Case Report ISSN 2639-944X

Journal of Medical - Clinical Research & Reviews

Anesthetic Management of A Giant Abdominal Aneurysm Monitored with The Flo-Trac™/Vigileo System

Su In Park, Jae-Hang Shim, Woo Jae Jeon, Chan Woo Park and Sang Yun Cho

Department of Anesthesiology and Pain Medicine, Hanyang University Guri Hospital, Guri-si, Gyeonggi-do, Repulic of Korea.

***Correspondence:**

Sang Y Cho, Department of Anesthesiology and Pain Medicine, Hanyang University Guri Hospital, Guri-si, 249-1, Gyomun-dong, Guri-si, Gyeonggi-do, 471-701, Republic of Korea, Tel: +82-31-560-2400, Fax: +82-31-563-1731.

Received: 04 May 2021; **Accepted:** 01 June 2021

Citation: Su In Park, Jae-Hang Shim, Woo Jae Jeon, et al. Anesthetic Management of A Giant Abdominal Aneurysm Monitored with The Flo-Trac™/Vigileo System. J Med - Clin Res & Rev. 2021; 5(6): 1-3.

ABSTRACT

Background: *The Flo-Trac™/Vigileo system (Edwards Lifesciences, Irvine, CA, USA) can be used to estimate cardiac output and stroke volume variation for giant abdominal aortic aneurysm (AAA).*

Case Presentation: *A 60-year-old male patient presented with a thrombosed abdominal aortic aneurysm approximately 8.8 x 8.4 cm in size. The patient was scheduled to undergo open repair. The left radial artery was punctured to monitor direct arterial pressure, stroke volume, cardiac output, and SVV. A Flo-Trac™ sensor (Edwards Lifesciences, Irvine, CA, USA) was connected to the arterial monitor system. The aneurysm was opened and longitudinally incised. A total of 600 ml of blood in the aneurysm was drained, and mural thrombi were removed. The graft was proximally anastomosed to the pararenal abdominal aorta. The distal potion of the graft was anastomosed to the iliac bifurcation. The clamping time was 62 min. The CO and SVV measured by the Flo-Trac™ sensor were 4.2 L/min and 8%, respectively.*

Conclusions: *We report a case of giant AAA where intravascular volume control was obtained by CO and SVV, which were monitored by a Flo-Trac™/Vigileo system.*

Keywords

Abdominal aortic aneurysm, Cardia output, Stroke volume variation.

Introduction

Giant abdominal aortic aneurysm (AAA) is defined as aneurysm with a transverse diameter of 13.0 cm or more and occurs rarely [1]. The complex shape of giant AAA includes a short aneurysm neck, significant angulation, and a heavy intraluminal thrombus burden, which can be challenging for the managing vascular surgeon and anesthesiologist [1]. The stroke volume variation (SVV) response can be monitored by a Flo-Trac™ sensor (Edwards Lifesciences, Irvine, CA, USA) and used to gauge changes in intravascular volume in elective surgical patients [2]. We report a case of giant AAA in which intravascular volume control was used to assess CO and SVV.

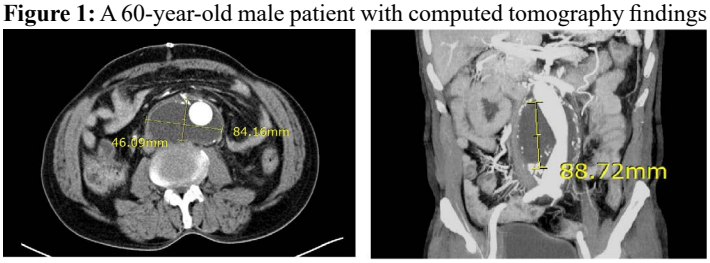
Case presentation

A 60-year-old male patient was referred to our hospital with an incidental ultrasonic finding of abdominal aortic aneurysm at a local clinic. His medical history was positive for hepatitis B virus carrier. The findings indicated a juxta-renal abdominal aortic aneurysm about 8.8 x 8.4 cm in size, which was confirmed to be a thrombosed abdominal aortic aneurysm (AAA) (Figure 1). The proximal neck length of the AAA was 0.4 cm, the right limb length was 1.5 cm, and the left limb length was 1.7 cm.

No definite evidence of significant steno-occlusive lesion at either lower extremity arterial system was noted. Endovascular aortic aneurysm repair could not be attempted due to the location and size of the AAA. Therefore, the patient was scheduled for open repair. Anesthesia was induced through a mask at 100%

oxygen with intravenous administration of propofol 90 mg and recuronium 50 mg. Endotracheal intubation was performed with an 7.5 endotracheal tube after a 90-second manual ventilation. The left radial artery was punctured to monitor direct arterial pressure, stroke volume, cardiac output, and SVV. A Flo-Trac™ sensor (Edwards Lifesciences, Irvine, CA, USA) was connected to monitoring the arterial system. Midline laparotomy was performed, in which the omentum and transverse colon were retracted cephalad, and the small bowel was packed in the right hemiabdomen. Bilateral renal arteries were dissected, exposed, and wrapped with U-tape, as were bilateral common iliac arteries (Figure 2). A total of 5000 IU of heparin was infused. Bilateral renal and common iliac arteries were clamped, with a suprarenal clamp placed just above the origins of the bilateral renal arteries. The CO and SVV were measured by a Flo-Trac™ sensor and determined to be 4.8 L/min and 10%, respectively (Figure 3A). The aneurysm was opened and longitudinally incised. A total of 600 ml of blood was drained from the aneurysm, and mural thrombi were removed. The graft was anastomosed proximal to the pararenal abdominal aorta. The distal potion of the graft was anastomosed to the iliac bifurcation, and the clamps at the common iliac arteries were released. The clamping time was 62 minutes, and the CO and SVV measured by the Flo-Trac™ sensor were 4.2 L/min and 8%, respectively (Figure 3B). After closure of the abdominal operation wound , 200 mg of bridion was administered. Extubation of the endotracheal tube was performed when neuromuscular blockade recovery was confirmed by the neuromuscular stimulator. Finally, the patient was transferred to the intensive care unit after recovery of consciousness.

Figure 1: A 60-year-old male patient with computed tomography findings



showing a juxta-renal abdominal aortic aneurysm about 8.8 x 8.4 cm in size and a thrombosed abdominal aortic aneurysm in axial (A) and sagittal (B) views.

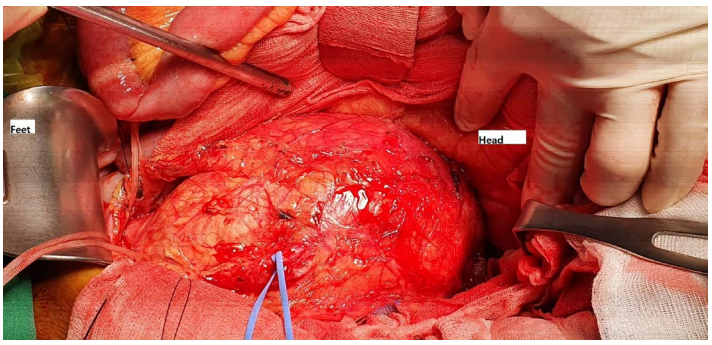


Figure 2: Intraoperative findings during abdominal aortic aneurysm open repair.

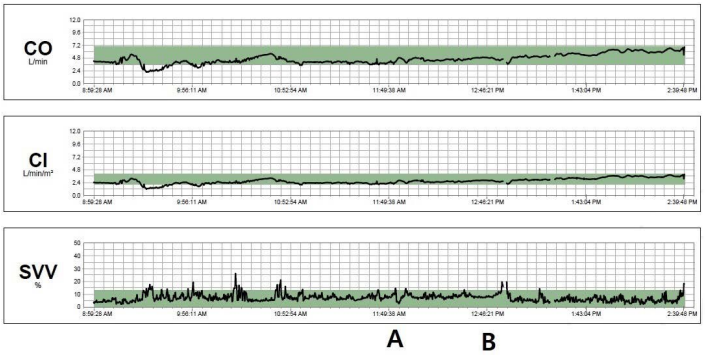


Figure 3: Cardiac output monitoring showing the cardiac output index and stoke volume variation during operation: (A) clamping of both common iliac arteries, (B) clamp release.

Discussion

The risk of open AAA operation is high, with associated morbidity and mortality reported at rates from 12% to 26% and 4% to 6%, respectively [3,4]. Therefore, measurement and assessment of cardiac output (CO) can be useful when administering anesthesia for giant AAA, as well as for critical patients undergoing major surgery [5]. For patients undergoing major surgery, goal-directed fluid administration with CO monitoring measured by esophageal Doppler is assocated with improved patient outcomes and a slight reduction in the length of hospital stay [5]. The CO measured by the Flo-Trac™ sensor is based on analysis of the systemic arterial pressure wave, which has been confirmed to be both accurate and reliable [6,7]. In patients undergoing elective cardiac surgery, CO measured by the FLOTrav/Vigileo™ system was comparable to the results of intermittent thermodilution [6]. Senn et al. demonstrated that the Flo-Trac™/Vigileo system improved cardiac output measurement as well as tracking alterations during hemodynamic changes induced by body positioning in patients after electrive off-pump coronary bypass surgery [7]. In addition, SVV, which is the percentage variation of stroke volume over a floating period of 20 seconds, can be used to predict fluid responsiveness in patients undergoing cardiac surgery or neurosurgical procedures, particularly within the context of the intensive care unit [8-10]. The SVV displayed on the monitor in the Flo-Trac™ sensor better predicts the response to fluid administration than does any other invasive monitors, such as central venous pressure (CVP) or pulmonary artery occlusion pressure [10]. Li et al. [11] proposed that the changes in SVV and CVP were significantly correlated with the changes in stroke volume index, while the changes in heart rate, mean arteial pressure and sytemic vascular resistance were not. Both CVP and SVV can be used to evaluate volume status, but fluid responsivity can only be predicted by SVV. Reports have indicated that the normal range of SVV under controlled ventilation is less than 10-13%. In this case, CO and SVV were 2.4-7.2 L/min and 5-25%, respectively. Fluid was administered instantaneously (6% hydroxyethyl starch; 4-5 mL/kg + saline) whenever SVV was more than 13%.

Conclusions

We report a successful case of open repair for an abdominal aortic aneurysm with fluid administration monitored by the Flo-Trac™/

Vigileo system. Based on our results, this approach should be considered for similar cases to optimize patient outcomes.

Acknowledgements

The authors thank the Hanyang University E-world center for their support and assistance during preparation of the manuscript.

Declarations

Author Contributions: all authors including SIP, JHS, WJJ, CWP and SYC participated in the care of the patient and revise this manuscipt, have read and approved final manuscript.

All authors participated in care of the patient, contributed to the drafts and revisions of this manuscript, and have read and approved the final manuscript.

References

1. Ullery BW, Itoga NK, Lee JT. Giant abdominal aneurysms A case series and review of the literature. Vasc Endovascular Surg. 2015; 49: 242-246.
2. Kungys G, Rose DD, Fleming NW. Stroke volime variation during acute normovolemic hemodilution. Anesth Analg. 2009; 109: 1823-1830.
3. Schlosser FJ, Vaartjes I, van der Heijden GJ, et al. Mortality after elective abdominal aortic aneurysm repair. Ann Surg. 2010; 251: 158-164.
4. Scermerhorn ML, Buck DB, O'malley AJ, et al. Long-term outcomes of abdominal aortic aneurysm in the Medicare population. N Engl J Med. 2004; 373: 328-338.
5. Gan TJ, Soppitt A, Maroof M, et al. Goal-directed intraoperative fliud administration reduces length of hospital stay after major surgery. Anesthesiology. 2002; 97: 820-826.
6. Button D, Weibel L, Reuthebuch O, et al. Clinical evaluation of the FloTrac/Vigileo system and two established continuous cardiac output monitoring devices in patients undergoin g cardiac surgery. Br J Anaesth. 2007; 99: 329-336.
7. Senn A, Buttton D, Zollineger A, et al. Assessment of cardiac output changes using a modified Flo Trac/VigeleoTM algorithm in cardiac surgery patients. Critical care. 2009; 13: R32.
8. Berkenstadt H, Margalit N, Hadani M, et al. Stroke volume variation as a predictor of fluid responsiveness in patients undergoing brain surgery. Anesth Analg. 2001; 92: 984-989.
9. Reuter DA, Kirchner A, Felbinger TW, et al. Usefulness of left ventricular stroke volume variation to assess fluid respomsiveness in patients with reduced cardiac function. Crit Care Med. 2003; 31: 1399-1404.
10. Rex S, Brose S, Metzelder S, et al. Prediction of fluid responsiveness in patients during cardiac surgery. Br J Anaesth. 2004; 93: 782-788.
11. Li C, Lin F, Fu S, et al. Stroke volume variation of fluid responsiveness in patiens undergoing gastrointestinal surgery. Int J Med Sci. 2013; 10: 148-155.