

**Case Report****Open Access**

## Our Anesthesia Experience in a Pediatric Patient with Ruptured Lung Hydatid Cyst

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Hydatid cyst is a parasitic disease caused by *Echinococcus granulosus* and transmitted to humans mostly through canine feces. Although it can settle in every organ in the body, the lung is the most frequently involved organ in children. As well as being asymptomatic, a pulmonary hydatid cyst may cause complaints such as chest pain, cough, shortness of breath, pneumothorax, and hemoptysis. A child patient was admitted to the pediatric emergency service with complaints of severe respiratory distress, hemoptysis, and pneumothorax in the right lung. Hydatid cyst treatment is primarily surgical. With the rupture of the cyst during the operation, anaphylactic shock and even death can be seen. In case of sudden onset of tachycardia and a decrease in mean arterial pressure during hydatid cyst operation, the possibility of anaphylaxis should be kept in mind after excluding other possibilities. We think that keeping in mind that anaphylaxis may develop in patients who will undergo surgery for hydatid cysts and being prepared for this will have a significant positive effect on mortality and morbidity. In this case report, we aimed to present our anesthesia experience of anaphylactic reaction following cyst rupture during surgical excision of lung hydatid cyst.

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**Received:** May 24, 2023; **Accepted:** May 29, 2023; **Published:** June 07, 2023**Keywords:** Pulmonary Hydatid Cyst, Rupture, Anaphylaxis, Pediatric Anesthesia**Introduction**

Hydatid cyst is a parasitic disease caused by a flatworm called *Echinococcus granulosus*. The main host is predators. Humans are incidental intermediate hosts and are usually transmitted through dog feces. It can be seen in every organ in the body. The lung is the most frequently involved organ in children. In children due to high lung elasticity than in adults, therefore the incidence of giant cysts is higher the children age group [1]. The risk of rupture in a giant hydatid cyst is quite high and the cyst respiratory problems may occur due to the compression effect [2].

Pulmonary hydatid cysts may be asymptomatic or may cause chest pain, cough, bronchial cyst, dyspnea, hemoptysis, pneumothorax, and eosinophilic pneumonia. As a result of the disintegration of the cyst, asthma-like symptoms, fever, and anaphylaxis may develop [3]. Anaphylaxis often develops in the first 15 minutes as a result of the disintegration of the cyst [4]. Anaphylaxis produces a clinical spectrum ranging from urticaria to life-threatening circulatory shock [5]. In this case, we aimed to present our approach to preoperative and intraoperative anaphylaxis in a pediatric patient who presented with a ruptured giant hydatid cyst in the lung.

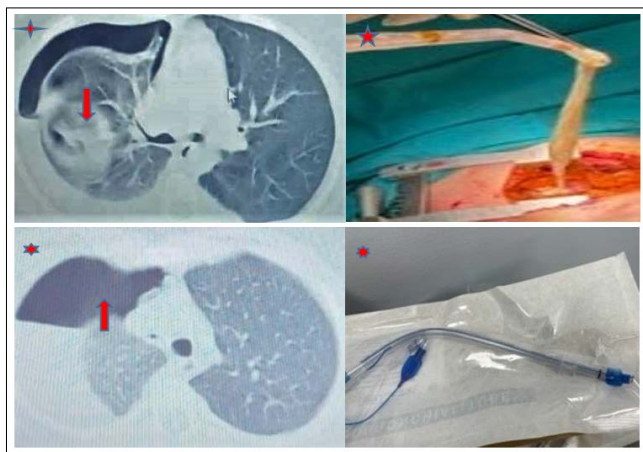
**Case Report**

Our patient applied to the pediatric surgery emergency department with complaints of cough, respiratory distress, and hemoptysis, and permission was obtained from his family to use his data in scientific studies. Our patient was a Syrian immigrant child. The patient who did not respond to medical treatment and became unconscious (GCS: 6) and whose blood gas worsened with arterial PO<sub>2</sub>:68 and PCO<sub>2</sub>:58, PH: 7.23 was intubated with a 5.5 F cuffed tube. When the patient's lungs were listened to with a stethoscope, only the left upper lobe of the lung could be ventilated. There was a pneumothorax appearance in the right lung. For treatment, a thoracic tube was placed in the right lung, and underwater drainage was performed. The patient, whose informed consent was obtained, was operated on the next day. An 11-year-old male patient with a height of 150 cm and a weight of 50 kg was operated on under emergency conditions with pressure-controlled ventilation. Our patient had no known comorbidity and no history of previous surgery. On physical examination, there was no respiratory sound in the middle-lower region of the right lung, and deep breathing sounds could be heard in the left apical region on listening to the left lung. There was no distinctive feature in the physical examination of the patient who had no fever.

Albendazole is a drug used in the treatment of many helminthiases, especially hydatid cysts. When this drug is metabolized, it inhibits the microtubule formation of the parasite and shows its effect by stopping cell proliferation in the metaphase stage. It can exert the same effect on the host organism. Albendazole was started at 200 mg twice a day, every 12 hours, through a nasogastric tube. In laboratory tests, leukocytes: 9600 mCL, Hb: 10.5 g/dL, Hct: 30.8% Plt: 405,000 mm<sup>3</sup>, glucose: 101 mg/dL, BUN: 10.3 mg/dL, creatinine: 0.32 mg/dL, Na: 138 mmol/L, AST: 25 U/L, ALT: 12 U/L, PT: 11.4, aPTT: 26.6, INR: 1.2 measured. Walled cystic formations were observed in the lower region of the left lung and the middle and lower regions of the right lung in the PA chest X-ray. Thorax computed tomography shows 103×90×95 mm in the upper lobe of the right lung and 87×85×98 mm in the lower lobe.

Cysts measuring 88×66×53 mm were detected in the upper lobe of the left lung (Picture 1-3). With the diagnosis of a bilateral hydatid cyst in our patient, cyst excision was planned in two stages. In the first stage, it was decided to remove the cyst in the right lung.

Standard monitoring including electrocardiography, pulse oximetry (SpO<sub>2</sub>), and non-invasive blood pressure was applied. Peak heart rate: 96/minute, blood pressure: 105/60 mmHg, SpO<sub>2</sub>: 92%. Anesthesia inhalation was started with sevoflurane and an intravenous infusion of 1-5 microgram/kg/min remifentanyl was administered throughout the case. 1 mcg/kg remifentanyl, 0.1 mg/kg dromidone, and 0.6 mg/kg rocuronium was administered for induction. Radial artery cannulation was performed for invasive blood pressure measurement. Anesthesia was maintained by administering a 50% oxygen - 50% air mixture and 2% sevoflurane at a concentration of 1 MAC. After the patient slept, the 5.5 F cuff endobronchial tube was removed and a 28 F Phthalate left endobronchial tube was inserted into the patient with a 3.7 mm outer diameter pediatric fiberoptic bronchoscope. The bronchial cuff was inflated during the operation, the tracheal cuff was left open throughout the operation, and ventilation of the right lung was prevented. Giant hydatid cysts were removed from the left lung by deflating the left lung. Thus, single lung ventilation was achieved with left main bronchus intubation. A plateau pressure of 12 cmH<sub>2</sub>O was maintained to prevent unwanted rupture of hydatid cysts in the contralateral lung. Pressure-controlled ventilation was preferred. After the patient was placed in the right lateral position, the operation was started. In the first hour of the operation, the right upper lobe cyst was reached and approximately 300 cc of cyst content was aspirated. The germinative membrane was removed by washing with a hypertonic saline solution.



**Figure 2:** +; ★ CT image of ruptured giant hydatid cyst and pneumothorax, ★; giant hydatid cyst image removed intraoperatively, ★; left lung endobronchial tube used during surgery

lobe of the left lung. Mean arterial pressure was 45 mmHg and heart rate was 128/minute. An increase in peak inspiratory pressure from 25 cmH<sub>2</sub>O to 38 cmH<sub>2</sub>O and a decrease in SpO<sub>2</sub> from 94% to 84% were observed. With listening, there was no significant change in breath sounds and no additional sound was heard. The only lung area that was ventilated in the patient was the left upper lobe of the lung which remained intact. There was no significant blood loss and no abnormal changes were observed in the electrocardiogram. Skin rash wasn't detected on the face and arms. The patient who did not respond to bolus crystalloid administration was started on noradrenaline infusion (0.6 microgram/kg/min). Pheniramine 20 mg, theophylline 60 mg, dexamethasone 4 mg, and methylprednisolone 20 mg were administered intravenously. We tried to avoid the risk of contralateral cyst rupture by keeping the tidal volume at 0.4 mL/kg with pressure-controlled ventilation.

## Discussion

The breakdown of the hydatid cyst and the mixing of the allergic proteins in it into the systemic circulation may lead to anaphylaxis [6,7]. The symptoms can range from urticaria to anaphylactic shock. It is difficult to detect symptoms such as weakness, itching, dizziness, and shortness of breath in an unconscious patient under anesthesia. This situation can be used in the diagnosis of anaphylaxis developing in the perioperative period [8]. Symptoms such as redness and flushing may be overlooked during the operation because the patient is covered with sterile dressings [9]. While hypotension, tachycardia, and arrhythmia are frequently observed in the patient; bronchospasm is seen less frequently [10]. It is difficult to exclude the diagnosis of anaphylaxis in atypical cases. Acute bleeding in the surgical field and hypotension were secondary to the neuraxial anesthesia we apply mimic anaphylaxis. In our patient, resistant to the intraoperative period any major bleeding present during hypotension wasn't. A paravertebral block applied to our patient was performed at the end of the operation. Sudden hypotension, widespread rash around the mouth, and swelling all over the body developed in a 13-year-old patient who went into anaphylaxis as a result of a rupture of a lung cyst. This patient was administered 0.01 mg/kg adrenaline and 0.6 mg/kg dexamethasone [11]. In our case, no rash was observed, but hypotension developed. Hemati et al [12]. In the case report of a 33-year-old female patient in which they described anaphylaxis after administration of cefazolin during renal transplantation, there was profound hypotension. The prominent pulmonary symptoms accompanying this patient indicate a decrease in SpO<sub>2</sub> without an increase in airway peak pressure. In our case, the airway peak pressure increased and oxygen saturation decreased. We found that the reason for this low rate detected in pulse oximetry was peripheral secondary to anaphylaxis rather than a ventilation problem. We thought it might be a circulatory disorder. Tryptase is a protease released from mast cells during immediate hypersensitivity reactions. An increase in tryptase level of more than 25 mg/L 1 hour after anaphylaxis suggests mast cell activation and mediator release and supports the diagnosis of anaphylaxis. However, an elevated tryptase value measured each time may never accompany severe anaphylaxis and may be normal. A tryptase value alone is not sufficient to exclude anaphylaxis [13]. Although severe anaphylaxis symptoms developed in our patient, tryptase values obtained immediately after resuscitation and at the 24th hour were at normal levels. Adrenaline is the first choice in the acute treatment of perioperative anaphylaxis. In addition to adrenaline therapy, monitoring, extensive vascular access, and effective fluid therapy are essential in preventing the treatment of concomitant hypotension. During anaphylaxis, up to 70% of the blood volume can be extravasated into tissues within minutes [14]. Crystalloids are preferred for fluid resuscitation. Corticosteroids start late and

are effective in preventing late reactions due to their long-term effects [15]. We achieved an effective hemodynamic response by using 0.9% NaCl, corticosteroid, and adrenaline infusion in the treatment of our patient. The operation was completed in the patient whose hemodynamic and vital parameters improved.

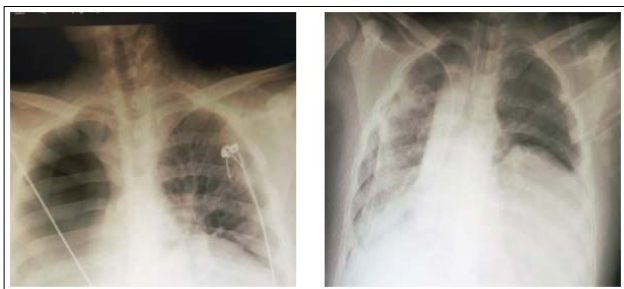


Figure 2: A; Preoperative and B; Postoperative P-A chest X-ray

### Conclusion

Anaphylaxis may develop due to rupture during hydatid cyst surgery. Anaphylaxis should be considered in the presence of hemodynamic changes that cannot be explained by bleeding and hypovolemia. In anaphylaxis due to hydatid cyst rupture, a response to fluid resuscitation and inotropic therapy may be obtained.

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