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Hazards of a Simple Monitoring Device, The Esophageal Stethoscope

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Continuous cardiovascular monitoring is a mainstay of safe anesthetic practice. When a precordial stethoscope is not practical, the esophageal stethoscope has proven useful and is presumed to be innocuous. The purpose of this paper is to report two cases in which the esophageal stethoscope directly contributed to intraoperative complications.

REPORT OF TWO CASES

Patient 1. A 4-year-old boy was admitted to the pediatric intensive care unit of The Children’s Hospital of Philadelphia following an automobile accident that produced severe head injury with coma. A nasotracheal tube was inserted to protect the airway. Following seven days of intubation with minimal change in central nervous system status, an elective tracheostomy was scheduled. The precordial stethoscope used for monitoring during transport from the intensive care unit to the operating room was removed, and an esophageal stethoscope was inserted. Because the patient did respond to painful stimuli with movements, anesthesia was induced with nitrous oxide and oxygen and neuromuscular blockade achieved with d-tubocurarine.

Following dissection, an incision was made into a structure identified by palpation and thought to be the trachea. The esophageal stethoscope, however, was immediately identified by the surgeon. The esophagus was repaired, the trachea properly identified and a tracheostomy performed. Nasogastric and wound drainage was established. Mediastinitis did not occur during the postoperative period, and the esophagus healed without complication. The patient subsequently died of extensive central nervous system damage.

Patient 2. A 20-month-old girl with communicating hydrocephalus and left hemispheric porencephaly was admitted to The Children’s Hospital of Philadelphia for elective revision of the cardiac portion of a ventriculojugular shunt. After uneventful induction of nitrous oxide-oxygen anesthesia and d-tubocurarine-facilitated tracheal intubation, an esophageal stethoscope was inserted.

Dissection of the internal jugular vein was misguided because the stethoscope-filled esophagus was thought to be the jugular vein containing the ventriculojugular shunt catheter. As a result, the esophagus was inadvertently incised. This was immediately recognized and the esophagus closed. Shunt revision was abandoned in view of potential wound contamination. Cervical drainage was established, a nasogastric tube was inserted, and antibiotics administered. The patient recovered uneventfully. Upon readmission five weeks later an uncomplicated shunt revision was performed.

DISCUSSION

Cardiovascular monitoring of all patients undergoing anesthesia should include a continuous electrocardiogram, measurement of systemic arterial pressure by the Riva-Rocci or another method, and continuous assessment of cardiac and breath sounds. Although cardiac and breath sounds can be conveniently monitored with a precordial stethoscope in most operations, procedures in and on the thorax, those with the patient in the prone position, and certain head and neck procedures interfere with the placement of a precordial stethoscope. In these instances, the esophageal stethoscope, introduced more than 20 years ago, has been a reasonable alternative.1 However, the two cases presented indicate that in procedures involving dissection of the neck, even when performed by experienced surgeons, the esophageal stethoscope can lead to mistakes in identification of anatomic structures. The surgeons’ desire to identify a structure containing a therapeutic appliance resulted in incorrect identification and incision. Misidentification would not have occurred had the surgeon not been guided by the presence of a foreign body or had he known that other foreign bodies were present in other structures. In less experienced hands, these errors in identification associated with the esophageal stethoscope are likely to be more common.

Though use of the esophageal stethoscope is convenient, in both of the cases cited above a precordial stethoscope could have been attached to the chest.

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Anesthetic Management of Laryngotracheoesophageal Cleft

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Laryngotracheoesophageal cleft is a rare congenital anomaly. The cleft is a posterior midline defect and extends from the larynx for a variable distance down the trachea (fig. 1). Of the 34 previously reported cases, only four had the cleft extending the entire length of the trachea. None of these infants survived more than five days. The history and the presenting symptoms may simulate those of esophageal atresia or tracheoesophageal fistula. In 20 per cent of cases, the two anomalies may exist concomitantly.

The present case of complete laryngotracheoesophageal cleft is reported to present a technique of management and to point out the pitfalls.

REPORT OF A CASE

A Caucasian female infant was admitted to the Long Island Jewish–Hillside Medical Center when she was 2 days old. She was described as being tachypneic at birth, with excessive tracheo-bronchial mucus, and a peculiar “hooo” cry. She had bilateral scattered rales and rhonchi. Whenever feeding attempts were made, she choked and became cyanotic.

Repeated x-ray studies of the lungs showed granular infiltrates and numerous areas of atelectasis, suggestive of aspiration.

During repeated attempts at passing a nasogastric tube to rule out esophageal atresia, the tube was observed to double back through the glottic opening. A presumptive diagnosis of laryngotracheoesophageal cleft was made.

At laryngoscopy and bronchoscopy, the bronchoscope was found to slip through the larynx into the esophagus. The cleft extended from the base of the arytenoid cartilages through the cricoid and the entire length of the trachea, down to the level of the carina. At the distal end of the cleft, separate openings for the left and the right main-stem bronchi, as well as the common pouch of the trachea and esophagus, were seen.

Since the infant’s general condition was so poor, it was decided to perform only a high gastric division. The smaller upper gastroesophageal portion was drained by a tube to prevent gastric aspiration. The lower portion would be used for a feeding gastrostomy.

In view of management difficulties, the initial operation was begun with local anesthesia. As soon as the stomach was visualized, a number-10 Foley catheter was passed orally into the stomach. The Foley balloon was inflated with 3 to 4 ml air and retracted until resistance was felt, this being presumed to be the gastroesophageal junction. This position was confirmed by the surgeon. At this point, with the child breathing spontaneously, auscultation revealed equal breath sounds over both lungs. Under direct laryngoscopy, the trachea was intubated with a 4-mm Cole endotracheal tube. The patient breathed spontaneously an anesthetic mixture of halothane, nitrous oxide, and oxygen administered via a Jackson–Rees circuit. Gastric division was accomplished, the upper pouch

1 Transcutaneous Doppler Model 801-B, Parks Electronics Lab., Inc., Beaverton, Oregon 97005.
2 Digital Plethysmograph Model 14301A, Hewlett-Packard, Waltham, Massachusetts 02154.

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In the event that an esophageal stethoscope appears to be the only reasonable method of continuous assessment of cardiac function in a procedure where the surgeon will be dissecting structures in the neck, the anesthesiologist should inform the surgeon that an esophageal stethoscope has been inserted. When a structure is palpated and will be incised, it would then be wise for the surgeon to continue palpation while the anesthesiologist moves the esophageal stethoscope up and down. This should minimize the hazard of inadvertent incision of the esophagus.

REFERENCE


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