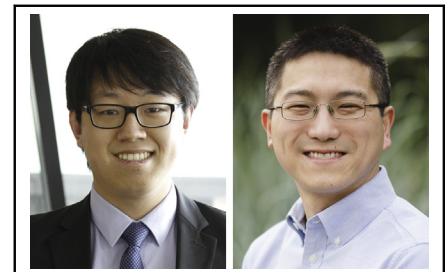


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Commentary: Adapting for our patients: Reducing intraoperative adverse events as new technologies emerge

Weiang Yan, MD,^{a,b} and
Michael H. Yamashita, MDCM, MPH, FRCSC^{a,b}



Weiang Yan, MD, and Michael H. Yamashita, MDCM, MPH, FRCSC

CENTRAL MESSAGE

As new technologies emerge, cardiac surgeons must ensure that they are well trained in all aspects of the field and are familiar with all equipment used in their practice.

Cardiac surgery uses increasingly complex and high-risk interventions to care for patients with severe cardiovascular diseases. Although morbidity and mortality have improved significantly in the modern era of cardiac surgery, errors in the operating room remain a major cause of preventable adverse events and avoidable death.^{1,2} Therefore, it is prudent to examine individual cases of surgical missteps to learn from them and avoid repeating these mistakes in the future.

In this issue of the *Journal*, Fukunaga and colleagues³ describe a case of inappropriate aortic cannula placement for central venoarterial extracorporeal membrane oxygenation and the complications that ensued. The arterial cannula used in this case was placed too deeply into the distal ascending aorta, with its tip residing in the descending thoracic aorta. The patient sustained a localized iatrogenic aortic dissection (iAD) near the cannula tip, cannula-related thrombosis, acute renal injury, and stroke, which may or may not have been related to the extracorporeal membrane oxygenation cannula. Fortunately, the patient successfully recovered from these complications and was discharged to home with no significant long-term sequelae.

However, these and future downstream complications likely could have been prevented had the correct technique been used for cannula placement.

This case provides 2 important learning points. First, cardiac surgeons must be well trained in all aspects of the field and be familiar with all the equipment used in their practice. Despite ample efforts to combat contributing system factors, individual human factors remain an important cause of intraoperative errors and patient injuries.⁴ In particular, a surgeon's lack of technical competence or knowledge is cited as a contributing factor in almost one-half of all surgical malpractice claims.^{5,6} These were predominantly cases in which surgeons were practicing within their specialty but lacking knowledge or skill with specific tasks at hand.⁶ With the adoption of novel therapies into the standard of care of cardiac surgery, surgeons must adapt and ensure they are properly trained to deliver these new standards. This is especially true regarding mechanical circulatory support, a subspecialty of cardiac surgery where new techniques and devices are continuously being introduced to our practices. A study among vascular surgeons in England identified equipment unfamiliarity to be significantly predictive of intraoperative failure.⁷ A formal training curriculum and high-fidelity simulation models can be used to gain knowledge and experience with these new techniques and technologies.⁸

Second, cardiac surgeons must remain vigilant for iAD when using venoarterial extracorporeal membrane

From the ^aDepartment of Surgery, Max Rady College of Medicine, University of Manitoba and ^bCardiac Sciences Program, St. Boniface Hospital, Winnipeg, Manitoba, Canada.

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Address for reprints: Michael H. Yamashita, MDCM, MPH, FRCSC, Y3519-409 Tache Ave, Winnipeg, Manitoba, Canada R2H 2A6 (E-mail: myamashita@sbgh.mb.ca).

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oxygenation. In this population, the reported incidence is as high as 1.4%.⁹ Early recognition of iAD is key to reducing mortality; it should always be suspected when there are sudden changes to systemic arterial pressure (and pulse waveform), decreases in flow rate, increases in extracorporeal membrane oxygenation arterial line pressure, and/or evidence of decreased organ perfusion.¹⁰ As shown in this report, transesophageal echocardiography is a safe and effective modality for diagnosing and guiding management of iAD in critically ill patients.

Thus, as the field of cardiac surgery evolves, it remains incumbent on us to keep abreast of novel techniques and technologies. Our patients depend on it.

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