HYDATID CYST DISEASE

Hydatid disease, also called hydatidosis or echinococcosis, is a cyst-forming disease resulting from an infection with the metacestode, or larval form, of parasitic dog tapeworms from the genus *Echinococcus*.

Main infecting agent: Eggs of *Echinococcus granulosus.*

Mode of infection:

a. Direct contact with infected dogs. (handling and fonding)
b. By allowing dogs to feed from the same dish.
c. By taking uncooked vegetables contaminated with infected canine faeces.

Portal of entry: Alimentary tract

L**ocalization:**

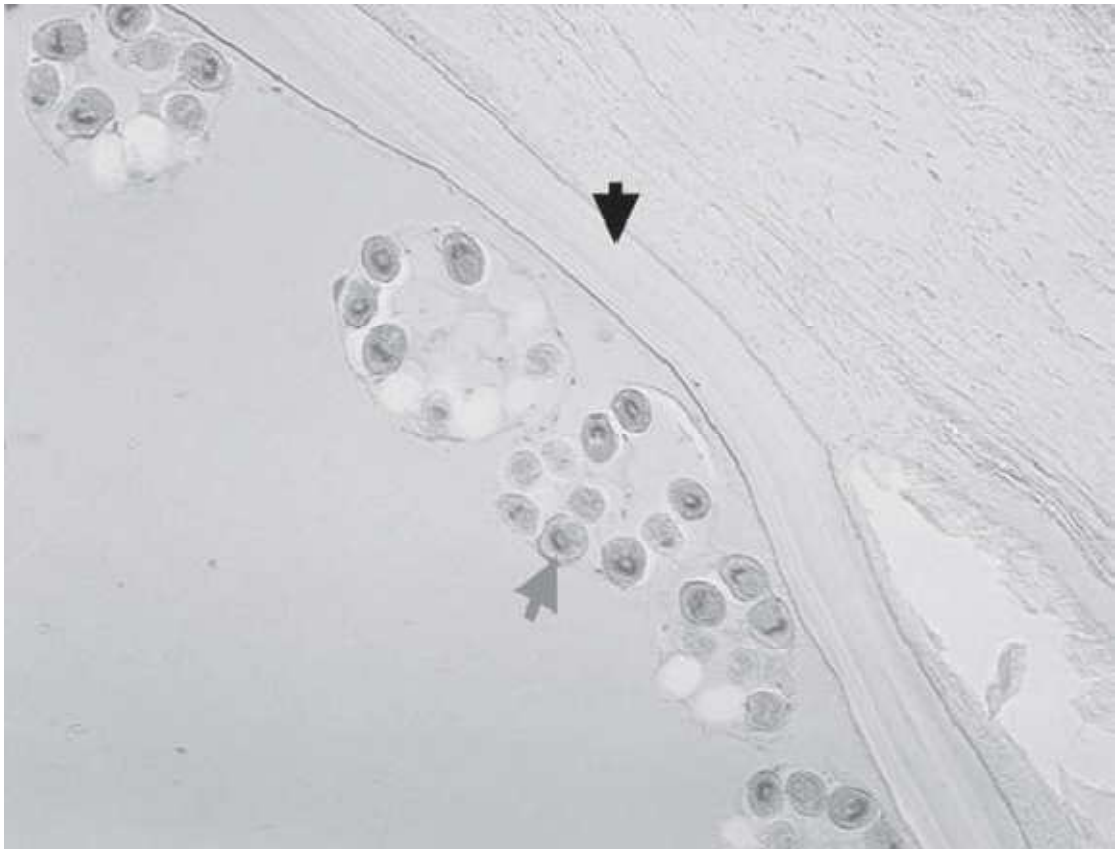
- Once ingested, the eggs release **oncospheres** capable of penetrating the intestinal mucosa.
- These **oncospheres gain access to the bloodstream via the hepatic portal vein** and migrate to various internal organs where they develop into cysts.
- Hydatid cysts most often localize within the **liver** and the **lungs**; however, cysts may also form in the **bones, brain, skeletal muscles, kidney and spleen**.

Infected persons: Infection is common in childhood because of intimate association with dogs.

Structure of hydatid cyst:

It is composed of two layers:

1. **Outer cuticular layer: Ectocyst.**
2. **Inner germinal layer: Endocyst.**



Photomicrograph of a hydatid cyst from the liver. Note the hyaline membrane (black arrow) and the protoscolex in the brood capsules (gray arrow).

Ectocyst:

a. It has a thickness of **1 mm**.
b. **To the naked eye, ectocyst has an appearance of white and hard-boiled egg.**
c. It is elastic and when ruptured, exposes the inner layer.

Endocyst:

a. It is cellular and **consists of a number of nuclei embedded in a protoplasmic mass.**
b. **It is very thin and has a thickness of 22-25 μm.**
c. ***It is the vital layer of the cyst*** and-
- **Gives rise to the outer cell layer.**
- **Gives rise to the brood capsules with scolices.**
- **Secretes the specific hydatid fluid.**

Features of hydatid fluid:

1. Clear colourless fluid. (may be pale yellow)
2. Low specific gravity. (1.005-1.010)
3. Slightly acidic pH (6.7)
4. **Contains-**
   a. **Sodium chloride**
   b. **Sodium sulphate**
   c. **Sodium and calcium salts of succnic acid** (A Fehling reducing agent)
5. **Antigenic (Being used for immunological test)**
6. **Highly toxic (Gives rise to anaphylactic syndromes)**
7. **Hydratid sand:** A granular deposit found to get settled at the bottom, containing liberated **brood capsules, free scolices and hooklets.**
8. **Acephalocysts:** Sometimes brood capsules are not developed and if developed, are without any scolices. These **cysts are sterile** and called acephalocysts.

PATHOGENESIS OF HYDATID CYST:

Endogenous daughter cyst formation:

It is the result of growth of hydatid cysts over many years in man.

1. The daughter cysts form within the **mother cyst** or
2. May arise from the **detached segments of inner germinal layer** or
3. From **regressive changes in the young brood capsule and scolex bud**.

- **The daughter cyst also contains of <u>an outer protective layer and an inner germinal layer from which brood capsule and scolices arise and even grand-daughter cysts may develop.</u>**

Exogenous daughter cyst formation:

- **It is found in bone hydatid, where the growth continues to take place at an outward direction.**
- The **high intracystic pressure** causes **herniation** or **rupture** of the germinal layer, resulting in development of the exogenous daughter cyst.

Development of brood capsules and scolices:

- **Brood capsules sprout from germinal layer**.
- **The scolices develop within these brood capsules**.
- A fully developed scolex represent the future head of the adult worm with suckers and a circle of hooklets invaginated inside the scolex.

Host response to hydatid cysts:

- **Wherever the cyst settles, an active cellular reaction consisting of monocytes, macrophages, giant cells and eosinophils takes place around the cyst.**
- This is a defensive mechanism of the host and a large number of parasites may be destroyed by this reaction.
- **Some of the parasites, who escape this destruction, develop into hydatid cysts.**
- The cellular reaction gradually decreased, followed by appearance of fibrosis and new blood vessel formation.
- **This fibrous layer circles around the cyst and called pericyst. It does not form a part of the cyst but gradually through it, the inside cyst gets nourishment.**
- In an old cyst, the pericyst calcifies or scleroses so that the parasite inside it dies.

Clinical features:

- Cysts may survive in the liver for several years and often do not cause any symptoms in the infected host.
- ***Symptoms arise when the cysts become large enough to be palpable and/or cause visual abdominal swelling and pressure. Patients frequently experience abdominal pain in the right upper quadrant, often accompanied by nausea and vomiting.***
- ***The rupture or leakage of cysts within the tissue can result in anaphylactic shock and facilitate the spread of secondary cysts through the release and dissemination of germinal elements.***
- Cysts residing within the lung tissue often remain silent producing little to no symptoms. Problems arise when cysts grow large enough to obstruct or erode a bronchus, often causing the rupture of cysts and the dissemination of cystic fluids.
- ***Patients infected with pulmonary cysts frequently experience chronic dry cough, chest pain and hemoptysis often accompanied by headache, sweating, fever and malaise.***

LABORATORY DIAGNOSIS OF HYDATID CYST

ROUTINE LABORATORY TESTS

1. **CASONI'S RAECTION:**
    - It is an immediate hypersensitivity skin test introduced by casoni (1911).
    - **Intradermal injection of .2 ml sterile hydatid fluid** (from animal or human sources- sterile by Seitz filter) produces a **large wheal with multiple pseudopodia,** within 30 minutes in positive cases.
    - It fades in 1 hour.
    - .2 ml sterile normal saline is injected at other arm for control.
2. **Blood examination:** It reveals **generalised eosinophilia.**

3. **Serological tests:**
   - **a.** Precipitin reaction : Using hydratid fluid antigen.
   - **b.** Complement fixation test: Using hydratid fluid antigen.
   - **c.** Hemagglutinin test: Using fresh sheep RBC and echinococcus antigen.
   - **d.** Flocculation tests: Using bentonite latex particle and hydratid fluid.
   - **e.** Indirect fluorescent antibody test (IFA)
   - **f.** Immunoelectrophoresis

4. **Molecular methods:**
   a. DNA probe
   b. PCR

Note: For primary diagnosis of disease, commonly IgG-ELISA test is done.

5. **X-RAY:**
   The cyst is relatively opaque due to the saline contents and casts a characteristic circular shadow with sharp outline.
6. **USG of whole abdomen,**
7. **CT SCAN also helps in diagnosis.**

TREATMENT

Albendazole and mebendazole are used for treatment.
Dosage is 400-800 mg twice daily for 1-6 months.