Intraoperative endobronchial rupture of pulmonary hydatid cyst: An airway catastrophe

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Abstract

Hydatid cyst disease of lungs may not be symptomatic. It may present as spontaneous rupture in pleura or a bronchus. During spontaneous breathing, cyst content of endobronchially ruptured pulmonary hydatid cyst is mostly evacuated by coughing. However, during positive pressure ventilation such extruded fragments may lodge into smaller airway leading to an airway catastrophe. We present such accidental endobronchial rupture of pulmonary hydatid cyst during surgery, its prompt detection, and management by rigid bronchoscopy.

Key words: Bronchoscopy, endobronchial rupture, hydatid cyst

Introduction

Hydatid cyst/Echinococcosis is caused by larva of Echinococcus granulosus.[1] Liver and lungs are the most common sites of growth of these cysts but they may occur in other organs.[2] A pulmonary hydatid cyst can present after spontaneous rupture into the pleura or bronchus.[3] We present the successful management of an accidental rupture of pulmonary hydatid cyst into bronchus during surgery with the patient on mechanical ventilation.

Case Report

A 20 kg, 7-year-old girl with history of recurrent hemoptysis was scheduled for thoracoscopic excision of a pulmonary hydatid cyst. Chest X-ray revealed a 4 cm homogenous opacity in lower lobe of left lung. Contrast-enhanced computed tomography chest revealed 3-4 cm well-defined hypodense lesion in lower lobe of left lung. ELISA test for a hydatid cyst was positive. All other relevant investigations were within normal limits. The patient had taken multiple courses of albendazole for the same.

Single lung ventilation with 3.5 mm ID Univent tube (for 6-8 years) was planned.[4] A 20 G venous access was taken in the dorsum of left hand. Electrocardiograph, noninvasive blood pressure, peripheral oxygen saturation (SpO$_2$), and capnography monitoring was initiated.

The patient was administered fentanyl 40 mcg and hydrocortisone 100 mg intravenously (IV). Pheniramine maleate 34.125 mg was given intramuscularly. After preoxygenation for 3 min, anesthesia was induced with propofol 40 mg and vecuronium 2 mg IV. The trachea was intubated with the 3.5 mm ID Univent tube and lung ventilation was confirmed. The bronchial blocker was guided into the left bronchus under fiberoptic guidance for isolating the two lungs. The patient was positioned in the right lateral position. Tube position and lung isolation were reconfirmed clinically by auscultation and fiberoptically. Anesthesia was maintained with an oxygen–nitrous oxide inhalation mixture (1:1) with isoflurane ≤1% and supplemental IV doses of fentanyl and vecuronium.

While creating pneumothorax there was sudden fall of SpO$_2$ from 98% to 56% with bradycardia (heart rate dropped from 110 to 46/min) and bloody discharges appeared in the Univent tube. Airway pressures increased from 18 cm to 35 cm. Pneumothorax was released, atropine 0.4 mg IV was given, 100% oxygen administered and tube suction done. SpO$_2$ improved to 98-99% and heart rate increased to 130/min.
Patient’s blood pressure remained stable. Anaphylaxis and contra-lateral pneumothorax was ruled out clinically. On chest auscultation, there was decreased air entry on the right side and air entry was present on the left side.

Anticipating a displaced bronchial blocker patient’s position was made supine and flexible fibrescopy was done which showed fluid with membranes along with a displaced bronchial blocker in the trachea. Suctioning was done through the flexible fibrescope suction channel but membranes could not be removed. The Univent tube was withdrawn and rigid bronchoscopy was performed with 4.5 mm pediatric ventilating bronchoscope. About 20-25 ml of fluid with flakes of membrane was removed by forceps, bronchoalveolar lavage, and suction [Figures 1 and 2]. After bronchoscopy, trachea was reintubated with a 6 mm ID uncuffed endotracheal tube.

Patient’s vital parameters remained stable. At the end of procedure, the patient was shifted to ICU for elective ventilation. Postoperative chest X-ray was normal. The trachea was extubated the next day and the patient was discharged home on the 7th postoperative day. Histopathological examination of membranes was of suggestive of a hydatid cyst.

**Discussion**

Hydatid cyst infestation commonly involves liver (50-70%), lungs (18-35%), or both liver and lungs (5-13%).[2] A pulmonary hydatid cyst may be asymptomatic or present with cough, hemoptysis, chest pain, or respiratory distress.[5] A pulmonary hydatid cyst can spontaneously rupture into pleura or bronchus secondarily to infection, chest trauma, and erosion of cyst wall into bronchus.[1,6] Spontaneous endobronchial rupture manifest as cough, hemoptysis, and expectoration of cyst content.[1,2] Cyst contents are usually completely evacuated.[11] Extruded cyst fragments have been reported to lodge in the bronchi of the same and the opposite lung resulting in acute airway obstruction which needed an emergent bronchotomy of the main stem bronchus to retrieve the cyst contents.[7] Massive endobronchial rupture of hepatic hydatid cyst during mechanical ventilation has been reported which lead to an increase in intrathoracic pressure.[8] There are also reports of intraoperative cyst rupture and subsequent anaphylaxis but there is no report of intraoperative endobronchial rupture of pulmonary hydatid cyst causing small airways obstruction and subsequent use of bronchoscopy for its confirmation and management. There are few reports on the use of fiberoptic bronchoscopy to diagnose pulmonary hydatid cyst[9,10] and a few reports of its use for its treatment.[10,11]

In patients undergoing pulmonary hydatid cyst resection, the healthy lung must be isolated to protect it against transbronchial spread of hydatid fluid should inadvertent rupture of cyst occur during its dissection and exposure.[12] Various techniques of single lung ventilation have been described in pediatric patients which include use of bronchial intubation with single lumen endotracheal tube (ETT), balloon tipped bronchial blocker, uninvent tubes, and double lumen tubes (DLT).[4] When double lumen tube is used, it is easy to suction the operative lung and oxygenate it using continuous positive pressure.[4] In pulmonary hydatid cyst surgery, the use of DLT is recommended as ventilation can be controlled and flooding of contralateral lung prevented, in the case of cyst rupture.[8] DLT could not be used in the case reported as smallest size DLT used available is 26 FG (for age 8-10 years)[4] and so we used a 3.5 mm ID Uninvent tube.

Bronchial intubation with an ETT may not achieve collapse of the operative lung and may even fail to prevent transbronchial spread of hydatid fluid. The operative lung also cannot be suctioned with this technique.[12] When bronchial blockers are

![Figure 1: Bronchoscopy still image showing a gelatinous hydatid membrane](image1)

![Figure 2: Hydatid cyst membrane in sheath](image2)
used, blocker balloon may dislodge into trachea and operative lung cannot be suctioned with closed tipped blocker.[4] Univent tubes gives good lungs isolation but potential problems with their use include delayed deflation of affected lung, displacement of bronchial cuff into main tracheal lumen during position change or surgical manipulation and large external diameter compared to its internal diameter.[13]

Increased intrathoracic pressure due to mechanical ventilation and pneumothorax probably caused cyst rupture in the case reported, but the case was successfully managed due to prompt detection by flexible fiberscopy and successful intervention with rigid bronchoscopy.

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