

Case Report

Management of Penetrating Neck Injuries: Case Report of an Uncommon Trauma

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Abstract
 A man was admitted to our Emergency Department with a foreign body crossing the neck at full thickness. The clinical course and the management are described and discussed.

ABBREVIATIONS

PNI: Penetrating Neck Injuries; ICU: Intensive Care Unit; CT: *Computed Tomography*; IV: *Intravenous*; OR: *Operation Room*

INTRODUCTION

Penetrating neck injuries (PNI) can be associated with a number of life-threatening complications, primarily due to the high density of vital anatomical structures, including arterial and venous vessels, airways and nerves. From an anatomical point of view, the neck can be subdivided into three zones: zone I includes the area between the thoracic inlet and the cricoid cartilage, zone II the area between the cricoid and the lower border of the mandible and the zone III the area between the inferior border of the mandible and the base of the skull; furthermore, the posterior border of the sternocleidomastoid separates the anterior from the posterior cervical region[1-3] (Table 1). It appears that Zone II is more accessible for surgical exploration compared with Zone I and III [4].Independent from the involved zone(s), the therapeutic approaches to PNI differ according to underlying visceral injuries and the resulting clinical conditions (Table 2) [5]: in the absence of airway compromise and/or massive bleeding a diagnostic work up which should include CT scan with IV contrast, bronchoscope and esophagoscopy is recommended prior to any surgical decision, whereas an emergent surgical exploration is mandatory in hypotensive or dyspneic patients [6]. Here, this case reports a patient with a foreign body fully crossing the Zone III without causing any major damage.

CASE PRESENTATION

A 77-year-old man was admitted to our ICU with a Zone III caused by an 8 mm-thick wooden stick entering from the left temporal-mandibular and emerging from the right parotid region after an accidental fall (Figure 1). At admission and during the diagnostic work up he was fully alert and his vital signs were

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normal; a CT- scan with IV contrast demonstrated that the foreign body crossed the rhino-pharyngeal soft tissues and muscles inside the prevertebral space without injuring the cervical vessels or the mandible (Figure 2). The left internal carotid artery was thrombosed; this finding was considered preexisting by the vascular surgeon and unrelated to PNI due the absence of neurologic symptoms and the presence of collaterals. The patient

Table 1: The division of the neck into 3 zones and respective structures.

ZONE	STRUCTURES
ZONE 1	<ul style="list-style-type: none"> • Thoracic outlet vasculature (subclavian arteries and veins, internal jugular veins) • Proximal carotid arteries • Vertebral artery • Apices of the lungs • Trachea • Esophagus • Spinal cord • Thoracic duct • Thyroid gland
ZONE 2	<ul style="list-style-type: none"> • Common carotid arteries • Internal and external branches of carotid arteries • Vertebral arteries • Jugular veins • Trachea • Esophagus • Larynx • Pharynx • Spinal cord • Vagus and recurrent laryngeal nerves
ZONE 3	<ul style="list-style-type: none"> • Distal portion of the internal carotid arteries • Vertebral arteries • Jugular veins • Pharynx • Spinal cord • Cranial nerves IX, X, XI, XII • Sympathetic chain

Table 2: Symptoms and Signs associated with underlying visceral injuries.

Structure	Symptoms and Signs
Vascular	<ul style="list-style-type: none"> • Moderate to large haematoma • Pulsatile stable haematoma • Pulse deficit • Bruit • Any mediastinal changes on chest X-ray
Pharynx/ esophagus	<ul style="list-style-type: none"> • Odynophagia • Dysphagia • Saliva leak from wound • Blood in nasogastric tube • Haematemesis • Subcutaneous emphysema • Prevertebral air on lateral cervical spine • Pneumomediastinum on chest X-ray • Depressed level of consciousness
Larynx / trachea / bronchus	<ul style="list-style-type: none"> • Dysphonia/hoarseness • Tension pneumothorax • Severe surgical emphysema • Persistent air leak from chest drain



Figure 1 Right parotid region after an accidental fall.

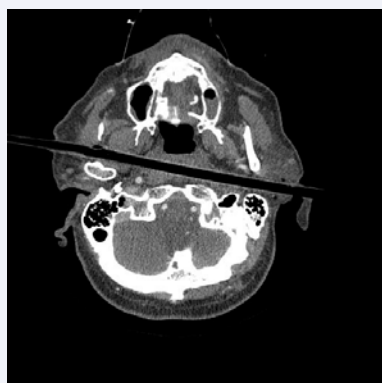


Figure 2 Prevertebral space without injuring the cervical vessels or the mandible.

was moved to the OR where a bronchoscopy demonstrated the presence of narrowed upper airways attributed to the edema of the retropharyngeal tissues and was then orally intubated through the bronchoscope; immediately thereafter the stick was removed through a right cervical incision in order to control a possible active bleeding (Figure 3); finally, a tracheostomy



Figure 3 Tracheostomy Removal.

was performed. After five days, a CT scan demonstrated that the airways had returned to normal, the tracheostomy was subsequently closed and he was discharged, free of symptoms.

DISCUSSION

The treatment of PNI can be subdivided in an outpatient phase consisting of the control of bleeding and the maintenance of the airways according to the ATLS guidelines, and an inpatient phase where the definitive therapies are implemented. These latter have undergone major changes in the last 20 years: due both the high rate of complications associated with useless interventions and the impressive advances of imaging techniques [7]. As a result the treatment of PNI has evolved from a mandatory surgical exploration of the neck to a more conservative approach, which restricts immediate interventions to unstable patients, or in the presence of hard signs such as neurologic symptoms, massive subcutaneous emphysema or dyspnea etc [2]. As far as the location of the PNI is concerned, the recently issued guidelines recommend that stable patients with Zone III PNI undergo a CT-scan of the head and the neck to identify aerodigestive or vascular lesions [8]. Both conditions require prompt recognition and repair, being associated with a number of serious complications, including respiratory failure; mediastinitis due to the leak of saliva into the retropharyngeal spaces; internal bleeding; neurologic damage due to nerve dissection; medullary involvement or ischemia, caused by vessel dissection and/or thrombosis. Due to their peculiar location, vascular lesions in Zone III can be particularly challenging to control and an endovascular treatment with embolization or stenting is recommended when the compromised vessel is inaccessible [2]. In this patient, the absence of bleeding, dyspnea and neurologic damage allowed a thorough investigation of the involved region. Remarkably, the foreign body, albeit crossing the neck at full thickness in Zone III, did not cause any major damage and the only PNI-related abnormality was the edema of the prevertebral soft tissue, since the left carotid thrombosis was and remained totally asymptomatic, indicating that it probably occurred long before the current admission. The tracheostomy was performed due to the compression of the upper airways, which was expected to deteriorate in the following days.

CONCLUSIONS

The treatment of PNI largely depends on the patients' condition. In this case, the absence of vascular, aerodigestive and nervous lesions allowed a conservative approach, which was

limited to a tracheostomy. In patients with Zone III PNI, which is the most challenging area to explore, both clinical examination as well as imaging must guide the most appropriate surgical choice.

REFERENCES

1. Demetriades D, Theodorou D, Cornwell E, Berne TV, Asensio J, Belzberg H, et al., Evaluation of penetrating injuries of the neck: prospective study of 223 patients. *World J Surg.* 1997; 41: 7-8.
2. Burlew CC, Moore EE, Moore FA, Coimbra R, McIntyre RC Jr, Davis JW, et al., Western Trauma Association Critical Decisions in Trauma. *J Trauma Acute Care Surg.* 2012; 73: 1359-1363.
3. Tisherman SA, Bokhari F, Collier B, Cumming J, Ebert J, Holevar M, et al. Clinical practice guideline: penetrating zone II neck trauma. *J Trauma.* 2008; 64: 1392-1405.
4. Youssef N, Raymer KE. Airway management of an open penetrating neck injury. *CJEM.* 2015; 17: 89-93.
5. Van Waes OJ, Cheriex KC, Navsaria PH, van Riet PA, Nicol AJ, Vermeulen J, et al. Management of penetrating neck injuries. *Br J Surg. Soc.* 2012; 99: 149-154.
6. Teixeira F, Menegozzo CA, Netto SD, Poggetti RS, Collet E Silva Fde S, Birolini D1, et al. Safety in selective surgical exploration in penetrating neck trauma. *World J Emerg Surg.* 2016; 11: 32.
7. Petrone P, Verde JM, Asensio JA. Management of Penetrating Neck Injuries, in *Trauma Surgery*, Milano: Springer Milan, 2014; 149-164.
8. Madsen AS, Oosthuizen G, Laing GL, Bruce JL, Clarke DL. The role of computed tomography angiography in the detection of aerodigestive tract injury following penetrating neck injury. *J Surg Res.* 2016; 205: 490-498.

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