

“Amplitude changes in the P-wave of intracavitary electrocardiography have been used to assess the tip placement of central venous catheters. The research assessed the sensitivity and specificity of this sign in comparison with standard radiographic techniques for tip location, focusing on factors influencing its clinical utility” Wang et al (2015).

Reference:

Wang, G., Guo, L., Jiang, B., Huang, M., Zhang, J. and Qin, Y. (2015) Factors Influencing Intracavitary Electrocardiographic P-Wave Changes during Central Venous Catheter Placement. PLoS One. 10(4), p.e0124846.

Electrocardiographic P-wave changes during central venous catheter placement
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Abstract:

Amplitude changes in the P-wave of intracavitary electrocardiography have been used to assess the tip placement of central venous catheters. The research assessed the sensitivity and specificity of this sign in comparison with standard radiographic techniques for tip location, focusing on factors influencing its clinical utility. Both intracavitary electrocardiography guided tip location and X-ray positioning were used to verify catheter tip locations in patients undergoing central venous catheter insertion. Intracavitary electrocardiograms from 1119 patients (of a total 1160 subjects) showed specific amplitude changes in the P-wave. As the results show, compared with X-ray positioning, the sensitivity of electrocardiography-guided tip location was 97.3%, with false negative rate of 2.7%; the specificity was 1, with false positive rate of zero. Univariate analyses indicated that features including age, gender, height, body weight, and heart rate have no statistically significant influence on P-wave amplitude changes ($P > 0.05$). Multivariate logistic regression revealed that catheter insertion routes (OR = 2.280, $P = 0.003$) and basal P-wave amplitude (OR = 0.553, $P = 0.003$) have statistically significant impacts on P-wave amplitude changes. As a reliable indicator of tip location, amplitude change in the P-wave has proved of good sensitivity and excellent specificity, and the minor, zero, false positive rate supports the clinical utility of this technique in early recognition of malpositioned tips. A better sensitivity was achieved in placement of centrally inserted central catheters (CICCs) than that of peripherally inserted central catheters (PICCs). In clinical practice, a combination of intracavitary electrocardiography, ultrasonic inspection and the anthropometric



measurement method would further improve the accuracy.

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