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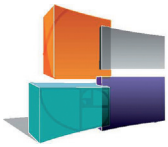

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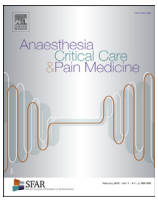

Editorial

Interchangeability of cardiac output measurements between oesophageal Doppler and pulse contour analysis is dependent on stroke volume

ARTICLE INFO

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A simple way of measuring cardiac output has been an eagerly sought goal for almost 60 years. As less invasive devices are progressively replacing invasive tools, an increasing number of studies comparing two methods of measurements have been published. Although major limitations of non-invasive methods have been previously reported in *Anaesthesia, Critical Care and Pain Medicine* [1], these studies have continued to seek the "Holy Grail" of cardiac output measurements. Studies have reported variable percentage errors, exceeding or not exceeding the 30% threshold which give a good result or not [2]. In this issue of *Anaesthesia, Critical Care and Pain Medicine*, Grégoire Weil and co-authors show that Proaqt/Pulsioflex is not equivalent to oesophageal Doppler monitoring to measure cardiac output or trends in cardiac output in the cancer surgery setting [3]. The authors have kindly provided us with the raw data on which this article was based, and we have analysed these data with the new method that we have developed to assess interchangeability over the range of values [4]. We found that the interchangeability rate for absolute values was dependent on stroke volume. As shown in Fig. 1, the interchangeability rate between the two methods of measurements presents a curvilinear slope according to the stroke volume. Interestingly, the interchangeability rate was better for physiological stroke volumes between 80 to 120 mL [5].

The variability of the differences between measurements is dependent on the variability of the two techniques [6]. According to the data of Weil et al., the interchangeability rate varied over the range of stroke volume, indicating that the precision of at least one or both methods was modified over the range of stroke volume. As neither of the methods demonstrated variability over a large range of data, it is impossible to determine whether this effect was due to changes of Pulsioflex or oesophageal Doppler variability with the range of stroke volume. The US patent describing Doppler blood flow measurement provided data about blood flow measurement variability. The variability of predicted aortic diameters using a nomogram is based on 404 patients (72% of measured diameters were situated within 20% variability of predicted diameters: US patent No. US4796634A). Unfortunately, no data are available concerning the variability of measurements according to the range of stroke volume for Proaqt/Pulsioflex.

Pulsioflex uses MAP to calibrate the cardiac output. MAP changes could modify aortic diameter [7,8], and oesophageal Doppler software does not include mean arterial pressure (MAP) changes in the nomogram. By analysing the dataset of Weil et al., we did not observe any changes of interchangeability rate as a function of MAP. Most patients in their study had a MAP around 75 mmHg, and a few patients presented outliers outside the 60–90 mmHg range. This low range of MAP might explain we did not find any dependency of the interchangeability rate over the MAP range.

The low trend interchangeability rate for changes in cardiac output reported by Weil et al. could be explained by the poor interchangeability rate of absolute values and the changes of range of stroke volume induced by therapeutic manoeuvres, as only 34 pairs of measurements (34/117 = 20%) were situated within the 80–120 mL range of stroke volume that provides the best interchangeability rate.

This study highlights the stroke volume dependency of the interchangeability rate of cardiac output measurements between Proaqt/PulsioFlex and oesophageal Doppler in the cancer surgery setting.

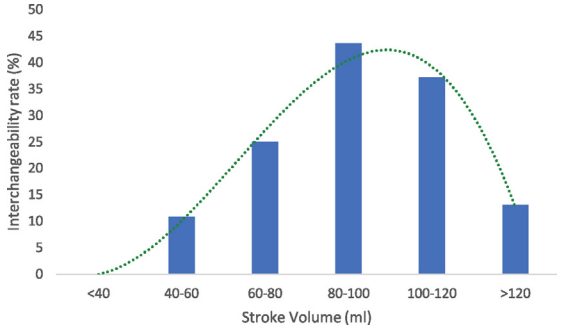

Fig. 1. Interchangeability rate as a percentage according to the range of stroke volume (mL).

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Disclosure of interest

The authors declare that they have no competing interest.

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