Hydatid Cyst of Liver

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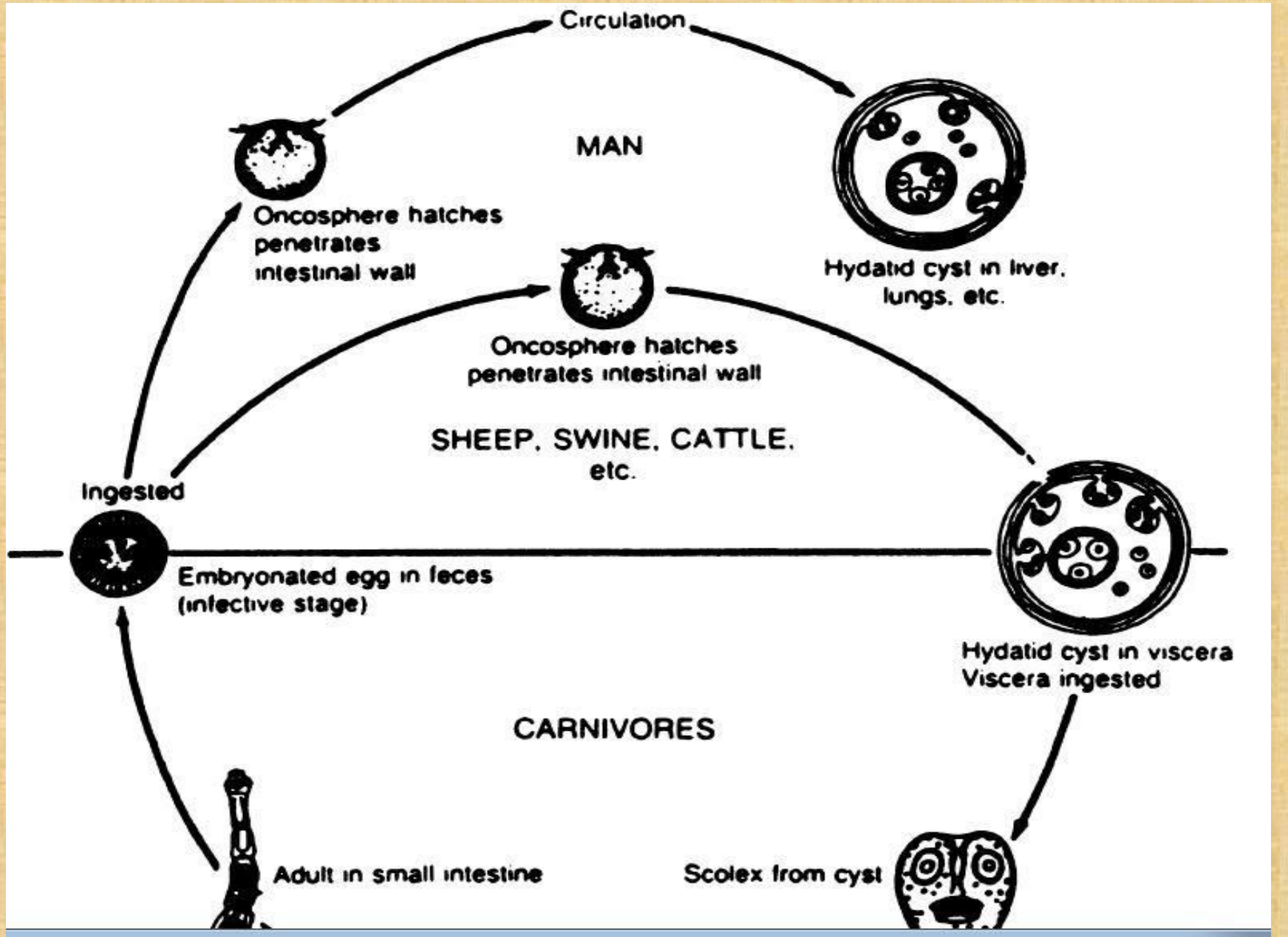
Etiology

Causative agent	Intermediate host	Definative host
Echinococcus granulosus,	Sheep, Human	dog
Echinococcus multilocurlaris (Alveolar echinococcosis)	Rodents ,Humans	dog,fox


Circulation
MAN
Oncosphere hatches
penetrates
intestinal wall
Hydatid cyst in liver,
lungs, etc.
Oncosphere hatches
penetrates intestinal wall
SHEEP, SWINE, CATTLE,
etc.
Ingested
Embryonated egg in feces
(infective stage)
Hydatid cyst in viscera
Viscera ingested
CARNIVORES
Adult in small intestine
Scolex from cyst

Pathology

- After 3 weeks of infestation cyst appear in liver
- Growth rate is 2-3cm/yr
- A primary cyst in the liver is composed of three layers:

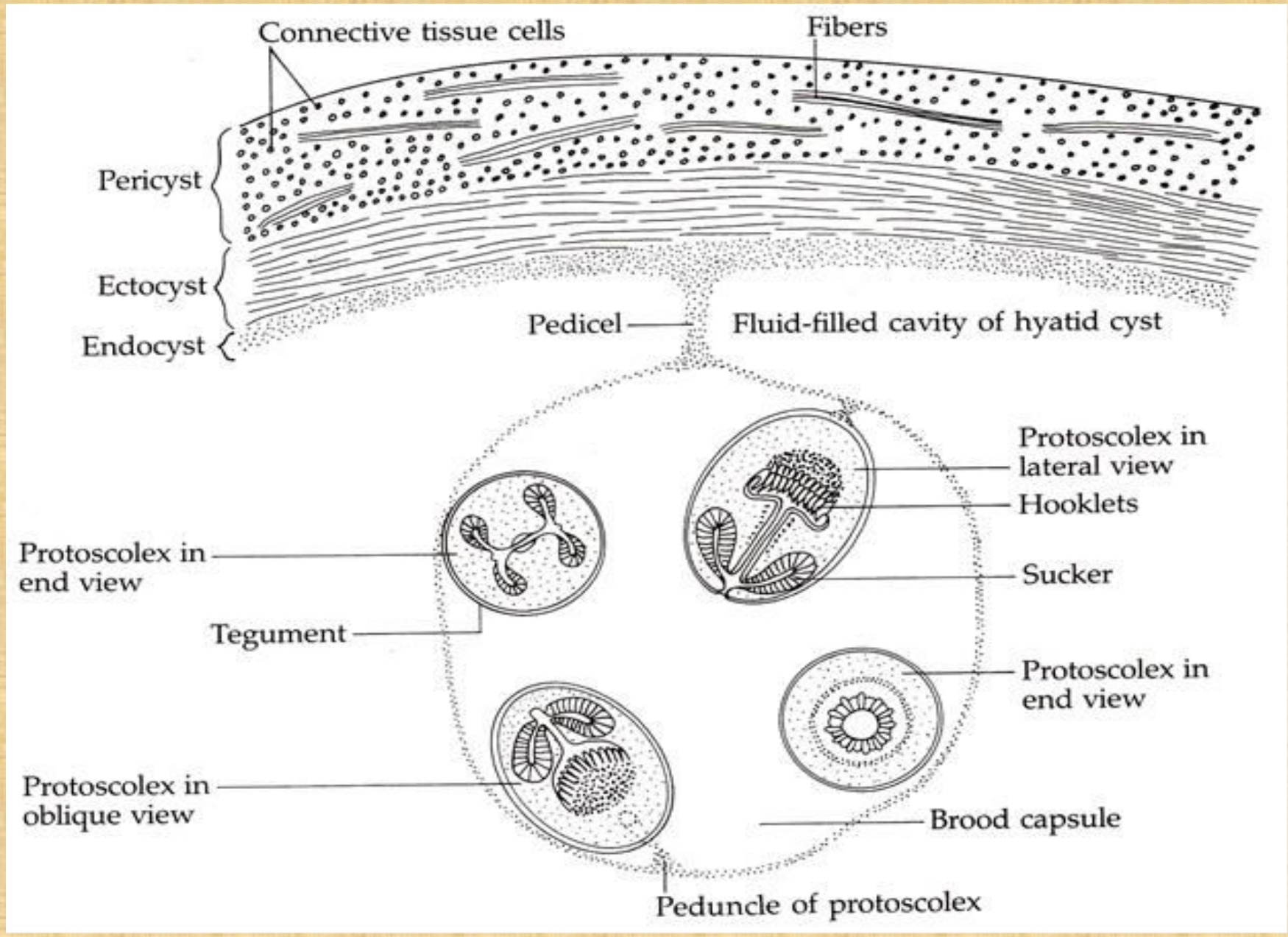
- **Adventitia (pseudocyst / pericyst)** –
- **Laminated membrane (ectocyst)** – gelatinous layer,acellular,separable
- **Germinal epithelium (endocyst)** –living part.

- Development of brood capsules from the germinal layer indicates complete biologic development of the cyst, which occurs after 6 months of growth.
- Daughter cyst formation is a defense reaction.

Pathology (contd)

- ***Features of hydatid fluid :-***

✓ Clear
✓ High specific gravity (1.005-1.009)
✓ Shows hooklets and scolices


Connective tissue cells
Fibers
Pericyst
Ectocyst
Endocyst
Pedicel
Fluid-filled cavity of hyatid cyst
Protoscolex in lateral view
Hooklets
Sucker
Protoscolex in end view
Tegument
Protoscolex in end view
Protoscolex in oblique view
Brood capsule
Peduncle of protoscolex

Organ involved

- ✓ **liver (63%),**
- ✓ **lungs (25%),**
- ✓ **muscles (5%),**
- ✓ **bones (3%),**
- ✓ **kidneys (2%),**
- ✓ **brain (1%),**
- ✓ **spleen (1%).**

CLINICAL FEATURES

- **asymptomatic**
- **abdominal pain, dyspepsia, and vomiting.**
- **hepatomegaly/mass**
- *Mass shows* ***classical thrill (hydatid thrill)*** **elicited by *three-finger test.***
- **Jaundice and fever** (8%)
- **Bacterial superinfection(behave like pyogenic abscess)**

complications

- **Rupture :** into the biliary tree(60%)
- pleural ,pericardium,brochi,
- **Free ruptures** can result in disseminated echinococcosis and a potentially fatal anaphylactic reaction**.**
- ***Camellotte sign****:* Following intrabiliary rupture, gas enters into cyst causing partial collapse of the cyst wall.

Course

- may die and cyst eventually may get *calcified.*

•Commonly cyst *enlarges* and is palpable per abdomen.

- *Secondary cysts* in the lung, spleen, mesentery, retroperitoneum
- *liver failure*

Investigations

- elevated bilirubin or alkaline phosphatase (bile duct inv)
- Leukocytosis : infection of the cyst.

Serological tests

- ***Primary serological tests* :-**

1) ELISA
2) Immunoelectrophoresis-80-95% sensitivity for liver hydatid.

- ***Secondary laboratory tests: –***

1) Detection of precipitation line - arc 5;
2) Immunoblotting;
3) Polymerase chain reaction (PCR).

✓ More specific, very useful in extra hepatic hydatid disease and calcified non-fertile liver hydatid.

- **Casoni's test** (intradermal test - 75% sensitive) - complement fixation test - historical interest

IMAGING TECHNIQUES

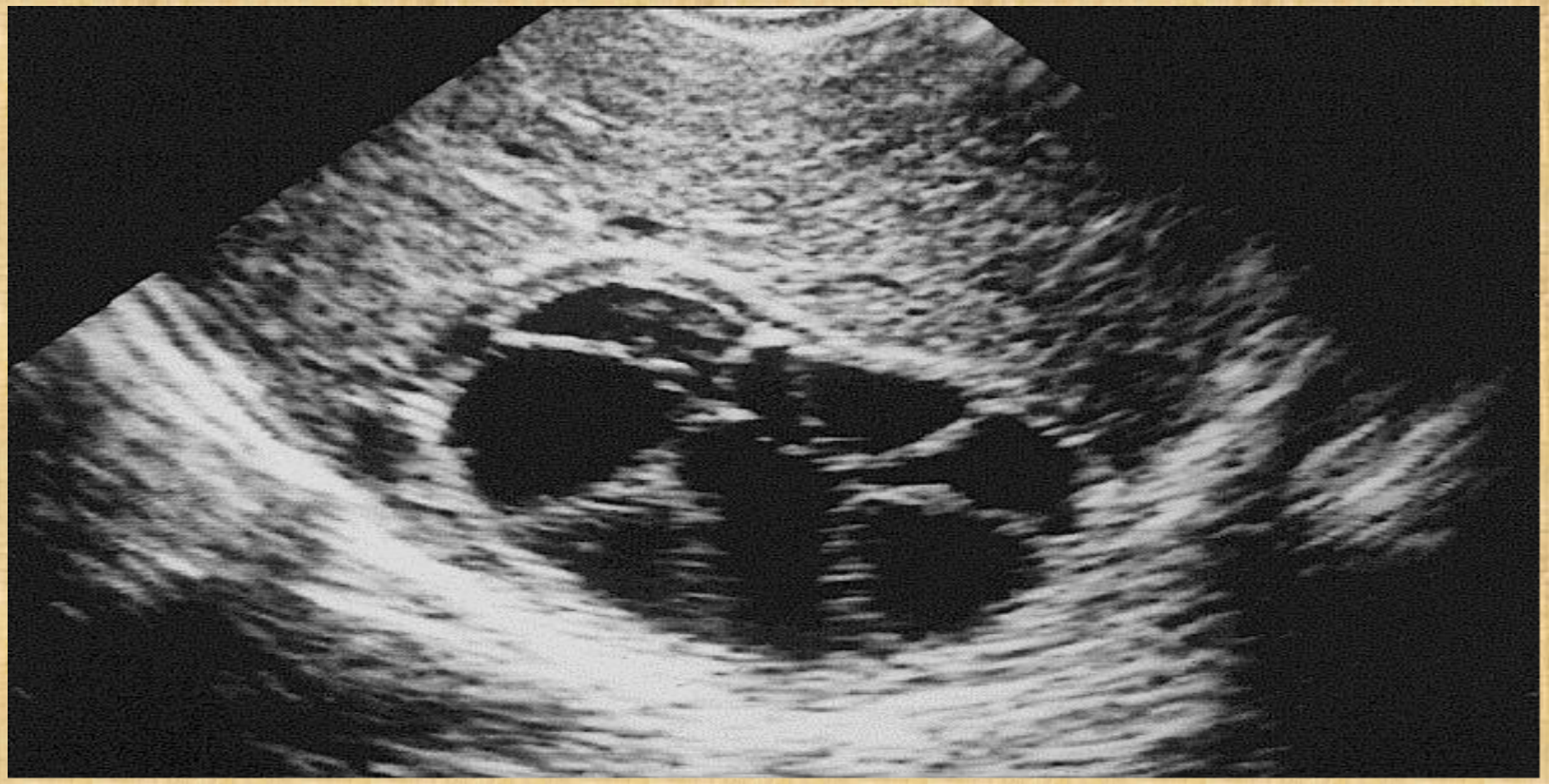
- **<u>Plain X-RAY Films:</u>**
- thin rim of calcification

- **Ultrasound:**
- Accuracy:90%
- a) ***Solitary Cyst*** –
- anechoic univesicular cyst with well defined borders.
- *dependent debris (hydatid sand) moving freely with change in position;*
- *presence of wall calcification*
- *localized thickening in the wall(daughter cysts)*
- Separation of membranes (***ultrasonic water lily sign***) due to collapse of germinal layer seen as an undulating linear collection of echoes.

Ultrasonography (contd)

- c) ***Daughter cysts*** - probably the most characteristic sign with cysts within a cyst, producing a *cartwheel or honeycomb cyst.*

- d) ***Multiple cysts*** with normal intervening parenchyma.



Hydatid cyst of the liver on ultrasound examination. Note the multiloculated appearance of the cyst due to the presence of multiple daughter cysts. Detached germinal membranes and brood capsules can be seen in the more anterior daughter cyst. This multiseptated anechoic or hypoechoic appearance on sonography is typical of a hydatid cyst.

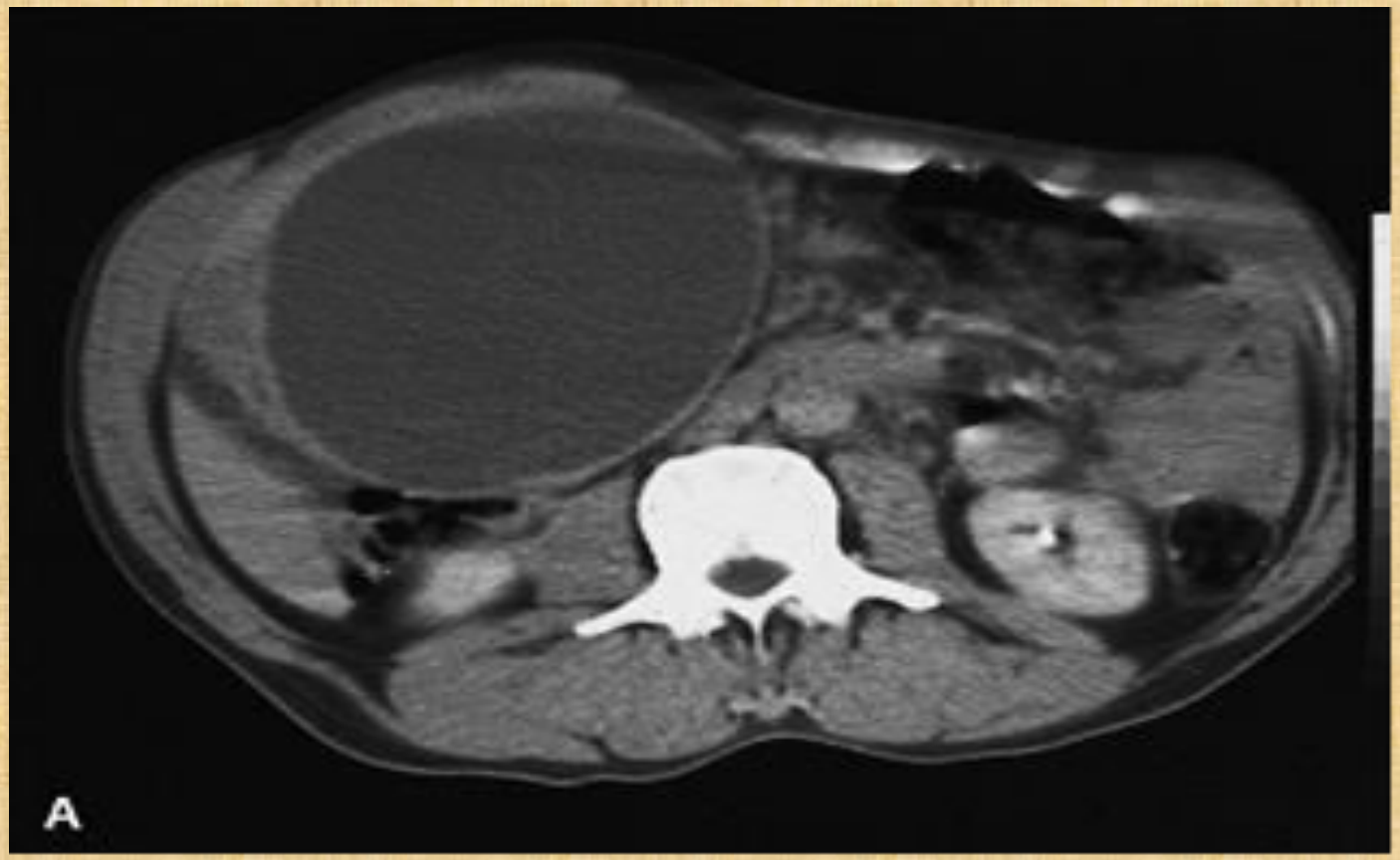
Gharbi morphological classification

- Type I has a pure fluid collection.
- Type II has a fluid collection with a split wall (floating membrane).
- Type III reveals a fluid collection with septa (honeycomb image).
- Type IV has heterogenous echographic patterns
- type V has reflecting thick walls.

Computed Tomographic scan

- 98%
- number, size, and location
- clue to presence of intrabiliary rupture.
- CT features include:-
  - *sharply marginated single or multiple rounded cysts of fluid density (3 – 30 Hounsfield units) with a thin dense rim*.
  - It is supported by *floating membran*e within the cysts on CT scan.

CT Scan showing Type I cyst



(**A**) Univesicular uncomplicated type I cyst

CT scan showing Type II cyst

B) Multivesicular type II hydatid with multiple daughter cysts giving a septated appearance

CT scan

(**C**) Old hypermature liver hydatid cyst. Non-contrast CT shows calcification in the cyst wall and matrix and fluid within the cyst, suggesting it is still evolving and not innocuous and should be treated

Other Imaging Techniques

- **Angiography:** avascular lesion with vascular displacement and a thin peripheral halo of higher density.
- **Direct cholangiography** – (Endoscopic or percutaneous) may be required in suspected intrabiliary rupture and bile duct obstruction.
- ERCP is also a valuable method for detecting post-operative complications involving the biliary tree following surgical intervention.

Treatment

- The treatment of choice is surgery.
- **Available Options:**
  - **Medical**
  - **Per-cutaneous**
  - **Endoscopic**
  - **Surgical**

MEDICAL TREATMENT

ALBENDAZOLE

- Indications:
- extrahepatic manifestations of the disease
- alveolar form caused by *E. multilocularis*.
- Given for at least 3 months preoperatively, albendazole reduces the recurrence rate when cyst spillage, partial cyst removal, or biliary rupture has occurred.
- inoperable primary liver or lung cysts
- cysts in 2 or more organs

MEDICAL TREATMENT

- **<u>Contraindications:</u>**
- pregnancy
- chronic hepatic disease,
- large cysts with the risk of rupture,
- inactive or calcified cysts
- bone cysts

- **Albendazole**
- dose of 400 mg twice daily.
- The treatment is given in cycles of 28 days with two weeks treatment free periods between the cycles.
- The different schedules for the treatment are:

1. Inoperable cases - as primary treatment - 3 cycles
2. Pre-operatively – to reduce the risk of recurrence 6 weeks continuous treatment
3. Post-operatively to prevent recurrence in cases of intraoperative cyst spillage – 3 cycles.

PERCUTANEOUS DRAINAGE OF HYDATID CYST (PAIR)

- PAIR (*Puncture, Aspiration, Injection, Re-aspiration*)
- PAIRD

PAIR

- ultrasound or CT guidance
- The cyst is then filled with isotonic sodium chloride solution.
- Perioperative treatment with a benzimidazole is mandatory

INDICATIONS FOR PAIR

- Patients with:
- Non-echoic lesion ≥ 5 cm in diameter (TYPE 1)
- Cysts with detachment of membranes (TYPE2) and/or with daughter cysts (TYPE 3),
- Multiple cysts if accessible to puncture
- Infected cysts
- Pregnant women
- Children >3 years old
- Patients who fail to respond to chemotherapy alone
- Patients in whom surgery is contraindicated
- Patient who refuse surgery
- Patients who relapse after surgery

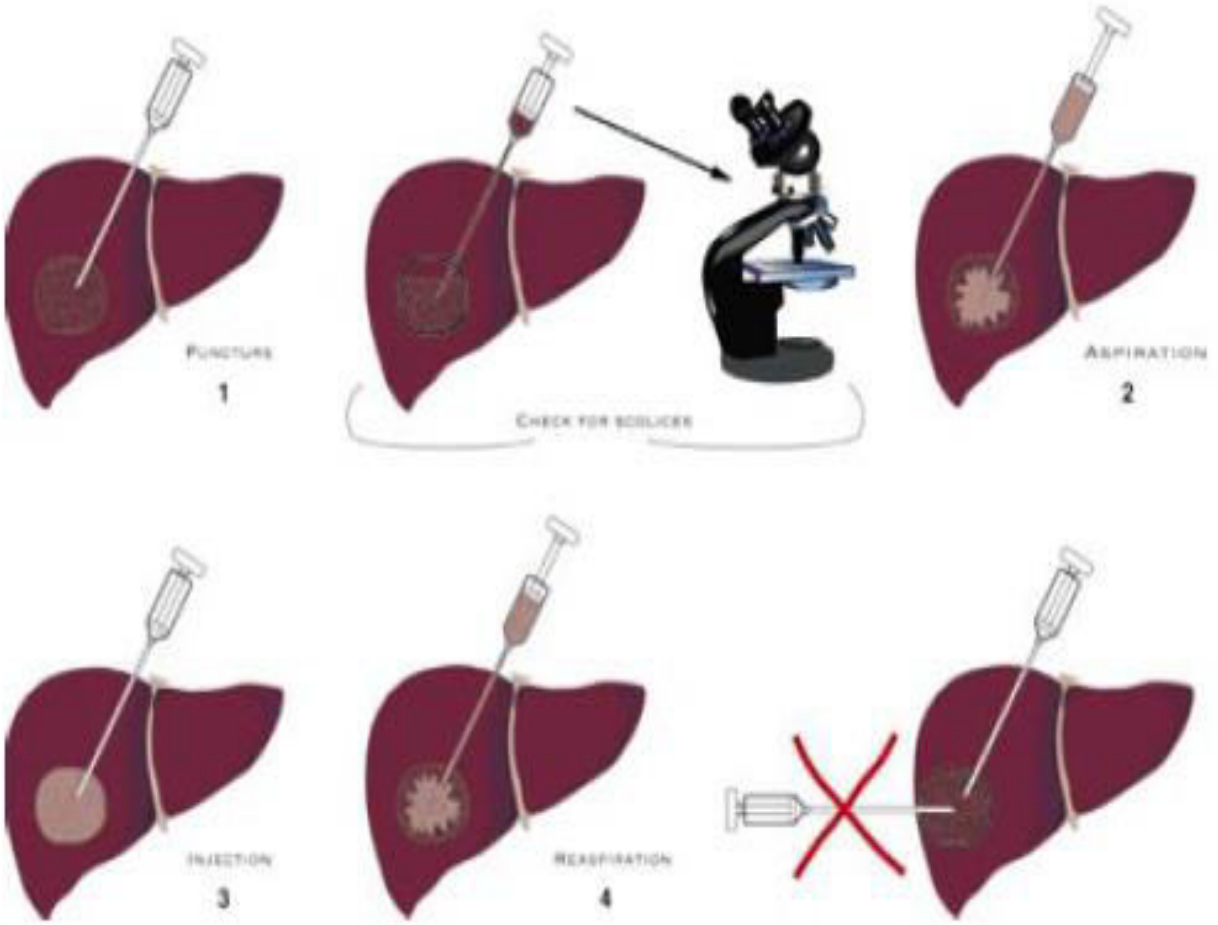
Contraindications for PAIR

- Non-cooperative patients and inaccessible or risky location of the cyst in the liver.
- Cyst in spine, brain and/or heart.
- Inactive or calcified lesion.
- Cysts communicating with the biliary tree.
- Cysts open into the abdominal cavity, bronchi and urinary tract.

PAIR STEP BY STEP

- PAIR Protocol (Minimum Requirements):

1. Prophylaxis with albendazole
2. Puncture and parasitological examination (if possible) or fast test for antigen detection in cyst fluid
3. Aspiration of cystic fluid (10-15 cc)
4. Test for bilirubin in cyst fluid
5. If bilirubin present: →→ →→ stop procedure
6. If no bilirubin present: →→ →→ aspirate all cystic fluid
7. Injection of 95 % ethanol solution or hypertonic saline (1/3 of the amount of aspirated fluid)
8. Re aspiration of protoscolicide solution after 15 minutes
9. New parasitological control if possible



Pair Sequence

The steps of the puncture procedure (cartoon): the critical point is the angle of puncture: normal liver parenchyma must be present between the puncture point and the surface of the cyst to avoid leakage of cyst fluid (prevention of anaphylactic reactions) and protoscolex spillage (prevention of recurrences). Direct puncture of a cyst close to the abdominal wall must be avoided.

Endoscopic management of Hydatid cyst

-
- **ERCP** : diagnosing biliary tree involment
- Rx: ES,removal of cysts using basket

SURGICAL TREATMENT

Indications:

- Large liver cysts with multiple daughter cysts superficially located
- liver cysts with biliary tree communication
- pressure effects on vital organs or structure
- infected cysts.

Contraindications:

Pregnancy

multiple cysts in multiple organs

cysts that are difficult to access

- dead cysts
- calcified cysts

very small cysts .

PRINCIPLES OF HYDATID SURGERY

- Total removal of all infective components of the cysts
- The avoidance of spillage of cyst contents at time of surgery
- Management of communication between cyst and adjacent structures
- Management of the residual cavity

PRINCIPLES OF HYDATID SURGERY

Packing

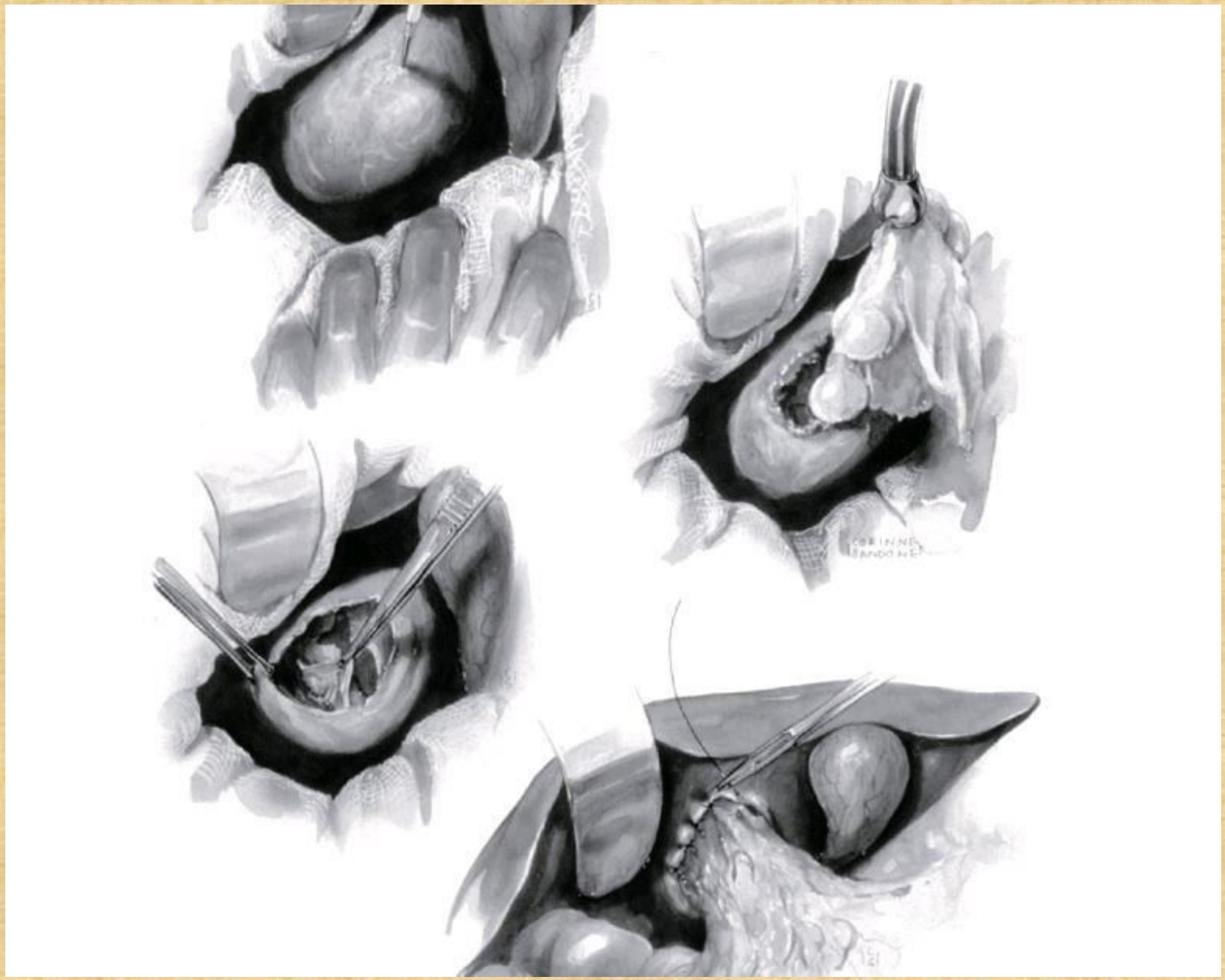
Aspiration

Injection of scolicidal agents:

- ✓ Scolicidal agents include:-
- 10% betadine
- Cetrimide - can cause acidosis
- Alcohol 95% - can cause cholangitis
- Hypertonic saline - hypernatraemia
  - Sodium hypochlorite – hypernataraemia
- Hydrogenperoxide
- ✓ In cases with biliary communication only hypertonic saline (15-20%) is used

Open Cyst Evacuation

- safest surgical method
- Peripherally located cysts
- abdominal or flank approaches
- the field is lined with hypertonic (20%) saline-soaked gauze .
- The cavity may then be irrigated with a scolecidal agent.



Laparoscopic Cyst Evacuation

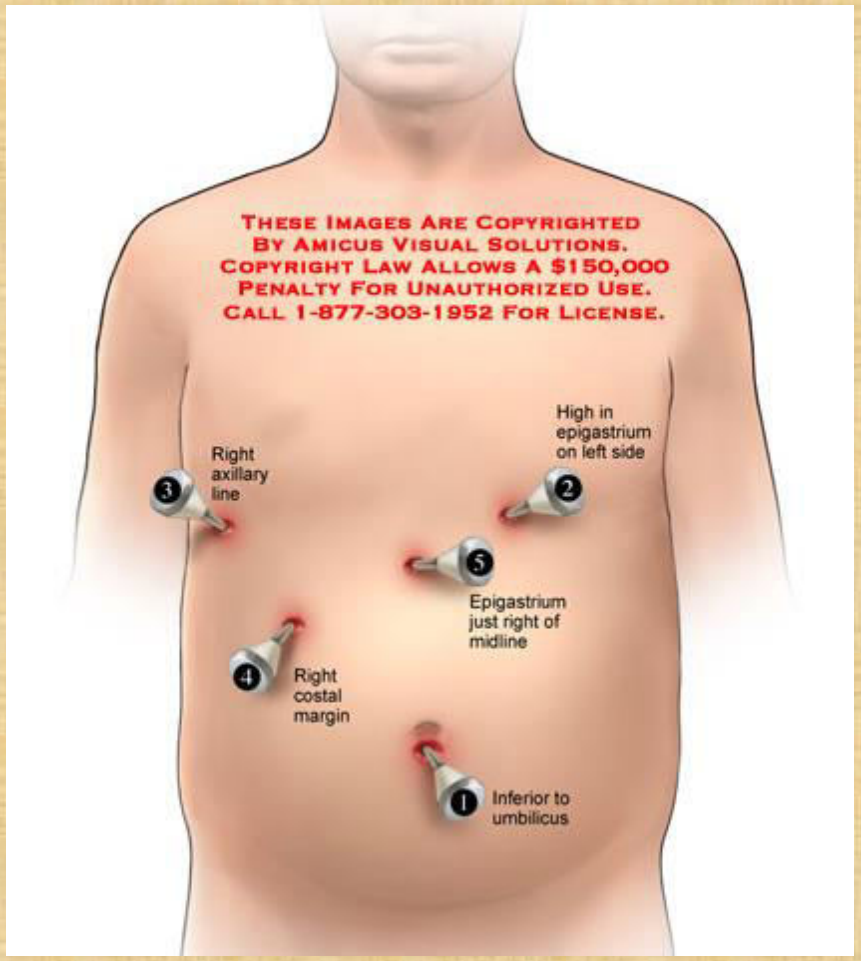
Peripherally located

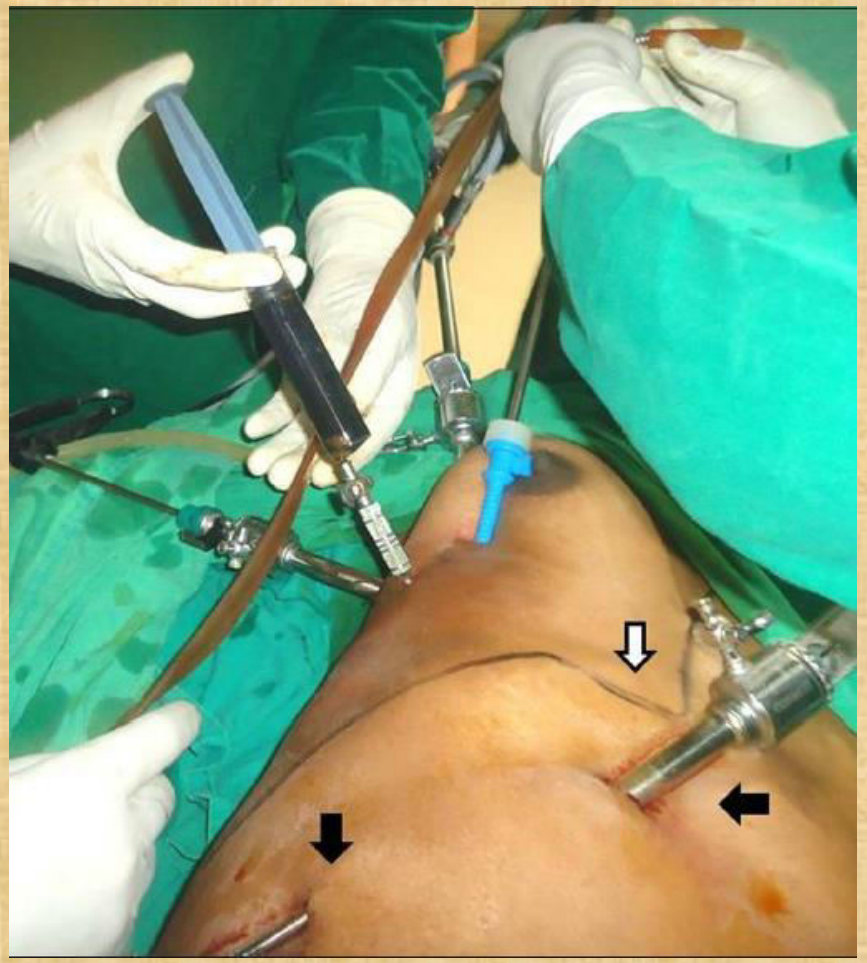
- anteriorly and non calcified walls.
- A right lateral approach also works for cysts in segments VI and VII.
- A trocar (11-mm) is inserted just above the cyst, and 10% povidone iodine–soaked sponges are placed as the scolecidal agent.
- The cyst is aspirated with a 14-gauge needle.
- The 11-mm trocar is then exchanged for an 18-mm trocar, and the germinal membrane is aspirated.
- The laparoscopic camera is inserted directly into the cyst to explore for residual daughter cysts or biliary fistulae.
- The remaining cavity is irrigated with 20% saline solution, and the cyst wall is excised.
- The cavity may be plugged with omentum or closed over a closed suction drain.[38]

- **perforator-grinder-aspirator apparatus**.
- -250mbar negative pressure

- *Laparoscopic pericystectomy*
- Contraindications :
- deeply situated cyst, densely adherent cyst, and inaccessible cysts; more than 3 cysts; calcified cysts and cysts in other organs.
- Liver resection - only occasionally segmental or hemihepatectomy is done.

Laparoscopic port placement

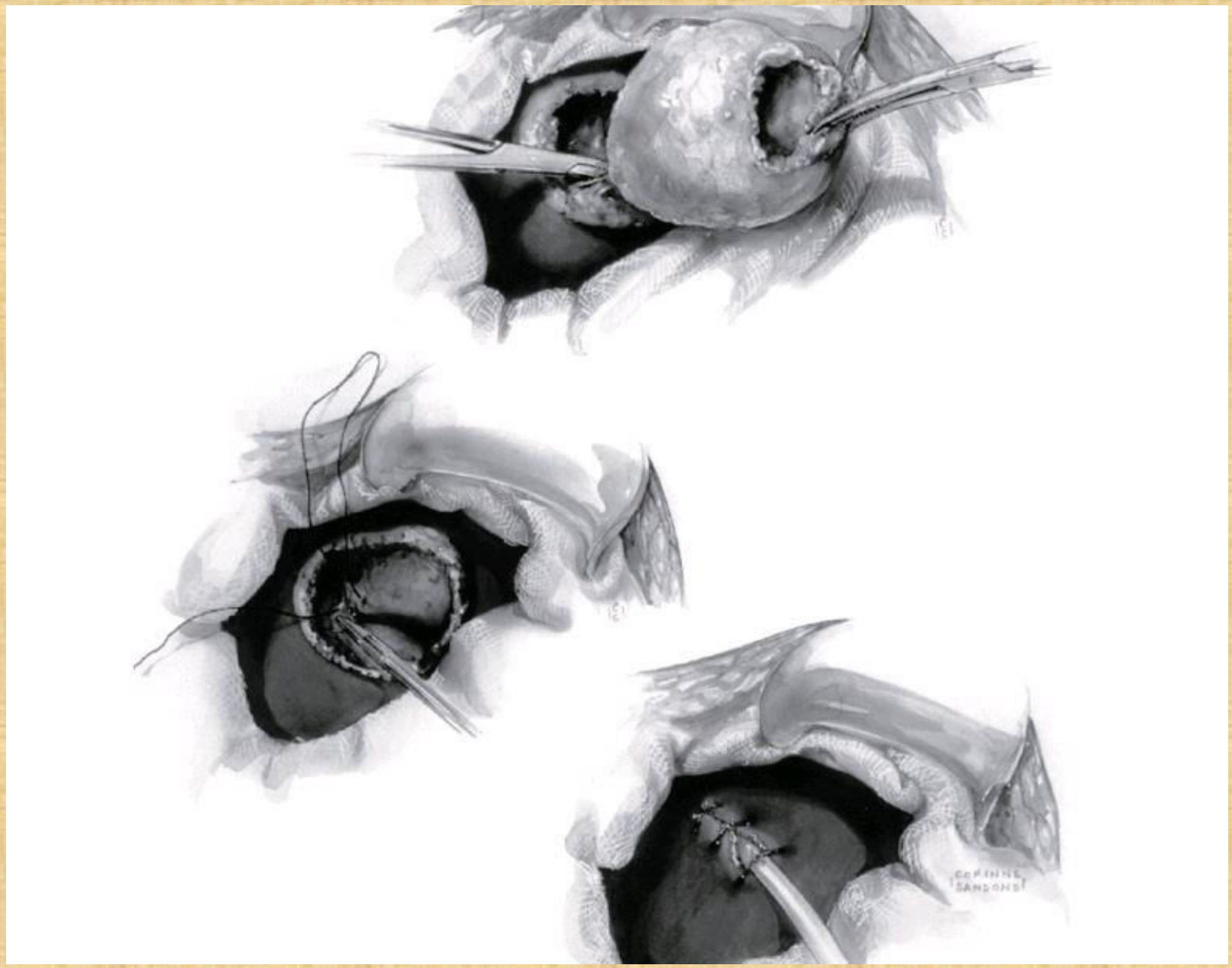




Pericystectomy

- complete resection of the cyst wall without entering the cyst cavity.
- This procedure is done through a plane outside of the pericyst or along the cyst wall itself.
- Preoperative localization of the bile ducts and vascular system is imperative.
- If a bile duct connection is suspected, preoperative ERCP should be obtained.

- Intraoperative ultrasound also should be utilized.
- decreases the risk of spillage of cyst
- lowers the risk of recurrence.
- The disadvantage to this approach is the potential for bleeding or damage to bile ducts in proximity to the cyst wall.
- 0% recurrence rates, a lower incidence of biliary fistulae, and shorter hospitalization
- The procedure also precludes management of the cavity and facilitates detection of recurrence.



Liver Resection/Transplantation

- Multiple cysts within proximity to a major blood supply
- cyst in a relatively safe location (i.e., segments II/III)
- *E. multilocularis* infection may also lead to fulminant hepatic failure from sclerosing cholangitis, biliary sclerosis, or Budd-Chiari syndrome, and in these rare cases orthotopic liver transplantation may be necessary.

Area of interest(post op bile leak)

- Detection of *cysto biliary communications* is very crucial as it may cause caustic sclerosing cholangitis when scolicidal agent like formalin is used.
- Communicating openings may be single or multiple.
- Cyst more than 10 cm is likely to have cysto-biliary communications.
- Often clinically features of communications may not be present.
- Preoperatively there may be recurrent cholangitis; dilated bile duct.jaundice,LFT(ALP,bilirubin raised)

- Factors important are - its size; number; site; involvement of hepatic/bile ducts; liver dysfunction.
- Finding of bile stained cyst on table during aspiration is highly suggestive of communication.
- White mops soaked with hypertonic saline are kept in the cyst cavity and gallbladder is gently squeezed to see for the bile staining of the mop in the cavity which confirms communication.

- *Procedures used to correct the cysto-biliary communications and to obliterate the cavity :-*
- simple suture using vicryl/PDS suture with T tube drain of bile duct .
- *capitonnage*
- *Introflexion.*
- *Omentoplasty.*
- Reconstructive procedure like *pericysto jejunostomy;* bile duct repair .

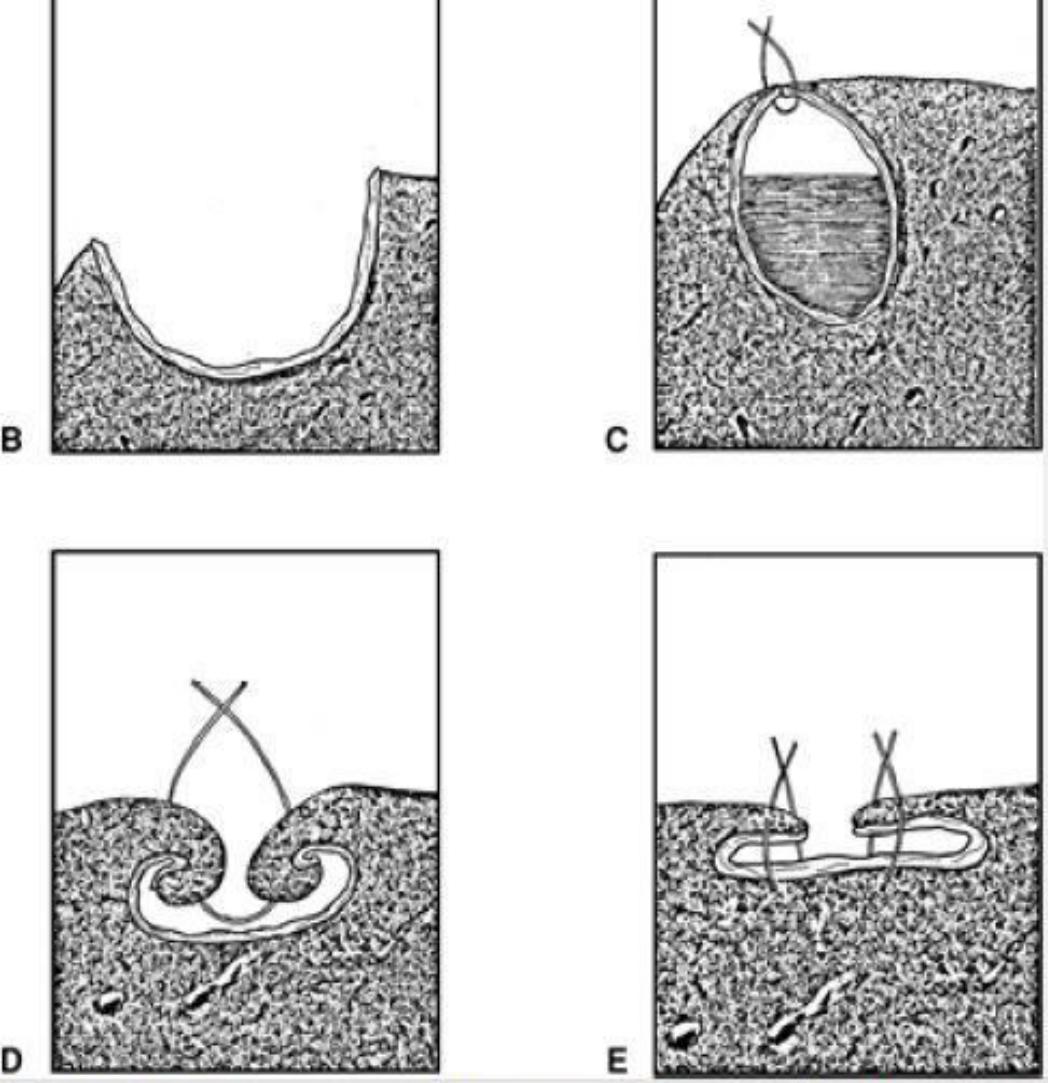


Fig. 18. Management of the residual cavity. **A:** The pericyst cavity after removal of the parasite with accumulation of fluid. **B:** The pericyst cavity left open. This is applicable to small and shallow cavities. **C:** Simple closure of the cyst cavity. The cavity can be filled with saline. **D:** Introflexion of the rim of the pericyst cavity. Suture does not engage the bottom of the cavity. **E:** Capitonnage. There is spiral suturing from the bottom of the cavity upward.

FOLLOW UP

- **Chemotherapy:**
- **Albendazole:**1 month (PAIR complete resection)
- 3-6 months incompletely resected CE, spillage during surgery or PAIR, and metastatic lesions.

Malignant hydatid disease

- misnomer

Echinococcus multilocularis (Alveolaris)

multiple small cysts in both lobes of the liver.

- It is difficult to treat
- They die of liver failure

TRANSPLANTATION.

Table 28–11. Treatment Options for Hydatid Liver Cysts	
UNCOMPLICATED PATIENTS	
Percutaneous or Laparoscopic Evacuation	**Open Evacuation or Resection**
Gharbi type I or II	Gharbi type IV or V
Anterior cysts	Posterior cysts
Peripheral cysts	Central cysts
One to three cysts	More than three cysts
Small cysts	Large cysts
No or minimal calcification	Heavy calcification
COMPLICATED PATIENTS	
Percutaneous or Laparoscopic Evacuation	**Open Evacuation or Resection**
Infected cysts meeting above criteria	Infected cysts meeting above criteria
Biliary communication—not indicated	Biliary communication—indicated
Pulmonary communication—not indicated	Pulmonary communication—indicated
Peritoneal rupture—not indicated	Peritoneal rupture—indicated

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