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Penetrating Neck Injury due to Foreign Body at C5 Level with Plexus Brachialis Nerve Injury: A Case Report

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Abstract: Penetrating neck injury caused by screwdriver is a very rare case. Rapid transport to a major trauma center is needed for such patients to prevent neurological dysfunction and post traumatic tissue damage. Early and complete assessment and exact surgical procedure are very important to overcome a good outcome and prognosis. We reported a case of a 28-year-old male transferred to the emergency room after being stabbed using a screwdriver. No history of nausea, vomiting, and loss of consciousness. A screwdriver got stucked on the neck at the level of C5-C6 associated with edema but no active bleeding. The upper extremity examination revealed that the muscle contraction was 5555/4444, thumb test +/, opposition test +/-, abductor adductor test +/-, and sensory within normal limit. Radiology examination showed a metallic density of the foreign body in the cervical region penetrating from soft tissue to the vertebral body of cervical C5. The patient was diagnosed with penetrating neck injury due to foreign body in the posterior neck region at C5 level with plexus brachialis nerve injury. Foreign body removal and laminectomy were done to decompression purpose. This case need early, complete and adequate management to prevent post traumatic tissue damage, other neurological dysfunction, and mortality. On the fourth post-surgical day, the patient was discharged with stable vital signs and no neurological deficit. The regular follow up at the neurosurgical clinic showed that neither motoric nor sensoric deficit was found. In conclusion, penetrating neck injury which can cause severe morbidity and permanent disability need an adequate management to prevent any spinal cord damage and minimize any neurological dysfunction.
Keywords: penetrating neck injury; spinal cord injury

Introduction

Penetrating neck injury caused by screwdriver is a very rare case. This type of injury represents 5–10% of all trauma cases.[1] It is important for clinicians to be familiar with management principles, as mortality rates can be as high as 10%.[2] This can be proved difficultly as there are no international consensus guidelines, however, recent improvements in imaging modalities have altered the way for a new approach.[3,4] Published guidance on the management of penetrating neck injury tends to focus on traditional approaches.[3,5,6]

Penetrating neck injury describes the trauma to the neck that has breached the platysma muscle. Rapid transport to a major trauma center is needed for patients to prevent neurological dysfunction and post traumatic tissue damage. Therefore, early and complete assessment and exact surgical procedure are very important to overcome with a good outcome and prognosis. This review provides a practical guide for the evaluation and management of penetrating neck injuries.

Case Presentation

A 28-year-old male was transferred to the emergency room after being stabbed by someone using a screwdriver since 10 hours before admission to the hospital. While the patient was talking with his friend, someone came and stabbed his neck using a screwdriver which then got stucked until the patient arrived at the hospital. There was no history of nausea, vomiting, and loss of consciousness. The patient was admitted to Manembonembo Bitung Hospital then was referred to Prof. Dr. R. D. Kandou Hospital with intravenous line access and the stucked screwdriver at the back of his neck.

On physical examination, the screwdriver appeared to get stucked on the neck at the level of C5-C6 associated with edema and no active bleeding (Fig. 1). The Glasgow coma scale (GCS) was 15/15 (E4M6V5). The upper extremity examination revealed that the muscle contraction was 5555/4444, thumb test +/-, opposition test +/-, abductor adductor test +/-, and sensory within normal limit.

Laboratory examination showed elevated leucocyte count (18,300 u/L). On examination of the AP/Lateral cervical x-ray, it was found that the foreign body in the cervical region reached the level between C5-C6. Cervical X-ray, Cervical CT-Scan without contrast, and Recon 3D revealed a metallic density of the foreign body in the cervical region penetrating from soft tissue to vertebral body of C5 (Fig. 2, 3, 4) Patient was diagnosed with penetrating neck injury due to foreign body in the posterior neck region at C5 level with plexus brachialis nerve injury.

The patient underwent C5 and 6 laminectomies on the prone positions. Foreign body removal and laminectomy was done to decompression purpose. The surgery went smoothly under general anesthesia. During surgery, no hemorrhagic problems occurred and bleeding was under control. (Fig. 5)

The patient then treated at inpatient room for three days and was given antibiotic (Ceftriaxone 1 gr/12 hours/iv), analgesic (tranexamic acid 500mg/8 hours/iv), and antiinflammation (methylpredinsolon 125mg/6 hours/iv). On the fourth post-surgical day, the patient was discharged of the hospital with stable vital signs and no neurological deficit. The regular follow up at neurosurgical clinic showed that neither motoric nor sensoric deficit was found.

Discussion

Penetrating neck injury describes trauma to the neck that has breached the platysma muscle.[6] The most common mechanism of injury worldwide is a stab wound from violent assault, followed by gunshot wounds, self-harm, road traffic accidents and other high velocity objects.[5,7] The neck is a complex anatomical region containing important vascular, aerodigestive and neurological structures that are relatively unprotected.[7] Vascular injury may include partial or complete occlusion (most common), dissection, pseudoaneurysm, extravasation of blood or arteriovenous fistula formation.[8] Arterial injury occurs in approximately 25% of penetrating neck

injuries; carotid artery involvement is found in approximately 80% and vertebral artery in 43%.[2] Combined carotid and vertebral artery injury carry both major haemorrhagic and neurological concern.[8]

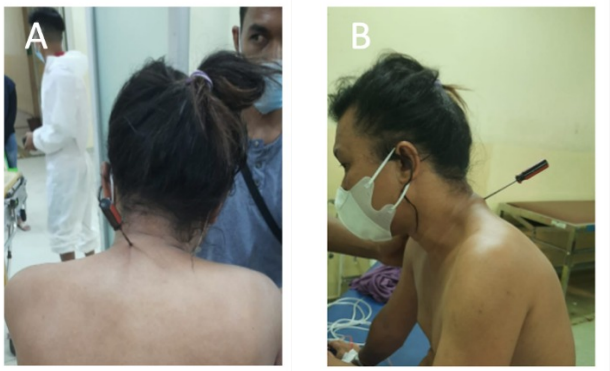

Figure 1. A 28 year-old male with screwdriver stabbed in the cervical region. A) Posterior view, B) Lateral view

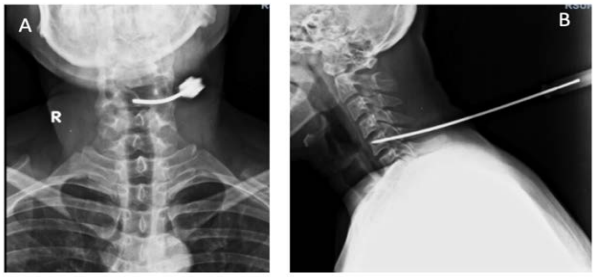

Figure 2. Cervical X-ray A) Anteroposterior View, B) Lateral View

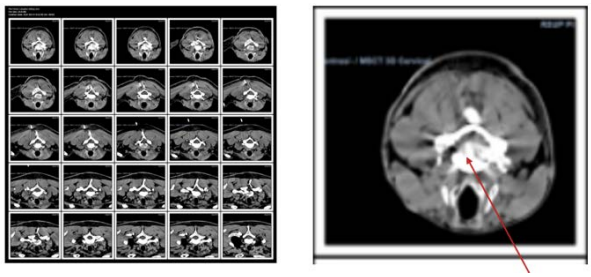

Figure 3. Cervical CT-Scan. Metallic hyperdensity penetrates from soft tissue to vertebral body of C5 (red arrow)

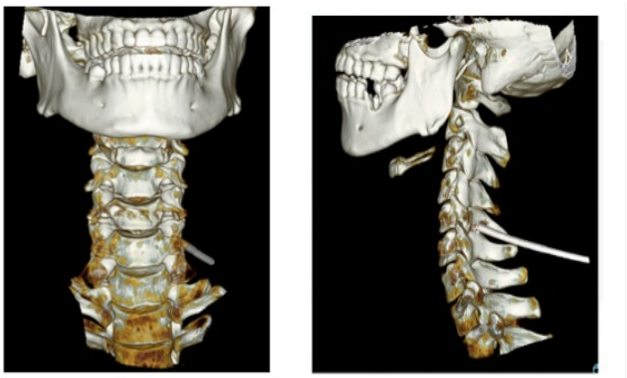

Figure 4. Recon 3D revealed a metallic density of the foreign body in the cervical region penetrating from soft tissue to vertebral body of C5

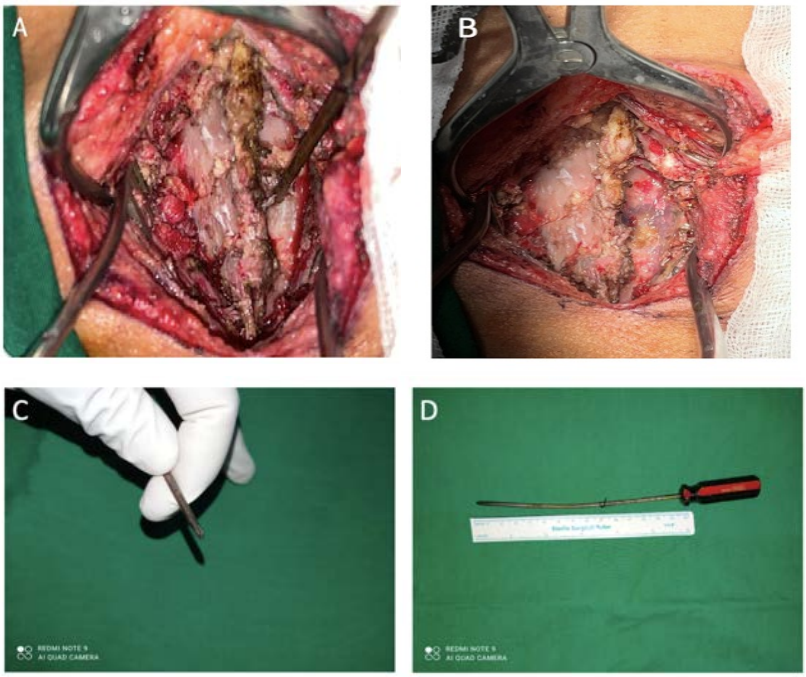

Figure 5. A-B) Intra operation ; Foreign body extraction, laminectomy. C-D) The foreign body (screwdriver)

Aerodigestive injury occurs in 23–30% of patients with penetrating neck injuries and is associated with a high mortality rate.[6] Pharyngo-oesophageal injuries are less common than laryngotracheal injuries but both are associated with a mortality rate of approximately 20%.[7,9] Neurological structures at risk of involvement include the spinal cord, cranial nerves VII–XII, the sympathetic chain, peripheral nerve roots, and brachial plexus. Spinal cord injury occurs infrequently (less than 1%), particularly in low velocity injuries such as stab wounds.[1]

Patients with penetrating neck injuries can decompensate rapidly and should be transported immediately to the nearest trauma centre. Impaled objects should not be removed in the field. A systematic approach to the management of penetrating neck trauma is critical. The initial evaluation and assessment involve resuscitation in accordance with the Advanced Trauma Life Support (ATLS) principles.[4,5] Early inspection of a neck injury is advised to determine if the platysma muscle has been breached.[4] Use of local anaesthesia facilitates a more accurate assessment of the wound.[4] If the platysma is intact then, by definition, the wound is superficial. If the platysma is violated then it is a penetrating neck injury and the patient's signs and symptoms govern how to proceed with management.[4] Surgical consultation should be obtained in all penetrating neck injuries, particularly because the patient may initially appear stable but may decompensate rapidly.

The incidence of unstable cervical spine fractures in penetrating neck injuries is very low and cervical spine collars may obscure clinical signs and impair intubation.[17,18] The exceptions to this are if there is a focal neurologic or a high clinical suspicion for spinal injury in an unconscious or heavy intoxicated patient. Additionally, the incidence of cervical spine injury and cervical spinal cord injury has been demonstrated to be significantly different depending on the mechanism of injury.[10] Penetrating neck injuries resulted from high energy injuries, such as gun shots or blunt force as in motor vehicle accidents, are at higher risk of cervical spine injury and immobilisation needs to be considered.[10]

As spinal cord injuries most often occur in the context of a significant trauma, a comprehensive physical examination and clinical assessment for concurrent injuries are necessary at the time of presentation.[3]

Laboratory tests include analysis of blood gases, electrolytes, complete blood, coagulation

factors, blood type, alcohol and drugs. After the laboratory examination is done, the patient is immediately taken to radiology for further examination.[6]

Imaging is essential to accurately identify injuries.[3] Computed tomography scanning is considered as the neuroradiological modality of choice for penetrating brain injuries. Cerebral angiography is also recommended in patients when penetrating brain injuries carry a high suspicion of vascular injury.[7] CT can reveal vertebral fractures and raise suspicion for SCI; however, it has poor sensitivity to soft tissue injuries.[3]

Blind removal of the key can damage the neural tissue and may cause problems such as secondary injury to the brain and the adjacent vessels. Hence, stabilizing the head, adequate craniotomy/craniectomy and guiding of CT scan/3D reconstruction is helpful in removing the penetrated piece of keys with minimal damage.[8] It is not clear which technique, craniotomy, or craniectomy, is best to achieve the most optimal results.[9]

Surgical explorations is needed in all acute cases of penetrating spinal injury to repair dural tears.[10] The established indications for operative intervention include the presence of foreign bodies, persistence of cerebrospinal fluid (CSF) leakage, sepsis with a sinus of epidural abscess, [11] as well as radiologic sign of extrinsic spinal cord compression.[12] Removing the foreign object blindly could cause massive bleeding from epidural venous, traction injury to the cord and CSF leakage from dural tear.[13] Therefore, the foreign objects need to be removed under vision after the laminectomies.

Delayed debridement for more than 12 hours increases the risk of infection.[6] Infection is a common complication in penetrating brain trauma patients, and the presence of infection will increase the mortality and morbidity of patients. *Staphylococcus aureus* is one of the organisms that is often the cause of infection in penetrating brain trauma. However, infection with Gram negative bacteria is also quite common. Broad-spectrum antibiotics must be started as soon as possible in penetrating brain trauma patients. The recommended choice of antibiotics is 1.2g / 8h co-amoxiclav, or cefuroxime iv 1.5g and maintenance 750mg/8 hours with metronidazole iv 500mg/8 hours given intravenously. Antibiotics are given for 7-14 days.[6,7] In this case, the empirical antibiotics given were ceftriaxone and metronidazole as soon as the patient arrived and were continued for 14 days. Spinal cord edema, CSF leakage, retained foreign body, and infection may all contribute to the delayed neurological deficits. All patients are discharged in a stable condition and are asked to have a monthly control for follow-up of the signs of infection for six months.

Conclusion

Complete and adequate management is essential for patients with penetrating brain or neck injury to prevent post traumatic tissue damage, other neurological dysfunction, or even mortality.

Conflict of Interest

The authors affirm no conflict of interest in this study.

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