EVALUATION OF ULTRASOUND-GUIDED INSERTION OF CENTRAL VENOUS CATHETERS, SUBCLAVIAN AND INTERNAL JUGULAR, BY YOUNG RESIDENTS

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Background and Objectives:

Placement of large-bore central venous catheters via a jugular or subclavian vein is becoming increasingly common. Although the great majority of these catheters are successfully placed by clinicians using anatomic landmark techniques, this procedure is neither innocuous nor always successful. Serious complications, including hematomas, arterial injury, and pneumothorax can occur. The patient may experience considerable discomfort when multiple needle passes are made. Sonographic imaging of the jugular and subclavian veins can significantly improve the safety, speed, and the comfort of the procedure by defining the vascular anatomy of the jugular and subclavian veins before puncture, showing complications from prior attempts or placements of central venous catheters in these vessels, and providing guidance for needle puncture of the jugular and subclavian veins.

The aim of our study is to evaluate the contribution of ultrasound in the insertion of central venous catheters subclavian and internal jugular in terms of feasibility and complications

Materials and Methods:

After the approval of hospital ethics committee, we conducted a prospective study from March 2015 to February 2016 we included 60 adult patients hospitalized in intensive care. After informed consent of their parents, they were randomized into two equal groups: SC (insertion of subclavian vein catheter under ultrasound guidance) and JUG (insertion of internal jugular venous catheter under ultrasound guidance). The procedure was performed by young anesthesia residents who have received theoretical and practical training on ultrasound-guided placement of central venous catheter.

They used an ultrasound probe (Sonosite) flathead and high frequency. The procedure was performed in vascular mode with the use of Doppler color. The probe is placed perpendicular to the long axis of the vessel, visualizing the vein in its short axis as a circle. The needle is placed at the center of the probe (middle of the long axis) and directed to the short axis of the vessel. The tip of the needle is not seen as it traverses the tissue between the probe and vein but only when it punctures the wall of the vessel.

We noted the duration of the procedure and the number of attempts.

Then, a chest radiograph was performed and interpreted by a radiologist. It verifies the correct positioning of the catheter and the absence of pneumothorax.

For variables with a normal distribution, the data are presented as mean $\pm$ standard deviation. Mean comparisons shall be effected by paired or unpaired Student's t test. Percentages are compared by a test Chi-Squared test. The bivariate correlation was analyzed using the Pearson's test. Statistical analysis was performed using SPSS 22 software.

K Rando et al. Ultrasound-guided internal jugular vein catheterization: a randomized controlled trial. *Heart Lung Vessel*. 2014; 6(1): 13–23.

Results:

Thirty central subclavian (SC) vein catheters and 30 internal jugular (JUG) vein catheters were included. After having placed 5 subclavian vein catheters and 3 internal jugular vein catheters, a resident was able to successfully insert a central catheter from the first puncture. The subclavian puncture site averaged 55 mm below the clavicle and 90 outside the manubrium. The internal jugular vein is behind the common carotid artery in 35% of cases and within in 20% of cases

The encountered complications were:

- In the subclavian vein puncture: arterial puncture, a case of aberrant course (retrograde) and one case of pneumothorax;
- In the internal jugular: 3 cases of arterial puncture.

	SC	JUG	p
First attempt success rate	75%	85%	0,47
Average number of puncture	41/30	39/30	0,85
Average duration of catheter insertion (min)	8,6 $\pm$ 2,7	7.9 $\pm$ 2,1	0,23
Medium difficulty level (0à10)	4,3 $\pm$ 1,9	3,4 $\pm$ 1.3	0,66

Conclusion:

The ultrasound guidance can puncture the subclavian vein more laterally, away from the pleural dome considerably reducing the risk of pneumothorax and to reduce the risk of arterial puncture to the external jugular vein.