
Abstract:

BACKGROUND AND OBJECTIVE: For cannulation of the internal jugular vein (IJV), ultrasound increases the number of first pass successes and reduces the rate of mechanical complications. A frequent complication of IJV access is the accidental injury of the common carotid artery (CCA), which can be dangerous in some circumstances. Landmarks and palpation of the CCA are used when ultrasound is not available. These conventional methods are based on the lateral position of the IJV to the CCA, and physicians traditionally employ head rotation to increase the success rates of IJV cannulation. Ultrasound scanning strictly from the anterior to posterior is not possible for this process because the probe must be adequately coupled to compensate for the curvature of the neck. Scans have been performed from different angles lateral to the neck, but misleadingly depict the relationship of the IJV to the CCA. In this study, the authors examined the effect of scanning at a 45degrees angle at the level of the cricoid on the depiction of the IJV in relation to the CCA. Furthermore, the influence of 30degrees head rotation to the contralateral side was also investigated.

METHOD: The relationship of the IJV to the CCA was recorded using ultrasound in 600 patients. Patients were placed in a supine position and the probe was coupled at the level of the cricoid, scanning at an angle of 45degrees from the lateral side of the neck. Based on the
ultrasound images, the position of the IJV in relation to the CCA was recorded using a segmented grid. The centre of the vein (cross-section of the vertical and longitudinal diameter) determined the segment classification, in which the top of the ultrasound image was defined as the anterior. Additionally, in 300 patients, the head was rotated to the contralateral side at 30 degrees to examine the impact of head rotation on the position of the IJV.

RESULTS: The IJV was found in the lateral segment in only 3.0-3.3% of the patients. It was found in the anteromedial segment more frequently on the left side compared to the right side (P < 0.005). On the right side, the IJV was shown more frequently in the anterolateral position (P < 0.0001). Head rotation at 30 degrees in 300 of the 600 patients caused a significant change of the IJV position in the left anteromedial segment, in that it frequently placed the IJV towards the anterior and anterolateral segment (P < 0.05). There was no significant impact of head rotation on the IJV representation on the right side. Atypical positions of the IJV (posterior, medial or thrombosis) were found in some cases.

CONCLUSION: Ultrasound images used for IJV access usually depict the vein as being anterior to the CCA and only to a minor extent in the lateral position. This positioning is important for needle processing in order to avoid accidental arterial puncture and to identify atypical positions of the IJV. To determine the ideal puncture site, images of the neck vessels along their entire pathway should be obtained when using ultrasound for vascular access.