The Indian Journal of Pediatrics (November 2019) 86(11):985–986
https://doi.org/10.1007/s12098-019-03039-7

EDITORIAL COMMENTARY

Necessity of Image Guidance for Subclavian Catheterization to Improve Patient Safety

Shivanand Gamanagatti [1]

Received: 10 July 2019 / Accepted: 10 July 2019 / Published online: 26 July 2019
© Dr. K C Chaudhuri Foundation 2019

Central venous catheterization is one of the commonly performed interventional procedures and is done by a wide range of medical practitioners such as pediatricians, critical care specialists, anesthesiologists, nephrologists, radiologists, cardiologists, and oncologists, for varied indications such as hemodynamic monitoring, drug administration, dialysis, and parenteral nutrition.

Mechanical complications rates are almost equal between jugular and subclavian catheterization, however, existing guidelines suggest that subclavian vein catheterization benefit from lower infection rates as compared to jugular vein insertion [1, 2].

A systematic review suggested that dynamic ultrasound use reduces failed subclavian vein catheterizations and adverse events associated with traditional "blind" landmark techniques, thereby improves patient safety [3]. There have been a limited number of randomized controlled trials of variable methodological quality that have addressed ultrasound use for subclavian catheterization.

Exiting data has few limitations in reporting the technical challenges, exact rate of infection, arrhythmias, cardiac tamponade, nerve injuries and air embolism.

Complication rate and success rate also varies with clinician's experience (inexperienced resident *vs.* experienced senior physician) in ultrasound techniques, anatomical variations (superficial *vs.* deep) and patient population (newborn child *vs.* older children).

The paper by Pang et al. published in this issue of the Journal clearly highlights the advantages of ultrasound in initial cannulation and use of fluoroscopy for final positioning of catheter tip [4]. Also they have clearly mentioned the subclavian catheterization in step wise manner, which is easy to understand for the readers.

There are a few limitations of this study; the authors have not defined the complications as serious *vs.* non-serious; there is no mention of how many attempts were made by individual physician for a particular patient before referring to a more senior physician and the authors have not addressed the technical challenges. Since, all catheterizations were done only on right side, authors have not mentioned any particular reason for this selection bias. Was there a technical difficulty in accessing left-side subclavian vein? Overall rate of malposition of catheter tip is more on the right side as compared to the left side since right subclavian vein enters innominate vein at sharper angle than on left side [5].

Also it is important to address, the issue of accessing the subclavian vein using infraclavicular approach or supraclavicular approach, since infraclavicular approach has greater technical complications than supraclavicular approach [6].

Some solutions to overcome technical challenges in accessing subclavian vein are, use of virtual convex/trapezoid setting using high frequency linear probe to access deep seated subclavian veins, use of micropuncture set for cannulating smaller veins and not to inject contrast without ensuring needle tip is in the lumen by aspirating blood.

Because of heterogeneous data, there is a need for more well-designed randomized controlled trials with more clearly defined criteria's to provide a solid evidence base for future updates of clinical practice guidelines [7–9].

Compliance with Ethical Standards

Conflict of Interest None.

References

1. Randolph AG, Cook DJ, Gonzales CA, Pribble CG. Ultrasound guidance for placement of central venous catheters: a metaanalysis of the literature. Crit Care Med. 1996;24:2053–8.
2. Ruesch S, Walder B, Tramèr MR. Complications of central venous catheters: internal jugular versus subclavian access—a systematic review. Crit Care Med. 2002;30:454–60.

✉ Shivanand Gamanagatti
shiv223@gmail.com

[1] Department of Radiology, JPNA Trauma Centre, All India Institute of Medical Sciences, New Delhi, India

3. Lalu MM, Fayad A, Ahmed O, et al. Canadian Perioperative Anesthesia Clinical Trials Group Ultrasound-guided subclavian vein catheterization: a systematic review and meta-analysis. Crit Care Med. 2015;43:1498–507.
4. Pang H, Chen Y, Liu X, He X, Wang W, Liu Z. A randomized trial of ultrasound- versus fluoroscopy-guided subclavian vein catheterization in children with hematologic disease. Indian J Pediatr. 2019. https://doi.org/10.1007/s12098-019-03021-3.
5. Tarbiat M, Manafi B, Davoudi M, Totonchi Z. Comparison of the complications between left side and right side subclavian vein catheter placement in patients undergoing coronary artery bypass graft surgery. J Cardiovasc Thorac Res. 2014;6:147–51.
6. Matthews NT, Worthley LIG. Immediate problems associated with infraclavicular subclavian catheterisation; a comparison between left and right sides. Anaesth Intens Care. 1982;10:113–5.
7. Apfelbaum JL, Connis RT, Nickinovich DG, et al. Committee on standards and practice parameters, American society of anesthesiologists task force on preanesthesia evaluation. Practice advisory for preanesthesia evaluation: an updated report by the American society of anesthesiologists task force on preanesthesia evaluation. Anesthesiology. 2012;116:522–38.
8. National Institute for Clinical Excellence. Guidance on the use of ultrasound locating devices for placing central venous catheters. London: National Institute for Clinical Excellence; 2005.
9. Troianos CA, Hartman GS, Glas KE, et al. Councils on intraoperative echocardiography and vascular ultrasound of the American society of echocardiography; society of cardiovascular anesthesiologists: special articles: guidelines for performing ultrasound guided vascular cannulation: recommendations of the American society of echocardiography and the society of cardiovascular anesthesiologists. Anesth Analg. 2012;114:46–72.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.