Inadvertent subclavian artery cannulation

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Inadvertent line insertion into the subclavian artery is an uncommon complication of subclavian venous catheterisation and its timely recognition is vital to minimise the risk of harm to the patient. We describe a patient who had an inadvertent subclavian arterial cannulation which was recognised within the first hour of insertion and subsequently removed without complications.

Keywords: Inadvertent; arterial; cannulation

Introduction
Subclavian vein catheterisation is commonly performed but inadvertent puncture of the subclavian artery is an uncommon potentially fatal complication.1,2 We report a case in which the right subclavian artery was accidentally catheterised during attempted subclavian venous cannulation.

The catheter was removed on the following day by a vascular surgeon and pressure was applied for 15 minutes above the clavicle where pulse was felt.

Case presentation
A 63 year old man with a background history of schizophrenia and COPD was admitted to the surgical intensive care unit following a 3 and a half hour abdomino-perineal resection for rectal tumour under general anaesthesia and epidural analgesia. The patient had received 3.5L of crystalloids and 450mL of blood intraoperatively. A central line was not inserted preoperatively. A 7Fr, 15cm, 3 lumen central venous catheter was introduced via a right subclavian approach. 0.1µg/kg/min noradrenaline infusion was started through the central line.

An attempt was made to transduce CVP to the monitor but it was not successful. A second monitor was brought and CVP transduction was attempted. It revealed an arterial waveform giving the suspicion of inadvertent subclavian artery cannulation.

Noradrenaline infusion was immediately stopped. Right radial pulse and fingertips were checked for signs of ischaemia.

A blood gas analysis was performed with the blood obtained from the central line and arterial cannulation was confirmed. The catheter was left in situ.

The vascular team was summoned for further opinion. The catheter was left in situ overnight due to lack of theatre facility in the night. Patient was given s.c. enoxaparin 20mg to safeguard his right upper limb.

Pulse oximeter was connected to his right hand continuously and radial pulse was checked every ½ hourly for signs of ischaemia. Clotting profile and blood for grouping and direct testing was sent. The clotting profile was normal.

The following day morning (12 hours have elapsed since administering enoxaparin) the patient was seen by the vascular surgeon. He identified the site of puncture and felt the subclavian arterial pulse above the clavicle. Clotting profile was normal.

Pulse oximeter was connected to his right hand continuously and radial pulse was checked every ½ hourly for signs of ischaemia. Clotting profile was normal. Continuous pressure was applied for 15 minutes and a tight dressing was applied.

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Discussion
The infraclavicular subclavian vein is one of the most frequently used sites for central venous cannulation. This has a lower infection rate (4 per 100 catheter days) in comparison to the internal jugular vein (8.6 per 100 catheter days) and is more readily accessible in trauma patients with cervical collars.

Accidental arterial puncture occurs in around 1% and 2.7% of jugular and subclavian approaches respectively. This complication is often recognised early. However, in cases like ours, with hypotensive and unstable patients, this can be more difficult to detect owing to lack of pulsatile flow secondary to hypovolaemia.

Placement of intra-arterial catheter may be detected by pulsatile flow of blood, blood gas analysis - but both these may be difficult in hypovolaemic patients with poor oxygenation. Post catheter chest radiograph may reveal catheter tip crossing the midline.

There are a range of potential complications following inadvertent subclavian arterial puncture, including arterial occlusion, peripheral embolism, pseudoaneurysm formation, vessel laceration or dissection and haemorrhage. Some of these complications are limb or life threatening, particularly in critically ill patients or those with impaired coagulation.

When a line has been inadvertently inserted into an artery at a compressible site, this can be safely managed by removal and manual compression. However, if line removal is attempted at a non-compressible site, there is a greater propensity for serious complications such as haemorrhage or pseudoaneurysm to occur.

Inadvertent subclavian artery line insertion can also be treated by either surgical or endovascular methods.

Chest radiograph following abnormal position of the right subclavian line- catheter projected to the left of the intended position.

References


