

Learning From Others: A Case Report from the Anesthesia Incident Reporting System

Case 2021-05: Now What?

A 35-year-old healthy woman presented for laparoscopic TAHBSO. Induced GA and intubated successfully. Pt hemodynamically stable until umbilical trocar was inserted (no insufflation done yet). Pt went from her baseline sinus bradycardia (50s) to asystole. CPR immediately initiated by surgeon and ACLS protocol followed. ROSC after 1 round of ACLS. After conferring with service, and patient's sister, decision was made to abort procedure and wake the patient up. Emergence completed without difficulty. Pt transported to PACU hemodynamically stable, awake, and moving all extremities.

Cardiac arrest during laparoscopic surgery has been described in the anesthesia literature since the early 1970s and continues to occur today, although at a greatly reduced frequency. Most commonly it occurs as in the case described, as bradycardia progressing rapidly to asystole; the presumed mechanism is excessive vagal stimulation due to irritation of the peritoneum or viscera. Bradycardia typically manifests during initial insufflation but can occur at other times during the case, including trocar placement. Although there has been little prospective research published, it is possible that a lighter plane of anesthesia enables the vagal reflex response. In the early days of laparoscopy, bradycardic ar-



and cholecystectomy. While some reports have described higher rates of bradycardia in older patients, most – including one from our sister registry in Australia – have described laparoscopy-induced asystole predominantly in younger and healthier patients.

Prophylaxis with atropine or glycopyrrolate has been shown to reduce the incidence of laparoscopy-associated bradycardia but is not common practice (*Aust N Z J Obstet Gynaecol* 2019;59:777-80; *Urol J* 2009;6:92-5). As in the present case, when bradycardia occurs it can proceed to asystole very rapidly (*Int J Qual Health Care* 2015;27:473-8). Prompt treatment with atropine is recommended as well as CPR to circulate the medication. Happily, most patients respond quickly (*World J Surg* 2019;43:1490-6). For those who do not, consultation with an emergency manual or crisis checklist is appropriate to provide a reminder about other conditions that should be considered and ruled out. Air embolus due to trocar placement in a blood vessel is the most common alternative, also presenting with sudden bradycardia and cardiac arrest. Uncontrolled hemorrhage from an unrecognized vascular injury can lead to cardiac arrest but usually more slowly and by way of hypotension, tachycardia, and then pulseless electrical activity. If resuscitation lasts longer than a few minutes, transesophageal or transthoracic echocardiography can rapidly rule in or out a variety of rare diagnostic possibilities, including cardiac tamponade from an inadvertent injury, thromboembolism, or intercurrent myocardial infarction.

In the case presented, the anesthesia team responded correctly, achieving rapid return of spontaneous circulation

(ROSC). The team decided to postpone the procedure, the most appropriate course of action in all but emergent surgeries. While the patient experiencing a transient vagal cardiac arrest is most likely intact following ROSC, it is reassuring to document return to a normal neurologic status as soon as possible, especially if air embolus was a possible etiology. Anecdotally, delayed emergence in this setting can occur due to multiple doses of atropine during treatment of bradycardia and asystole; physostigmine should be administered if central cholinergic syndrome is suspected and may lead to rapid awakening. There is a low threshold for obtaining a cranial CT in the patient who is not waking up, and both hyperbaric oxygen therapy and targeted hypothermic temperature management might be considered.

Now what?

Intraoperative cardiac arrest is rare enough in modern anesthesia that it should almost always be assessed in peer review or a root-cause analysis. Even with rapid ROSC, there are some important questions to consider:

- Was there anything about the patient's history, vital signs, or preoperative di-

agnostic studies that would have suggested an increased risk for bradycardic arrest? Should prophylaxis have been considered in this patient with resting bradycardia?

- Was the anesthetic depth at the time of trocar insertion appropriate?
- Was there anything unusual about the technology or the surgical approach? For example, variation in the site of initial trocar placement?
- Was the right treatment given in a timely fashion?
- Were there any secondary complications observed such as intravenous line failure or loss of monitoring during CPR?
- Were communications, both in the room and externally, appropriate for the situation?
- Following recovery, was the event appropriately disclosed to the patient and family?
- Was there consideration of the wellness of the surgical and anesthesia team, or were they sent right back to work?

In a similar case reported years ago, root cause analysis of a laparoscopic trocar injury to the aorta identified a change in equipment vendor occurring that same day, with a new trocar that was both longer and sharper. Further discussion revealed that the OR manager responsible for communicating this change was on vacation at the critical moment and did not send out the usual announcement, the resident handling the trocar was new to the service and did not have a basis for recognizing the change, and the scrub nurse – who did notice the difference – did not feel empowered to mention it. Even simple adverse events can have complicated causes!

As quality improvement professionals, which all of us are by nature, it is the introspection after an event that is most likely to lead to mitigating strategies to reduce the chance of a recurrence. “Now what?” is often the most important question to ask when assessing a perioperative adverse event. ■

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rest was more common than today, perhaps because anesthesiologists were using lower anesthetic doses in expectation of less pain and sympathetic stimulation in laparoscopic versus open procedures, or perhaps because insufflating pressure was higher and less well regulated by older technology. Another contributing factor might have been the younger population of patients presenting for laparoscopic versus open procedures, as the first operations commonly performed this way were tubal ligations, other gynecologic surgery,

Review of unusual patient care experiences is a cornerstone of medical education. Each month, the AQI-AIRS Steering Committee abstracts a patient history submitted to the Anesthesia Incident Reporting System (AIRS) and authors a discussion of the safety and human factors challenges involved. Real-life case histories often include multiple clinical decisions, only some of which can be discussed in the space available. Absence of commentary should not be construed as agreement with the clinical decisions described. Feedback regarding this article can be sent by email to airs@asahq.org. Report incidents or download the AIRS mobile app at www.aqiairs.org.