However, because of the potential of mild nervous system toxicity at peak concentrations measured, we recommend that a 2 mg/kg dose of plain bupivacaine for illoinguinal–iliohypogastric nerve blockade not be exceeded, that strong consideration be given to using bupivacaine with epinephrine, and that the blockade preferably be performed near the beginning of the surgical procedure.

REFERENCES


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Refractory Bradycardia during Aspiration of a Tracheal Cyst in a Young Infant

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We recently anesthetized an infant with an unusual cause of stridor, a bronchogenic cyst, who also developed severe intraoperative bradycardia, which did not respond to iv atropine despite the absence of hypoxemia.

CASE REPORT

A 7-week-old, 4.2-kg infant born at 42 weeks gestation was scheduled for diagnostic bronchoscopy. Soon after birth she became stridorous without other evidence of respiratory distress. Her parents were told that she had a "flappy" airway and would outgrow the problem.

After discharge she was occasionally stridorous when agitated. This was intermittently accompanied by gasping respirations, tachypnea, and peripheral cyanosis. At four weeks of age the patient had an apneic spell and was admitted to another institution. She was stridorous with an intermittent cough. A chest radiograph and barium swallow were unremarkable. She was referred to our institution for further evaluation and scheduled for elective bronchoscopy.

On examination she appeared to be a healthy 4.2-kg infant without stridor, tachypnea, retractions, or cyanosis. The vital signs were unremarkable. The external airway was normal in appearance, breath sounds were equal and clear, and the remainder of the physical examination was equally unremarkable. The hemoglobin content was 12 g/dl. Atropine 0.1 mg im was used as premedication. Intraoperative monitoring included a precordial stethoscope, ECG, pulse oximeter, and blood pressure cuff. Induction of anesthesia was performed by inhalation of nitrous oxide, halothane, and oxygen without difficulty. We encountered no problems with ventilation, and the pulse oximeter indicated 100% saturation. A 22-gauge iv line was started and the N₂O discontinued. The trachea and vocal cords were topically anesthetized with 4% lidocaine administered by atomizer. With the patient spontaneously breathing, a Hopkins rod–glass telescope was introduced without difficulty, revealing a large midtracheal cyst originating from the right postero-lateral wall occluding 80% of the trachea. The tele- scope was then removed and a Storez® ventilating bronchoscope was passed easily. Equal bilateral breath sounds and chest expansion were obtained with assisted ventilation via the bronchoscope side port. A needle was introduced through the bronchoscope and 7–10 ml of fluid aspirated. Prior to aspiration the systolic blood pressure was 80 mmHg and the heart rate 140 beats/min. With aspiration the heart rate acutely fell to 50 beats/min and the systolic blood pressure to 50 mmHg. The pulse oximeter showed 100% saturation. No P-waves could be seen on the ECG, indicating a nodal rhythm. Controlled ventilation revealed bilateral breath sounds. Atropine 0.1 mg (∼25 μg/kg) was immediately administered iv. When no response was seen after 60 s an equal dose of atropine was repeated. Again no response was noted after another minute. Because of continuous bradycardia and hypotension, epinephrine 50 μg (∼10 μg/kg) was given iv, with an immediate increase in heart rate to 180 beats/min and systolic blood pressure to 80 mmHg. Repeat tracheoscopy revealed a decompressed cyst and posterior tracheomalacia.

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FIG. 1. CAT scan of the chest, showing posterior mediastinal location of cyst (arrow).

FIG. 2. At the time of open surgical resection of cyst, vagus nerve (white arrow) was found to be adherent to the wall of bronchogenic cyst (black arrow).
Postoperatively, a computerized axial tomography (CAT) scan (fig. 1) revealed a right posterior mediastinal cystic mass consistent with a bronchogenic cyst. The patient was brought to the operating room two days later for resection. Upon dissection the right vagus nerve was found to be adherent to the wall of the cyst (fig. 2) with the needle mark from prior aspiration visible nearby. The cyst communicated with the posterior tracheal wall several centimeters above the carina, and a pericardial patch was used to repair the tracheal defect.

The patient had an uneventful postoperative course. She was discharged one week later and is doing well.

**Discussion**

Bronchogenic cysts are an unusual cause of stridor in the pediatric population. Most of the reported cases describe extrinsic compression of the tracheobronchial tree. Intrinsic obstruction by a bronchogenic cyst is exceedingly rare.

Preoperative diagnosis of a bronchogenic cyst can be difficult. A chest radiograph has been cited as the most useful diagnostic test; unfortunately, the cyst cannot always be visualized, as was the case in our patient. Even in retrospect, we were unable to identify the initial cyst on the chest radiograph taken prior to bronchoscopy. Erakus et al. advocated a barium swallow for diagnostic purposes. This too was normal in our patient. Bronchogenic cysts should be considered in the differential diagnosis of congenital stridor.

Intraoperative bradycardia in infants is usually due to either hypoxemia or vagal output. The pulse oximeter in this case ruled out the former cause. The lack of effect of two doses of atropine is unusual but not without explanation. Bradycardia in infants can markedly decrease cardiac output and increase circulation time. This can delay the onset of tachycardia following iv atropine. However, two minutes elapsed between the first dose of atropine and the administration of epinephrine. No increase in heart rate was seen during those two minutes. We attribute this refractory bradycardia to a marked increase in vagal activity. Aspiration of the intratracheal portion of the cyst most likely caused traction on the vagus nerve adherent to the wall of the cyst.

Chest compressions were not initiated in the operating room because the systolic blood pressure remained at 50 mmHg, the patient appeared well-perfused, and oxygen saturation registered 100% throughout the period of bradycardia.

In summary, we report a case of persistent bradycardia refractory to atropine, occurring presumably as a result of vagal stretching.

**References**


**Effects of Radial Artery Cannulation on the Function of Finger Blood Pressure and Pulse Oximeter Monitors**

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Indwelling radial artery cannulae are commonly used to continuously measure systemic blood pressure and provide information about blood gases, including hemoglobin oxygen saturation. It is also assumed that insertion of an arterial cannula can cause spasm and decreased blood flow distal to the cannula, although there are no reports as to the degree and duration of this assumed decrease in flow. In addition, percutaneous cannulation of the radial artery has known complications, including ischemic changes, bleeding, pseudoaneurysms, infection, and thrombosis. In an effort to avoid these and other complications, several noninvasive monitors have been introduced, including Finapres™, a device to continuously measure blood pressure from a finger, and pulse oximeters to measure hemoglobin oxygen saturation. Both monitors rely on adequate peripheral blood