“This prospective observational study aimed to assess the diagnostic accuracy and reproducibility of ultrasound (US) and “bubble test” to detect malpositions of central venous catheters (CVC) in the pre-operative setting.” Meggiolaro et al (2014).

Reference:


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Abstract:

BACKGROUND: verification of the CVC position by chest X-ray (CXR) is usually performed in the post-operative period with the risk related to possible malposition. This prospective observational study aimed to assess the diagnostic accuracy and reproducibility of ultrasound (US) and “bubble test” to detect malpositions of central venous catheters (CVC) in the pre-operative setting.

METHODS: the study included 105 patients undergoing pre-operative CVC placement. A US protocol aimed at direct visualization of the CVC was completed by a single operator and two
consecutive “bubble tests” were performed independently by different physicians. Two parameters were considered: complete right atrium (RA) opacization versus visualization of “no or few bubbles” and time from agitated saline injection to visualization of micro-bubbles in the RA (“push-to-bubbles” time).

RESULTS: CXR identified 14 (13%) CVC malpositions. Vascular US showed a sensitivity of 64% and a specificity of 100% while visualization of “no or few bubbles” at bubble test yielded a sensitivity of 50% and a specificity of 100%. “Push-to-bubbles” times were ≈9 times longer in patients with compared to those without CVC malposition [1400 (702–2160) ms versus 167 (123–228) ms, p<0.001]. A cut off value of 500 ms had a sensitivity of 100% and a specificity of 99% for CVC malposition with an inter-observer agreement of 99% (kappa 0.96, p<0.001).

CONCLUSIONS: CVC malposition was observed in a sizeable proportion of patients undergoing pre-operative central venous cannulation. Measurement of “push-to-bubbles” time is a fast, accurate and highly reproducible tool for verifying the correct CVC position.

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