

SURGICAL INDICATIONS

1. Many **hydatid cysts** remain asymptomatic, even into advanced age.

The parasite load, the site, and the size of the cysts determine the degree of symptoms.

A history of living in or visiting an endemic area must be established.

Also, exposure to the parasite through the ingestion of foods or water contaminated by the feces of a definitive host must be determined.

2. Theoretically, **echinococcosis** can involve any organ.

The **liver** is the most common organ involved, followed by the lungs.

These 2 organs account for 90% of cases of echinococcosis.

3. In cystic **echinococcosis** (CE), symptoms can be produced by a **mass effect** or **cyst complications**.

Symptoms due to the pressure effect of the cyst usually take a long time to manifest, except when they occur in the **brain or the eyes**.

Most symptomatic cysts are larger than 5 cm in diameter.

Organs affected by E granulosus:

liver (63%)

lungs (25%)

muscles (5%)

bones (3%)

kidneys (2%)

brain (1%)

spleen (1%).

liver

Clinical manifestations:

In the liver, the **pressure effect** of the cyst can produce symptoms of

- 1.obstructive jaundice
- 2.abdominal pain.

!!! With biliary rupture, the classic triad of

1.biliary colic

2.jaundice

3.urticaria

PH/E:

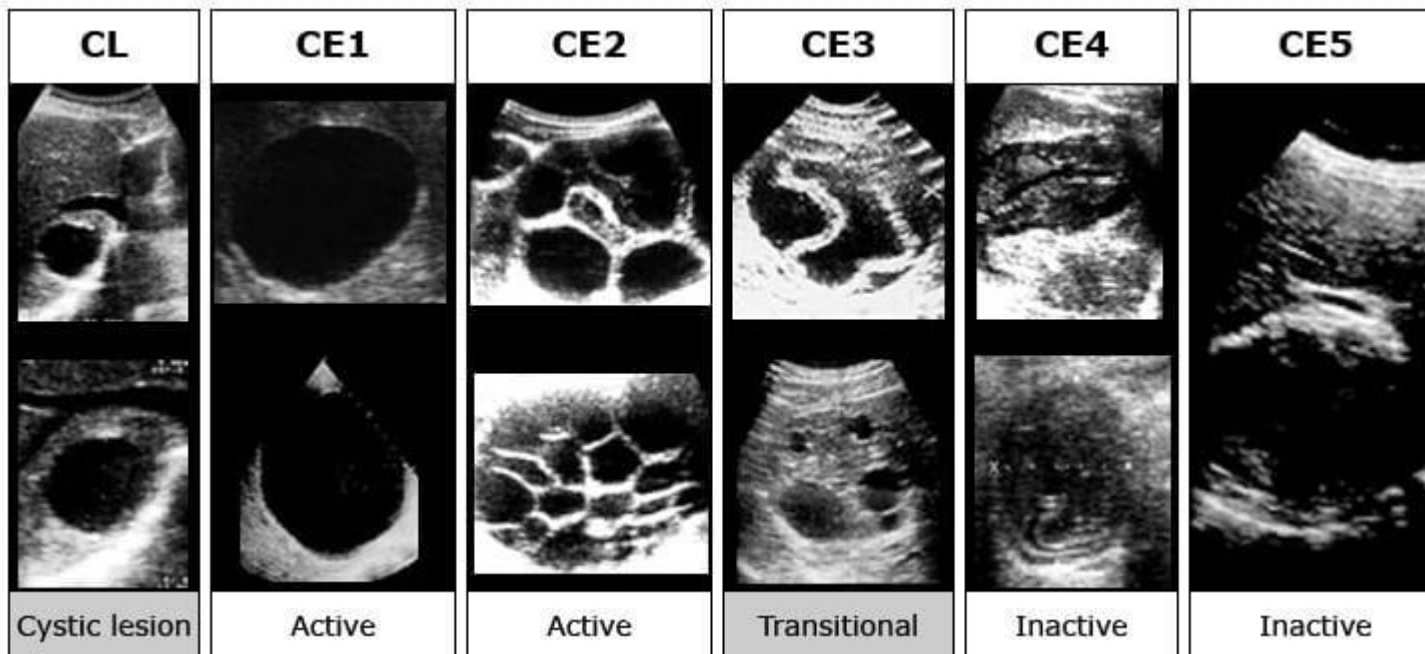
The most common sign is abdominal **tenderness**.

Hepatomegaly may be present or a mass may be felt.

Tender hepatomegaly is a sign of secondary infection of the cyst, especially when coupled with fever and chills. Ascites is rare.

Ultrasonographic classification of cysts due to cystic echinococcosis

Figure 1:

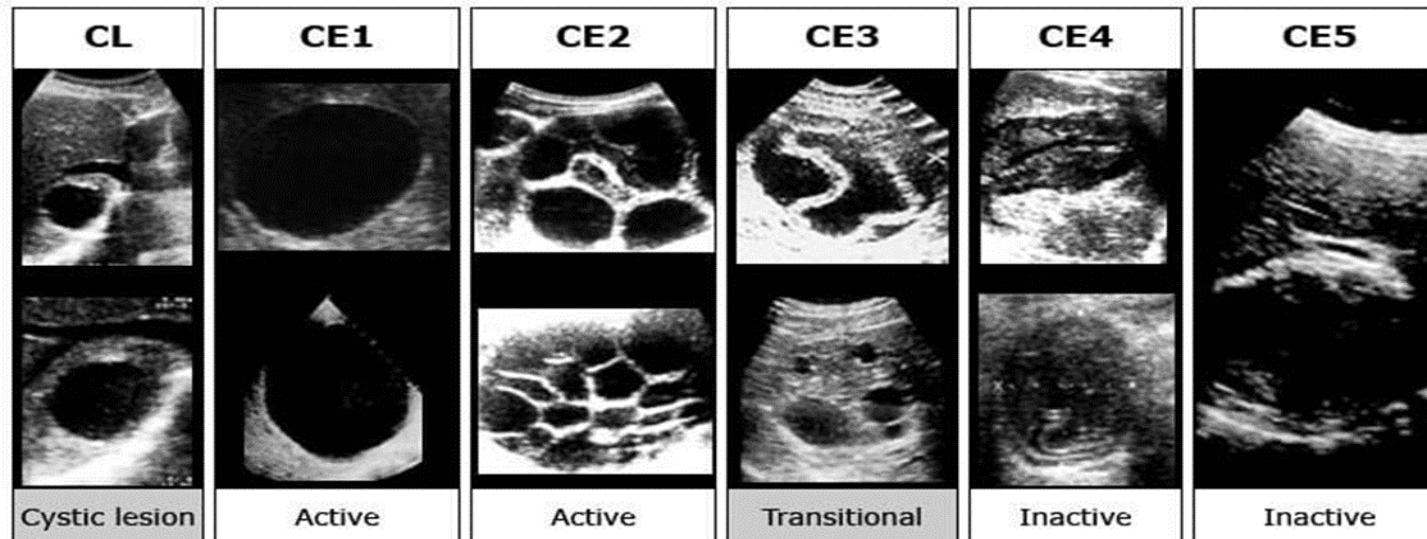


1.(Panel CL)

Consists of unilocular, cystic lesion(s) (CL) with uniform anechoic content. The cyst wall is not clearly visible; lesions are usually round but may be oval.

If these lesions are caused by cystic echinococcosis at an early stage of development, they are usually not fertile.

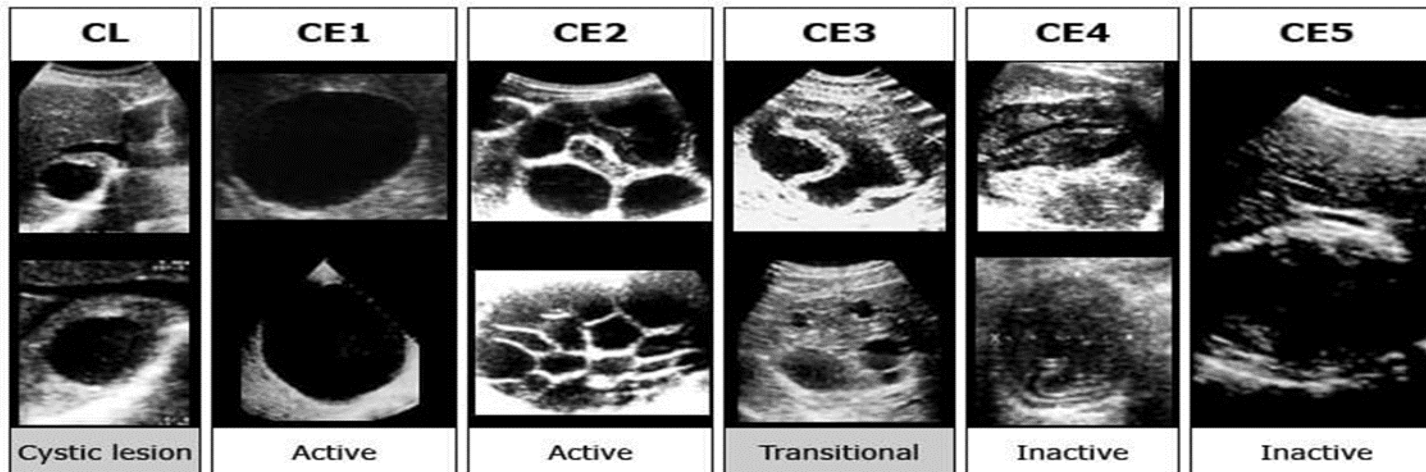
Definitive diagnosis cannot be made by ultrasound findings alone.



2.(Panel CE1)

Consists of unilocular, simple cyst with uniform anechoic content.

The cyst wall is visible; lesions are round or oval. Cyst may exhibit fine echoes due to shifting of brood capsules called hydatid sand ("**snow flake sign**")



3.(Panel CE2)

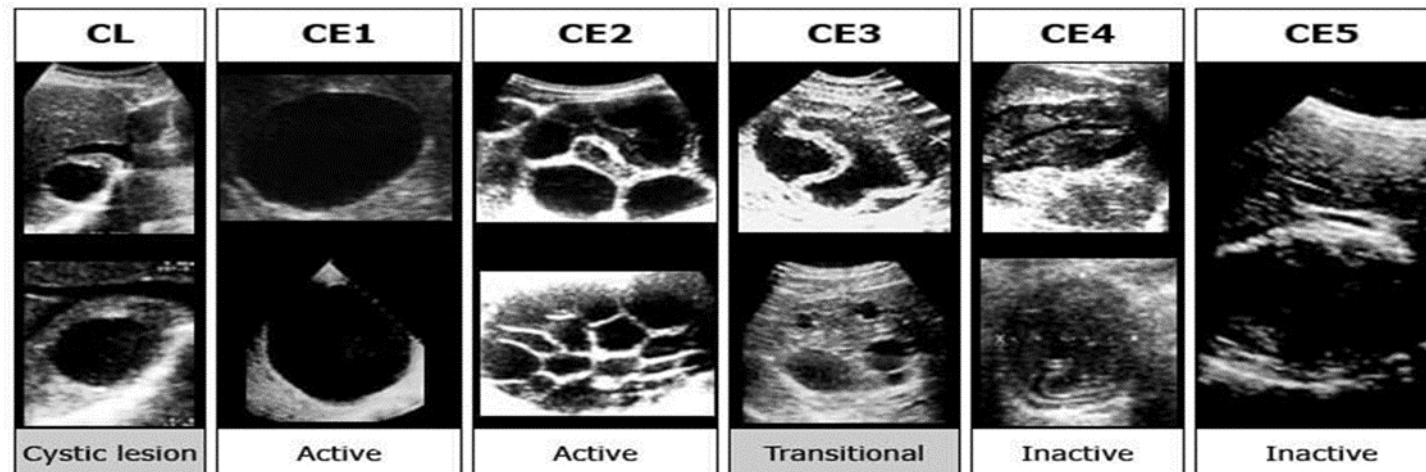
Consists of multivesicular, multiseptated cysts.

The cyst wall is normally visible; lesions are round or oval.

Septations produce **"wheel-like"** structures.

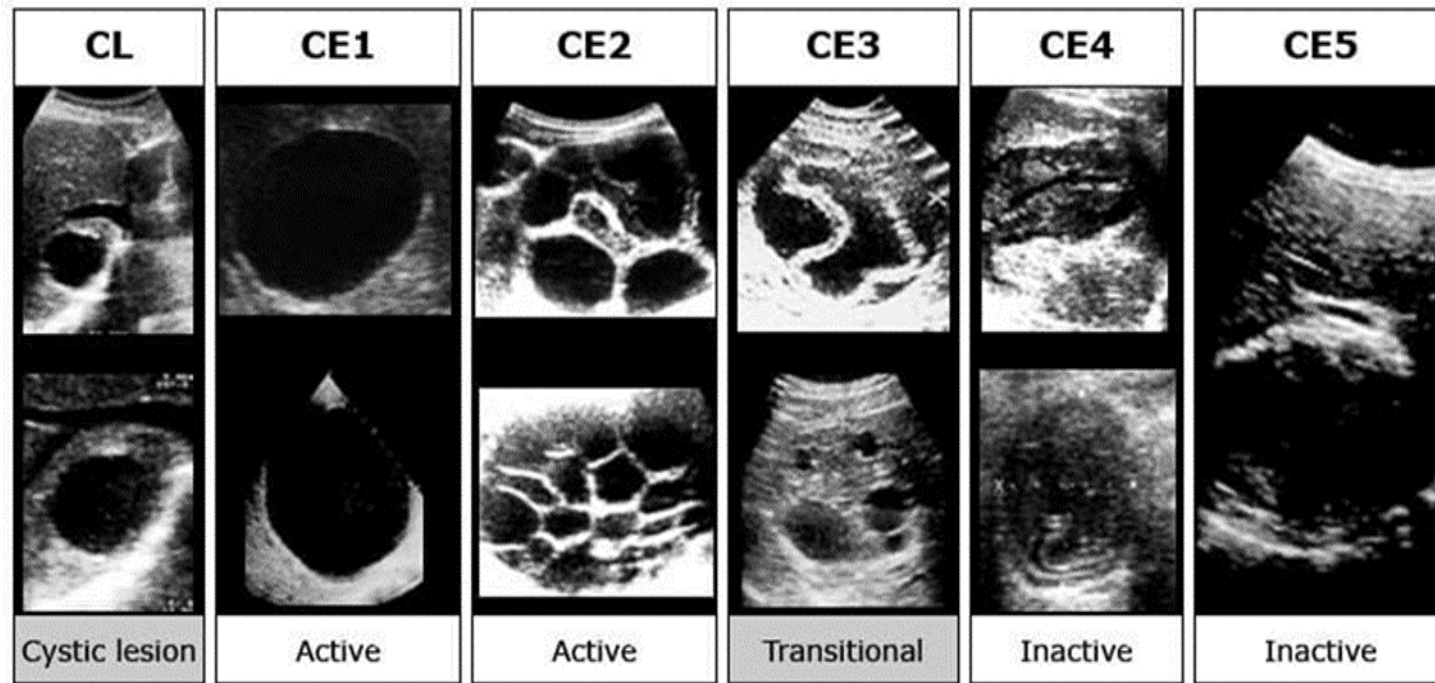
The presence of daughter cysts is indicated by **rosette-like or honeycomb-like** structures.

Daughter cysts may partly or completely fill the unilocular mother cyst



4. (Panel CE3)

Consists of a uniloc



Surgery is the treatment of choice for

- 1.complicated cysts
- 2.cysts with many daughter vesicles
- 3.cyst diameter >10 cm,
- 4.superficial cyst at risk of rupture due to trauma,
- 5.extrahepatic disease.
- 6.percutaneous treatment is not available.

!!! **Albendazole** is generally administered beginning one week prior to surgery and continued for at least four weeks postoperatively.

Some use **praziquantel** in addition to **albendazole**, although there is no clear evidence regarding its efficacy.

Complications include **secondary infection** of

1.cyst cavity

2.intraabdominal abscess

3.biliary fistula

4.sclerosing cholangitis

5.spillage of cyst contents leading to secondary echinococcosis

6.anaphylaxis.

Surgical Care

The indications and type of surgery are different for:

cystic echinococcosis (CE)
alveolar echinococcosis (AE).

Interventional procedures in AE

These procedures can be performed

1. endoscopically
2. under ultrasound
3. CT guidance.

Indications:

1. hyperbilirubinemia
2. vena cava thrombosis
3. portal vein thrombosis
4. ascrotic collections
5. and bleeding esophageal varices.

Contraindications: Postinterventional chemotherapy is not possible, and the risk of spreading the parasite is high.

Cystic echinococcosis

Indications:

1. Large liver cysts with multiple daughter cysts
2. superficially located single liver cysts that may rupture
3. liver cysts with biliary tree communication or pressure effects on vital organs or structures
4. infected cysts
5. cysts in lungs, brain, kidneys, eyes, bones, and all other organs are indications for surgery.

Contraindications:

1. General contraindications to surgical procedures (extremes of age, pregnancy, severe preexisting medical conditions)
2. multiple cysts in multiple organs
3. cysts that are difficult to access
4. dead cysts; calcified cysts
5. very small cysts are contraindications.

Choice of surgical technique:

1. **Radical surgery** (total pericystectomy or partial affected organ resection, if possible)

2. **conservative surgery** (open cystectomy)

3. simple tube **drainage** of infected and communicating cysts for surgical options.

!!!Laparoscopic approach has gained more acceptance and popularity in recent years.

At surgery, the exact location of the cyst is identified and correlated with the radiologic findings.

The surrounding tissues are protected by covering them with **cetrimide**-soaked pads.

The cyst is then evacuated using a strong suction device, and **cetrimide** is injected into the cavity.

This procedure is repeated until the return is completely clear.

Cetrimide is instilled and allowed to sit for **10 minutes**, after which it is evacuated, and the cavity is irrigated with **isotonic sodium chloride solution**.

This ensures both mechanical and chemical evacuation and destruction of all cyst contents.

During this process, care is taken to ensure no spillage occurs to prevent seeding and secondary infestation.

The cavity is then filled with isotonic **sodium chloride solution** and closed.
the omentum is needed to fill the cavity.

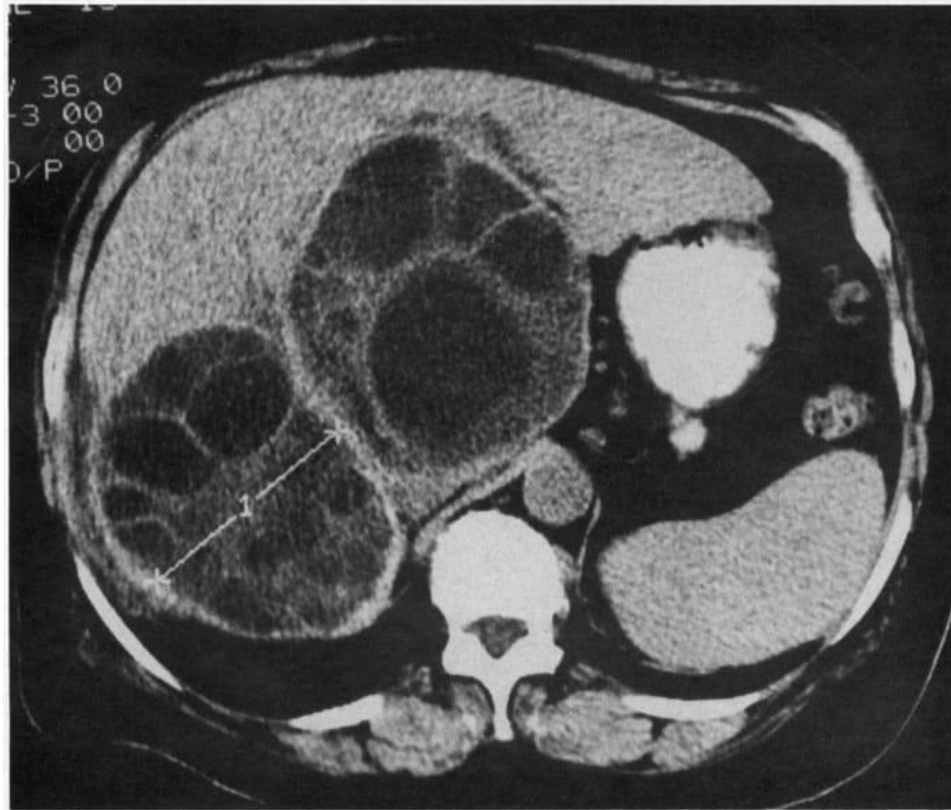
The cyst fluid is inspected for bile staining at the end of the evacuation and irrigation process.

The inside of the cyst is inspected, and any bile duct communication is sutured.

In case of infected cysts with biliary communication, closed suction drainage is required.

Regardless of whether an open or a **laparoscopic approach** is chosen, these basic principles must be followed in order to ensure the safety of the procedure.

Figure 2:



Ct of the liver of a 57 year old woman. Lobulated structure with daughter cyst

Figure 3:



LUNG

Infections with *Echinococcus* are usually confined to the **right lower thorax** and are related to extension from a **liver abscess below the diaphragm** via direct extension or **lymphatics to the right thorax**.

Metronidazole (flagyl) is usually effective, although Flagyl and tube drainage may be required for treatment of empyema.

Open resection is infrequently required.

The hydatid cyst may rupture, flooding the lung or producing a severe hypersensitivity reaction.

A lung abscess could occur with compression of the airway, great vessels, or esophagus.

Surgery, if feasible, may include simple enucleation via cleavage of planes between the cyst and the normal tissue.

Aspiration and hypertonic saline 10% may be performed before enucleation.

Positive pressure on the lung needs to be maintained until the cyst is out to prevent contamination, soilage, or hypersensitivity reaction.

Nonoperative therapy for small asymptomatic calcified cyst may be considered.

Clinical manifestations:

varied widely depending on the status of the hydatid cyst.

The most common presenting symptom of the patients was a **cough**, followed by **chest pains** of varying severity.

Clinical presentation of pulmonary hydatid cysts depends on the size of the cyst and whether the cyst is intact or ruptured.

Intact cysts are either incidental findings or present with **cough, dyspnea or chest pain.**

If it ruptures into a bronchus, pleural cavity or biliary tree it is called **complicated cyst** and may present with

1. expectoration of cystic contents
2. productive cough,
3. repetitive hemoptysis,
4. fever
5. anaphylactic shock in addition

Patients come to the clinician's attention for different reasons, such as when a large cyst has some mechanical effect on organ function or rupture of a cyst causes acute hypersensitivity reactions. The cyst may also be discovered accidentally during radiographic examination, body scanning, surgery, or for other clinical reasons.

PH/E:

physical findings are **hepatomegaly** when associated with liver involvement, a palpable mass if on the surface of the liver or other organs, and abdominal distention.

If cysts in the lung rupture into the bronchi, intense **cough** may develop, followed by **vomiting** of hydatid material and cystic membranes.

Figure 4:

Table 19-18
Indications for surgical drainage procedures for lung abscesses
1. Failure of medical therapy 2. Abscess under tension 3. Abscess increasing in size during appropriate treatment 4. Contralateral lung contamination 5. Abscess >4–6 cm in diameter 6. Necrotizing infection with multiple abscesses, hemoptysis, abscess rupture, or pyopneumothorax 7. Inability to exclude a cavitating carcinoma

Figure 5:



Chest radiograph showing large hydatid cyst right upper lobe causing mediastinal shift to opposite side

Figure 6:



CT appearance of an uncomplicated giant hydatid cyst of the right lung.

Figure 7:



CT scan showing two well-circumscribed homogenous cysts over right and left lower lobes

1. General principles of the treatment

1.1. Surgery methods

1.1.1. Conventional surgery

Initially, the surgical treatment of pulmonary hydatidosis involved the marsupialization of the cyst when it was attached to the wall, or an atypical pulmonary resection consisting of two stages:

first pleurodesis was produced

followed by marsupialization in a second procedure.

Evidently, these techniques have since been abandoned exceptly when the diagnosis of hydatid cyst rupture was carried later.

We have treated young women with chronic pleuritis by marsupialization discovered one month after hydatid cyst rupture.

Figure 8:



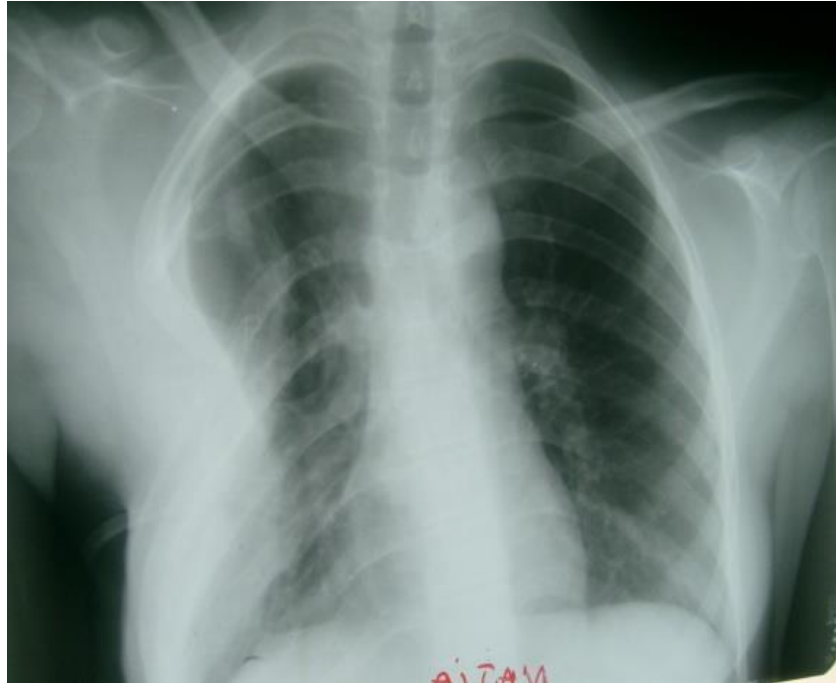
Complicated hydatid cyst with chronic pleuritis.

Figure 9:



Marsupialization of the cyst

Figure 10:



Outcomes of marsupialization after 1 year for complicated hydatid cyst

Actually the aim of surgery in pulmonary hydatid cyst is to remove the cyst completely while preserving the lung tissue as much as possible.

Lung resection is performed only if there is an irreversible and disseminated pulmonary destruction.

Careful manipulation of the cyst and adherence to the precaution to avoid the contamination of the operative field with the cyst content is the imperative part of the operation.

Different surgical procedures have been described such as the enucleation of intact cyst, and needle aspiration for the evacuation of the cyst with serious risk by spillage of hydatid fluid around the puncture site.

Cyst spillage may release a large number of viable scolices that implant elsewhere and produce secondary cysts

1.1.2. Others conventional procedure

A number of methods have been described for the surgical removal of hydatid cysts of the lung

The Barrett technique

The Perez Fontana method

The Ugon technique

1.1.3. Video assisted thoracoscopic surgery

Peritoneum:

Peritoneal echinococcosis (13%) is usually secondary. Primary peritoneal echinococcosis is rare. Presentation in the form of disseminated intraperitoneal hydatid disease is extremely rare finding. We report such a presentation where the abdominal cavity is seen to contain multiple hydatid cysts.

A 57-year-old nonalcoholic, nondiabetic Muslim male presented with progressively increasing abdominal distension for 3 months prior to admission along with weight loss and anorexia.

On examination, he was vitally stable with pale pallor.

Abdominal examination revealed a soft mass of 10×8 cm which was tender, mobile, and cystic in consistency and was palpable in the epigastrium and right hypochondrium.

Soft irregular masses were also felt in the umbilical and hypogastric region

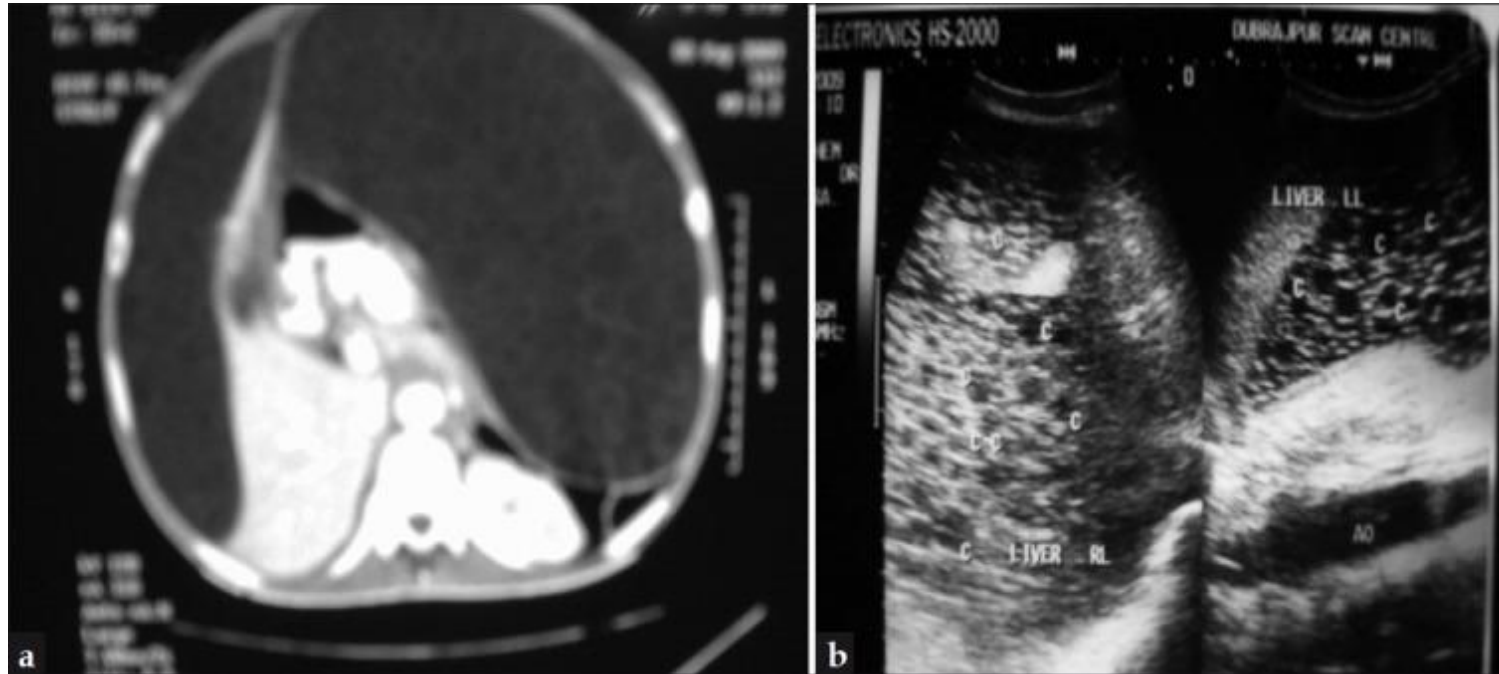
There was presence of fluid thrill but no shifting dullness or organomegaly could be elicited. Hematological tests showed a slight anemia and a mild increase in the eosinophil count (3%).

All other laboratory tests including liver function tests were within normal limits except for a positive test for antibodies against E. granulosus.

The contrast enhanced computed tomography (CECT) scan of the abdomen revealed multiple well-defined septate cysts throughout the abdomen [Figure 11a].

Ultrasonography of the abdomen showed a normal liver with multiple intraperitoneal cysts [Figure 11b].

Figure 11:



Contrast-enhanced computed tomography scan of the abdomen•

(a) showing a normal liver, spleen with the whole of the peritoneal cavity replaced by multiple hydatid cysts.

(b) Ultrasonography showing a normal liver with multiple intraperitoneal cysts

There was no contrast enhancement and pericystic invasion of cysts.

No other lesion was demonstrable in any organ system.

The patient underwent operation

Operative findings included **multiple hydatid cysts** [Figure 12] of about 1–2 cm in diameter in the whole abdominal and pelvic cavity.

Figure 12:



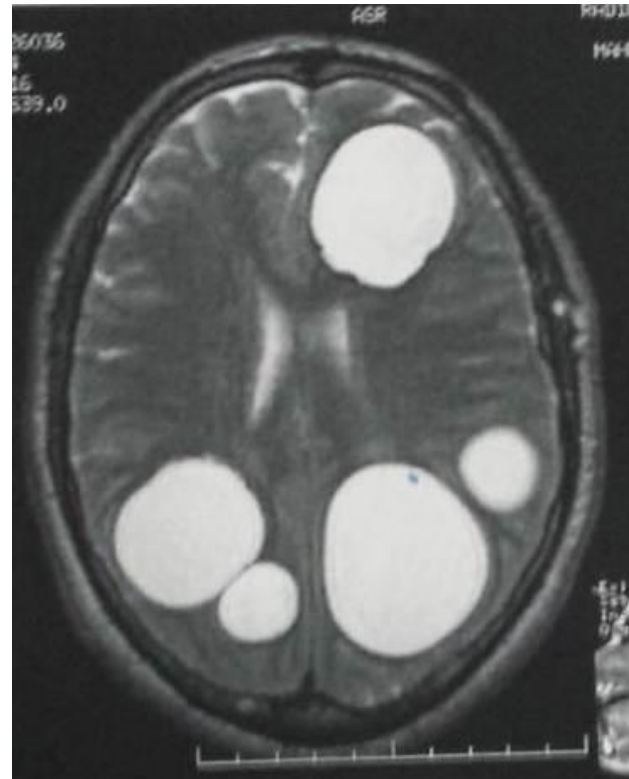
The mother cyst was seen in the transverse colon.
Postoperatively, he received praziquantel and albendazole for 2 weeks and **albendazole** was continued for 6 months. On 1-year follow-up, he was fine without any sequelae.

Cerebral hydatid disease

is caused by *Echinococcus granulosus* or less commonly *E. alveolaris* or *E. multilocularis*. The larval stage is the cause of [hydatid disease](#) in humans .

For a general discussion, and for links to other system specific manifestations, please refer to the article on [hydatid disease](#).

Figure 13:



Epidemiology:

Cerebral hydatid disease is a rare parasitic infestation and accounts for 1-2 % of all cystic echinococcosis. Hydatid disease is endemic in the **Mediterranean region**, the **Middle East**, Africa, eastern part of Turkey, Australia and parts of South America .

Clinical presentation:

- .focal neurological deficits
- .headaches
- .increased intracranial pressure
- .hydrocephalus
- .papilledema and loss of vision
- .altered mental status
- .seizures (rare)

Intracranial hydatid cysts can be classified into:

primary hydatid cysts

occur as direct invasion of larva that managed and filtered via liver and lung to the brain usually solitary but may be multiple
is fertile

secondary hydatid cysts

occur as a result of rupture of primary cysts in other organs then reaching by embolization to the brain usually multiple

Infertile do not have brood capsule or scolices

Treatment and prognosis

Management is **surgical**, with removal of the entire cyst without rupture using **Dowling's maneuver** (instilling warm saline between the cyst wall and the brain) . In some cases where it is felt that removing the cyst intact (without cyst rupture during surgery) is unlikely to succeed, the cyst can be removed after puncture and aspiration of its contents.

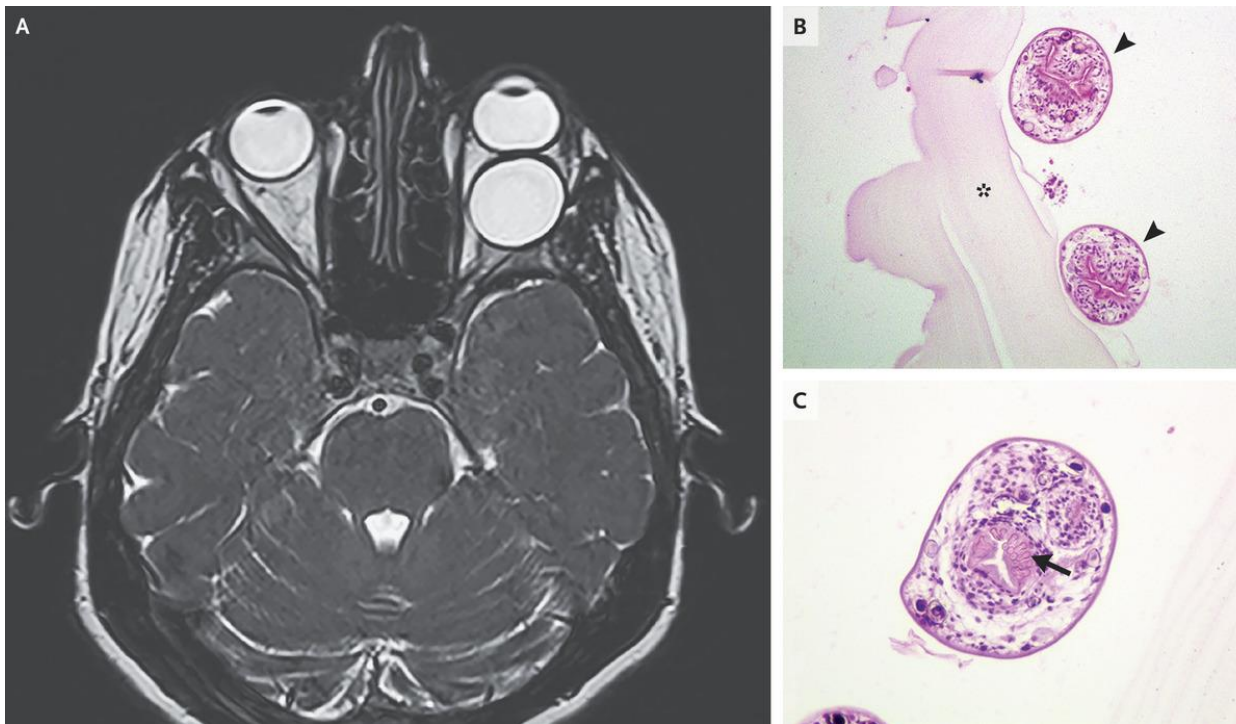
Case: ophthalmic hydatid cyst

A 31-year-old woman presented to the emergency department with a history of blurred vision in the left eye over a 4-week period and progressive bulging of the left eye over a 2-week period. Physical examination revealed nontender proptosis of the left eye, paresis of the left abducens nerve, and reduced visual acuity in the left eye. A T2-weighted gadolinium-enhanced magnetic resonance image of the brain showed a well-defined, ovoid, cystic, and retrobulbar lesion in the left orbital cavity (Figure 14.A).

The optic nerve was displaced nasally and the lateral rectus muscle was compressed. The patient underwent left lateral orbitotomy, and the cyst was completely removed but ruptured during surgery. The area was washed with saline. Histopathological examination revealed multiple protoscolices (Figure 14.B, arrowheads), with central hooklets (Figure 14.C, arrow) , adjacent or attached to a thick, acellular laminated echinococcal cyst membrane (Figure 14.B, asterisk) .

A diagnosis of a **hydatid cyst** caused by the *Echinococcus granulosus* tapeworm was made. Thoracic and abdominal computed tomographic scans revealed no extraorbital organ involvement. The patient received a 3-month course of **albendazole**, and at follow-up 3 months later, she had full recovery of visual acuity.

Figure 14:



Scolicidal agents for **protoscolices** of
Echinococcus granulosus hydatid cyst

Hydatid cyst is the larval stage of dog tape worm *Echinococcus granulosus*. Protoscolices are parasite larvae that develop into **adult worms** in the final host **intestine**. During surgical treatment of human hydatidosis spillage of live protoscolices is the major cause of **hydatidosis** recurrence.

To prevent this problem scolicidal agent such as **hypertonic salt** are used to kill the protoscolices that may disseminate into the patient's tissues during surgery. However, they may have some unacceptable side effects.

Hydatid cyst is the **larval stage** of *Echinococcus granulosus* dog tapeworm. It is endemic and is still an important economic and public health concern in some parts of the world, especially in the **Middle East**.

Hydatidosis is mainly
diagnosed by **imaging** technique
confirmed by **immunological** methods.

Protoscolices are **microscopic larvae** that capable to develop to adult worms in the final host **intestine** or to secondary **hydatid cyst** in the **intermediate host viscera**.

One of the **treatment** options for CE is **surgical removal** of the cyst combined with chemotherapy using **albendazole (ABZ)** or **mebendazole** before and after surgery. Surgical treatment of human hydatidosis involves the use of various scolicidal agents to kill infective E. granulosus protoscolices that may disseminate into the **peritoneal cavity** during surgery and potentially **re-infect** the patient. Spillage of live protoscolices during the operation is the major cause of recurrence.

many scolicalidal agents including

- 1.some plant extracts
- 2.mannitol
- 3.ABZ
- 4.chlorhexidine gluconate (Chx-Glu)
- 5.honey
- 6.hypertonic saline
- 7.silver nitrate
- 8.cetrimide
- 9.ethyl alcohol
- 10.H₂O₂
- 11.povidone-iodine

It seems that agents that in minimum concentration and minimum time have 100% scolicial activity could be good candidates for further investigations. In this context, it has been shown that

F. vulgare after 5 min, metalonic
extracts of **A. sativum** after 10 min,
hypertonic saline after 10 min
warm water after 2 min
kill all alive protoscolices.

These compounds could be good candidates to be used as protoscolisieds agents. Other compounds such as **monensin** although has 100% protoscolicidal activities, but it take a long time to show their effects. Finally, the side effects of candidate agents should be investigated on cells in vitro and also in animal models

***THANKS FOR YOUR
ATTENTION***