SONOGRAPHIC DIAGNOSIS OF CATHETER MALPOSITION IN A PATIENT WITH POSTOPERATIVE PLEXUS LESION AFTER RIGHT INTERNAL JUGULAR VEIN CATHETERIZATION

- Case Report -

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Abstract

Purpose: Postoperative brachial plexus lesion has been reported only rarely after catheterization of the right internal jugular vein (RIJV), and then is usually considered to be the result of puncture hematoma.

Clinical features: We here present the case of plexus brachialis injury after catheterization of the RIJV with ultrasonography showing direct compression of the plexus brachialis by a central venous catheter without evidence of puncture hematoma.

Conclusion: Every case of plexus brachialis injury after catheterization of the RIJV should be followed up by an emergency sonogram to rule out hematoma or catheter malposition.

Running head: Sonographic diagnosis of catheter malposition after RIJV catheterization.

Implication Statement

Ultrasonography should be performed in every case of brachial plexus lesion after catheterization of the right internal jugular vein to preclude damage to the plexus brachialis.

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Introduction

The scenario is not uncommon and familiar to many anesthetists. Following a surgical intervention with complication-free intraoperative course, the patient wakes up with nerve damage that primarily can not be associated with the surgical intervention or the general anesthesia procedure. Analysis of the ASA Closed Claims Database in 1999 showed "nerve damage" to be one the most common reasons for claims to indemnification[1].

Central venous cannulation through the right internal jugular vein (RIJV) is widely used in the management of patients scheduled for major surgery, but reports on injury of the Plexus brachialis after RIJV puncture are very rare, with such damage generally ascribed to puncture hematomas or patient malpositioning[2,3].

Case Report

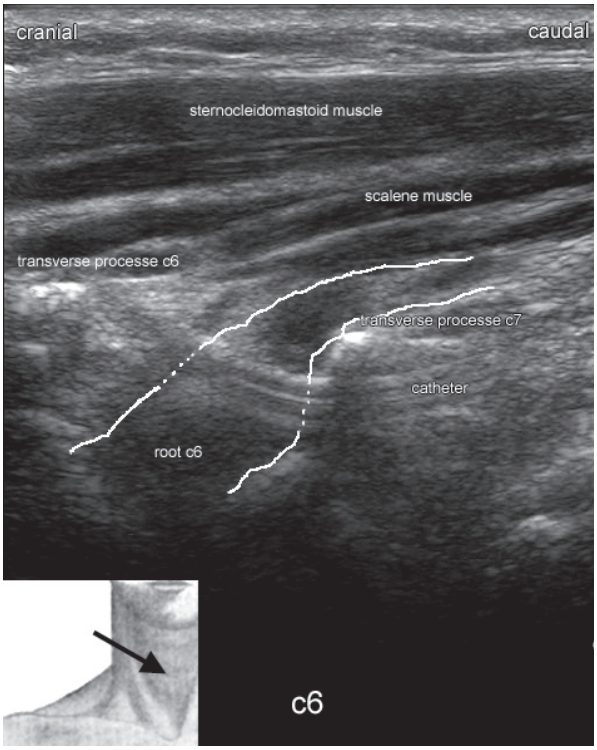
A 30-year-old female with an unremarkable medical history (ASA I) was scheduled for correction operation of thoracolumbar kyphotic spinal deformity (TH3-L2).

After inducing general anesthesia the patient was positioned 15° head-down with the head turned 30° to the left for introduction of a central venous catheter (ARROW® International) via the RIJV. Uneventful cannulation of the RIJV was performed via the approach described by Bazaral and Harlan[4] using the Seldinger technique.

For surgery the patient was positioned prone with her arms abducted 70° and the arm position controlled and noted every 30min. After emergence, the patient reported pain and paresthesia of the right arm. The puncture point for the RIJV catheter was unremarkable. Neurological examination revealed the picture of a Plexus brachialis lesion primarily involving the axillary and musculocutaneous nerve with diminished shoulder abduction and elbow flexion and reduced sensitivity on the outer side of the shoulder.

An urgently performed neurosonogram showed the RIJV catheter to press against the right side of the root of C6 with hardly any hematoma (Fig.1). The catheter was immediately removed and the patient was treated conservatively with physical therapy. Paresis and paresthesia began to improve twelve weeks after surgery with full recovery twelve months after the initial event.

Fig. 1
Ultrasound scan of the root c6 of the right brachial plexus. Scheme on the left bottom indicates ultrasound applicator position and scanning plane. The catheter touches the respective root in its course to the right jugular vein.



Discussion

Analysis of the ASA Closed Claims Database had showed perioperative nerve injury to still be a significant and constant source of injury (15%-16% of all lawsuits), with injury of the brachial plexus (i.e. due to patient positioning, regional block, surgical trauma or preexisting injury) at 20% being the second most common cause of damage (Nervus ulnaris 28%)[1,5]. In light of the similar anatomic-topographic situation it is, however, surprising that the ASA Closed Claims Database indeed lists claims for indemnification after Plexus brachialis anesthesia, but no reports on damage involving catheterization of the RIJV[1,5].

Likewise, an ASA Closed Claims Database study published by Domino et al. in 2004 on typical complications when introducing a central venous catheter does not even mention the possibility of

damage to the Plexus brachialis when catheterizing the RIJV[6]. Since this study only included claims for which a central venous catheter was explicitly named as the primary damaging event and a Plexus brachialis lesion can occur as the result of patient malpositioning, unrecognized puncture-induced damage to the Plexus brachialis could erroneously be ascribed to ”malpositioning“.

The potential danger posed to the nerves by the anatomic course of the Plexus brachialis because of the particular patient position (i.e. abduction of the arms, which stretches the nerves) required for the surgical intervention, is a well-known fact and malposition as a possible cause of nerve damage cannot be ruled out with guarantee even in our patient[7]. First doubts about the exclusivity of this malpositioning theory were already voiced in 1982 by Lederman et al., who found brachial plexus lesions in 23 out of 421 patients undergoing coronary artery bypass graft surgery with a correlation between the site of jugular vein cannulation and the side affected in 17 patients, thereby indicating the possibility of a puncture trauma during central venous catheterization[8]. Their results were confirmed by a prospective analysis of 531 patients undergoing cardiac surgery with sustained brachial plexus injury in 5% of the patients and a correlation between the side of plexus brachialis lesion and the side of internal jugular vein cannulation in 73% of the patients[9].

Anesthetists should be aware of the potential for this complication in general and should realize that even after uneventful catheterization of the RIJV, catheter malpositioning cannot be excluded by clinical inspection alone. The recommendation to use ultrasound guidance devices when introducing a central venous catheter into the RIJV is thus further underscored, because such devices permit the RIJV to be reached by the shortest possible route, with the least possible danger for the surrounding (nerve) structures[6,10,11]. Every case of postoperative injury to the plexus brachialis after catheterization of the RIJV should be followed up by an emergency sonogram to rule out hematoma or catheter malposition.

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