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Research Article

ANAESTHETIC MANAGEMENT IN PATIENTS WITH INTRACRANIAL HYDATID CYST A REVIEW ARTICLE

Anjna Badhan, Ankita Chandel and Vikas Panwar

Department of Anaesthesia and Critical Care; IGMC, Shimla

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Hydatid disease is a common but little studied disease in Himachal Pradesh, India.

ABSTRACT

Hydatid disease is a common but little studied disease in Himachal Pradesh, India. The definite hosts are various carnivores (meat eaters), and dog is the most common host. Sheep, cattle, goats and swine are common intermediate hosts. Humans are infected through faeco-oral route by the ingestion of food and milk, contaminated by dog faeces containing the ova of parasite or direct contact with dogs. Eggs lose their envelop in stomach and embryos are released, which then pass through the gut wall into the portal system and are carried to the liver where most of the larvae are entrapped and encysted. Some may reach the lungs and very rarely some may pass through the capillary filter of liver and lungs and enter into systemic circulation and reach intracranial cavity. Hydatid cyst disease in childhood is still a serious health problem in the rural area. The brain involvement rate varies from 1-2% in hydatid disease. Especially in children, hydatid cysts can grow to enormous sizes, and the cases can remain neurologically intact. Severe headache in childhood should be taken into consideration carefully in our area where hydatid disease is common. It is a big challenge to anaesthesiologist to manage patient intraoperatively

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INTRODUCTION

Human cystic echinococcosis is a chronic zoonotic disease that results from infection with the larval stage of the dog tapeworm, *Echinococcus granulosus* or *Echinococcus multilocularis*. Eggs are passed through dog feces and transmitted via oral route to an intermediate host such as humans and larvae subsequently lodge in organs such as the liver (70% of cases), lungs (22% of cases) or others such as heart, brain, kidney, spleen, muscle, skeletal system, skin (8% of all cases in total).^[1] Incidence of Intracranial hydatid cyst is 1-2% while its predominance is in paediatric age group (50-70%).^[2] It has been reported in large numbers from the Mid-Eastern countries^[3,4] Australia and New Zealand. In India, the disease has been reported from Chandigarh, Varanasi, Lucknow, Kashmir, Pondicherry and Madurai. Despite animal husbandry being extremely common in Himachal Pradesh, the only review from this mountain state is a report from 1974.^[5]

How Patients Presented and Investigated with Intracranial Hydatid cyst?

Patients are mainly in the first and second decade of life. Patients presents with increasing head size, focal neurological deficit and clinical features of raised intracranial pressure like

headache, episodes of loss of consciousness, diplopia, vomiting, and seizures.

Preoperative evaluation

Detailed History should be taken regarding symptoms and see for the severity, any allergy history. In examination see for focal neurological deficits, complete neurological examination, fundus examination for papilledema. Radiological investigations included computerized tomography (CT) scan and magnetic resonance (MR) scan. Commonest location is in the parietal lobe.

Other routine blood investigations complete blood count, LFTs, RFTs, blood cross match and blood and blood product arrangements should be done. Ultrasound abdomen-pelvic organ and chest to rule out other hydatid cyst.

Preoperative Preparation

We should ready with difficult airway cart, venoline, intraarterial, venoextension lines and all emergency drugs as in in-toto extraction of intracranial hydatid cyst rupture can occur and lead to severe anaphylaxis.

Premedication can be done if respiratory component of patient is not compromised, oral/intranasal midazolam preferred. Sometimes patient present with midline shift and respiratory

*Corresponding author: **Anjna Badhan**,
Department of Anaesthesia and Critical Care; IGMC, Shimla

depression, so avoid premedication in those. As intracranial hydatid cyst is mainly found in pediatric patients, so apply EMLA 30 min before securing cannula.

Intraoperative Management

Firstly preoxygenate the patient with 100% oxygen then give inj. Fentanyl 2mic/kg. Induction can be done with inj. Thiopentone 5mg/kg, inj. Atracurium 0.5mg/kg and controlled ventilation should be done. Anaesthesia should be maintained with (O₂:N₂O:Iso-50%:50%:0.1-1%) and Atracurium infusion. Sevoflourane should be preferred but in our institute it's not available.

Intraarterial for invasive blood pressure monitoring and central venous pressure monitoring line should be secured. Patient should be continuously monitored for Blood pressure, Heart rate, Oxygen saturation, EtCO₂ maintained between 25-30mm of Hg, temperature and urine output. To decrease intracranial pressure inj mannitol(1gm/kg) and Hydrocortisone (3mg/kg) should be given intraoperatively. Emergency drugs inj Epinephrine, Atropine, Dexamethasone, Pheniramine maleate and Salbutamol kept ready in case of anaphylactic reaction.

Craniotomy done and hydrodissection done with hypertonic saline 3%. The Cyst extracted completely with Dowling-Orlando Technique. Main challenge for anesthesiologist is to maintain patient hemodynamically stable throughout the procedure, manage anaphylactic reaction if occur and extubate successfully. 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% [6]. 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. 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.[7] 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.[8]



Fig 1 CT head showing hydatid cyst



Fig 2 Hydatid cyst removal with Dowling-Orlando Technique

DISCUSSION

Giant intracranial Hydatid cyst is very rare, with a reported incidence of 1-2% of all cases with hydatid cyst. Cerebral hydatid cyst is more common in paediatric population, probably related to presence of right-to-left shunts such as patent ductus arteriosus.[9,10] Solitary intracranial hydatid cysts are more common than multiple intracranial cysts.[9] Intracranial hydatid cyst may also be classified as primary or secondary. Primary cysts are formed as a result of direct infestation of brain without evidence of involvement of other organs. Primary cysts are fertile as they contain scolices and brood capsules. Rupture of primary cyst usually results in recurrence. The secondary cyst results from traumatic, spontaneous or perioperative rupture of a primary cyst and does not have brood capsules or scolices. Secondary intracranial cysts are infertile and risk of recurrence after their rupture is minor. Intracranial hydatid cysts are more frequently located in the supratentorial compartment, especially in the watershed area of the middle cerebral artery.[11]

The patients present with headache, nausea and vomiting (due to increased ICP), neurological deficits, hemiparesis, visual deficit, diplopia and seizures as per the location of the cyst.[12] In our patient history of seizures and weakness in right upper limb were present. A variety of surgical techniques are used for removal of the hydatid cyst.[13]

One option is direct puncture and aspiration of the cyst fluid through a small hole in the cyst wall, and expulsion of the cyst through a small cortical incision over cyst. The popular technique is Dowling's technique of hydrodissection in which normal saline or hypertonic saline irrigation is used with mild force between the cyst wall and brain interface in order to deliver the cyst intact.[14]

This is often possible because the adhesions around the cyst wall are minimal. In our case this procedure was performed (Fig-2) and hypertonic saline (3%) was used for hydrodissection which decreases the tension inside the cyst by keeping the cyst in a hyperosmolar environment. It also acts as scolicidal agent.[15] The Dowling-Orlando technique remains the preferred method of extruding the intracranial hydatid cyst, in which the cyst is delivered by lowering the head of the operating table by 45° using gravity.[14]

Numerous scolocidal agents have been used to prevent recurrence of the cysts resulting from rupture of cyst and release of parasites' protoscolices. Hypertonic saline, although a very effective scolocidal agent, may give rise to hypernatremia leading to seizure and dehydration of cerebral cells with shrinkage of the brain giving rise to subdural haematoma. Therefore, frequent and regular monitoring of sodium is necessary. We used lesser concentration of hypertonic saline (3%) to prevent these complications and monitored serum sodium level regularly. Hydrogen peroxide is another scolocidal agent. It releases gaseous oxygen which has scolocidal property. Ouerghi *et al.* reported severe oxygen embolism after use of hydrogen peroxide in cases of thoracic hydatid cysts.^[16] It has been found to produce haemodynamic instability even without embolism.^[17] Accidental rupture of the cyst may result in spillover of the contained fluid(highly antigenic) and scoleces.

This complication may result in severe anaphylaxis include severe hypotension and increased airway pressure due to bronchospasm and soiling of the neighbouring tissues with potentially infective scolex heads; hence, it is to be prevented.^[18] Other complications include development of subdural effusion, epidural haematoma and pneumoencephalus.^[19] So we should maintain hemodynamic stability, keep a check on hypernatremia, relaxed brain and remain watchful for anaphylaxis.

CONCLUSION

To successfully manage case of giant intracranial hydatid cyst all we need is hemodynamic stability. We should fully prepare for any complication and to treat that. In such cases vigilance is the price of safety.

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