Stroke volume variation obtained with FloTrac/Vigileo™ fails to predict fluid responsiveness in coronary artery bypass graft patients

Editor—Recently, a new cardiac output monitoring device (Vigileo™, Edwards Lifesciences, Irvine, CA, USA) has been introduced in clinical practice which is based on arterial pulse contour lacking the necessity of external calibration. This device offers the possibility of a nearly beat-to-beat measurement of cardiac output, stroke volume, and stroke volume variation (SVV). In patients undergoing coronary artery bypass grafting (CABG), this system has been demonstrated to measure cardiac output with clinically acceptable accuracy. However, the reliability of SVV measured with this system in predicting fluid responsiveness is unknown. We therefore studied 18 CABG patients monitored with a FloTrac/Vigileo™ system (using software version 01.01) to analyse whether this new device is suited for functional preload monitoring.

Fourteen male and four female patients [67 (7) yr, 79 (9) kg, 174 (9) cm, mean (sd), and BSA range 1.69–2.20 m²] undergoing CABG surgery were included in this study. The study was approved by the institutional review board. All patients had given written informed consent. Stroke volume index (SVI) was measured with transpulmonary thermodilution (PiCCO™, Pulsion Medical Systems, Munich, Germany) before and after a volume load (VL) of 10 ml·kg⁻¹ hydroxyethyl starch 6% 1 h after arrival of the patients on the intensive care unit. In addition, central venous pressure (CVP) and SVV were recorded. Patients were mechanically ventilated (volume control) with a tidal volume of 8 ml·kg⁻¹ (FiO2 0.4, PEEP 5 cm H2O) maintaining normocapnia. According to the available literature, fluid-responders were defined by an increase in SVI ≥12% subsequent to the VL. Statistical analysis was performed using SPSS version 15.0 (SPSS Inc, Chicago, IL, USA). Pearson’s correlation analysis was used to describe the linear relation between preload parameters before a VL and the change in SVI (ΔSVI) induced by that VL. The ability to predict fluid responsiveness was quantified for each preload parameter by calculating the area under the receiver operating characteristic (ROC) curve. A P-value of <0.05 was considered statistically significant.

Nine patients did not respond to the fluid load. The correlation coefficient for the relationship between ΔSVI and CVP prior to the volume load was 0.244 (P=0.329), and between ΔSVI and SVV 0.452 (P=0.069). ROC analysis showed that both preload indicators failed to predict fluid responsiveness. The area under the ROC curve for CVP and for SVV were 0.685 (P=0.185) and 0.660 (P=0.268) respectively.

The failure of CVP in predicting fluid responsiveness is in accordance with increasing evidence that static preload indicators are not suited for functional haemodynamic monitoring. In contrast, a growing number of clinical studies have clearly demonstrated the ability of dynamic preload indicators (including SVV) to accurately predict the response of an individual patient to a volume challenge. In contrast to these reports, we found SVV (obtained with the FloTrac/Vigileo™ system) failed to predict fluid responsiveness. This finding might be attributed to the fact that in our system, the first software generation (version 01.01) was implemented. This version operates with a re-calibration interval of 10 min, which is probably too long to accurately measure changes in respiratory variations in the arterial pressure curve. In fact, by employing shorter re-calibration intervals in a newer software version, the accuracy of the FloTrac/Vigileo™ system in measuring cardiac output had been markedly improved. Therefore, our findings warrant further investigation whether the application of shorter re-calibration intervals will allow using the FloTrac/Vigileo™ system for functional haemodynamic monitoring.

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Preoperative cardiopulmonary exercise testing

Editor—We were interested to read the article by Murray and colleagues1 which demonstrated the value of a shuttle walk test in predicting outcome after oesophagectomy. It would appear that an inability to walk 350 m during a test is of similar predictive value to an anaerobic threshold of 11 ml kg⁻¹ min⁻¹ obtained from formal cardiopulmonary exercise (CPX) testing.

CPX testing is, however, much more than anaerobic threshold measurement.2 This technique has powerful diagnostic utility and prognostic value. A well-conducted CPX test gives an immense amount of physiological data and a measurement of actual work done by the patient. The data, when mapped out in a typical Wasserman 9 panel plot,3 indicate concurrent pathophysiology, such as cardiac ischaemia, COPD, or pulmonary hypertension.

Since the incorporation of CPX testing into the oesophageal cancer management programme in our hospital, we have tested 23 consecutive patients with oesophagogastric tumours. One patient did not proceed to surgery after their CPX test. No patient tested on the programme died within 30 days of surgery and none remained on intensive care for more than 7 days after operation.

Murray and colleagues question the use of CPX on cost grounds. We believe that in addition to the prediction of relative perioperative risk, the value of CPX testing is that it enables better diagnosis of underlying co-morbidities, and therefore more precise peroperative (or non-operative) management.

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Postoperative catheter-related pain after radical retropubic prostatectomy

Editor.—We compliment Tauzin-Fin and colleagues1 for recording the severity of catheter-related bladder discomfort (CRBD) on a numerical scale rather than the subjective analysis of previous authors.2-4 However, they recorded postoperative discomfort in the supra-pubic region as incisional pain contrary to established norm of treating this symptom as manifestation of CRBD. It would have been better if the authors had excluded patients undergoing supra-pubic surgery and thus avoided the confusion regarding the differentiation of postoperative pain and CRBD. They collectively assessed CRBD and postoperative pain with a single VAS scale, but these are two different entities and thus should be assessed on separate scales.

Further, the observed reduction in the postoperative pain may have been due to the anti-muscuranic action of trame-dol5 which in combination with sublingual oxybutynin may have reduced the incidence and severity of CRBD, thus leading to reduction in supra-pubic discomfort which the authors have observed and reported as reduction in the postoperative pain.


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