Case Report

A rare case of internal jugular vein dissection following central venous catheterization

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A B S T R A C T
Background: Central venous catheterization (CVC) is an important and common procedure performed for the purpose of drug administration, hemodynamic monitoring, emergency venous access, and extracorporeal intervention. We report a rare case of CVC prior to cardiac surgery, complicated by internal jugular venous dissection. Case presentation: A 66-year-old female was undergoing central venous catheterization prior to cardiac surgery. During the procedure the guidewire could not be proceed at which point an ultrasound was used to visualize the internal jugular vein, where a venous dissection was noted. Cannulation was, therefore, undertaken on the contralateral side, which was done uneventfully. Conclusion: Venous dissection is a rare complication of CVC, however the incidence is likely higher than the frequency of reporting suggests. Given the low pressures in the venous system the dissection will likely be self-limiting and can be monitored for complication. However, should continue expansion occur, surgery would be necessary.

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Introduction
Central venous catheter (CVC) insertion is a common procedure, performed by anesthetists and intensivists, consisting of an indwelling device inserted into a large, central vein – most frequently the internal jugular vein (IJV). The procedure is often indicated for the critically ill patient, or those undergoing major surgery, and can be used for:

- The administration of multiple infusions or infusions incompatible with peripheral access, such as vasopressors, chemotherapy, or total parental nutrition.
- Hemodynamic monitoring, specifically central venous pressure.
- Emergency venous access for patients in which peripheral access cannot be obtained.
- Extracorporeal intervention such as hemodialysis, renal replacement therapy, or plasmapheresis [1].

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• Prepare sterile field
• Identify triangle formed by the clavicle and the sternal and clavicular heads of the SCM (apex will form needle insertion site)
• Gently place 3 fingers on carotid artery
• Infiltrate local anaesthetic at needle insertion site (apex of triangle identified above) and along anticipated needle insertion path
• Insert introducer needle at 30-40°, maintaining negative pressure, aiming towards the ipsilateral nipple
• Stop advancing when a flash of blood appears
• Securely hold needle, remove syringe, and introduce guidewire
• Remove needle, widen insertion tract, and place catheter
• Remove guidewire, secure catheter in place, and dress
• Flush each port
• Post procedure CXR to confirm tip lies in SVC near its junction with right atrium, and confirm pneumothorax has not occurred

Fig. 1 – External landmark technique for insertion of CVC into IJV. SCM, sternocleidomastoid; CXR, chest radiograph.

Historically, the procedure was performed using a landmark technique (Fig. 1); however, since the first case of real-time use of ultrasonic guidance for internal jugular venous catheterization, this practice has grown; the perceived benefits being increased speed of placement and decreased rate of complications [2,3]. Here we report a case of IJV dissection, noted during CVC insertion.

Case report

A 66-year-old Afro-Caribbean female, with a background of hypertension and type 2 diabetes mellitus, acutely presented to the emergency department with a 2-week history of chest pain, and a 1-day history of breathlessness. Her saturation on arrival was 75% on room air. She was noted to have severe type 2 respiratory failure and pulmonary edema, likely precipitated by a non-ST elevated myocardial infarction. She was admitted to the intensive care unit where she was commenced on furosemide infusion, bi-level positive airway pressure therapy, and dual antiplatelet therapy. She developed an acute kidney injury, and therefore, a bi-lumen vascath was inserted for the purpose of hemodialfiltration into the right IJV.

Once stabilized, she was transferred to the cardiology ward for ongoing care. A coronary angiogram was performed, demonstrating severe triple vessel disease. She was therefore taken to theater, under the care of the cardiothoracic team, for coronary artery bypass graft.

In theater, she underwent general anesthetic induction, followed by intubation with an endo-tracheal tube. Once intubated, her neck was sterile cleaned and draped in preparation for CVC insertion. External landmark technique was utilized, and a 21-gauge needle placed into the right IJV. Venous blood was aspirated, followed by line transduction to confirm venous placement, and a guide-wire introduced into the vein, however, could not be advanced further due to resistance. A second attempt was made, unfortunately the same problem was encountered. An ultrasound machine was used to visualize the right IJV which showed venous dissection (Fig. 2). Cannulation of the right IJV was aborted, and the left IJV used in its place, this time with the use of real-time ultrasound guidance. The procedure was performed uneventfully, and the patient recovered well postoperatively. She was monitored for complication of the venous dissection, however there were none, and intervention was not required.

Fig. 2 – Ultrasound short-axis view of the internal jugular vein demonstrating venous dissection. IJV, internal jugular vein; CCA, common carotid artery; SCM, sternocleidomastoid muscle.

Discussion

CVC insertion, as with all procedures, entails risks which include pneumothorax, hemothorax, arterial puncture, brachial plexus injury, and air embolism [3]. Here we have reported a rare case of venous dissection caused by CVC insertion. Ve-
nous dissection largely follows the same mechanism as aortic dissection, in that it is caused by a tear in the tunica intima, with blood entering the media layer [4]. The high pressures in aortic dissection tear the tissue of the media along the laminated plane. However, as the venous pressures are far lower than arterial pressures, there is little expansion of the dissection and complications are few. While intervention is not often required, should continue expansion be observed, surgery may be indicated.

Whilst ultrasound guided CVC insertion has increased in frequency, and its benefits well-established, NICE guidelines suggest ‘the degree to which this technology would be most suitable applied would vary according to the clinical situation and the competence/previous experience of the operator’ [5]. In the scenario described, the clinician in question was an experienced cardiac anesthetist, who deemed it suitable to utilize the landmark technique, as the patient was due to have a sternotomy, and therefore, in the instance of any potential complication, appropriate management could have been implemented instantly.

There have been only three reported cases of IJV dissection in the literature [4,6,7]. There were no reported complications in any of these cases. Despite being reported rarely, it is likely the incidence is higher than realized, however just not often visualized.

**Patient consent statement**

The authors confirm that written, informed consent was obtained from the patient for publication of their case.

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