

Case report of a cervical intraspinal misplacement of a central venous line

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Abstract A case of cervical spinal misplacement of a central venous line via the right jugular vein is reported. A review of the literature resulted in eight similar cases. Only two further adults are described. Children and patients suffering from malnutrition seem to have a higher risk for intraspinal malpositioning of central venous catheters.

Keywords Intraspinal misplacement central venous line

Introduction

The use of percutaneously placed central venous lines is a routine procedure and is recognized as a safe way to provide critically ill patients with fluids and drugs. Complications with neurological sequelae are very rare.

Case

A noncooperative 83-year-old female patient (ASA 4) who suffered from dementia and cachexia (30 kg) was planned for parenteral feeding. An attempt to puncture the right internal jugular vein was undertaken, but an artery was punctured by a resident of an external anesthesiology department. Using ultrasound guidance with poor visualization of the internal jugular vein, a venous vessel with aspiration of blood was cannulated and a triple-lumen silastic line was inserted without difficulties. After fixation, no blood could be aspirated, so that a wedge in the vein was suspected. Therefore, no infusion was administered. The patient developed a quadriplegia below C7. Further radiologic imaging showed the catheter entering the right neuroforamen between the 6th and 7th cervical vertebrae (Figs. 1, 2) and could be followed to the level of T4. After the diagnosis of misplacement the patient was transferred to our institution and the catheter was removed. The neurological deficits were not resolved. The patient died nearly 2 days later. The most probable cause of death was a central circulatory dysregulation as an immediate sequela of the insertion procedure and thereby spinal cord injury. The lesion of the spinal cord led to sympathetic blocking and thereby to a neurogenic shock. The patient developed decreased vigilance, intermittent bradycardia, and hypothermia (35.4°C). Treatment for the multimorbid patient was finally stopped by consent with her relatives.

Discussion

Complications after positioning of central venous catheters may occur in approximately 20% of patients [1]. Arterial puncture, hematoma, pneumothorax, hemothorax, thrombosis,

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Fig. 1 Conventional chest X-ray, showing a bending of the catheter toward the midline at the level C6–C7

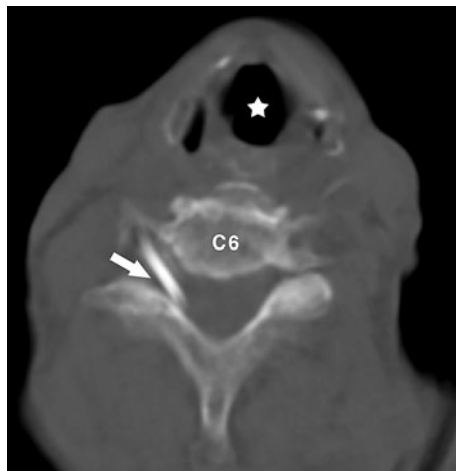


Fig. 2 Axial computed tomography of the neck shows catheter passing through the right neuroforamen C6–C7 (arrow). Star trachea

and infection are the most common complications. Neurological complications are extremely rare. In adults, one case of spinal cord infarction after a hemothorax with extensive mediastinal shift and assumed venous affection was reported [2].

However, there are reports of lumbar misplacements in pediatric patients. Chen et al. [3] described 12 patients (1 case of their own and 11 from the literature) with insertion of a central venous catheter in the saphenous vein and via the lumbar plexus into the spinal canal. The patients were mostly infants, with the oldest being 7 years old.

This is, to our knowledge, the first description of a cervical intraspinal misplacement of a routine (no retrograde cannulation for cerebral monitoring in the jugular bulb, no Swan-Ganz catheter) central venous line in an adult patient.

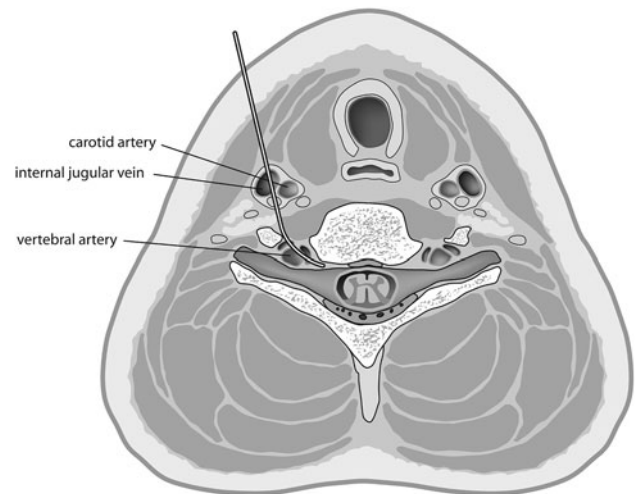


Fig. 3 Artist's illustration of the vascular and osseous relationship

It is assumed that a vertebral vessel/periradicular venous plexus was punctured and that the guidewire was inserted through the neuroforamen C6–C7 (Fig. 3).

When insertion of a central venous catheter via the internal jugular vein is intended, typically the skin is punctured over the sternocleidomastoid muscle at an angle of approximately 40° in the sagittal plane. The cannula is then advanced lateral to the palpated carotid artery and in the direction of the ipsilateral nipple. Ultrasound may be used for better anatomical orientation. In the present case, there might have been an angulation toward the midline. The extreme cachexia might have also attributed to the misplacement.

Reviewing the literature (Table 1), eight cases of spinal misplacements and one case of dural puncture during an attempt to place a central venous line via an internal jugular vein have been published. Including the present case, three adults are described: two of these patients showed cachexia and the third “marked senilism.” In one case a Swan-Ganz catheter was used; in another case a retrograde insertion in the jugular bulb was attempted. Only in the present case was a common triple-lumen venous central line intended.

The remaining six cases included five infants (aged 4 days–9 months) and one 17-year-old boy, which leads to the assumption that spinal malpositioning is a higher risk in small or malnourished patients.

No mortality is reported as an immediate consequence of the misplacement. Five patients showed no neurological deficit, but two quadriplegias occurred. In the remaining two communications, no information was given.

Conclusion

Intraspinal misplacement of a central venous catheter is extremely rare and need not lead to permanent neurological

Table 1 Compilation of reported cases

Authors	Age	Punctured vein	Tip of misplaced catheter	Year of publication	Reference
Bagwell et al.	“Child”	Unknown	Epidural space	2000	[4]
Fujita et al.	9 months	Left internal jugular vein	Intradural, T2	2006	[5]
Fumagalli et al.	49 years	Right internal jugular vein, retrograde (SjO ₂ -monitoring)	Intradural, apical cervical	1995	[6]
Gemma et al.	17 years	Right internal jugular vein, retrograde (SjO ₂ -monitoring)	Epidural space, C3	1999	[7]
Glaser et al.	83 years	Right internal jugular vein	Intradural, T4	2011	
Miyamoto et al.	16 days	Right internal jugular vein	No catheter was inserted, only cerebrospinal fluid (CSF) aspirated via needle	1996	[8]
Nagai and Kemmotsu	45 years	Right internal jugular vein	Swan-Ganz catheter, intradural, T1?	1985	[9]
Semjen et al.	4 days	Right internal jugular vein	Epidural, thoracic	2007	[10]
Skinner and Mather	11 weeks	Left internal jugular vein	Epidural C6	1995	[11]

deficit. When no blood can be aspirated, the line must not be used. In a routine chest X-ray, a median position of the catheter will arouse suspicion. However, if a patient shows signs of neurological deterioration after insertion of a central venous line, spinal malpositioning should be ruled out. Small and undernourished patients seem to be at highest risk.

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