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## Passive leg raising: influence of blood pressure transducer site

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Dear Editor,

We read with interest the published articles about the passive leg raising (PLR) test [1, 2]. The authors applied the changes of arterial pulse pressure and pulse contour-derived cardiac output to predict the fluid response during the PLR test; however, they did not demonstrate the exact position of the blood pressure transducer and whether the site was changed during the PLR test. They might have ignored the influence of the blood pressure transducer site.

If the PLR test started from the semi-recumbent position and finished at the horizontal position with the leg raising [3], the blood pressure transducer site could be changed relative to the heart. The altered length may be about 10–30 cm for an adult

patient. We supposed that altered length could cause a small change in blood pressure, but large for pulse contour-derived cardiac output. Responding to arterial transducer raising vertically, pulse contour-derived cardiac output would increase and blood pressure would decrease in our primary sample study. Because of this, it is unknown which site should be chosen for the transducer during the PLR test. Some may argue that we could attach the transducer to a fixed level associated to the heart, but it is difficult for femoral blood pressure monitoring, and may require some special attached device.

For invasive blood pressure monitoring, current recommendations suggest the transducer must be level with the phlebostatic axis. The site of the phlebostatic axis is at the intersection of the fourth intercostal space and mid-axillary line. This point represents the position of the left atria and therefore reflects central blood pressure. The study showed significant errors occur when subjects are in non-supine positions [4]. Thus, the blood pressure transducer level may be effective for the result of the PLR test. The value of knowing the PLR test is not being challenged here, nor is the value of dynamic changes in arterial waveform derived variables being questioned [5]. We are suggesting that the blood pressure transducer site should be taken as an

impact factor in the PLR test, and it would be worthy of further study.

**Conflicts of interest** On behalf of all authors, the corresponding author states that there is no conflict of interest.

## References

1. Monnet X, Bataille A, Magalhaes E, Barrois J, Le Corre M, Gosset C, Guerin L, Richard C, Teboul JL (2013) End-tidal carbon dioxide is better than arterial pressure for predicting volume responsiveness by the passive leg raising test. *Intensive Care Med* 39:93–100
2. Jabot J, Teboul JL, Richard C, Monnet X (2009) Passive leg raising for predicting fluid responsiveness: importance of the postural change. *Intensive Care Med* 35:85–90
3. Monnet X, Teboul JL (2008) Passive leg raising. *Intensive Care Med* 34:659–663
4. McCann UG 2nd, Schiller HJ, Carney DE, Kilpatrick J, Gatto LA, Paskanik AM, Nieman GF (2001) Invasive arterial BP monitoring in trauma and critical care. *Chest* 120:1322–1326
5. Marik PE, Cavallazzi R, Vasu T, Hirani A (2009) Dynamic changes in arterial waveform derived variables and fluid responsiveness in mechanically ventilated patients: a systematic review of the literature. *Crit Care Med* 37:2642–2647

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