

Comparison of Ultrasound (US) Guided Versus Landmark Method for Central Venous Access in the Operating Room (OR) - Preliminary Results From a Randomized Controlled Trial

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Background: Traditionally, central venous catheterization has been guided by anatomic landmarks. The traditional technique has been observed to have complication rates up to 15%.¹ A meta-analysis commissioned by the British National Institute for Clinical Excellence found that morbidity was reduced when catheterization was assisted by ultrasound (US) guidance.² The hypothesis of this ongoing study is that use of US for real-time guidance by residents during internal jugular (IJ) central venous line (CVL) placement results in increased success and decreased complication rates.

Methods: After IRB approval, written informed consent was obtained from 29 patients of the planned 140 scheduled to undergo surgery with an indication for IJ CVL placement. Patients were randomized into two groups: Group A) patients had CVL placed in traditional manner using external landmarks; Group B) patients had CVL placed under direct vision using an US guided technique. Resident (CA-1, CA-2, CA-3) performing the procedure, number of attempts, success rate of by the resident, duration of procedure, and early complications were recorded and analyzed. Total time was measured from central line drape placement to removal of central line guide-wire.

Results: Patient demographics were similar between groups. Mean time for landmark technique was 387.8 ± 268.9 sec compared to 561.8 ± 298.1 sec for US technique. Although shorter, statistical significance was not found ($p < 0.1113$)(Table 1). Each time (from “drape” to “guide-wire out”) was less when utilizing the landmark method except for the “guide-wire in”. Although the “palpation/probe placement” time was statistically different between landmark and US ($p < 0.0004$), in 2 patients randomized to “landmark” the procedure had to be changed to US requiring faculty rescue. An additional landmark procedure required faculty rescue without change to US. Neither method has incurred any complications.

Conclusion: This preliminary data from an ongoing study demonstrates that the landmark technique has lower total times, although only 1 reached statistical significance. Of note, 3 of the 14 landmark procedures (21%) required either attending rescue and/or switch to US. This suggests that while requiring longer time, US utilization may lead to higher overall success. In addition, the US group had more CA-1's (4) that may account for the longer times. Ongoing enrollment in this study will facilitate more robust analysis and given the lack of anesthesiologist-specific RCTs to date, will potentially add useful data to the field.

1. Robinson JF, Robinson WA, Cohn S, Garg K, Armstrong JD. Perforation of the great vessels during central venous line placement. *Arch Intern Med.* 1995; 155:1225-1228. Hind D, Calvert N, McWilliams R, Davidson A, Paisley S, Beverley C, et al. Ultrasonic locating devices for central venous cannulation: meta-analysis. *BMJ* 2003;327:361-7.