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## “Saved by the Belly”: A Case Report of Penetrating Neck Injury with Favorable Outcome

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### Abstract

Penetrating neck injuries represent approximately 5% to 10% of all trauma cases that present to the emergency department. These cases may result in significant mortality due to the presence of many vital structures within the neck which lack skeletal protection anteriorly. In this case, we report a case of a gentleman who had a spear penetrate the anterior of his neck. He subsequently underwent surgical removal of the spear. A vertical incision along the anterior border of the sternocleidomastoid was made to provide proper surgical exposure to the site of injury. Layers of the muscles along the foreign body were separated using the artery forceps and by digital manipulation until the end of the hook was identified. The skin incision was extended to obtain a wider surgical exposure and to make sure the whole length of the spear was exposed. Finally, a spear with 3 hooks was identified lying just lateral to the tendon and posterior belly of the digastric muscle and just below the facial vein with the tip of the spear blocked by a dense fibrous tissue just medial to the anterior border of the sternomastoid muscle, thus preventing it from damaging the carotid sheath which contained the carotid artery and internal jugular vein. The spear was removed successfully. In conclusion, despite not having skeletal support anteriorly, the muscles and fascia in the anterior of the neck is important in protecting vital structures in the neck apart from its' primary function of mobility.

### Introduction

Penetrating neck injuries generally cause a stir of panic among medical practitioners as everyone is aware how life threatening it could be. Penetrating neck injuries represent approximately 5% to 10% of all trauma cases that present to the emergency department in Malaysia [1]. These cases may result in significant mortality due to the presence of many vital structures within the neck with lack of skeletal protection

anteriorly. In this case, we report a case that highlights the importance of a number of neck structures in protecting vital structures in the neck.

### Case History

A 24-year-old local aboriginal male came to our emergency department with a penetrating neck injury. He was riding his motorcycle while holding a speargun in his left hand. He accidentally rode over a plank on the road and he fell. As he lost his balance, he pierced his neck with the speargun. He had no other injuries.

On examination, the gentleman was alert and conscious. His vital signs were stable. There was a metal fishing spear seen protruding from his left lateral neck at an angle of 30 degrees penetrating into the right posterior neck with minimal bleeding. The length of the protruding metal was 4 cm and 0.5 cm in width. The distal part of the metal could be felt upon deep palpation (**Figure 1**).



**Figure 1** Image of the spear penetrating the anterior of the neck at presentation. The entry point of the spear appears to be located just medial to the sternocleidomastoid muscle.

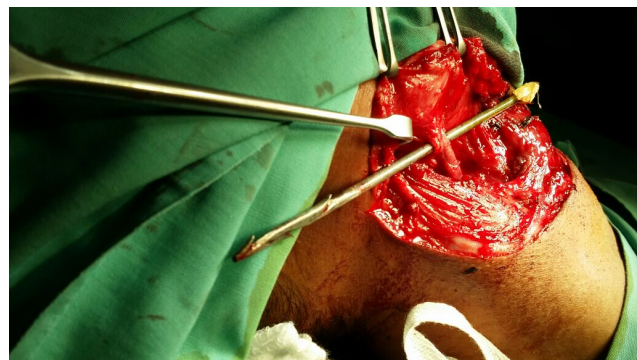
Soft tissue X ray of the neck was taken in an anteroposterior and lateral angle, which revealed a foreign body in the anterior neck segment with no involvement of the cervical vertebrae (Figure 2).



**Figure 2** The antero-posterior and lateral neck radiograph showing the depth and angle of penetration of the spear. The jagged edges of the spear formed by the hooks incorporated into the spear is clearly visible in these images. During the surgical removal of the spear, it was imperative that all 3 hooks were adequately exposed before the spear was pulled out. Also, note that the angle of penetration of the spear lies at about 30° from the vertical plane.

The gentleman was covered with a broad spectrum antibiotic i.e. amoxicillin-clavulanic acid and sent for emergency surgery. A vertical incision along the anterior border of the sternocleidomastoid was made to provide proper surgical exposure to the site of injury. Layers of the muscles along the foreign body were separated using the artery forceps and by digital manipulation until the end of the hook was identified. Initially, an attempt was made to gently pull out the metal foreign body after one hook was identified but failed due to deeper tissue resistance. Following that, the skin incision was extended to obtain a wider and adequate surgical exposure and to make sure the whole length of the spear was exposed. Finally, a spear with 3 hooks was identified lying just lateral to the tendon and posterior belly of the digastric muscle and just below the facial vein (Figures 3-5).

The tip of the spear was blocked by a dense fibrous tissue just medial to the anterior border of the sternomastoid muscle and thus preventing it from further advancement to reach the carotid sheath which contained the carotid artery and internal jugular vein. The spear was removed successfully without any severe damage to the important structures in the neck. Following surgery, patient recovered well in ward. He completed 3 days of intravenous antibiotics and was discharged well with oral antibiotics cover for one week.



**Figure 3** The speargun trapped in the posterior belly of the digastric muscle.



**Figure 4** Removal of the speargun from the digastric muscle. Note the adequate surgical exposure of the area of injury.



**Figure 5** The length of the speargun measuring approximately 14 cm.

## Discussion

The neck comprises of vital structures belonging to the vascular, respiratory, digestive and neural systems [1]. In the human body, important structures in the body are generally well protected by the sturdy skeletal system. The anatomy of the neck is peculiar in a way that the skeletal system does not protect the neck like it does the other areas of the body [2]. This peculiar difference is not without a reason. By being devoid of surrounding skeleton, the neck is flexible. As a result, of this compromise, even the slightest penetrating neck trauma can cause significant morbidity and mortality, particularly so from the anterior of the neck [3].

Neck traumas are common in our setting as the use of motorcycles is still prevalent and the incidence of motor vehicle accidents remain high. The lack of regulations on the transportation of 'weapon like' objects further adds to the risk of motorcyclists in Malaysia. Patients presenting with neck traumas would require careful and detailed examination which is crucial in determining the extent of the injury. In this freak accident, the patient presented with a spear penetrating the anterior of his neck. The injury was located in zone 2 of the neck which ranges from the angle of mandible to the cricoid [4]. Within this zone lies the carotid artery, internal jugular vein, larynx, trachea, esophagus and 10th cranial nerves. If either the carotid artery or internal jugular vein was lacerated by the penetrating injuries, severe haemorrhage may occur before it will stopped by the compression effect from haematoma within the fascial layers of the neck. However severe damage to vital structures within this zone was avoided. In this case, the strategic and perfectly placed the tendon and posterior belly of the digastric muscle of the neck saved the underlying external carotid artery (ECA) and internal jugular vein (IJV). The digastric muscle consists of an anterior and posterior belly, each serving different functions due to its differing attachments. The position of this muscle with its tendon along with the stylohyoid and omohyoid anterior to structures such as the IJV and ECA within the carotid triangle serves to cushion these structures from impact. This anatomical design provided the necessary protection for the ECA and IJV in the neck without compromising the flexibility of the neck. Digastric muscle was also regarded as "surgeon's best friend" when performing any neck surgeries cause its location and landmark indicate that further dissection medial to it is potentially dangerous due to the presence of CA, IJV and important cranial nerves.

In this case, removal of the spear was a challenge as the hooks on the spear was buried deep in the dense tissue fibres. The surgical incision had to be extended to achieve adequate exposure of the surrounding structures in the neck in order not to damage any vital structures. There is the danger of blindly removing the spear with hooks which could cause severe bleeding if the facial vein, the carotid artery or the internal jugular veins were injured. In this case, it was fortunate that the patient himself or his friend did not make an attempt to pull it out.

The principles of management of penetrating neck wounds consist of adequate preoperative resuscitation, followed by immediate surgical exploration and definitive surgery. While adequate surgical exploration form the bread and butter of managing such cases, recent advances in CT angiography have tilted clinicians preference to tailor the management to adopt a policy of selective exploration based on clinical and radiographic examinations.

## Conclusion

Penetrating neck injuries are potentially dangerous and life threatening. In the absence of skeleton in the neck, muscles of the neck serve to protect the vital internal structures. The significance of the neck muscles as the focal protector of vital structures and organs is often overlooked as similar functions are undertaken by the skeleton.

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