

Case report

**Near fatal fall complicated by penetrating neck injury
with uneventful outcome: a case report**

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Abstract

Fall from height is commonly associated with long bones fractures or neurological compromised outcome. On the other hand, penetrating neck injury is linked to life threatening complications especially when the injury involves major blood vessels, spinal cord, cervical spines and aerodigestive tracts. However, in some rare circumstances, a patient may suffer both the eventful fall from height complicated with penetrating neck injury. We report a patient who presented with a wooden stick passing through the lateral side of his neck after an episode of fall. He survived without any residual complications.

Keywords: Fall, penetrating neck injury.

Introduction

Neck injuries carry high risk of morbidity and mortality. The severity depends on few factors including massive blood loss due to injury to the major blood vessels namely the carotid arteries and jugular veins, upper airway obstruction which can be due to edema, hematoma or emphysema that might compress the airway. A fall from height complicated by penetrating neck injury may increase the risk as the patient may suffer the combination of both complications. Subsequently, the complexity of the neck structures itself has made the neck exploration also impose additional risk especially if the foreign body penetration has gone too deep or lead to the distortion of the normal anatomy.

Case summary

A 23 years Malay gentleman was brought to the emergency unit with history of falling from 15-feet high coconut tree while he was plucking the fruits. Upon landing on the ground his neck was penetrated by a wooden stick. There was no other complaint such as bleeding from the neck wound or shortness of breath. He was fully conscious and the vital signs were normal.

He was able to breathe normally and carotid pulsations were felt both sides, there was no neck crepitus to suggest emphysema. There was a wooden stick measured more than 10 cm long passing through his right side of the neck (Figure 1). The portal entry was at the level of angle of right mandible and the exit was just lateral to midline, at the level of the thyroid notch. There was minimal dripping of blood from the site of entry. The patient was intact neurologically.

Urgent cervical spine computed tomography scan was obtained and it showed no evidence of cervical fracture. The entry and exit wounds measured 3.2 cm and 2.9 cm in greatest diameter respectively (Figure 2&3). All major blood vessels were intact and the laryngeal framework structures such as hyoid bone, cricoid or thyroid cartilage preserved.

The patient was taken to the operating theater for neck exploration under general anesthesia. An incision was made on the skin overlying the wooden stick. The stick was removed in one piece and it measured 12cm in length and

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3cm in width. The penetration of the stick was between the superficial cervical fascia and the investing layer of deep cervical fascia. The stick cut part of the right sternocleidomastoid muscle and injured the right submandibular gland. The right anterior jugular vein was severed. However, the carotid sheath was intact and inspection of the larynx showed no injury. Irrigation with normal saline was performed and all bleeders were secured. The wound was closed in layers, with drain inserted. The patient was extubated and nursed in general ward with intravenous antibiotics prophylaxis. He was discharged on the 5th day after his laryngoscope assessment showed normal structures and functions of the larynx. On one week follow up he was completely well with no anatomical or functional disability except the healing neck incision.



Figure 1: A wooden stick penetrating the neck at the region of right sternocleidomastoid muscle where the major vessels lay below

Discussion

Many cases of penetrating neck injuries that required massive surgical intervention and repair have been reported. The clinical presentations sometimes do not reflecting the true injury that has occur internally. A clinically superficial looking minor stab wound can have vascular or aerodigestive injury when the wound is explored¹. The severity of injury depends on many factors including the mechanism of injury, the object that cause or used, the direction of the wound and the power or the force that push the object towards the neck. All of these factors will determine the

depth of the wound and which vital structures going to be violated. Anatomically, injury to the lateral side of the neck will cause vascular damage and midline involvement will subject the airway namely the laryngeal skeleton to be affected.

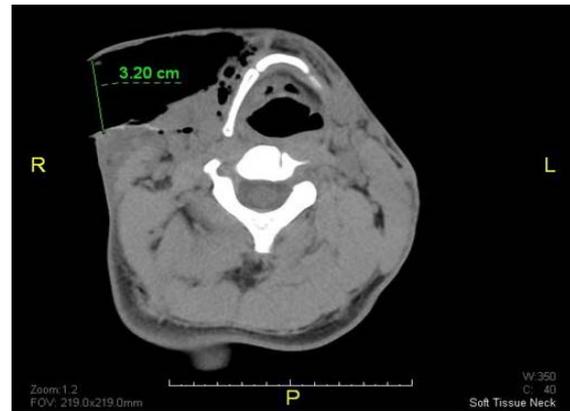


Figure 2: Area of portal entry of the foreign body measured 3.2 cm, located below the right angle of mandible



Figure 3: The exit point skin breached measured 2.87 cm, at the level of thyroid notch

In the present case, the injury was mainly on the right side, which has made the great vessels namely the carotid artery and jugular vein were at risk. However, there was no symptom and sign of blood loss except minimal dripping of blood, which was later on proven to be from the injury anterior jugular vein. He presented with weak voice most probably because of the size of the wooden stick that press on the neck and its proximity to the larynx. However, the breathing was not compromised.

The injury was classified as in zone I which is the most common site for penetrating neck injuries according to Monson's criteria (Zone I: from the clavicles to the cricoid cartilage; zone II: from the inferior margin of the cricoids cartilage to the angle of the mandible; and zone III: from the angle of the mandible to the base of the skull)^{1,2}. Based on the anatomical site of injury we clinically suspected that the patient may have laryngeal fracture in addition to a hematoma formed from a hidden bleeder. This was because despite of the massive injury in such a vascular area, only minimal blood drops comes out of the wound.

By doing a computed tomography scan (CT) imaging, it was confirmed that all the internal structures were intact. However, the role of CT scan in penetrating neck injury is sometimes compromised in certain types of foreign bodies such as bamboo stick or a small fragment from a crushed wooden stick. The bamboo stick for example because of its peculiar structure will appear as a hypodense area and a very small fragment result from crushed wooden stick can be easily missed. In these cases the contrasted MRI study to confirm the presence of foreign body. Otherwise, if the foreign bodies made from metal, plastic or glass it will readily appreciated as radio-opaque on even a plain x-ray³.

Our patient was extremely fortunate because he did not get laryngeal fracture. Otherwise, suffocation and airway obstruction will be the result. If he arrives to emergency department

with stridor, an urgent tracheotomy must be done as life saving procedure.

According to series of cases studied in Boston which include management of laryngeal fracture caused by both blunt and penetrating injuries, only 2 cases of laryngeal fracture out of 12 cases were caused by penetrating neck injury while the rest was due to blunt neck injury⁴. Laryngeal fracture seemed to occur more commonly with blunt injury compared to penetrating neck injury.

Since the CT scan imaging is less sensitive to predict oesophageal perforation or tear, and it is not superior to the combination of barium swallow and oesophagoscopy which carry 100% sensitivity, we did the gold standard rule which is the surgical exploration⁵.

Our patient demonstrated no neck crepitus or subcutaneous emphysema and able to breathe normally. Later it was confirmed with CT scan that there was absence of airway injury. Goudy SL et al in 2002 reviewed 19 patients with neck emphysema and only 55% needs surgical exploration and 20% out of this revealed no injury. The authors concluded that even in suspected cases of upper aerodigestive tract injury, the patients could be managed without surgery. However, a high index of suspicion for airway compromise and associated facial injuries must be considered⁶. In some of the neck trauma cases, where the possibility of having a major vascular injury is suspected, a computed tomographic angiography (CTA) is indicated^{7,8}.

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