

venous path, these catheters interrupted the smooth flow of blood, creating turbulence and possibly enhancement of thrombin deposition. In addition, the curve in the catheter brought more of its length into contact with the vessel wall. This could lead to areas of relative blood stasis as well as endothelial injury.

Though the number of patients in the study were small we tentatively can conclude that the incidence of clinically silent venous thrombosis from internal and external jugular cannulations in children following open heart surgery is low. In addition, when the tip of the central venous cannula is located outside the thoracic cavity, the risk for development of venous thrombosis may be increased and these catheters should not be left in place for extended periods.

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The One that Got Away: Misplaced Esophageal Stethoscope

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In addition to accidentally inserting endotracheal tubes into the esophagus or stomach,^{1,2} nasogastric tubes have been inserted into the cranium,^{3,4} and esophageal stethoscopes into the trachea.⁵ We present here a case in which an esophageal stethoscope passed completely into the stomach.

REPORT OF A CASE

An 18-year-old man with scoliosis was scheduled for posterior spinal fusion. After inducing anesthesia with thiopental, endotracheal

intubation was accomplished with a 7.0-mm (I.D.) endotracheal tube. A #24 (French) esophageal stethoscope was inserted orally without difficulty, with proper placement confirmed by auscultation of heart and breath sounds. A #18 (French) Salem Sump®[¶] gastric suction tube was inserted into the stomach via the nose, after much difficulty in achieving tube passage. Proper placement was confirmed by aspiration of green fluid.

Following insertion of the nasogastric tube by the second anesthesiologist, the first anesthesiologist, seeing no esophageal stethoscope in place and assuming it had been removed to facilitate placement of the nasogastric tube, inserted a #24 (French) esophageal stethoscope into the esophagus, confirming proper placement by auscultation of heart and breath sounds. The patient was turned prone, and anesthesia and surgery were without apparent incident. After 6 h of operative time, the esophageal stethoscope was removed, the trachea extubated with the patient awake and responsive and the patient taken to the recovery room in satisfactory condition.

Interpretation by two radiologists of postoperative radiographs of the chest and thoracolumbar spine taken in the recovery room on the day of surgery stated, "An N-G tube is in the fundus of the stomach," and "The tip of the N-G tube is again noted to be at the level of the G-E junction."

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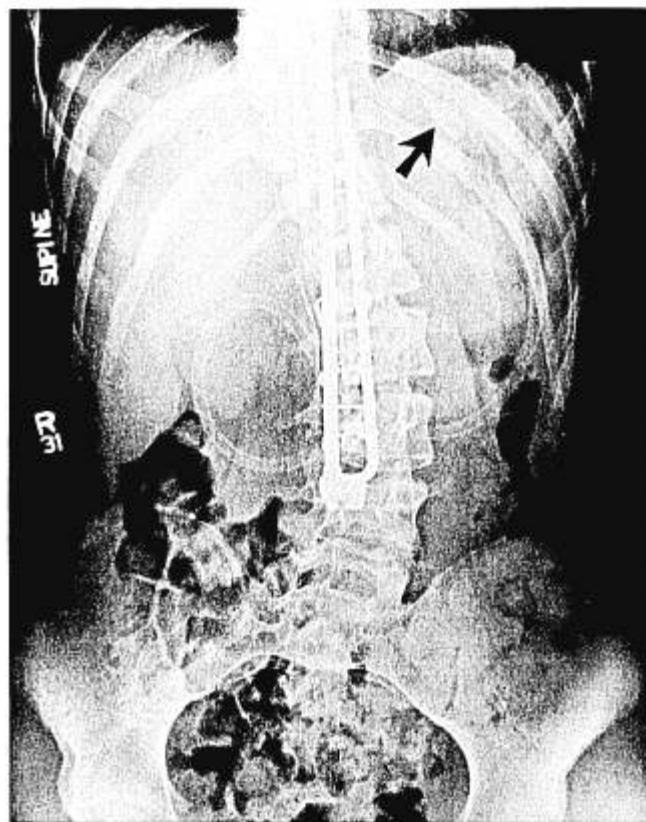


FIG. 1. Radiograph obtained on postoperative day 6. The esophageal stethoscope easily can be seen in the stomach. Note the characteristic "booster rocket" profile of the proximal end of the foreign body (arrow), identifying it as an esophageal stethoscope.

The nasogastric tube was removed the day following surgery, after auscultation of active bowel sounds. Oral fluids were begun on the second postoperative day and were well tolerated. Solid food was begun on postoperative day 3 without problems. On postoperative day 4, the patient complained of "feeling full in my abdomen." Oral intake was minimal. A 10 mg bisacodyl suppository was inserted per rectum, with a subsequent bowel movement $3\frac{1}{2}$ hours later. Oral intake on day 4 was noted to improve following the patient's bowel movement.

On day 5 the patient again complained of feeling "constipated." Active bowel sounds were heard over the entire abdomen, although decreased oral intake was noted. On postoperative day 6 the patient was placed in a brace to stabilize his spine, and a radiograph was obtained to confirm proper spinal alignment prior to the patient's discharge home. A review of the radiograph (fig. 1) showed an esophageal stethoscope in the patient's stomach, with "... the distal tip through the duodenal C-loop."

A pediatric surgeon, after examination of the patient and a review of the hospital course and radiographs, recommended leaving the stethoscope in place, stating that it should pass on through without problems. The plan was that if it does not pass by 3 weeks, then it could be removed by gastroscopy. This recommendation was discussed with the patient and his parents and was acceptable to all.

Four-and-a-half weeks following discovery of the errant esophageal stethoscope, the patient returned to the clinic. He reported no evidence of passage of the stethoscope. The patient had been entirely free of physical symptoms for the $4\frac{1}{2}$ weeks since his hospital

discharge, but was somewhat anxious about the retained stethoscope. A spine film documented the device to still be in the stomach. Flexible gastroscopy was performed with the patient awake. The lining of the stomach appeared normal, and the entire stethoscope was within the stomach. Using a rectal polyp snare in conjunction with the gastroscope, the esophageal stethoscope was removed orally without incident. The stethoscope was much stiffer after its removal than prior to its insertion.

DISCUSSION

A number of events had to occur to make possible the intraoperative passage of an esophageal stethoscope into the stomach undiagnosed until the sixth postoperative day. First, in the maelstrom of activity surrounding the induction of anesthesia, with two anesthesiologists performing various tasks, we lost track of an esophageal stethoscope. A single anesthesiologist probably would not have done so. Second, the radiologist examining the postoperative films obtained in the recovery room did not notice the presence of the esophageal stethoscope. A retrospective analysis of this radiograph did reveal the proximal end of the stethoscope to be in the cervical esophagus, just to the left of the shadow of the spinous processes of the vertebrae.

The location of the stethoscope high in the esophagus while the patient was in the recovery room might have made removal rather simple and prevented the subsequent symptoms and misdiagnosis that occurred in the subsequent week of hospitalization. In addition, the emotional distress that accompanied retention of the stethoscope, as well as the need for subsequent gastroscopy, could have been avoided.

Third, the patient's symptomatic complaints of "feeling full" and "constipated," and his lack of appetite, were considered normal postoperative sequelae, and treated as such with a laxative. Had the operative procedure not required a follow-up film prior to discharge, the patient might have been sent home unaware that any untoward event had transpired. The uncomplicated course for $4\frac{1}{2}$ weeks following hospital discharge, as well as the normal appearance of the gastric mucosa at endoscopy, suggest that the stethoscope might have remained in the stomach indefinitely.

In a previous report of an endotracheal tube that passed into the stomach of an adult,² removal of the tube required anesthesia and laparotomy. In our patient, gastroscopy without the need for anesthesia sufficed for removal of the foreign body.

The pediatric surgeon who ultimately removed the stethoscope initially believed the stethoscope would pass spontaneously through the gastrointestinal tract and out. After $4\frac{1}{2}$ weeks, this obviously was not about to occur. The marked stiffness of the stethoscope noted after its removal may have contributed to its failure to leave the stomach. Although the radiograph obtained 6

days postoperatively (fig. 1) was interpreted as showing part of the stethoscope in the duodenum, later review of the film, together with the location of the stethoscope at gastroscopy, indicated it never left the stomach. Thus, we would recommend elective removal of an errant esophageal stethoscope with an endoscope upon recognition of the problem, rather than nonintervention in the hope of spontaneous distal passage.

In summary, we report a case of inadvertent passage of an esophageal stethoscope into the stomach of an anesthetized patient. Diagnosis was delayed until the sixth postoperative day and was aided by the characteristic "booster rocket" silhouette of the proximal end of the esophageal stethoscope (fig. 1). Removal was accomplished without difficulty 5½ weeks after insertion of the stethoscope. Elective removal, rather than expectant

hope for passage of an esophageal stethoscope located in the stomach, is recommended.

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Atracurium: Hypotension, Tachycardia and Bronchospasm

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Histamine release following iv administration of atracurium can cause hypotension and tachycardia.¹ We describe such a case where significant tachycardia, hypotension, and bronchospasm occurred following an iv bolus of atracurium.

REPORT OF A CASE

A 34-year-old, 48-kg, ASA physical status I woman was scheduled for laparoscopy, lysis of adhesions, and possible laparotomy for infertility. She gave a negative history for drug allergies. Following premedication with hydrocortisone 100 mg, morphine sulfate 8 mg and glycopyrrolate 0.4 mg im, she received fentanyl 100 µg and diazepam 5 mg iv prior to induction of anesthesia with thiopental 425 mg iv following which BP was 110/80 mmHg, heart rate 100 bpm with controlled respirations via face mask. Atracurium 30 mg

iv was administered prior to tracheal intubation. Less than 30 s later, heart rate increased from 100 to 150 bpm, systolic BP decreased from 110 to 55 mmHg, and ventilation via face mask became difficult. The ECG monitor showed a supraventricular tachycardia. Skin flushing was not observed. Carotid massage, edrophonium 10 mg, and methoxamine 6 mg in divided doses iv were without effect. Her trachea was intubated easily and auscultation of her lungs revealed inspiratory and expiratory wheezing bilaterally. The systolic BP was now 60 mmHg and heart rate 150 bpm. One hundred per cent oxygen was given and the rate of iv fluids increased. An iv neosynephrine drip 40 µg/ml to a total of 400 µg was given, resulting eventually in a BP of 110/50 mmHg and heart rate of 110 bpm. At this time, pH_a was 7.31, PaO_2 485 mmHg, $Paco_2$ 47 mmHg, and HCO_3^- 23.2 mEq/l. The return of her cardiovascular variables toward preatracurium values occurred 20 minutes following iv atracurium. At this time, the bronchospasm resolved spontaneously and the neosynephrine was discontinued. It was decided to proceed with the planned surgical procedure.

During the 2-h operation, anesthesia was maintained with enflurane, N_2O , O_2 , and intermittent iv injections of pancuronium totaling 3 mg. At the end of surgery, muscular blockade was reversed without incident, following the administration of neostigmine 4 mg and glycopyrrolate 0.4 mg iv while monitoring neuromuscular activity with a nerve stimulator. Her recovery room and postoperative courses were unremarkable.

DISCUSSION

This patient's initial increase in heart rate was interpreted as a spontaneous supraventricular tachycardia (SVT). It was treated with carotid massage and iv edrophonium. When the systolic BP of 55 mmHg was noted, methoxamine and neosynephrine were administered iv. The appearance of bronchospasm suggested

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