

■ CORRESPONDENCE

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Asystole from Unintended Myocardial Hypothermia

To the Editor:—Asystole, regardless of cause, is an extreme medical emergency. We report here on a case of asystole following irrigation of room temperature Betadine solution (Purdue Frederick, Norwalk, CT) into the thorax during lobectomy surgery.

Case Report

A 74-yr-old, 85-kg man, ASA physical status 2, presented for a right upper lobectomy for histologically confirmed squamous cell carcinoma. Concurrent disease included proven peripheral vascular disease and presumptive coronary artery disease. Laboratory findings were unremarkable except for a first-degree heart block and an intraventricular conduction delay on the preoperative electrocardiogram.

After an uneventful induction with thiopental (250 mg) and succinylcholine (80 mg), the trachea was intubated with a size 8.5 single-lumen endotracheal tube with prior extraluminal placement of a 14-French Fogarty catheter for bronchial blockade.¹ Maintenance of anesthesia included isoflurane titrated to blood pressure with increments of fentanyl.

Toward the end of the surgery, which had proceeded uneventfully, the surgeon poured approximately 1 l of room temperature (20°C) Betadine solution from a 2-l stainless steel pitcher into the patient's open thorax. The heart then promptly stopped beating. Asystole was confirmed by flat tracings on the electrocardiogram, intraarterial pressure tracing, and pulse oximeter plethysmography.

An internal cardiac massage was instituted immediately by the surgeon while the Betadine was evacuated by suction. Atropine (1 mg) was given twice. Shortly thereafter, after some ventricular escape beats, a sinus rhythm was reestablished, and adequate blood pressure was obtained. No clinical sequelae of the event were noted, with no significant electrocardiographic nor cardiac enzyme changes.

Discussion

Asystole can result from numerous causes, but it is relatively unusual in patients without preexisting heart disease. One cause of asystole in such patients may be excessive vagal tone, such as that which has occurred during laparoscopy.² Other causes of vagally mediated reflex bradycardia include application of ocular pressure (oculocardiac reflex), traction on the bowel, laryngoscopy under light general anesthesia, cervical dilatation, and the administration of anticholinesterases, such as neostigmine.³

In this patient, however, there was no specific reason to suspect a vagal cause, because at the time of the event, no activity known to

increase vagal tone was in progress. Instead, we speculate that the cause of the arrest was regional myocardial hypothermia. It is known that ventricular fibrillation and asystole can occur when the myocardial temperature decreases to approximately 30°C.⁴ The exact electrophysiologic mechanism is unclear, but it is thought to be related to decreased conduction velocity in the myocardial conduction system with resultant increases in the PR and QT intervals and QRS complex duration.⁴

Because the cardiac arrest occurred promptly after the fluid was poured into the chest, however, there may not have been sufficient time for much heat transfer to have taken place, especially for cooling of the conduction system, which lies deep in the myocardium. An alternative and possibly more likely reason is that because this was a right thoracotomy, the fluid could have cooled the sinoatrial node, which is very thin and superficial. In fact, cardiac surgeons sometimes pour warm fluid onto the sinoatrial node to speed up the heart; it therefore stands to reason that the reverse phenomenon also might occur. A third, less likely alternative is that there could have been massive discharge from the vagus nerve, which lies in the vicinity as well.

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