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## Case Report

# Management Approach of Penetrating Vertebral Artery Injury With Concomitant Cervical Nerve Root Injury in Regional Hospital: Report of Two Cases

## 穿透性椎動脈損傷伴有頸神經根損傷在區域醫院的處理方案 - 二例報告

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### ABSTRACT

Penetrating vertebral artery injury is uncommon yet potentially fatal. We present two cases of penetrating vertebral artery injury with concomitant cervical nerve root injury managed in our centre. The first case was a young gentleman who suffered from neck injury by broken metal fragment. Cervical nerve root injury was suspected preoperatively. Massive bleeding from vertebral artery was encountered during wound exploration. It was managed by ligation, followed by retrograde endovascular embolisation. The second case was a young lady being assaulted with knife and fork over the neck. She was also suspected to have cervical nerve root injury preoperatively. Vascular control of vertebral artery was achieved with endovascular intervention. Subsequent operation for foreign body removal and nerve root repair was performed with minimal bleeding intraoperatively. Management approach of penetrating vertebral artery injury with concomitant cervical nerve root injury and the role of endovascular intervention were discussed.

### 中文摘要

穿透性椎動脈損傷不常見，但可以致命。我們報告兩個穿透性椎動脈損傷，并伴有頸椎神經根損傷的案例。第一案例是一名年輕男士被金屬碎片割傷頸部。術前懷疑頸神經根損傷。傷口探查過程中遇到椎動脈大量出血，血管結紮後進行逆行血管內栓塞術作進一步處理。第二案例是一名年輕女士被人以刀叉襲擊頸部。手術前亦懷疑有頸神經根損傷。她先接受了血管介入性治療，隨後進行異物取出和神經根修復手術，術中出血量少。文章探討穿透性椎動脈損傷合併頸部神經根損傷的處理方法及血管內介入治療的作用。

### Introduction

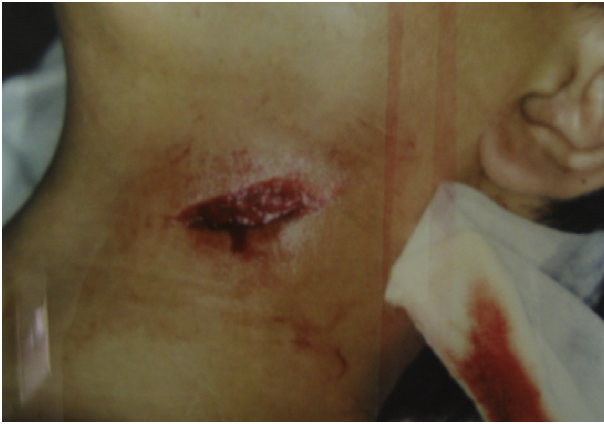
Penetrating vertebral artery injury is uncommon. The reported incidence of vertebral artery injury ranged from 1–7%<sup>1</sup> for patients having penetrating neck injury. Unilateral vertebral artery injury often occurs without neurologic deficits, although devastating complications including stroke and death do also occur, while focal upper limb neurological deficit should raise our suspicions on concomitant cervical nerve root or brachial plexus injury. We present two cases of penetrating vertebral artery injury with concomitant cervical nerve root injury managed in our centre and

hope to share our experience in managing this rare but potentially fatal injury.

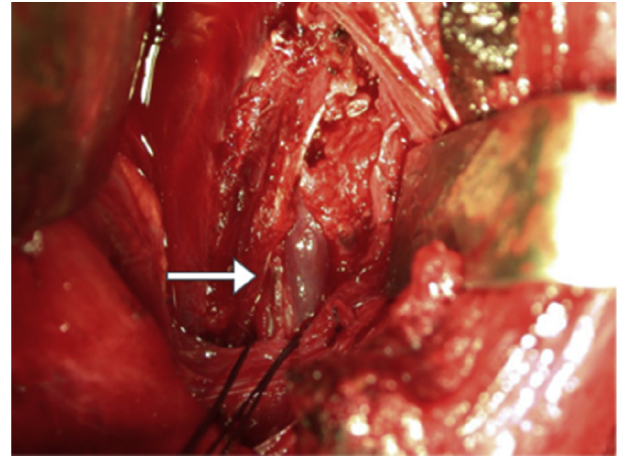
### Case 1

Mr X was a 31-year-old gentleman with good past health. He was brought to our Accident and Emergency Department after an industrial incident. His was injured on the neck by a broken metallic fragment from a cutting instrument. There was no history of massive bleeding from the wound. He was fully conscious and haemodynamically stable on arrival. On examination, there was a 4-cm deep laceration over the left anterior neck, zone II region (Figure 1). Otherwise, there was no massive bleeding, surgical emphysema, hoarseness of voice or stridor. However, on

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**Figure 1.** Clinical photo of the neck wound.

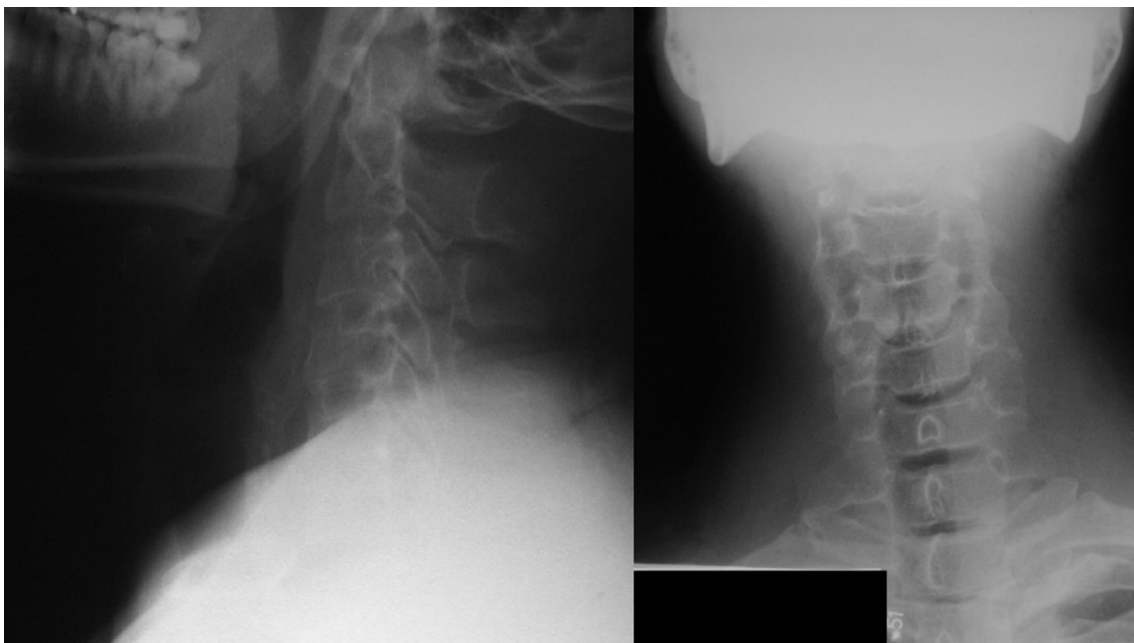


**Figure 3.** Intraoperative photo showed vertebral artery with suture sling *in situ* (arrow).

neurological examination, he was found to have weakness in left shoulder abduction and elbow flexion with power grade 4/5, impaired light touch sensation over left C5 dermatome and diminished biceps reflex. Left C5 cervical nerve root injury was suspected. Anteroposterior and lateral X-ray of cervical spine did not reveal any obvious foreign bodies (Figure 2).

Emergency wound exploration under general anaesthesia was jointly performed by general surgeons and orthopaedic surgeons. The wound was extended longitudinally in cephalic and caudal directions. An 8 mm left internal jugular vein tear was found and repaired. A small bone fragment around the left C5–6 neuroforamen was also noted. However, during exploration, there was sudden massive bleeding of around 2.3 L of blood within few minutes. Bleeding from vertebral artery was suspected. Temporary haemostasis was achieved by direct pressure and clamping of vertebral artery at level of C7 transverse process. Further dissection of the vertebral artery from C7 to C6 with Southwick–Robinson anterior approach was performed. Suture sling was passed beneath the vessel for proximal control (Figure 3). Bleeding stopped after

releasing the clamp. Vascular surgeons and interventional radiologist were consulted, and the vertebral artery was ligated proximally. Emergency diagnostic angiography confirmed the complete occlusion of the left vertebral artery at C6–7 level. Injection of the right vertebral artery showed retrograde flow of distal left vertebral artery to C3 level (Figure 4) with good opacification of the basilar trunk and bilateral posterior inferior cerebellar arteries. Distal coil embolisation was performed by interventional radiologist to further secure haemostasis. It was done with retrograde approach by passing microcatheter through the right vertebral artery to the vertebral confluence and down to distal segment of the left vertebral artery. Detachable coils were then delivered to achieve vessel occlusion. Adequate cerebral circulation was confirmed again after procedure (Figure 5). Computed tomography (CT) of cervical spine and oblique X-ray of cervical spine were performed postoperatively and revealed fracture of left C5 transverse process and metallic foreign body inside the left C5–6 neuroforamen (Figure 6). The



**Figure 2.** Anteroposterior and lateral X-ray of cervical spine showed no obvious fracture or foreign body.

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