

CASE REPORT



Anaphylactic shock during pulmonary hydatid cyst surgery in children : a case report.

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ABSTRACT

Pulmonary hydatid cyst is a parasitic disease causing an endemic and health burden in many regions. It is caused by a tapeworm. Lung cysts are more common than liver cysts in children. Anaphylactic shock during surgery by cyst rupture is rare but it can be potentially life-threatening. Diagnosis can be challenging but the immediate treatment is necessary in case of respiratory distress, potential collapse and urticaria. We report a case of anaphylactic shock secondary to pulmonary hydatid cyst with hemodynamic instability in a 10-year-old child during surgery and its management. We describe steps to establish early diagnosis and well-coded treatment. Therefore, preventive measures should be taken to avoid anaphylaxis reactions risk.

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1. INTRODUCTION

Hydatid cysts are a human hydatidosis anthrozoosis caused by infection with *Echinococcus granulosus* [1]. This condition typically occurs when humans ingest the eggs of the tapeworm, often through contaminated food or water. There has been a notable increase in the incidence of hydatid cysts, with the liver being the most commonly affected organ, accounting for 60% to 80% of cases [2]. Following closely behind is the lung, which accounts for 20% to 30% of cases [2]. But it may also potentially occur in various other organs as well, including the spleen, brain, eye, heart, bone marrow, and kidney [3]. Pulmonary hydatid cysts are the most common site of hydatidosis in children [4, 5]. The most commonly found areas such are South America, the Mediterranean, Australia, New Zealand, China, and the Middle East [6-10]. Algeria is an endemic country of Hydatid cyst disease, especially in rural regions. Surgery has indeed been considered the gold standard treatment for lung cysts [11, 12]. It consists of enucleation for the small cysts, pericystectomy, cystotomy with capitonnage or cystostomy with the closure of the bronchial openings and capitonnage, open aspiration, and

Segmental resection [12]. Surgical removal of a cyst should indeed be approached with care and precision to mitigate potential complications involving anaphylaxis shock. In the case of intra-operative rupture of hydatid cysts, the high antigenicity fluid content cyst can trigger an immune response, leading to IgE-mediated anaphylactic reactions [13]. Anaphylaxis shock is a rare adverse event during pediatric anesthesia but it can be life-threatening. It is defined as an acute, severe, and potentially fatal multi-system reaction that is caused by the sudden release of mast cells and basophil-derived mediators. A severe anaphylactic shock response due to spontaneous or provoked ruptured hydatid cyst. It can result during cyst surgery, after trauma, or spontaneously [14]. Several reports have cited an incidence rate ranging from 0.2% to 3.3% of anaphylactic shock occurring after surgical removal of hydatid cysts [15]. Clinical symptoms range from urticaria, angioedema, and bronchospasm to life-threatening circulatory shock [16, 17]. Confirmatory diagnosis was based on blood tests including immunofluorescence, immunoelectrophoresis, and hemagglutination. The management of the anaphylactic shock following pulmonary

hydatid surgery is similar to other anaphylactic reactions. It consists of rapid administration of epinephrine and fluid resuscitation. Corticosteroids and antihistamines are often administered after the acute phase and used as adjunctive therapy.

We report a case of anaphylactic shock during pulmonary cyst surgery in children.

2. CASE REPORT

On January 2018, a 10-year-old boy from a rural area in Tiaret (Algeria), presented for elective surgery to remove a right lung hydatid cyst. At the preoperative assessment, there was no known chronic illness or medical history. Also, there was no personal or familial history of allergies but there was a surgical history of a left hydatid cyst surgery one year before without incidents. The patient weighed 25 kg and measured 100 cm. His pulse rate was 82 beats/min, and his blood pressure was 132/67 mmHg. The preoperative cardiovascular and respiratory systems examinations were normal and the laboratory tests were within normal limits. He classified ASA physical status 1.

Upon admission to the operating room, standard monitoring was initiated, including heart rate, ECG, arterial oxygen saturation (SpO₂), temperature, and non-invasive blood pressure (NIP). An inhalational anesthesia allowed for insertion of vascular access. A dose of 1 g of cefazolin was administered. General anesthesia was induced with propofol (3 mg/kg), sufentanil (3 µg/kg), and rocuronium (0.6 mg/kg). After successful tracheal intubation, we maintained anesthesia by sevoflurane (3%) in a nitrous oxide and oxygen mixture (50%:50%). Ventilation parameters were set at a tidal volume of 175 mL and a rate of 14 breaths/min. 45 mn after the surgical incision, the cyst aspiration led to rupture and the patient presented sudden hypotension. The systolic blood pressure decreased from 109 mmHg to 41 mmHg. Also, tachycardia increased from 115 beats/min to 132 beats/min with desaturation (SpO₂: 82%, then 70%). In addition, we noted a bilateral wheezing at pulmonary auscultation indicating a bronchospasm. In front of these symptoms, the anaphylactic shock was diagnosed. The management of critical adverse started by stopping Surgical manipulation, and Treatment included increasing oxygen fraction to 100%, fluid resuscitation with crystalloid infusion (10 ml/kg), two IV boluses of epinephrine (10 µg/kg), and intravenous hydrocortisone. Hemodynamic stability was achieved with NIP: 92/36 mmHg, allowing the surgery to continue. Vital signs were stable under low-dose epinephrine continuous infusion. The patient was transferred to the intensive unit care and he was extubated 12 hours later without after-effect.

3. DISCUSSION

Hydatid disease is prevalent in Algeria [8]. The cyst hydatid surgery isn't without risks. The incidence of serious adverse events during surgery is variable including anaphylaxis shock. Few studies have reported this event, emphasizing its exceptional nature. The physiopathological mechanism is complex, consisting of a hypersensitivity reaction with immunoglobulin E or activation of complement [18, 19]. The anaphylactic shock may be secondary to the spillage of high concentrations of echinococcus antigen into bronchus and respiratory tissue. The hypersensitivity and endotoxic shock could induce vasomotor dysfunction and circulatory failure.

In our case, the anaphylactic shock diagnosis was based on cardiovascular symptoms such as hypotension, tachycardia, respiratory signs such as bronchospasm (wheezing), and oxygen desaturation. Many studies reported the predominance of cardiovascular and respiratory symptoms in anaphylactic shock [18, 20]. Cutaneous signs were absent for our patient but they were described in other cases such as generalized rash [16]. The diagnosis was established if the IgG ELISA test was positive. There is a strong association between a ruptured cyst and a positive test [21]. Immunologic immunofluorescence reactions and immunoelectrophoresis hemagglutination should be used to confirm the anaphylactic shock diagnosis but we not realized this for our patient due to the unavailability of the test in our hospital. Although it was necessary to start early treatment. The anaphylactic shock diagnosis by content cyst is maintained after the exclusion of other causes: hypovolemic shock due to hemorrhage, muscle drugs, and antibiotics because our patient had received these substances during the last surgery without complications and the shock was produced a distance of time of their administration. Also, latex allergy, cardiogenic shock, and carcinoid syndrome were eliminated, based on anamnesis data. untimely during the surgical procedure Intraoperatively [22]. The diagnosis of shock anaphylactic is strongly evoked when faced with a circulatory failure that is not proven or a collapse poorly explained by intraoperative bleeding, especially when associated with other clinical signs suggestive of an allergic mechanism such as bronchospasm [23]. In our case, the management is an emergency. It consists of stopping momentary surgery, stopping any administration of medication, and starting fluid resuscitation also administration of vasopressor. Epinephrine is the choice drug and the first-line treatment in most guidelines on perioperative management of anaphylaxis [24, 25]. Our approach is similar to others described by many others [16, 18, 26]. The patient has received steroids to act on inflammatory reactions. According to the literature, most anaphylactic reactions respond to adrenaline and hemodynamic stability can be restored within a few times.

4. CONCLUSION

Intraoperative occurrences of anaphylactic shock during hydatid cyst surgery are rare and often unpredictable. Any unexplained hemodynamic instability in such procedures should prompt consideration of anaphylactic shock, with immunological assays serving as the definitive diagnostic tool. Prevention primarily relies on surgical precautions aimed at minimizing the risk of triggering allergic reactions, such as careful handling and avoidance of overdistension with sterilization liquid. Early recognition and appropriate management are paramount to ensuring patient safety and optimal surgical outcomes.

Competing interests: The authors declare that they have no competing interest.

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