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CASE REPORT

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Anesthetic management of a pediatric patient during surgical excision of primary cerebral hydatid cyst

Murat Izgi[1], Melahat Yalcin Solak[1], Sennur Uzun[1], Burcak Bilginer[2]

[1]Hacettepe University Faculty of Medicine Anaesthesiology and Reanimation Department, Ankara, Turkey
[2]Hacettepe University Faculty of Medicine, Department of Neurosurgery Ankara, Turkey

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Abstract

Hydatid cysts develop in humans with the transmission of Echinococcus Granulosus or more rarely Echinococcus Multilocularis. The disease develops in the liver 50-75%, and in the lungs 15-35% of the cases. Intracranial hydatid cyst is seen 0.5-3% of the cases. In this case report, we aimed to present the anesthetic approach and possible anaphylactic reaction in a giant primary intracranial hydatid cyst. A five years and eight months old boy (19 kg, 114 cm) was admitted to the emergency room with complaints of a headache, nausea, vomiting, and deviation of the eyes for about 1 month. Fundus examination revealed bilateral disc elevation and severe papillary edema. Cranial magnetic resonance imaging showed a large hydatid cyst in the right parietal lobe. The patient was scheduled for craniotomy by the neurosurgeons. After induction and endotracheal intubation, 1 mg.kg-1 pheniramine hydrogen maleate and 1 mg.kg-1 methylprednisolone were administered as a protective measure against anaphylaxis. The cyst excised by Dowling method, and no rupture observed. The patient, who did not have any perioperative complication, was extubated and followed in the intensive care unit of neurosurgery department. Cerebral hydatid cyst is rare and usually seen in children. This could be explained by the presence of right-to-left shunts. The gold standard in the treatment of cerebral hydatid cysts is surgical removal. In order to prevent recurrence and anaphylactoid reaction, the cyst should be removed without rupturing it. The hemodynamic changes with cyst rupture are seen milder in the patients receiving prophylactic treatment.

Keywords: Anaphylactoid reaction, cerebral hydatid cyst, surgical treatment

Introduction

Hydatid cysts develop in humans with the transmission of Echinococcus Granulosus or more rarely Echinococcus Multilocularis. Hydatid disease is endemic in South America, the Middle East, Australia, the Mediterranean, India, and China [1-2]. The main host of E. granulosus is dogs and foxes, while the intermediate hosts are all mammals, especially sheep and cattle. It is transmitted to humans through direct contact with the dogs or by fecal-oral route with food and milk contaminated with dog feces containing parasitoid eggs [1-3]. The eggs lose their envelopes in the stomach and release their embryos [2]. The embryos that pass through the intestinal wall and enter the portal system are transported mostly to the liver and some of them are transported to the lungs [2-4]. The disease develops in the liver in 50-75% of the cases and in the lungs in 15-35% of the cases. However, a small proportion of the larvae can pass into the systemic circulation and settle in the brain or other organs [2-3].

Intracranial hydatid cyst disease is rare and seen in 0.5-3% of the cases [5]. Intracranial cysts are frequently seen in children (75%). Primary hydatid cysts are usually solitary, spheroidal, and unilocular. They are predominantly located in the supratentorial area, which is perfused by the middle cerebral artery [1,2,5]. Primary treatment is surgical excision of the cyst (5-6). The integrity of the cyst should be protected during the excision. Otherwise, the intracranial distribution of cyst content may lead to anaphylactic reactions and spread of the disease [6].

In this case report, we aimed to present the anesthetic approach and possible anaphylactic reaction in a giant primary intracranial hydatid cyst.

Case report

A five years and eight months old boy (19 kg, 114 cm) was admitted to the emergency room with complaints of a headache, nausea, vomiting, and deviation of the eyes for about 1 month. The patient was conscious and his body temperature was 36.1°C. Fundus examination revealed bilateral disc elevation and severe papillary edema. He had normal vital findings. His neurological examination and other systems were also normal. Cranial magnetic resonance imaging (MRI) showed a large hydatid cyst (8x6 cm) in the right parietal lobe with a 14 mm midline shift.

The patient underwent hydatid cyst screening in other organs.

***Coresponding Author:** Murat Izgi, Hacettepe University Faculty of Medicine Anaesthesiology and Reanimation Department, Ankara, Turkey
E-mail: muratizgi@hotmail.com.

The abdominal ultrasonography (USG) was normal. The echocardiography (ECO) showed a small ostium secundum atrial septal defect (ASD) and patent foramen ovale (PFO). Thorax computed tomography (CT) revealed a hydatid cyst located above the major fissure in the upper posterior segment of the left lung.

Albendazole 10 $mg.kg^{-1}.day^{-1}$ and sulbactam-ampicillin was initiated and the patient was scheduled for craniotomy by the neurosurgeons. Preoperative complete blood count and biochemistry tests were normal. Electrocardiogram, pulse oximetry and noninvasive blood pressure monitorization were performed in the operating room. Then, the patient was intubated following 2 $mg.kg^{-1}$ of propofol, 0.6 $mg.kg^{-1}$ of rocuronium, 1 $\mu g.kg^{-1}$ of fentanyl. Pheniramine hydrogen maleate 1 $mg.kg^{-1}$ and methylprednisolone 1 mg.kg-1 were administered as a protective measure against anaphylaxis. Anesthesia maintained with 50% O_2/ air mixture, 2% sevoflurane and 0.1 $\mu g.kg^{-1}$ remifentanil infusion. The patient was lied down in the supine position and the head was turned to left side. The perioperative systolic blood pressure values of the patient were 100-110 mmHg, pulse rate was 90-100 beats/ min and EtCO2 was 25-30 mmHg. During the operation, the skin incised with a frontotemporal U shape incision, and following the removal of the bone, a 2 cm cortical incision performed. The cyst was washed with 3% hypertonic sodium chloride and then excised by Dowling method. No rupture observed during excision. The surgery time was 175 min and the anesthesia time was 190 min (Figure 1,2,3).

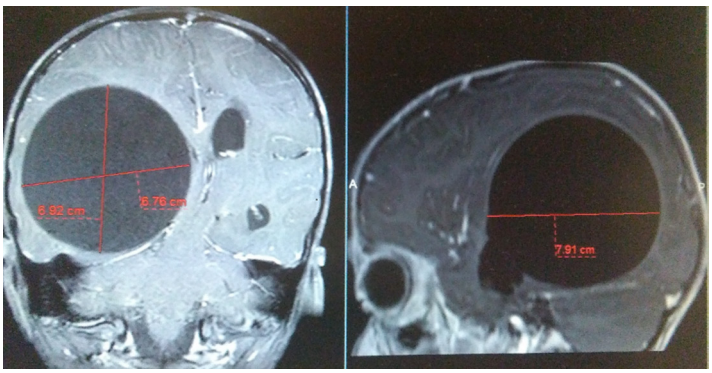

Figure 1. T1- and T2-weighted MR images of cerebral hydatid cyst

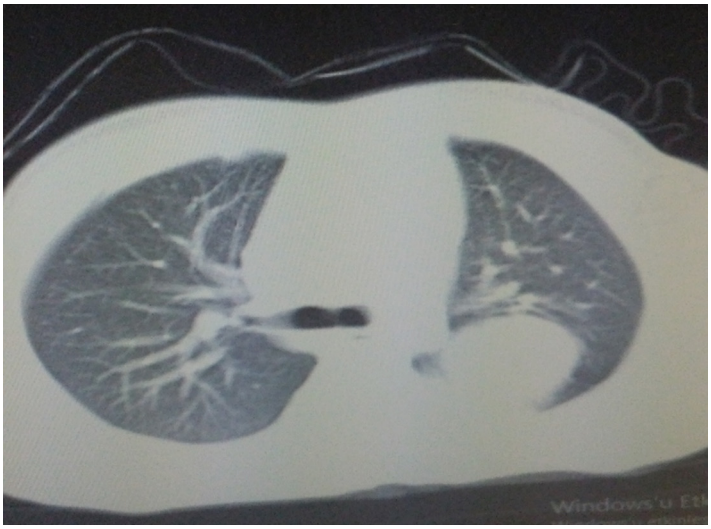

Figure 2. CT imaging of hydatid cyst located in the left lung

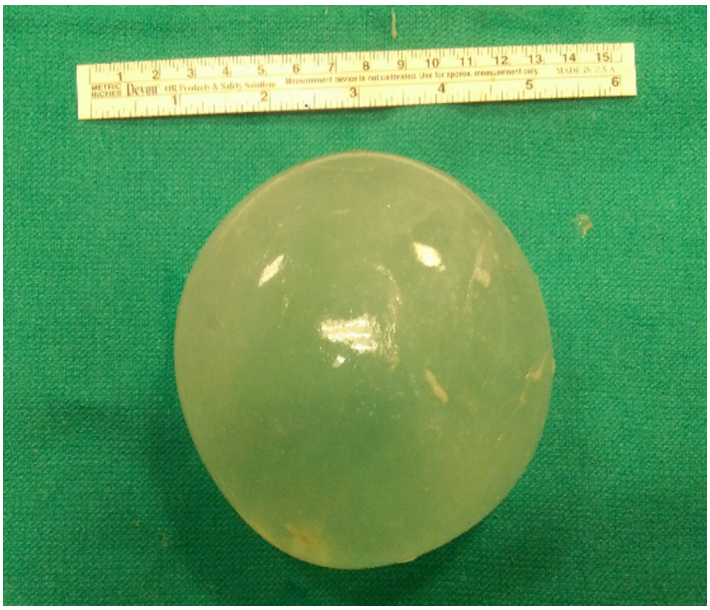

Figure 3. The appearance of hydatid cyst after surgical excision

The patient, who did not have any perioperative complication, was extubated and followed at the intensive care unit of neurosurgery department. After an uneventful postoperative period, the patient was discharged and referred to the thoracic surgery department for pulmonary hydatid cyst.

Discussion

Our patient had a solitary hydatid cyst in the right parietal lobe. Cerebral hydatid cyst is rare and usually seen in children. This could be explained by the presence of right-to-left shunts, such as patent ductus arteriosus [1,2,4,7]. Primary cerebral hydatid cysts are usually single and mostly located in the supratentorial area which is perfused by the middle cerebral artery [1,2,5]. It should be kept in mind that extracranial cysts may also be present in patients with cerebral hydatid cysts. Therefore, a thorough radiological evaluation of the patient is necessary with chest X-ray, abdominal ultrasound (USG) or computed tomography (CT). Echocardiography (ECO) is also indicated [1]. Routine radiological examinations were performed in our case and a hydatid cyst in the lung, ASD, and PFO in the heart were detected. As the intracranial hydatid cysts grow slowly, the symptoms occur in the delayed period. The cysts are usually giant at the diagnosis. It has been reported that the growth rate of brain hydatid cysts varies between 1.5 and 10 cm per year. Patients usually present with symptoms due to increased intracranial pressure and/or focal neurological findings [4]. A headache, nausea, and vomiting are usually seen because of increased intracranial pressure. Pupil edema due to increased intracranial pressure is the main finding in young people [1]. Focal neurological findings may vary according to the location of the cyst, but hemiparesis, visual deficits, diplopia, and seizures may also be seen [8]. Epileptic seizures are more common in elderly patients [2].

The gold standard in the treatment of cerebral hydatid cysts is surgical removal. In order to prevent recurrence and anaphylactoid reaction, the cyst should be removed without rupturing it [8]. Dowling hydro dissection technique is the preferred method to remove the cyst completely [4].

The aim of anesthesia is to provide relaxation of the brain tissue during excision of the cyst, to establish a clean surgical field with regards to bleeding, and to take necessary precautions against possible anaphylactic reactions [8].

The anaphylactic reaction is a sudden, systemic, life-threatening event that affects various organs. Anaphylaxis during anesthesia and the perioperative period is rare. Anaphylaxis can induce nausea, vomiting, urticaria, angioedema, bronchospasm, upper airway obstruction, cardiovascular collapse. It is predicted that the mortality rate due to anaphylaxis is between 3-6% [9]. An anaphylactic reaction can develop due to spontaneous or surgical rupture of the cyst during excision. The cause of death in hydatid cyst rupture is due to anaphylaxis-related complications [2]. The incidence of intraoperative anaphylaxis due to hydatid cyst is reported as 0.2-3.3% and it is mediated by Ig E-mediated type 1 hypersensitivity reaction. Most of the clinical symptoms of anaphylaxis cannot be observed during general anesthesia; urticaria, bronchospasm, hypotension, bradycardia are the main symptoms that can be observed [10]. Massive fluid resuscitation (crystalloid/colloid), vasopressor drugs (adrenaline, noradrenaline), glucocorticoids, H1 and H2 receptor blockers are used in the treatment of anaphylactic reaction. If anaphylaxis develops, all medications and the operation should be stopped and 100% oxygen treatment should be started. The use of adrenaline for vasopressor treatment is the first-line treatment for perioperative anaphylaxis. Glucocorticoids are used to minimize late effects of anaphylaxis [9,11]. H1, H2 receptor blockers and glucocorticoid treatment were applied for prevention of anaphylaxis in our case, cyst rupture and anaphylaxis was not seen during surgery, but it could be. Some studies have reported that the use of prophylactic antihistamines and glucocorticoids prevent or reduce anaphylaxis. Kambam et al. gave preoperative histamine (H1 and H2) receptor blockers in one of two patient groups undergoing hydatid cyst surgery. They found that the hemodynamic changes in patients with cyst rupture were milder in the patient group receiving prophylactic treatment. It has been concluded that preoperative H1 and H2 receptor blockers are useful in hydatid cyst surgery [12].

In another case report, although the cyst was not ruptured during hepatic cyst excision, the cyst was found to be connected to the venous system. They reported that anaphylactic reaction developed in their case despite prophylactic H1, H2 receptor blockers and glucocorticoid therapy [10]. The anaphylactic precautions for surgical treatment of cerebral hydatid cyst cases have differences in different studies.

Conclusion

The aim of this case report is to review the general characteristics of hydatid cyst cases and the anesthetic management and anaphylaxis prevention during surgical treatment.

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

Financial Disclosure
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