

Case Report

Penetrating injury to the neck - Three case reports with review of literatures

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Abstract

Penetrating neck wounds are potentially dangerous and require emergency management because of the presence of vital structures in the neck. Organic foreign bodies further carry a risk of wound infection. Three interesting penetrating neck injury with foreign bodies are presented of which two are metallic, one with bamboo stick penetrating the neck tissue without damaging any vital structures except facial nerve injury. Mode of entry, the peculiarity of the foreign body, the management protocol and the outcomes of neck injury are evaluated in the three cases of this case report. Review of literature revealed that few such cases have been reported.

Key words: Foreign body, bamboo stick, metallic, penetrating, neck

Introduction

Penetrating neck injuries are present in 5-10% of all trauma cases. Many kinds of materials such as knife, bullet, metallic rod, pencil fragments of glass, bamboo stick etc can cause penetrating neck injury. Such injuries can damage vital structures in the neck like great vessels, nerves, pharynx, esophagus etc. & threaten life.¹ Penetrating neck wounds complicate approximately 10% of all neck trauma presentation² while they are most commonly associated with violent acts; they are also encountered in road traffic collisions and other accidents. The mechanism of penetration is important in determining the extent of damage and treatment options. The neck has a dense concentration of neurovascular and aerodigestive structures that can be damaged by injuries which penetrates the platysma muscle. It is useful to divide the neck horizontally into three zones. Zone 1 extends between the clavicle and the cricoid cartilage; injuries to this region carry the highest mortality because of vascular injury and high risk during surgical exploration.³ Zone II is superior to zone I and extends as far as the angle of the mandible. Zone III is the area between the angle of the mandible and the base of the skull. Zone II injuries are the most common followed by zone I and finally zone III.⁴

Injuries may occur in more than one zone. Inevitable vascular injury is the most frequent complication of neck trauma occurring in one quarter of all cases and carrying a mortality of nearly 50%. Trauma to the trachea occurs in one tenth of cases & mortality in these cases approaches 20%.⁵ Extensive penetration may result in oropharyngeal trauma. Currently it is thought that penetrating neck injuries carry 3-6% mortality rate.⁶ The mortality rate for zone II stable injuries is generally perceived to be lower than this, although there are no large studies to back this up. In the postwar era it was shown that the mortality associated with penetrating wounds dropped from around 35% to 6% when immediate surgical exploration was performed⁷ We present 3 cases where unusual penetration neck injuries by bamboo stick, iron rod and tufted metallic rod ended sharp pointed hook which missed all the major structures of the neck.

Case 1

A 18 year old female was brought to the ENT department of Dhaka Medical College hospital on 30/10/2009 with a history of fall from 5th floor of a constructed building following which she sustained massive lacerated injury to the neck and oral cavity with a rod which passed though the oral cavity and came out from the left parotid region. There was history of bleeding from the oral cavity, nose & left external auditory canal. Patient was conscious but irritable & restless. Examination revealed a through & through penetrating neck wound with an iron rod in situ entering through the oral cavity and come out through the parotid region, zone III (Figure 1).



Figure-1: Iron rod in situ entering through the oral cavity

The patient was conscious, hemodynamically stable with left sided facial nerve paralysis. The patient was taken to the operation theatre and a tracheostomy was done under local anesthesia. Then general anesthesia was given through the tracheostome. Oral cavity and oropharynx could then be examined and it showed the iron rod foreign body passed through the oral cavity with lacerated wound in the left tongue margin, softpalate, left parotid & fracture mandible.

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The rod was removed after proper exposure of the wound about (14 × 2.5). Wound was properly toileted with antiseptic solution and repaired in layers, no major blood vessel injury was found. Mandibular wiring was done with the help of a maxillofacial surgeon. Postoperative period was uneventful except left facial nerve paralysis. Tracheostomy was closed after 7 days and patient was discharged with referral to physical medicine department for physiotherapy.

Case 2

A 35 years old man presented to the ENT department of Dhaka Medical College Hospital on 27.01.08 following a road traffic accident. He sustained a penetrating neck injury with a bamboo stick which entered through the left submandibular region and came out through the oral cavity (Figure-2). There was no history of unconsciousness and as the patient had walked into the department alert and oriented. Examination revealed that there was an entry wound in the left submandibular region about 1.5 inch in diameter and exit lacerated wound in the right side of the floor of the mouth, tongue & oropharynx with loose upper incisor teeth. Haemodynamically patient was stable. No major neurovascular injury was noted.

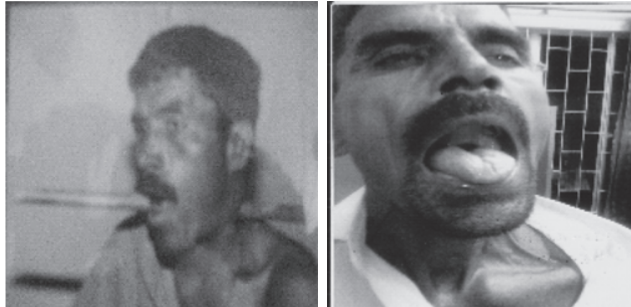


Figure-2: Penetrating neck wound with bamboo stick before and after treatment

The bamboo stick was sharp as end smoothly in beveled manner. The patient was taken to the operation theatre and tracheostomy was done then general anesthesia was given through the tracheostome, oral cavity, oropharynx could then be examined and it showed a bamboo stick about (10" × 1") passing through the floor of the mouth with lacerated entry wound in the left submandibular region. The bamboo stick was removed after adequate exposure of exit & entry wound. Wound closed in layers after proper toiletting with antiseptic solution. A drainage tube was kept in the submandibular region. A nasogastric tube was inserted, postoperative period was uneventful, tracheostomy removed after 5 days and patient discharged after 7 days without any residual effect.

Case 3

A 27 year old man presented to the ENT department Dhaka Medical College hospital on 03-03-2010 with tufted multiple metallic rod ended in sharp pointed hook prevailing as foreign body penetrating in the lower face & upper neck following homicidal assault of land dispute (Figure 3). Patient was conscious, well oriented. There was no significant bleeding.

On examination it was found that a tufted multiple metallic rod sharp pointed hook shaped end foreign body in the lower face & upper neck, among which one entered through the submental region, one entered through the right nasal vestibule, one passed through the left submandibular region & one passed over the mandible. No neurovascular or important structure injury was noted. Patient was taken to the operation theatre; foreign body was removed after adequate exploration under general anesthesia with orotracheal intubation. Wound was adequately toileted & closed in layers. Postoperative period was uneventful; outcome was satisfactory without any debility.



Figure-3: Penetrating neck wound with tufted metallic rod before and after treatment

Discussion

The neck is a complex region from an anatomical point of view. It contains a constellation of a number of vital structures, such as vascular, aero digestive and neural, being protected by strong musculature, tough fascia and related bones. The aggregation of structures in a small volume make them more vulnerable for damage in any penetration injury of the neck crossing the platysma with serious and life threatening consequences. However, in some places, the vital structures are protected with a tough, bony shield and clavicle where as in other places these are more superficial and can open up. Diversity of this arrangement compels the clinician different management protocol for a different location of the neck. In the present three cases, the injuries were confined to the lower face, zone III and zone II without damaging major structure/major neurovascular structure as well as the aero digestive tract.

All penetrating neck wounds are potentially dangerous and require emergency treatment because of the presence of vital structures in the neck which can be divided in the following four groups⁸ (i) the air passages: trachea, larynx, lungs (ii) vascular structures: carotid, jugular, subclavian, innominate and aortic arch vessels; (iii) gastrointestinal structures: pharynx and esophagus (iv) neurological structures; cranial nerves, peripheral nerves, brachial plexus and spinal cord. Objects penetrating through the neck could damage any of these structures. Moreover, the injury in the zone III (area above the level of angle of mandible) is more dangerous than injury in the zone II (the area between the cricoid cartilage and angle of the mandible) because of proximity of skull base to zone III.⁸

In the present 3 cases there were injury in the floor of the mouth but fortunately the major vessels and nerves were not injured except facial nerve injury in one case. Angiography is required in injuries of zone I and zone III for evaluation of the vital vessels and evaluation of relationship between foreign bodies and vessels.^{8,9}

A recent study by Klunz et al has emphasized the use of contrast enhanced CT angiography as a noninvasive alternative to conventional angiography.¹⁰ Selective arterial angiography is an important tool in diagnosing vascular injury in the case of penetrating neck injury. Data from Ferguson and colleagues suggest that in the absence of vascular sign with a penetrating neck injury, angiography is not necessary.^{11,12} We did not have any angiography in our reported cases due to clinically absence of vascular sign & financial constraint. Each investigation has advantages & disadvantages.¹³ The selection of a particular type of investigation depends on the financial condition of the available investigation modality.

Studies have shown that there is no significant difference between clinical examination and angiography for detection of vascular injury in zone II penetrating neck injuries. It is also seen that finding on physical examination are good predictors of arterial injury in patients with penetrating neck wounds and can exclude injury in over 90% of patients³ shown in a recent study. In a recent study done by Saharan et al on 145 patients with zone II penetrating neck trauma, it was found that physical signs of vascular injury like active bleeding, expanding hematoma, bruit, pulse deficit, central neurological deficit etc could accurately detect vascular injury with missed injury rate of 0.7% which is comparable to arteriography in accuracy but less costly and noninvasive.¹⁴

Our cases had no physical signs of major vessels injury. So, extensive investigations were not needed. Moreover the facilities for angiography were not available in the centre. Sometimes injury of major vessels might be tamponaded by foreign bodies; therefore, blind removal of objects may cause life threatening hemorrhage. Such foreign bodies should always be removed by exploration in a proper setup. Exploration of neck is considered mandatory by many surgeons but a selective approach is considered appropriate by others considering the morbidity and mortality associated with surgical exploration.^{15,16} Moreover, exploration of zone III is more difficult than other areas as it hidden by the ramus of the mandible and also carries the risk of injuring the facial nerve. In one of our reported case, facial nerve was injured by the penetrating foreign body. Organic foreign bodies like the piece of bamboo stick are grossly contaminated and can cause serious infection if not removed promptly and not treated with antibiotic coverage. Such organic foreign bodies can not be left in situ. In our presented cases we used antibiotic and there was no infection in the wound.

Penetrating foreign body in the neck is not uncommon but potentially life threatening and crisis condition. In cases of organic foreign bodies, early exploration and removal reduces the chances of wound infection resulting in a favorable outcome. Diversities in the management protocol with

changing technique compel the clinician to perform a close evaluation of the patient. Each maneuver should minimize mortality and morbidity by means of timely intervention.

References

1. Agrawal R, Timilsina DS, Reddy NS, Ganguly SN, Tayal A. Penetrating foreign body neck: A case report. Kathmandu University Medical Journal 2007; 5(3): 414-416.
2. Nason RW, Assuras GN, Gray PR, et al. Penetrating neck injuries: analysis of experience from a Canadian trauma centre. Can Surg 2001; 44:122 - 6
3. Thal ER, Myer DM. Penetrating neck trauma. Curr Probl Surg 1992; 29: 1
4. McConnell DB, Trunky DD. Management of penetrating trauma to the neck. Adv Surg 1994; 27:97
5. Bryant AS, Cerfolio RJ. Esophageal trauma. Thorac Surg Clin 2007; 17:63
6. Singh R, Bhandry S, Karki P. Managing a wooden foreign body in the neck. J Emerg Trauma Shock 2009; 2:191-5
7. Fogelman MJ, Stewart RD. Penetrating wounds of the neck. Am J Surg 1956; 91; 581-96
8. Maisel HM, Hom DB. Penetrating trauma to the neck. In: Curnmings CW, Fredrickson JM, Harker LA, Krause CJ, Richardson MA, Schuller DE, editors. Otolaryngology Head and Neck surgery. St Louis: Mosby; 1998. P.1707-20
9. Miller RH, Duplechain JK. Penetrating wounds of the neck. Otolaryngology Clin North Am 1991;24:15-29
10. Nunez DB Jr, Torres Leon M, Munera F. Vascular injuries of neck and thoracic inlet: helical CT-angiographic correlation. Radiographic 2004; 24 (4):1087-98
11. Beister P, Weigett JA, Flynn E, Easley S. Physical examination end arteriography in patients with penetrating zone II. Surg 1994;129: 577 -81
12. Gracias VH, Reilly PM, Philpott J, Klein WP, Lee SY, Singer M, et al. Computed tomography in the evaluation of penetrating trauma. Arch Surg 2001; 136:1231-5.
13. Hanpeter DE, Demetriaades D, Asensio JA, Berne TV, Velmahos G, Murray J. Helical Computed tomographic scan in mediastinal gun shot wounds. J Trauma 2000; 49: 689-95.
14. Sekharan J, Dennis JW, Veldenz HC, Miranda F, Frykberg ER. Continued experience with physical examination alone for evaluation and management of penetrating zone II neck injuries: results of 145 cases. J Vasc Surg. 2000; 32 (3):483-9.
15. Rodriguez Gomez E. Cervical foreign body - An unusual case. Acta Otorinolaringol Esp.2004; 55(6):298-301.
16. Hersman G, Barker p, Bowley DM, Boffard KD. The management of penetrating neck injuries. Int Surg.2001 Apr-Jun; 86(2):82-9.