



Absence of the Right Internal Jugular Vein During Ultrasound-Guided Cannulation

Sağ İnternal Juguler Venin Ultrason Eşliğinde Kanülasyonu Sırasında Yokluğu

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Cannulation of the internal jugular vein (IJV) may be difficult because of anatomical variations. A 66-year-old female patient, who was in the intensive care unit, underwent ultrasound-guided cannulation of the right IJV. The right IJV could not be visualized by ultrasonography despite positional changes of the patient and Valsalva manoeuvre. The left IJV was easily determined by ultrasonography and cannulated. Although the landmark technique may be sufficient for most of the central vein cannulations, the rate of anatomical variations and related complications is quite high. We point out that even if ultrasound cannot be used in real-time, the ultrasonographic confirmation during the pre-insertion period may be crucial for successful central vein cannulation.

Keywords: Right internal jugular vein, ultrasonography, complication, anatomic variation

İnternal juguler ven (İJV) kanülasyonu anatomik varyasyonlar nedeniyle zor olabilir. Yoğun bakımda 66 yaşındaki kadın olguya ultrasonografi eşliğinde sağ İJV kanülasyonu planlandı. Sağ İJV olgunun pozisyonunu değiştirmemize ve Valsalva manevrası uygulamamıza rağmen görüntülenemedi. Sonrasında Sol İJV kolayca görüntülenerek ultrasonografi eşliğinde kanülasyon yapıldı. Anatomik işaretlere göre santral ven kanülasyonu birçok hastada başarılı olmakla birlikte, anatomik varyasyonların oranı çoktur ve buna bağlı komplikasyon oranı da oldukça yüksektir. Santral ven kanülasyonlarında ultrasonografi eş zamanlı kullanılmasa dahi işlem öncesi anatomik yapıların ultrasonografi ile doğrulanmasının başarılı santral ven kanülasyonu için önemli olduğunu vurgulamak istedik.

Anahtar Kelimeler: Sağ internal juguler ven, ultrasonografi, komplikasyon, anatomik varyasyon

Introduction

Correct placement of an internal jugular vein (IJV) catheter may become a technically challenging procedure because of anatomical variations. The anatomical variations increase the central venous catheterization (CVC) failure and the rate of malposition (1). Recently, the guidance of ultrasonography (USG) either in pre-insertion or in real-time is accepted as a remedy to reduce the failure and malposition rate (2). Here, we reported a case with a rare anatomical variation, which was determined during cannulation of the right IJV with ultrasound guidance in an intensive care unit (ICU).

Case Presentation

A 66-year-old female was admitted to the ICU and mechanically ventilated. The patient was diagnosed with acute respiratory failure due to rigid Parkinson disease. The anaesthesiologist planned the right IJV cannulation with ultrasound guidance. An informed consent for IJV cannulation was obtained from the patients' primary relative because of her clinical condition. The patient was placed in the 15° Trendelenburg position for the procedure. Lidocaine (2%, 3 mL) was administered for local anaesthesia following sedation with 0.05 mg kg⁻¹ intravenous midazolam and sterilization. A portable ultrasound machine (Sonosite M-Turbo®, Sonosite Inc, Bothell, WA, USA) with a linear, high frequency transducer (6-13 MHz, Sonosite) was used for catheter placement. The transducer was covered with a sterile sheath, and the right neck area was examined. Nevertheless, the right IJV was not visible by USG despite the positional changes of the patient and the transducer during examination (Figure 1a). Color Doppler imaging revealed the presence of the right carotid artery without the right IJV (Figure 1b). An experienced radiologist was consulted for ultrasonographic confirmation of the absence of the right IJV. After the confirmation, the patient was positioned for ultrasonographic examination of the left neck. The left IJV was easily

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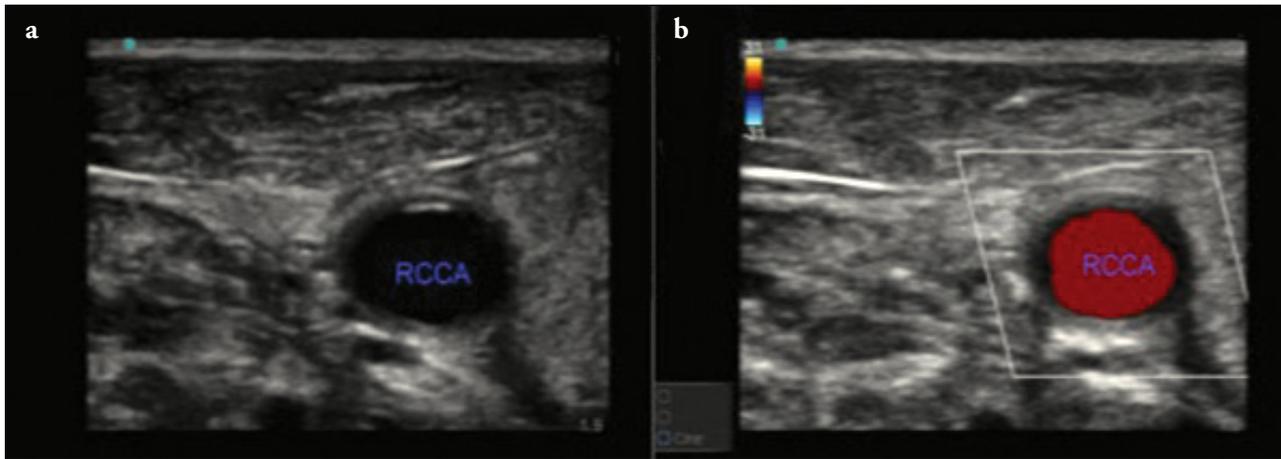


Figure 1. a, b. Ultrasonographic appearance of the right common carotid artery (RCCA) with the absence of the right internal jugular vein. The image was obtained during the Trendelenburg position and Valsalva maneuver. (a) RCCA (b) RCCA with color Doppler imaging

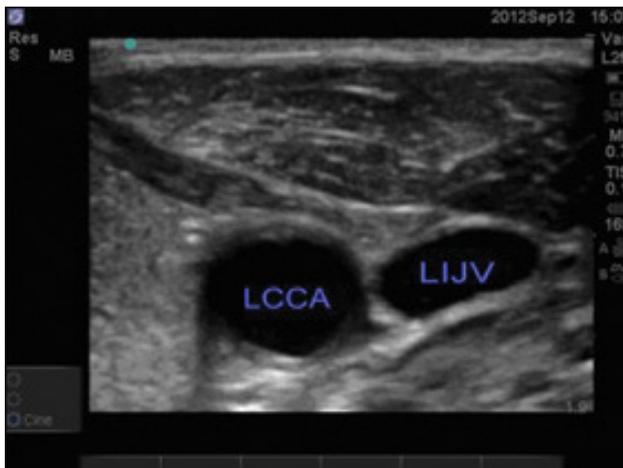


Figure 2. Ultrasonographic appearance of the left common carotid artery (LCCA) and the left internal jugular vein (LIJV)

determined by USG without any positional changes of the patient and the transducer (Figure 2). The left IJV cannulation was performed without difficulty, and placement of the catheter was also confirmed by ultrasound.

Discussion

Anatomical variations of the IJV are common and exhibited in a wide range. All abnormalities of IJV may be related to an increased complication rate and CVC failure (1). Generally, the physicians may perform multiple attempts for cannulation according to the anatomical landmarks. The rate of complication, particularly carotid artery puncture, increases because of several and consistent attempts. The close anatomical relationship between the IJV and carotid artery may also augment these obstacles. Carotid artery puncture is a serious complication of IJV cannulation, and it may be related to vascular damage, airway obstruction and neurologic injury (1).

In the literature, cerebral venous insufficiency has been reported in neurological disorders, particularly in multiple sclerosis. It may be characterized by stenosis or lack of ve-

nous flow. The lack of a Doppler detectable venous flow in the cerebral venous system was reported by researchers (3). Initially, we assumed that the present patient presented with cerebral venous insufficiency because of her neurological disorder; however, we could not observe the right IJV despite multiple colour Doppler screenings in different locations on the right IJV. Another possibility is IJV thrombosis. It is a rare condition and generally secondary to various aetiologies such as existence of central vein catheter, malignancy, trauma, infection and hypercoagulable status (4). Our case did not have any history of catheter insertion of the right IJV, and we eradicated the other possibilities related to IJV thrombosis. With the aid of these findings, we assumed that IJV thrombosis may result from the undiagnosed absence of the right IJV. We found only one paediatric case report with the absence of the right IJV by B-mode and colour Doppler imaging. The author also located the left IJV easily under the guidance of USG and performed left IJV cannulation without any complication (5).

Ultrasonography imaging is helpful, but it may not be sufficient to confirm the absence of the IJV. Invasive investigations such as venography may have been helpful to confirm this anatomical circumstance. However, we did not perform venography in this case because of ethical issues and the patients' poor physical status. It should have been performed as an elective procedure after USG confirmation.

It was stated that the patient's position and Valsalva manoeuvre could affect the IJV diameter. The Trendelenburg tilt significantly increased the right IJV diameter compared to the neutral supine position (6). In our case, despite the several position changes and Valsalva manoeuvre, we could not locate the right IJV.

Conclusion

The landmark technique could be satisfactory for most of the CVC attempts. However, the IJV abnormalities are common

and are also related to a high complication rate. We claim that even if it cannot be used in real-time, USG confirmation in the pre-insertion period may be crucial for successful CVC attempts without complication and prolongation.

Informed Consent: Written informed consent was obtained from patients' relative.

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