DEM Journal Club

Article Appraisal

Article: Intravascular Complications of Central Venous Catheterization by Insertion Site

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Background and Study Objective(s):

Central lines are commonly placed in the Emergency Department. Three sites are used based on clinical context, provider comfort and dogma regarding complication rates. There is growing basis of evidence refuting claims of increased complications at certain insertion sites. This study aims to address the complications of central venous catheterization by insertion site.

Study Design:

Multi-centre randomized controlled trial. 10 ICUs in France with 3027 patients over 3 years. Intention to treat analysis. Inclusion criteria were: age > 18, ICU admission, require central venous access, and have at least 2 acceptable insertion sites (jugular, subclavian, femoral). “Selective Exhaustion” randomization to either 1:1:1 or 1:1 if one site was unacceptable. Sterile technique was used in standard Seldinger insertion with chest x-ray to confirm placement. After removal catheter tips and blood was cultured to screen for infectious complications. Ultrasonography was performed after removal to assess for DVT.

Results:

Results were analyzed by intention-to-treat and appropriate statistical methods were employed. 3,471 central lines were placed in this study. The number of primary outcome events per 1,000 catheter-days was 1.5, 3.6 and 4.6 for subclavian, internal jugular and femoral lines respectively. In other words 0.9% of subclavian lines, 2.4% of internal jugular lines and 2.6% of femoral lines had intravascular complications not including mechanical complications. Mechanical complications, a secondary safety outcome, were found in 2.1% of subclavian, 1.4% of jugular and 0.7% of femoral lines.

Validity of Results:

Although this was a large randomized trial there are some methodological flaws that affect the validity of these results. Most importantly mechanical complications were not considered in the composite primary outcome as a complication, therefore underestimating the risk of subclavian line placement. Additionally, clinical judgement was used to determine if a site was suitable for insertion. This judgement is realistic for normal working conditions but again may decrease the validity of the randomization and add a potential selection bias.

Generalizability of Results:

This study was done in an ICU setting which differs from the emergency department but the effect of this difference is unclear. Central venous catheterization was done by experienced providers, in reality many central lines are placed by less experienced providers with or without supervision. Ultrasound use was not randomized and left to the discretion of the clinician; again the effect is unclear as it is becoming standard practice to use dynamic ultrasound guidance for central line placement. The low rate of ultrasound use in the subclavian group may be responsible for the higher mechanical complication rate.

The Bottom Line:

This relatively large randomized control trial adds to the previous evidence that suggests that the complication rates are similar for all three commonly used central line insertion sites. The dogma that femoral lines are at high risk for infection is refuted by this evidence. The consensus from the journal club attendees as well as the online medical community feel that this adds support or justification to continue using the insertion point they are most skilled or comfortable using as none is clearly superior.