"The objective was to explore the relationship between hemodynamic parameters (blood pressures) measured through an IO catheter and intravascular catheters placed in the arterial and central venous circulation." De Lorenzo et al (2014).

Reference:

De Lorenzo, R.A., Ward, J.A., Jordan, B.S. and Hanson, C.E. (2014) Relationships of Intraosseous and Systemic Pressure Waveforms in a Swine Model. Academic Emergency Medicine. August 24th. .

Relationships of intraosseous and systemic pressure waveforms http://ctt.ec/i4q66+ @ivteam #ivteam

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Abstract:

BACKGROUND: Despite some focus on the use of intraosseous (IO) catheters to obtain laboratory samples, very little is known about the potential for obtaining other forms of clinical data. Largely unstudied is the relationship between IO pressures (IOPs) and systemic hemodynamic pressures such as mean arterial pressure (MAP) and central venous pressures (CVP).

OBJECTIVES: The objective was to explore the relationship between hemodynamic

parameters (blood pressures) measured through an IO catheter and intravascular catheters placed in the arterial and central venous circulation.

METHODS: Eight pigs (Sus scrofa) weighing 30 to 45 kg were sedated with a short-acting agent, intubated with a cuffed endotracheal tube, and anesthetized with 2% to 3% isoflurane. Intravascular catheters were placed into the femoral or carotid artery and the femoral or jugular vein for MAP and CVP measurements. IO catheters, 15 mm for the sternum and 25 mm for the long bones, were placed percutaneously into the proximal tibia, proximal femur, proximal humerus, right proximal ulna, and/or sternum. Pressures were recorded during normotension, hypotension, and hypertension.

RESULTS: Averaged across all eight animals, the means (ranges) for baseline systemic pressures were as follows: MAP = 66.5 (55.6 to 76.7) mm Hg, tibia IOP = 17.4 (9.3 to 34.5) mm Hg, femur IOP =18.4 (3.3 to 33.1) mm Hg, humerus IOP = 15.7 (2.8 to 28.9) mm Hg, ulna IOP = 16.0 (7.9 to 25.6) mm Hg, sternum IOP = 5.7 (-0.5 to 47.9) mm Hg, and CVP = 2.7 mm Hg (-3.3 to 7.9) mm Hg. The best median correlation occurred between femur IOP and mean MAP (r = 0.65). The four highest correlations between IOP and MAP were associated with mean femur IOP. Only one IO site had a correlation coefficient over 0.50 for CVP. The long bones tended to correlate better with the MAP and the sternum tended to correlate better with the CVP. Nonlinearity was observed in the actively rising pressure phases, which can be explained by a hysteresis model.

CONCLUSIONS: The relationship between IOP and MAP or CVP is variable by site, with the MAP and CVP tending to be estimated by the femur and sternum, respectively. The relationship to actively rising pressures is nonlinear and a hysteresis model is proposed to explain the phase change. Further experimentation is needed to refine the IOP relationship to the MAP and CVP and assess the potential of these measurements to provide clinically relevant information.

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