

# Impact of Hydrostatic Pressure on Peripheral Venous Pressure Measurements

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**Introduction:** It has been suggested that changes in peripheral vein pressure (PVP) might provide a clinically meaningful estimate of fluctuations in intravascular volume (1-2). There are no available data on the impact of limb position on derived measurements. This study was performed to address this void.

**Methods:** Institutional IRB criteria were fulfilled. 14 consecutive adult patients undergoing general anesthesia were included. PVP data were transduced from standard intravenous catheters inserted into the forearm/hand. Transducers were "zeroed" at the mid-axillary line with the patients supine. Pressures were measured with the arms at the side and at a ninety-degree elevation. An arterial catheter was inserted in the same side of the IV location for monitoring of blood pressure. Data are presented as mean  $\pm$  SD. Statistical analyses were by paired t-test, P value  $<0.01$  were considered statistically significant.

**Results:** Limb elevation resulted in statistically significant increase in mean PVP ( $18.7 \pm 5.2$  versus  $37.2 \pm 13.7$  mm Hg), with percent change of 98.5% (figure 1). The height of the fluid filled pressure tubing between the Intravenous catheter site (hand or forearm) and the transducer correlated with pressure changes in PVP, ( $r = 0.86$ ), as shown in (figure 2). Corresponding changes in mean arterial pressure were not significant ( $88 \pm 13.2$  versus  $89.7 \pm 16.4$  mm Hg).

**Conclusion:** We have shown limb height and the specific location of the intravenous catheter have a profound impact on PVP measurements. Valid extrapolation of such data must take this hydrostatic pressure factor into account. We suggest adjustment of transducer position to the location of the intravenous catheter and "re-zeroing" at this new position as a solution to this problem.

## References:

1. J CardioThor Vasc Anesth 2004; 18: 446-450
2. J Clin Anesth 2012; 24: 542-548

