

Title: COMPARISON OF COMPLICATIONS FROM RIGHT INTERNAL JUGULAR AND LEFT SUBCLAVIAN VEIN CANNULATION IN A TRAINING PROGRAM

Authors: M.B. Neal, M.D., H.K. Wallfisch, M.D., J.F. Arens, M.D.

Affiliation: Department of Anesthesiology, University of Texas Medical Branch, Galveston, Texas 77550

Introduction. Anesthesiologists consider cannulation of the right internal jugular (RIJ) a safe and relatively quick procedure. However, few anesthesiologists are as comfortable with subclavian vein cannulation for central venous access, and it is commonly assumed that there is an increased incidence of complications from subclavian vein cannulation. The purpose of this study was to (1) prospectively compare the success rate, and the frequency and type of complications of central venous access using the RIJ and the left subclavian vein (LSV) approach; and (2) evaluate whether the complication rate differs for an experienced operator (EX) versus an inexperienced PGY-II or III trainee (TR) being taught the internal jugular and subclavian cannulation method.

Methods. Three hundred thirty-seven consecutive adult patients scheduled for cardiopulmonary bypass procedures received both a RIJ and LSV catheter. All cases were staffed by the same faculty throughout the study. The patients were randomly assigned to receive either staff or resident placement at RIJ and LSV. Cannulation was performed at both sites using a 16 ga x 8 in catheter placed through a 14 ga x 2 in needle (Delmed I-Cath, Intercath Delmed, Inc., Canton, Maryland). All patients had a peripheral intravenous catheter, radial arterial line, and V5 ECG electrodes placed prior to cannulation. The procedure was performed in unanesthetized patients except when pain or lack of patient cooperation necessitated institution of anesthesia (7 pts). Cannulation time for both anesthesiologists was limited to 20 min. If cannulation was not completed by TR in this time, EX attempted cannulation. If EX was unsuccessful after 10 min the procedure was abandoned. Complications were noted at the time of cannulation, and were also assessed by chest X ray in the intensive care unit within 48 hrs. Time for central venous access, defined as the moment the needle initially touched the skin until the catheter was secure, was also recorded.

Results. Line placement was successful in 326/345 (94%) attempts at RIJ, and 329/342 (96%) cannulation attempts at LSV.

Complications of Central Venous Cannulation

Right Internal Jugular (N=345)

	EX	TR	Overall % Comp
incorrect line position	1	1	0.6%
arterial stick	6	6	3.4%
hematoma	2	0	0.6%
severe discomfort	0	2	0.6%
pneumothorax	0	0	0.0%

Left Subclavian Vein (N=342)

	EX	TR	Overall % Comp
incorrect line position	1	1	0.6%
arterial stick	0	1	0.3%
hematoma	0	0	0.0%
severe discomfort	0	1	0.3%
pneumothorax	0	0	0.0%

There were fewer complications utilizing LSV cannulation compared to the RIJ approach. The complication rate of arterial puncture at either site was not significantly different for the EX compared to TR. Time for cannulation, however, was significantly less in the hands of the EX.

Cannulation Time in Seconds (Mean + SD)

	RIJ	LSV
EX	124 + 147	62 + 82
TR	219 + 202	150 + 165

Furthermore, the overall success rate at both sites was higher for the EX compared to the TR.

Cannulation Success Rate

	RIJ	LSV
EX	98 %	99 %
TR	90 %	93 %

Discussion. This prospective study demonstrates that both intravenous sites can be utilized safely and efficiently to gain central venous access. Furthermore, since inexperienced trainees have as low a complication rate as an experienced operator in an appropriately supervised situation, it would appear that intravascular line placement can be taught with an acceptably low complication rate. This is contrary to a recent report suggesting that complications are higher for inexperienced trainees.¹ Our rate of arterial puncture is lower than that previously reported,^{2,3} and we attribute this to careful patient positioning. In conclusion (1) subclavian vein cannulation is as safe as internal jugular cannulation; (2) residents in training can be taught both internal jugular and subclavian vein approaches for central venous cannulation with minimal complications. Proper positioning and instructions from an experienced operator can minimize the complication rate for central venous cannulation.

References.

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