

CASE REPORT

Hemiparesis following attempted internal jugular vein catheterisation – a case report

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Abstract

In critical care and perioperative care, central venous catheterisation is a routine procedure. In this case report we describe a patient suffering a neurological complication following attempted ultrasound-guided internal jugular vein catheterisation. Ultrasound guidance for placement of central venous catheters can reduce, but not eliminate, the risk of placement failure and complications. A brief review of the literature is given.

Introduction

In critical care and perioperative care, central venous catheterisation is a routine procedure. Central venous catheters can be used to measure haemodynamic variables, to safely deliver medication and nutrition, and for various forms of renal replacement therapy.¹ The internal jugular vein is one of the most suitable sites due to accessibility and low overall complication rates. Puncture of the carotid artery is one of the mechanical complications.²

Neurological complications due to arterial puncture are rare.³ Ultrasound guidance can reduce the rate of mechanical complications overall,⁴ and arterial punctures in particular.⁵ We report a patient who suffered a neurological complication following carotid artery needle puncture during an ultrasound-guided attempt of internal jugular vein catheterisation.

Case history

A 66-year-old female was admitted to our intensive care unit because of coma and shock following auto-intoxication with sedatives and hydroxychloroquine with suicidal intent. The patient's medical history was unremarkable except for depression; there was no history of atherosclerotic disease.

The patient remained unconscious. Her pupils were equal, round and responsive to light at 2 mm. The trachea was intubated because of the coma. She had an initial blood

pressure of 70/53 mmHg, and a nodular escape rhythm of 40 beats/min. She was volume resuscitated and isoprenaline was administered peripherally. The chest, abdomen and extremities showed no abnormalities at physical examination.

Laboratory testing at admission and later showed transient liver enzyme abnormalities, moderate prerenal kidney injury and a positive test for flunitrazepam in the urine. Hydroxychloroquine was tested and later on found to be positive, in a plasma concentration of 12 µg/l.

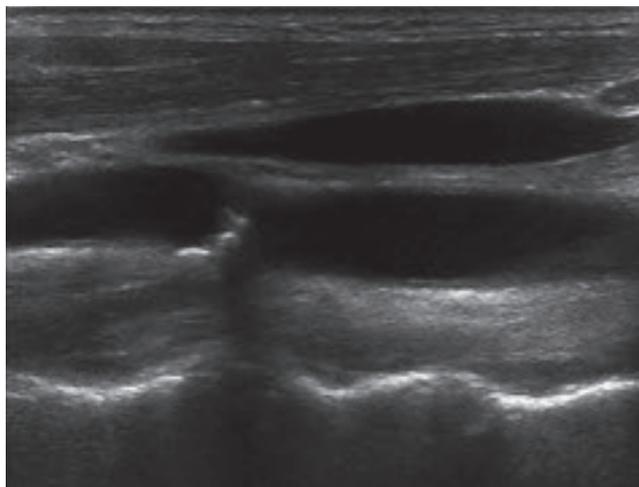
Ultrasonography of the internal jugular vein was performed. The vessels in the neck were easily identified. During an ultrasound-guided right internal jugular vein catheter placement procedure, the carotid artery was punctured with a 18 Gauge needle. This was immediately recognised as such, and the needle was removed. Gentle manual pressure was applied at the arterial puncture site for about three minutes. There was no haematoma. The procedure was aborted and catheterisation of the femoral vein was performed uneventfully.

For eight days the patient was mechanically ventilated because of reduced level of consciousness and generalised weakness, which slowly improved. At day eight, the patient was awake with a maximal Glasgow Coma Scale score of 15. The endotracheal tube was removed. We noticed a paresis of the left arm, confirmed by a consulting neurologist. The muscle strength in the left arm was graded 4 out of 5 on the Medical Research Council Scale, compared to 5 out of 5 on the right.

A computed tomography of the brain revealed no clear abnormalities. A carotid Doppler examination showed normal flow and a tiny calcified plaque in the right carotid artery at the bifurcation. A protruding lesion could be seen in the lumen of the artery, probably corresponding to a thrombus at the site where the needle had punctured the vessel.

The patient's neurological condition recovered fully over the next few weeks. She was transferred to the psychiatric unit in a good clinical condition. The consulting neurologist saw

Figure 1. A carotid Doppler shows a tiny calcified plaque at the bifurcation with a protruding thrombus.



the patient after one month; there were no signs of residual weakness.

Discussion

Arterial puncture is a known mechanical complication of internal jugular vein catheterisation, with an average incidence of 5.9% using the landmark technique.⁶ Various factors associated with mechanical complications have been identified. Patient-related factors include the underlying disease, comorbidities, atherosclerosis, anatomical variations and low or high body weight.^{2,7} The most distinct practitioner-related factor is experience in the placement procedure.^{2,8} For central venous catheter placement in the internal jugular vein or the subclavian vein the Trendelenburg's position should be used to distend the vein.¹

Ultrasound guidance for placement of central venous catheters can decrease the risk of placement failure and complications during the procedure.^{4,5,9} An arterial puncture rate of 0-1% during internal jugular vein catheterisation using ultrasound guidance was reported vs. 7% using the landmark technique.^{5,9} Training with only ultrasound guidance may lead to reduced skill in placement of central venous catheters using the landmark technique.¹⁰

Secondary neurological complications to arterial injury including stroke are rare but have been reported.¹¹⁻¹³ A study described no neurological complications in 374 internal jugular vein catheterisation procedures with an arterial puncture rate of 6.3-9.4%.³ In some rare events, central venous catheters are placed in the jugular vein while passing through the carotid artery. This trans-arterial position of the catheter may go unnoticed when the pressure readings indicate placement in the jugular vein. In the event of neurological complications, this ought to be excluded as a possible diagnosis.

Two cases where true carotid artery needle injury led to hemiparesis have been reported.^{6,14} Heath described a case where carotid artery needle injury in a patient with advanced atherosclerotic disease possibly led to carotid thrombosis and stroke.¹⁵ In all cases the landmark technique was used when attempting internal jugular vein catheterisation. The suggestion has been made that hemiparesis following arterial puncture can be due to carotid artery needle injury of a significant carotid atherosclerotic plaque.¹⁶

Our patient had no history of atherosclerotic disease. The cannulation attempt was ultrasound guided, but this did not prevent us from puncturing the carotid artery. Hypovolaemia probably contributed to the fact that we missed the vein. Carotid Doppler revealed a tiny calcified plaque in the right carotid artery at the bifurcation. We believe carotid artery needle injury of this tiny calcified plaque loosened atherosclerotic material, which subsequently caused hemiparesis.

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