Managing Complications of the Misplaced Central Venous catheter

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Abstract

Introduction: Central venous catheters are an integral part of the management of the acutely unwell patient but their use is not without risks.

Report: An 11F double lumen central venous catheter was inadvertently placed into the vertebral artery when the landmark technique was used to obtain an internal jugular vein puncture. The patient required a sternotomy for adequate exposure, and the vertebral artery was ligated.

Discussion: This case demonstrates a rare complication of large bore central venous catheterisation requiring major open surgical repair and is the first reported case of an 11F catheter placed in the vertebral artery requiring surgical ligation.

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Introduction

Central venous catheters are an integral part of the management of many critically ill patients but are not without risks. Complications of insertion can be infective, thrombotic and mechanical. The incidence of mechanical complications, consisting of arterial puncture, haematoma, haemothorax and pneumothorax, via the internal jugular approach ranges from 6 to 12%. Arterial puncture alone occurs in 6–9% of internal jugular approaches and 3–5% of subclavian approaches. Due to its close proximity, puncture of the carotid artery is commoner than the vertebral artery.

Report

A 63 year old lady was admitted with suspected swine flu, presenting with ‘flu-like’ symptoms, pyrexia (39 °C) and an arterial blood gas revealed type II respiratory failure. Following an unsuccessful trial of BiPAP, she was intubated, empirical antibiotics and Tamiflu® started, and transferred to the intensive care unit.

On her third day of admission, a catheter for haemofiltration was inserted using the landmark technique aiming...
for the right internal jugular vein. A 23G blue needle confirmed the vein position. A second adjacent puncture was performed, venous blood aspirated, and using a Seldinger technique, the 11F double lumen catheter inserted. Subsequent aspiration revealed arterial blood. Rather than remove the line and apply pressure over the carotid artery, a vascular opinion was sought due to the diameter of the arterial placed catheter. A CT scan (Fig. 1) demonstrated that the catheter had punctured and traversed the right jugular vein, passing posteriorly and inferiorly into the prevertebral area. Here it entered the right vertebral artery with the catheter tip positioned in the aortic arch. The left vertebral artery appeared patent.

Under the combined care of cardiothoracic and vascular surgeons, she underwent a sternotomy, gaining proximal controls of the innominate and right subclavian artery. The vertebral vein was ligated and vertebral artery exposed. 5mm short of it entering the transverse foramen of the C6 vertebrae, the catheter could be seen puncturing the vertebral artery and partially transecting it (Fig. 2). Due to the friability of the remaining vessel, distal clamping and repair of the artery were considered hazardous, so the artery was ligated and the catheter removed.

Her particular strain of influenza was confirmed as influenza B. She made good progress, was extubated on day 7 and discharged following a hospital-acquired pneumonia. Following extubation, a right-sided Horner’s Syndrome was noted, which improved over the subsequent two weeks.

**Discussion**

This case demonstrates a rare complication of large bore central venous catheterisation requiring major open surgical repair and is the first reported case of an 11F catheter placed in the vertebral artery requiring surgical ligation of the artery.

Arterial injury must be managed with caution. Identification of the site of arterial injury may alter the management as this case demonstrates. Removal of the catheter with pressure application may have lead to uncontrollable back-bleeding from the distal aspect of the vertebral artery upon retraction into the transverse foramen. Imaging prior to line removal is recommended following its identification and CT imaging (16 slice or greater) is the preferred imaging modality for blunt trauma, accurately identifying this arterial lesion.

Small arterial punctures may be adequately controlled with direct pressure. For punctures ≥7F in the carotid or subclavian artery, surgical or endovascular management is recommended over the pull/pressure technique, due to the risk of airway obstruction, false aneurysm and stroke.\(^2\) Endovascular techniques including embolisation, covered stent placement and balloon tamponade have been successfully used in 10 cases of brachiocephalic artery catheterisation, though none involved the vertebral artery.\(^2\) Vertebral artery injury is rare and, due to its deep position within the base of the neck, accurate pressure application is difficult. Previous reports of vertebral artery injury describe the use of percutaneous closure devices\(^4\) and open repairs of the vertebral artery for pseudoaneurysm and arteriovenous fistula ligation.\(^5\)

Due to the basilar artery’s dual blood supply, vertebral artery ligation rarely causes central neurological deficits. Ligation rather than primary repair was performed in this case due to the friable distal end of the vertebral artery which may have been difficult to control had it retracted up into the transverse foramen of the C6 vertebrae. The Horner’s syndrome was likely a result of dissection of the sympathetic fibres lying adjacent to the vertebral artery.

Complications are an unavoidable aspect of invasive procedures. Ultrasound assistance should be obligatory, though in this case the catheter went through the internal jugular vein and beyond into the vertebral artery. Adequate consent is required prior to line insertion and increased care taken with a greater luminal diameter of catheter.
Arterial injury should be anatomically imaged, to guide subsequent management prior to catheter removal.

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None.

**References**


