



“In order to find the correct final position of the tip of a central venous catheter, we have developed a new electric method (the Proximity of Cardiac Motion (PCM) method), designed to work in tandem with the existing ECG-based method” Konings et al (2015).

Reference:

Konings, M.K., Schelven, L.J., Meijer, R.C., Westra, A.H., Snijder, R.A. and Boxtel, A.J. (2015) Correct positioning of central venous catheters using a new electric method. The Journal of Vascular Access. March 9th. .

Central venous catheter tip location: Proximity of Cardiac Motion (PCM) method

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Abstract:

PURPOSE: In order to find the correct final position of the tip of a central venous catheter, we have developed a new electric method (the Proximity of Cardiac Motion (PCM) method), designed to work in tandem with the existing ECG-based method.

METHODS: A small, patient-safe, high-frequency current is fed through the catheter (via the saline-filled lumen of the catheter, or a stylet). Simultaneously, the resulting voltage is measured by two electrodes on the frontal thoracic skin. The catheter tip hence functions as

a current source inside the vasculature. The cardiac motion produces a variation in the amplitude of the measured voltage in the rhythm of the cardiac cycle, and the strength of this oscillatory variation is proportional to the strength of the incident current field on the heart, which is a rapidly decaying function of the distance between the catheter tip and the cavoatrial junction (CAJ). Hence the strength of this oscillatory variation is a strong indicator for the proximity of the catheter tip with respect to the CAJ.

RESULTS: The new method has been tested in an animal model, yielding an average final position of the catheter tip of 2.1 cm above the CAJ, with a maximum deviation of 0.5 cm.

CONCLUSIONS: We conclude that the new PCM method can be combined with the existing ECG method, and may potentially have significant added value when the ECG method cannot be applied, for example, in patients with atrial fibrillation or a pacemaker.

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