lead in some small caliber ammunition in attempts to eliminate the use of hazardous materials from small arms ammunition.

Considering its potential complications, early FB removal is recommended. However, Zhao et al. reported a case of a large piece of glass lodged in the parapharyngeal space after a motor vehicle accident. In this case the author suggests that the increased duration of FB retention in the parapharyngeal space may be helpful to allow fibrosis to surround it, thereby reducing the risk of active bleeding when it is removed [9]. Military literature suggests that if there is no risk of migration the patient can be observed; the risk factors for migration however are not mentioned [10].

Multiple techniques have been described for the extraction of FBs lodged in the neck. Direct laryngoscopy with image intensified television fluoroscopy system was reported by Vishwakarma et al. to address FBs around the prevertebral area [11]. Ultrasound assisted removal of a neck FB was described in a 13-year-old boy [12]. Güven et al. described a case similar to ours, where fluoroscopy was used to aid in the retrieval of a metallic FB lodged in the neck [13]. Ozturk et al. described the successful removal of multiple windshield glass fragments from Zone II of the neck with the help of fluoroscopy [14].

Except minimal discomfort our patient was asymptomatic without any hard signs. The case was discussed with 3 fellowship trained Trauma Surgeons. The decision to remove this FB was based on the risk of infection, migration and its proximity to the right internal carotid artery.

Careful evaluation of the CT angiography and the use of fluoroscopy with C-arm at the moment of the retrieval were the cornerstone of success. Fluoroscopy is strongly encouraged, it provides exact location of the FB and can help guide surgical dissection. If fluoroscopy is not available then the surgeon must rely on available resources; ideally a CT angiography or CT with IV contrast as 2nd option. These need to be carefully examined as they allow to delineate the surrounding area; providing an exact distance to vital structures. The decision to perform fiberoptic esophagoscopy and bronchoscopy was based on the low sensitivity of CT scans to rule out visceral injury (50%) and the high mortality rate of pharyngo-esophageal injury.

Conclusion

The surgeon should have enough neck anatomy knowledge and be aware of the precise relationship of the FB to vital neck structures before embarking into surgery. The use of fluoroscopy is strongly advised. Careful analysis of the preop imaging is of paramount importance. The management of lodged foreign bodies in the neck should be included as part of future guidelines for penetrating neck trauma.

References

[1] American College of Surgeons, National Trauma Data Bank Annual Report, http://www.facs.org/trauma/ntdb/pdf/ntdb-annual-report-2013.pdf, (2013) [Accessibility verified May 1, 2014].
[2] J.L. Nowicki, B. Stew, E. Ooi, Penetrating neck injuries: a guide to evaluation and management, Ann. R. Coll. Surg. Engl. 100 (1) (2018) 6–11, https://doi.org/10.1308/rcsann.2017.0191.
[3] A. Peng, Y. Li, Z. Xiao, W. Wu, Study of clinical treatment of esophageal foreign body-induced esophageal perforation with lethal complications, Eur. Arch. Otorhinolaryngol. 269 (9) (2012) 2027–2036, https://doi.org/10.1007/s00405-012-1988-5.
[4] S. Wang, J. Liu, Y. Chen, X. Yang, D. Xie, S. Li, Diagnosis and treatment of nine cases with carotid artery rupture due to hypopharyngeal and cervical esophageal foreign body ingestion, Eur. Arch. Otorhinolaryngol. 270 (2013) 1125–1130.
[5] Gomez E. Rodriguez, Cervical foreign body. An unusual case, Acta Otorinolaringol. Esp. 55 (6) (2004) 298–301.
[6] S. Behesthirouy, F. Kakaei, Carotid-esophageal fistula due to a retained foreign body, Asian Cardiovasc. Thorac. Ann. 22 (8) (2014) 984–986, https://doi.org/10.1177/0218492313502210.
[7] A. Apte, K. Bradford, C. Dente, R.N. Smith, Lead toxicity from retained bullet fragments: a systematic review and meta-analysis, J. Trauma Acute Care Surg. 87 (3) (2019) 707–716, https://doi.org/10.1097/TA.0000000000002287.
[8] J.F. Kalinich, C.A. Emond, T.K. Dalton, et al., Embedded weapons-grade tungsten alloy shrapnel rapidly induces metastatic high-grade rhabdomyosarcomas in F344 rats, Environ. Health Perspect. 113 (6) (2005) 729–734, https://doi.org/10.1289/ehp.7791.
[9] Y.F. Zhao, Y. Liu, L. Jiang, et al., A rare case of a glass fragment impacted in the parapharyngeal space associated with neurovascular compromise, Int. J. Oral Maxillofac. Surg. 40 (2) (2011) 209–211, https://doi.org/10.1016/j.ijom.2010.07.009.
[10] R.J. Barnett, Foreign Bodies of the Head, Neck and Skull Base. Otolaryngology/Head and Neck Surgery Combat Casualty Care in Operation Iraqi Freedom and Operations Enduring Freedom, Published by the Office of The Surgeon General Borden Institute, Fort Sam Houston, 2015.
[11] Rajesh Vishwakarma, Shawn T. Joseph, Arpit Sharma, Rahul C. Gupta, Endoscopic removal of sharp foreign bodies in neck using image intensified television, International Journal of Head and Neck Surgery 1 (2) (2010) 113–116.
[12] R.E. Friedrich, Ultrasonographically supported removal of foreign bodies of the eye lid and parapharyngeal space in a 13-year-old boy subjected to shot injuries in early childhood, GMS Interdiscip. Plast. Reconstr. Surg. DGPW 2 (2013), https://doi.org/10.3205/iprs000039 Doc19. Published 2013 Nov 29.
[13] Damla G. Güven, Hüseyin Yaman, Subaşl Buğra, Ender Güçlü, Fluoroscopic guided removal of a metalic foreing body in the neck: a case report, Konuralp Tıp Dergisi 5 (1) (2013) 42–45.
[14] K. Ozturk, B. Keles, Z. Cenik, H. Yaman, Penetrating zone II neck injury by broken windshield, Int. Wound J. 3 (1) (2006) 63–66, https://doi.org/10.1111/j.1742-4801.2006.00177.x.