CASE STUDY

Minimally Invasive Monitoring
High Risk Orthopedic – Vascular Surgery

INTRODUCTION

As minimally invasive, easy-to-use devices for monitoring hemodynamically unstable patients are more readily available, the application of these devices should be considered for more efficient hemodynamic management. The Edwards FloTrac sensor arterial pressure-based cardiac output (APCO) monitors an important component of oxygen delivery. Monitoring cardiac output and appropriately managing its components (HR, preload, afterload, and contractility) allows for a more precise and appropriate treatment than traditional vital signs alone can provide. Stroke volume variation (SVV), a parameter available with the Edwards Vigileo monitor, has been shown to be a sensitive indicator of a patient's preload responsiveness and can help guide the clinicians' management of volume resuscitation.[1]

CLINICAL EVENTS

Patient details:	67-year-old female, 157.5 cm, 136 kg
Medical history:	Morbidly obese, coronary artery disease with prior MI, CHF, ejection fraction 20%, aortic stenosis, obstructive sleep apnea, and untreated hypertension

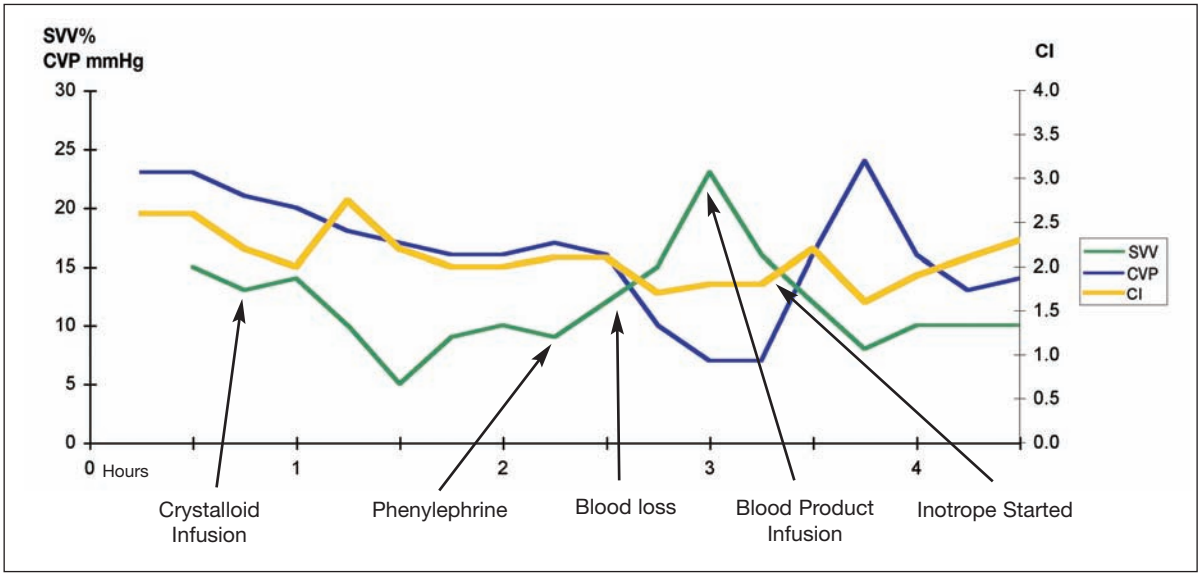

Figure 1

Edwards
LIFESCIENCES

CASE NOTES

This patient experienced the emergent repair of a lacerated left anterior femoral circumflex artery secondary to intertrochanteric hip fracture and hip repair. The case was classified as an emergent ASA 4. Invasive monitoring included a 14 gauge peripheral intravenous catheter, 8.5 Fr. 4-lumen right internal jugular central venous catheter and a 20 gauge 1-1/4 inch right radial arterial line for arterial pressure and continuous cardiac output monitoring using the FloTrac sensor and Vigileo monitor. The patient experienced an estimated blood loss of more than 6 liters during a total surgical time of 4.5 hours. The patient was resuscitated with 8,000 cc of crystalloids, 750 cc fresh frozen plasma, and 2560 cc of packed red blood cells. Additional support included vasopressor (phyenylephrine 50-150 µg/min) and inotropic support with (epinephrine 10-16 µg/min). Patient maintained a **urine output** of 108 cc/hr **CVP** starting at 23 and ending at 14 mmHg (lowest 7 highest 24); **CI** starting at 2.6 and ending at 2.3 L/min/m^2 (lowest 1.6 highest 2.8); **SVV** starting at 15% and ending at 10% (lowest 5% highest 25%).

DISCUSSION

The application of this less invasive, easy-to-use hemodynamic monitoring device allowed for the early identification of left ventricular failure and optimization of oxygen delivery during high and continuous blood loss along with compromised cardiac performance. Volume resuscitation was precisely guided by using SVV (<10%) as a guide for preload responsiveness and cardiac index (>2.2 L/m/m^2) as an indication of overall cardiac performance. Note the rising SVV when excessive blood loss began followed by a drip after volume resuscitation (see hours 2-4 in figure 1). Using both continuous SVV and CI provided confidence in the direction and magnitude of therapy given.

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REFERENCES
1. Michard F. Changes in arterial pressure during mechanical ventilation. Anesthesiology 2005; 103:419-428.

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