



Needle Guided Long-Axis Approach Improves Needle Visualization in CVC

Randomized, Prospective, Observational Simulation Study Comparing Residents' Needle-Guided vs. Free-Hand Ultrasound Techniques for Central Venous Catheter Access

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Summary and Methods

This study tested the hypothesis that a needle guided technique (NG) would allow faster central venous catheter placement, better success rates and fewer needle sticks than both the short-axis (S-FH) and long-axis (L-FH) free-handed methods. Additionally, the authors postulated the lack of control of needle depth under the short-axis (S-FH) approach contributes to inadvertent arterial puncture. Utilizing the needle guide technique would allow for better visualization of the needle tip during the procedure and could help circumvent this procedural risk.

Thirty-three anesthesia residents with equal levels of training participated in a prospective observational study at the Peter M. Winter Institute for Simulation, Education and Research at the University of Pittsburgh School of Medicine. Utilizing a central venous catheter (CVC) phantom, bedside ultrasound system and the Infiniti needle guide system, each resident performed a CVC insertion using three different techniques; short axis free-hand (S-FH), long axis free-hand (L-FH) and long axis needle guided.

Discussion and Results

The use of needle guided long-axis approach increased needle tip visualization by 276% when compared to the free-hand approaches. The success rate regardless of the technique was 100%.

In addition, no significant difference in procedure time was noted. Post-task surveys revealed positive feedback for the use of a needle guide including strong consideration to use the device in a clinical setting.

Conclusions

The authors reported study limitations including the lack of resident knowledge of the needle guide could have contributed to longer procedure times. Additionally, the venous catheter phantom does not react as human tissue. In a clinical setting, anatomical variances would exist based on patient body habitus. Finally, the time required task as the primary evaluation would not be reflective of a clinical setting.

The study's findings suggest the Infiniti needle guide:

- improved needle visualization in the long-axis versus free-hand technique
- demonstrated ease of usability and reliability of visualization of the needle.

Author Commentary

"The visualization of the needle under ultrasound-guided techniques, including vascular access, regional nerve block and interventional radiology is a crucial component of patient safety."

"The needle guide permitted significantly more consistent visualization of the needle during the procedure, which suggested the needle guide's potential to improve patient safety by reducing the incidence of inadvertent punctures to adjacent structures."



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