PROF. DR. AMIR MUHAMMAD

CLASSIFICATION OF HELMINTHES

Helminths, which are parasitic to man, belong to Two Phyla.

A. Platyhelminths or flat-worms

1. Cestodes
2. Trematodes

B. Nematodes

A. General Characteristics of Platyhelminths

Dorsoventrally flattened, leaf-like

Incomplete or absent alimentary canal.

No body-cavity.

Mostly hermaphrodites or Monoecious (both sexes together).

Further divided into cestodes & trematodes (Flukes/ tape worms).

EXAMPLE OF CESTODES (TAPE WORMS).

1. Taenia saginata & Taenia solium.
2. Echinococcus granulosus
3. Diphyllobothrium latum.
4. Hymenolepis nana.

EXAMPLES OF TREMATODES (FLUKES).

1. Schistosomes (Blood Flukes).
2. Fasciola hepatica.
3. Clonorchis sinensis.
4. Paragonimus westermani.

ECHINOCOCCUS GRANULOSUS

Common names:

The dog tape worm.

The hydatid worm.

Different names of the disease caused by E. granulosus:

- Echinococcosis
- Hydatid disease
- Hydatid cyst
- Hydatidosis

History

Adult worm :

- Hartmann, 1695
- In small Intestine of Dog

Larval Form :

- Goeze , 1782
- Hydatid cyst

Geographical Distribution

- Worldwide
- More common in sheep & cattle raising countries

Habitat

- **Adult** worm lives in small intestine of Definitive host i.e. dog & other canines (wolf, fox , jackal),
- Dog being the Optimum definitive host

- **Larval** form seen in intermediate host i.e. sheep, goat, cattle, horse & pig),
- sheep being the Optimum Intermediate host

- Life cycle of transmission maintained mainly between dog & sheep

MORPHOLOGY

A. Adult worm :

B. Eggs :

C. Larval form:

MORPHOLOGY

A. Adult worm :

A small tapeworm, 3—6 mm long.

a. Scolex :

Pyriform

300μm in diameter (One mm= 1000 micrometer)

Four suckers

Rostellum -- two circular rows of hooklets

MORPHOLOGY

b. NECK :

Short and thick

c. STROBILLA :

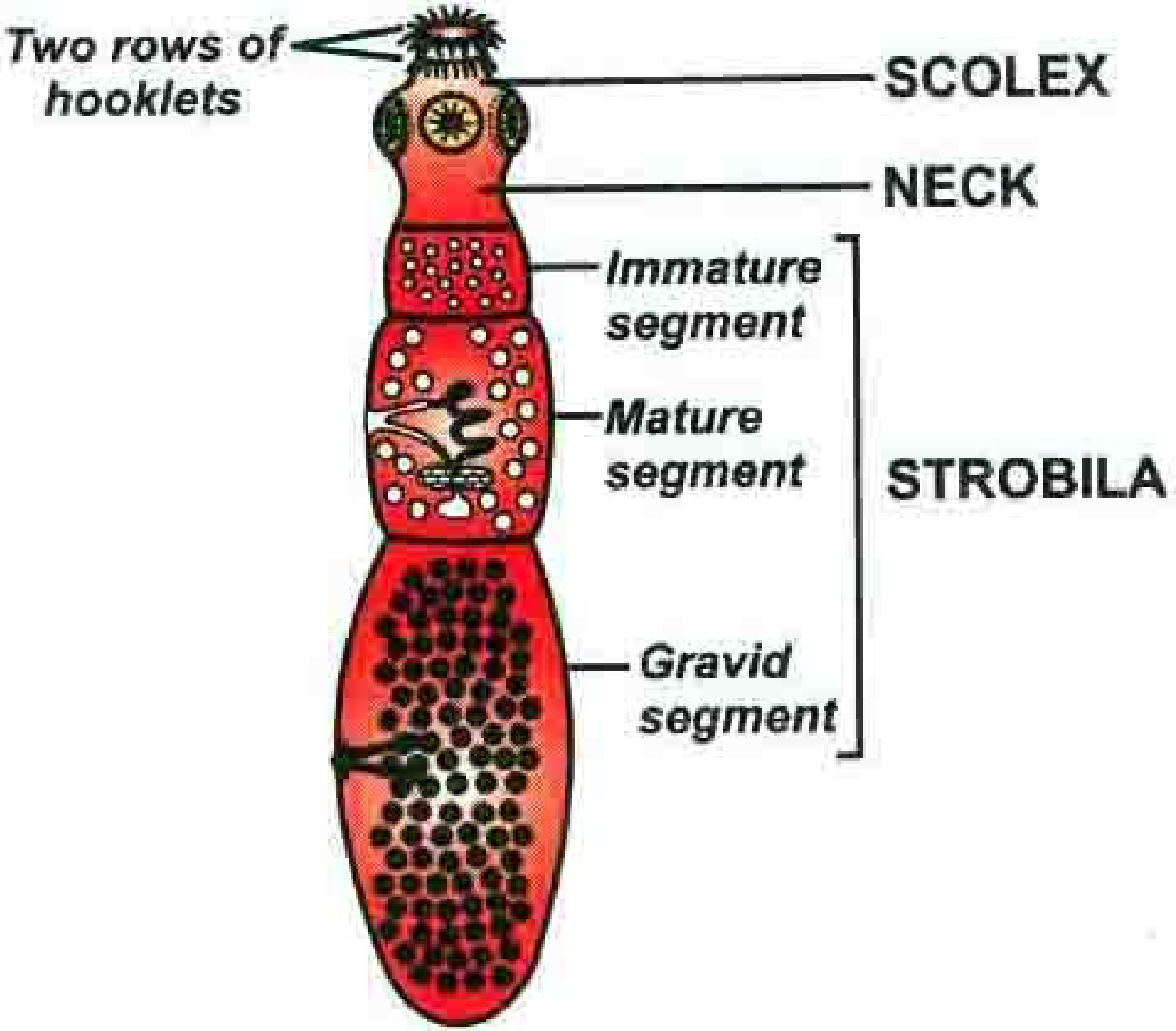
Three segments

1st segment, immature

2nd segment, mature

3rd segment, gravid

4th rare


Two rows of hooklets
SCOLEX
NECK
Immature segment
Mature segment
STROBILA
Gravid segment

B. Eggs :

Indistinguishable from those of Taenia spp.

Oval

Measure 32-36 μm (25-32 μm)

Contains hexacanth embryo having three pairs of hooklets

C. Larval form:

Found within the hydatid cyst,

in Intermediate & Accidental host

LIFE CYCLE

Two hosts

Dog : Definitive host.

Sheep : Intermediate host.

Man : Accidental host

LIFE CYCLE

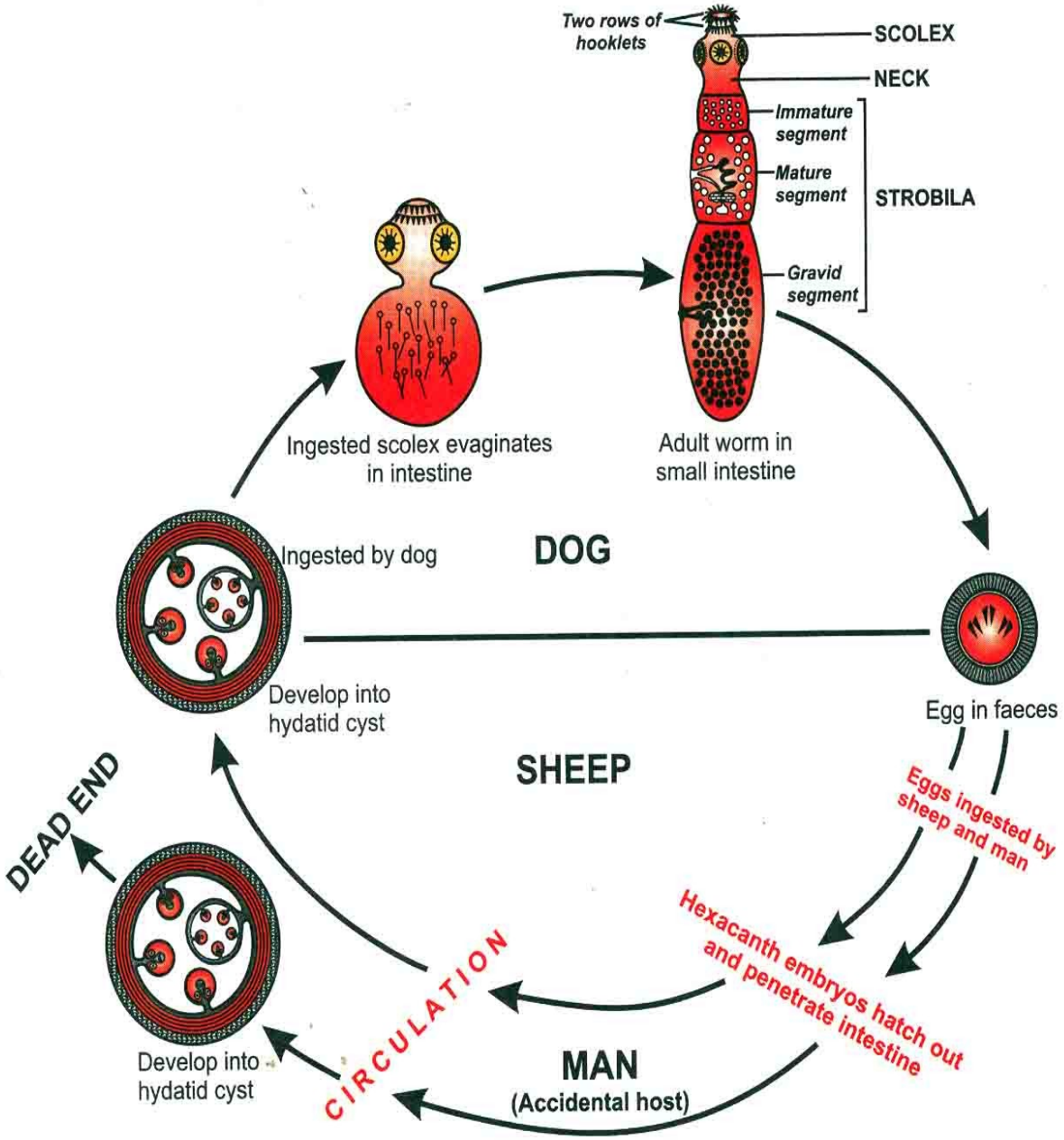
Continued

Adult worm present in dogs & other canine animals,

Remains attached to mucosa of small intestine.

Eggs discharged in faeces polluting the environment

Swallowed by intermediate hosts while grazing in fields.


Two rows of hooklets
SCOLEX
NECK
Immature segment
Mature segment
STROBILA
Gravid segment
Ingested scolex evaginates in intestine
Adult worm in small intestine
Ingested by dog
DOG
Develop into hydatid cyst
Egg in faeces
SHEEP
DEAD END
Eggs ingested by sheep and man
Hexacanth embryos hatch out and penetrate intestine
CIRCULATION
Develop into hydatid cyst
MAN
(Accidental host)

Sources of infection to Man

- Direct contact with infected dogs
- Sharing eating & drinking utensils with dogs
- Ingestion of food & water contaminated with faeces of infected dogs.

PATHOGENESIS

After ingestion of eggs,
embryos are hatched out in duodenum,

Crosses the intestinal wall,

Enters the portal circulation

a. First embryos enter hepatic circulation ,
liver being the first filter (60-70% lesions).

PATHOGENESIS CONT

b. Some embryos succeed in escaping & enter pulmonary circulation. Lung is the second filter.

c. Some able to enter the general circulation lodging various organs.

Brain, Heart, Spleen, Kidneys,
Genital organs, Muscles, Bones etc.

Structure of Hydatid Cyst

Cyst wall is secreted by the Embyo

- Pericyst
- Ectocyst : 1mm thick
- Endocyst : 22-25 μm thick
- Hydatid Fluid
- Hydatid sand

A. PERICYST :

Lodging of parasite

Cellular reaction by host ,

Fibroblasts deposit **fibrous tissue**

New blood vessel formation

Leading to formation of a Layer the **Pericyst**

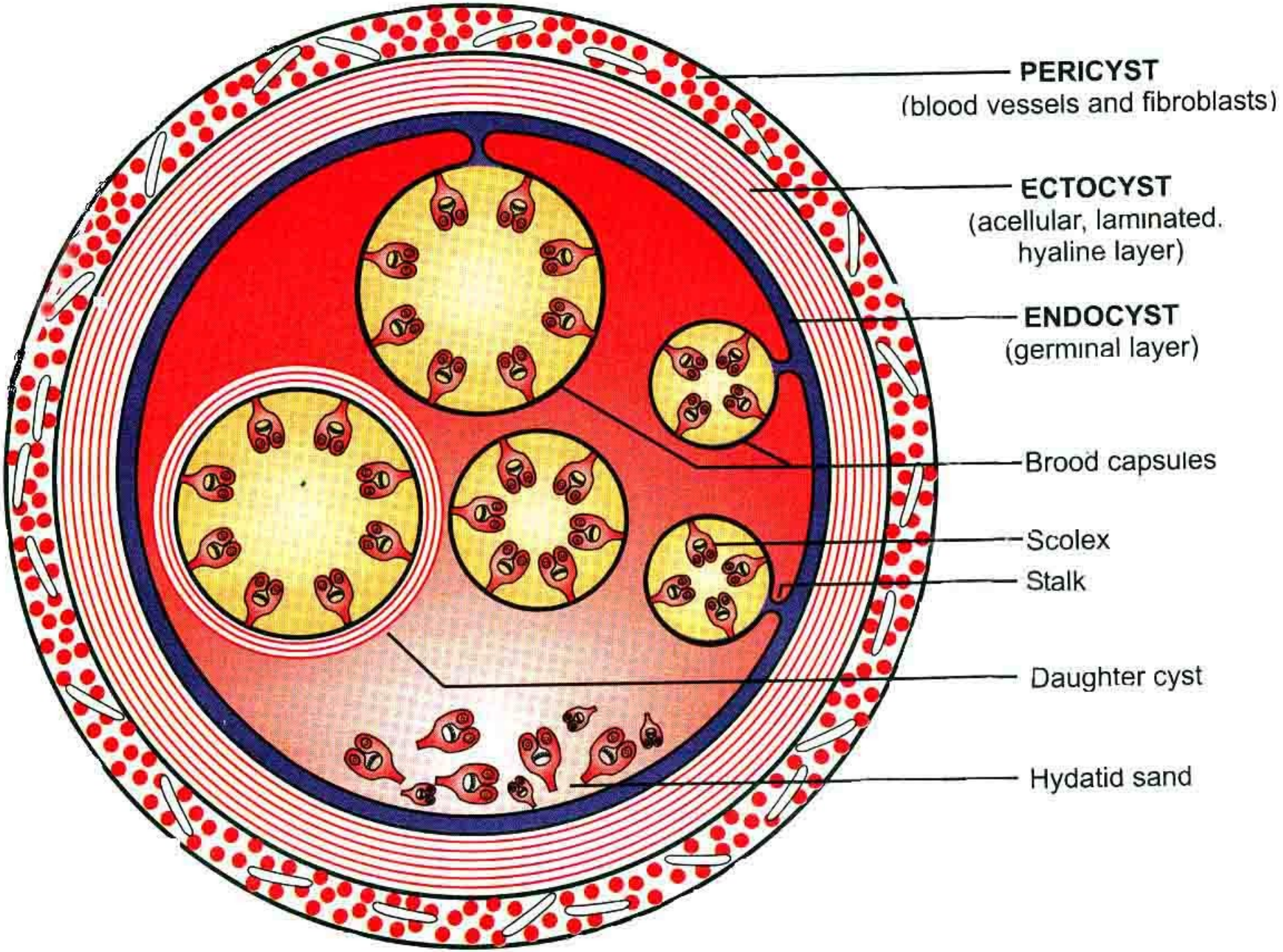
A. PERICYST :

Pericyst merges with the Cyst wall on the inner side

& with surrounding normal tissue on the outer side.

Parasites get nutrition through this layer.

Acts like Placenta


PERICYST
(blood vessels and fibroblasts)
ECTOCYST
(acellular, laminated.
hyaline layer)
ENDOCYST
(germinal layer)
Brood capsules
Scolex
Stalk
Daughter cyst
Hydatid sand

PATHOGENCITY: CONTD

- This disease is generally acquired in childhood but manifest in adult life.
- The embryo when settles anywhere in the body, the host responds by cellular reaction.
- Monocytes, Giant cells & Eosinophils.

PATHOGENCITY: CONTD

Inside the pericyst the embryo develops into a fluid-filled bladder called ***Hydatid cyst.***

Old cysts may undergo calcification.

The parasite within may die.

CLINICAL DISEASE

Potentially dangerous.

Mostly latent

Pressure effects

Outcome depends greatly 0n Size & Site

CLINICAL DISEASE

Liver cysts :

Being the first filter, most frequently affected (60--70%)

Mostly Rt. lobe.

- Symptoms : chronic abdominal discomfort, visible or palpable abdominal mass in Rt. hypochondrium.
- Secondary bacterial infection looks like an abscess
- .Rupture leads to anaphylactic reaction, shock & death

CLINICAL DISEASE contd

Lung cysts :

Usually asymptomatic.

Cough, shortness of breath & chest pain.

Rupture causes expectoration of hydatid fluid, scolices, or membranes,

Secondary Infection leads to lung abscesses.

Pneumothorax, empyema,

Allergic reaction & anaphylactic shock.

CLINICAL DISEASE contd

Other Sites

- Spleen 3—5 %
- CNS and heart 1—1.5 %
- Rarely
  kidneys , bones , muscles female genital tract, eyes.

LABORATORY DIAGNOSIS :

- 1. Casoni test (1911)
  SEITZ filter
- 2. DLC : Marked Eosinophilia
  E = 20—25 %
- 3. Examination of Hydatid fluid :
  Scolices , brood capsules , hooklets.
- [Diagnostic aspiration NOT recommended]

LABORATORY DIAGNOSIS : contdz

4. Serological tests :

- ELISA Enzyme-linked Immunosorbent Assay
- R I A Radio immunoassay
- I H A Indirect haemagglutination
- Compliment fixation test
- Bentonite flocculation test
- Latex agglutination test

LABORATORY DIAGNOSIS : contd

5. Histological examination :

- Three layers of cyst ,
- Embedded scolices,
- Hooklets

Hydatid cyst showing armed scolex & Free Hooklets

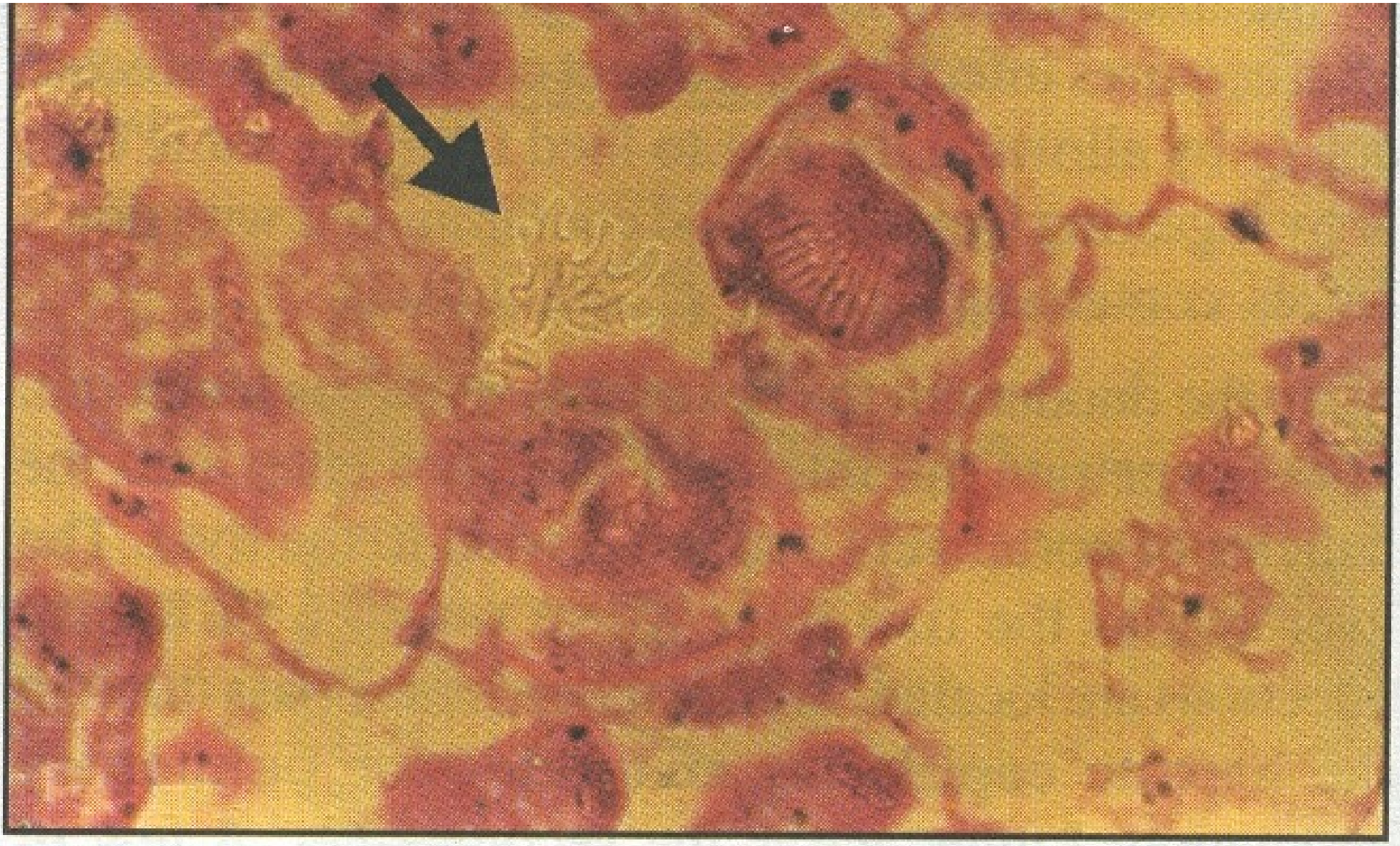


Fig. 9.24 Hydatid cyst showing armed scolex and free

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TREATMENT = Pharmacology

TREATMENT

1. SURGICAL TREAMENT:

Criteria for surgery :

1. Cyst size more than 10 cm in diameter
2. Secondary bacterial infection
3. Location in vital organs like brain and heart

Treatment of choice & feasible in 90 % cases.
Removal in toto, to avoid spillage of scolices

Some surgeons prefer to give Anthelmintic Treatment for couple of months before surgery

Followed by Anthelmintic Treatment for 2-3 yrs.

TREATMENT

2. MEDICAL TREAMENT :

PRAZIQUANTEL

ALBENDAZOLE

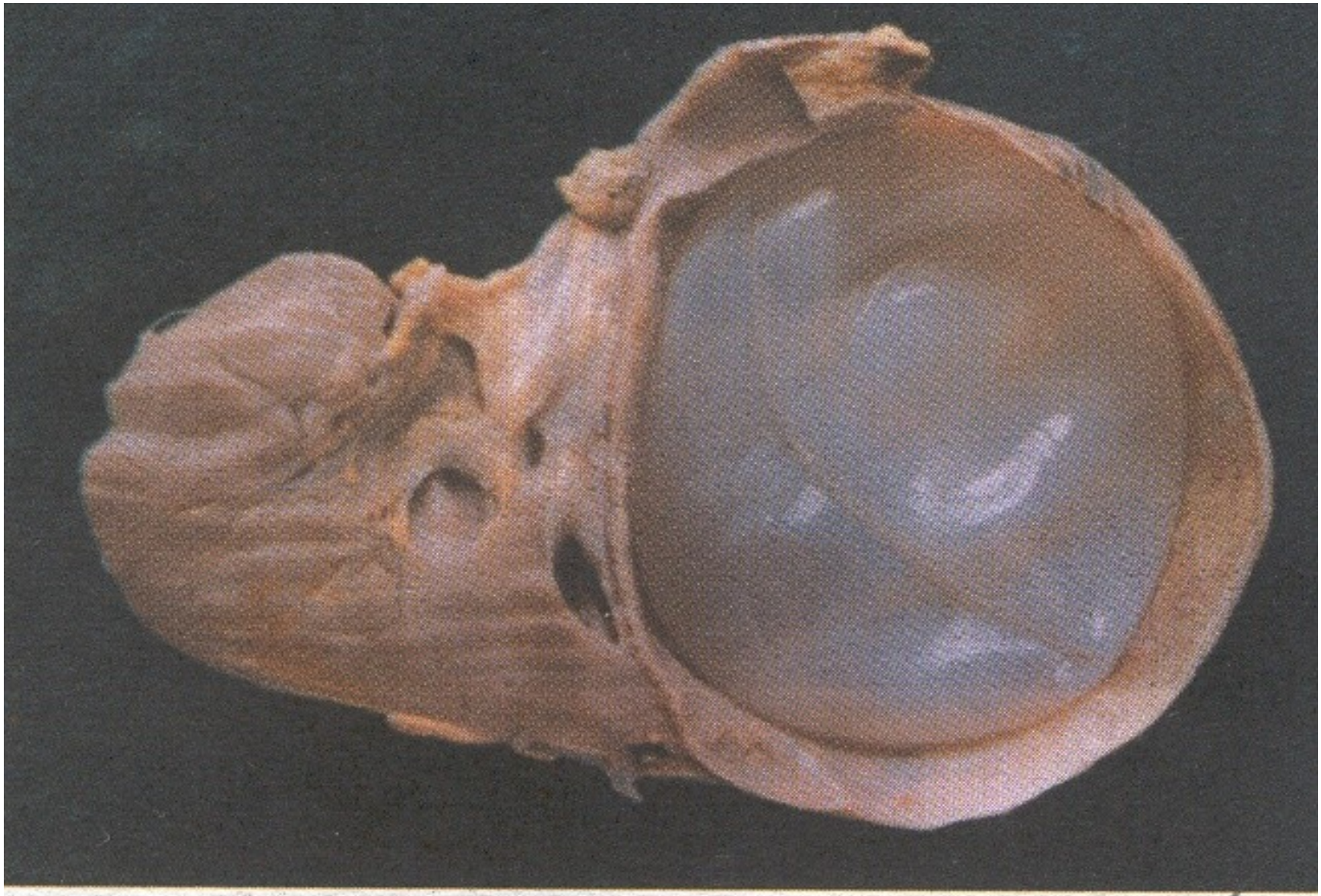
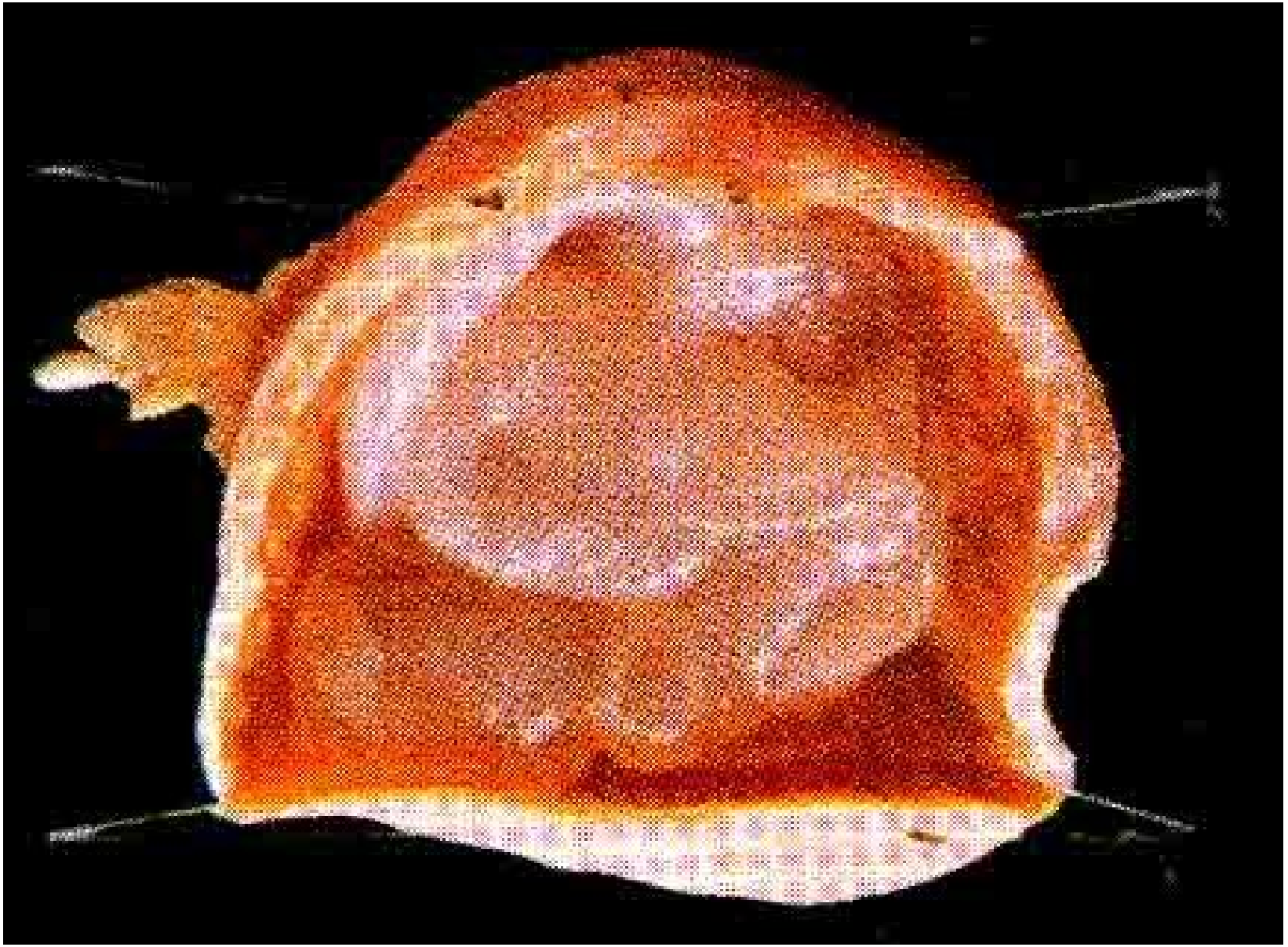
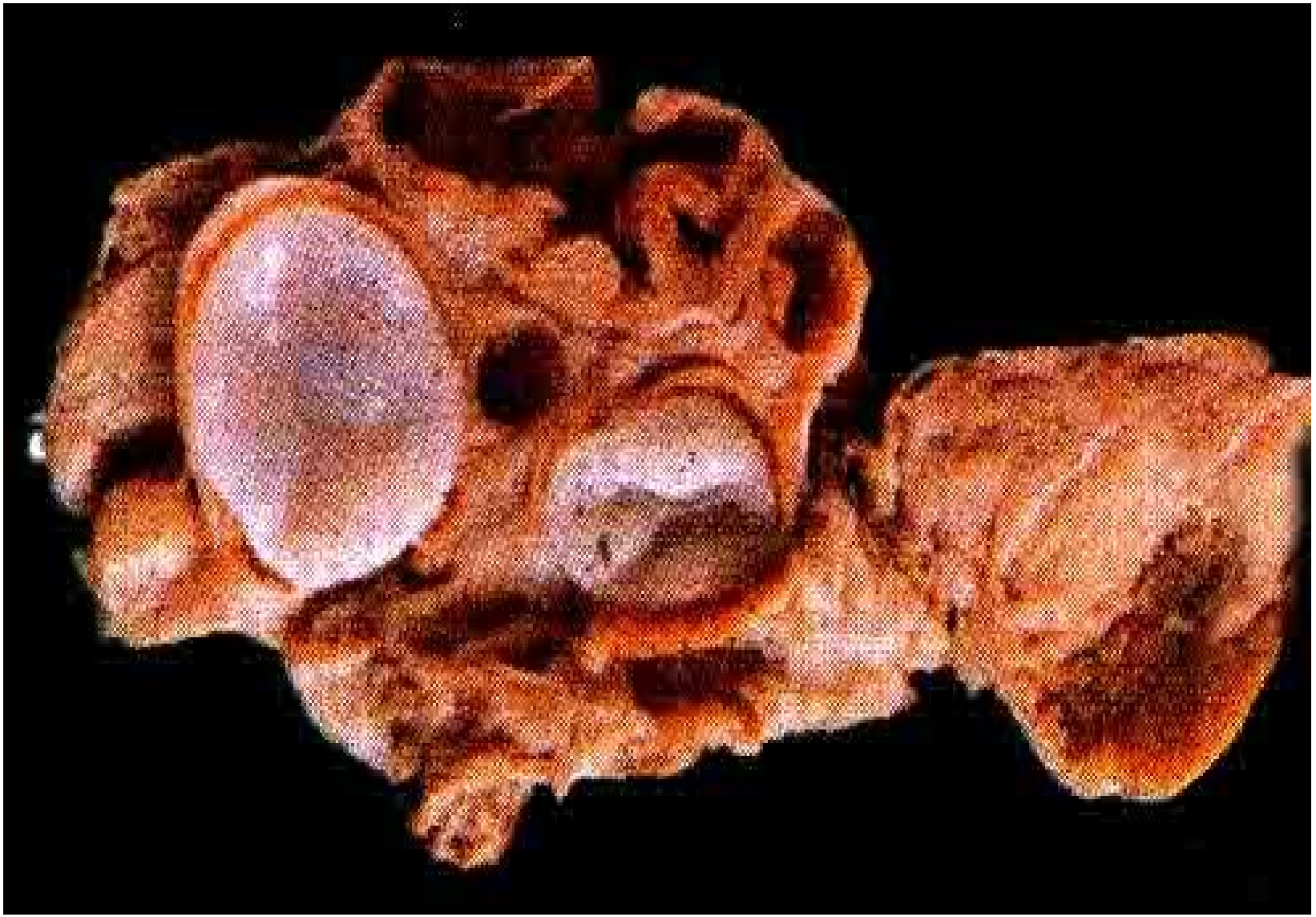


Fig. 9.20. Hydatid cyst of the kidney.

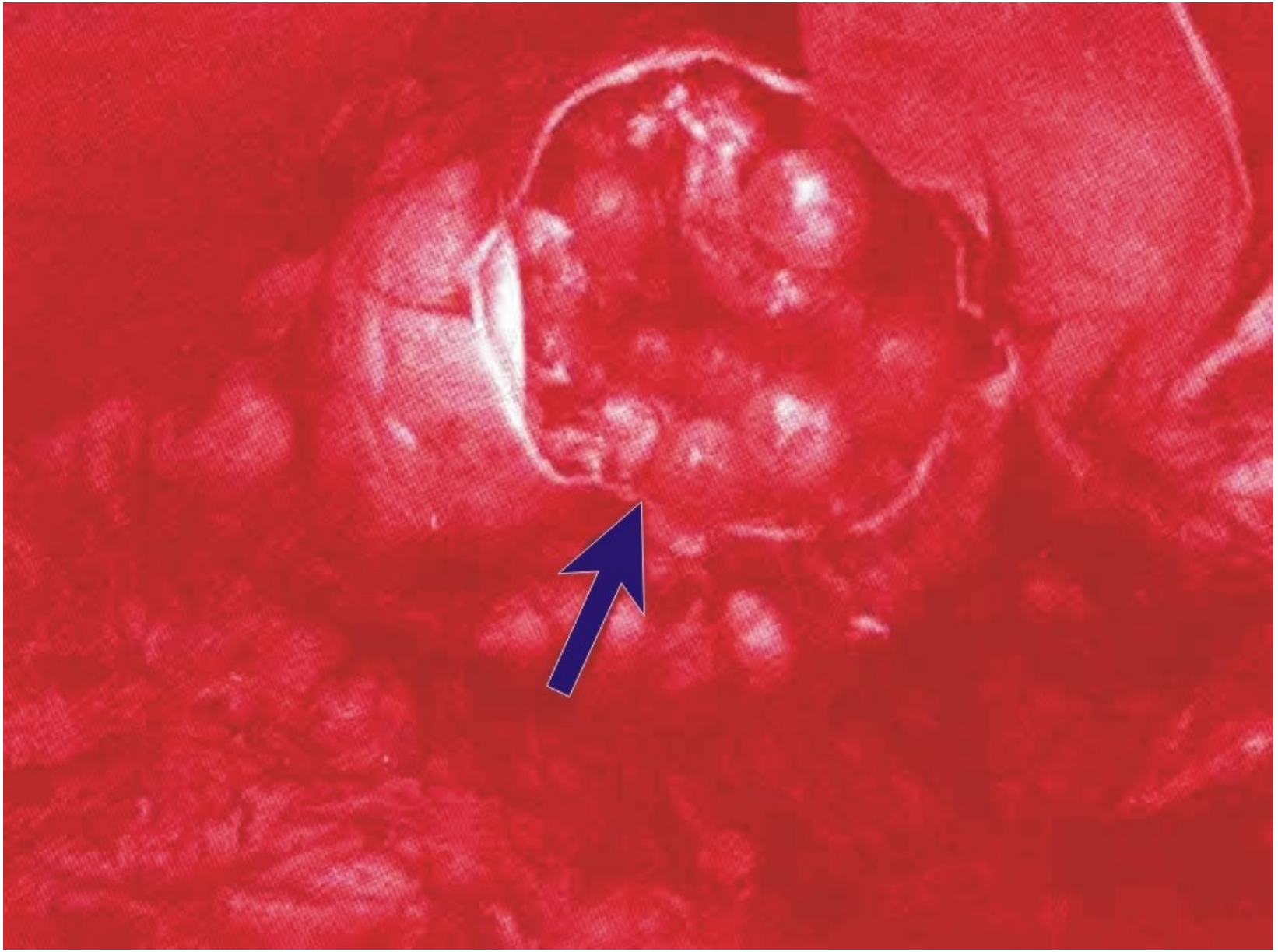


Hydatid cyst of Ovary

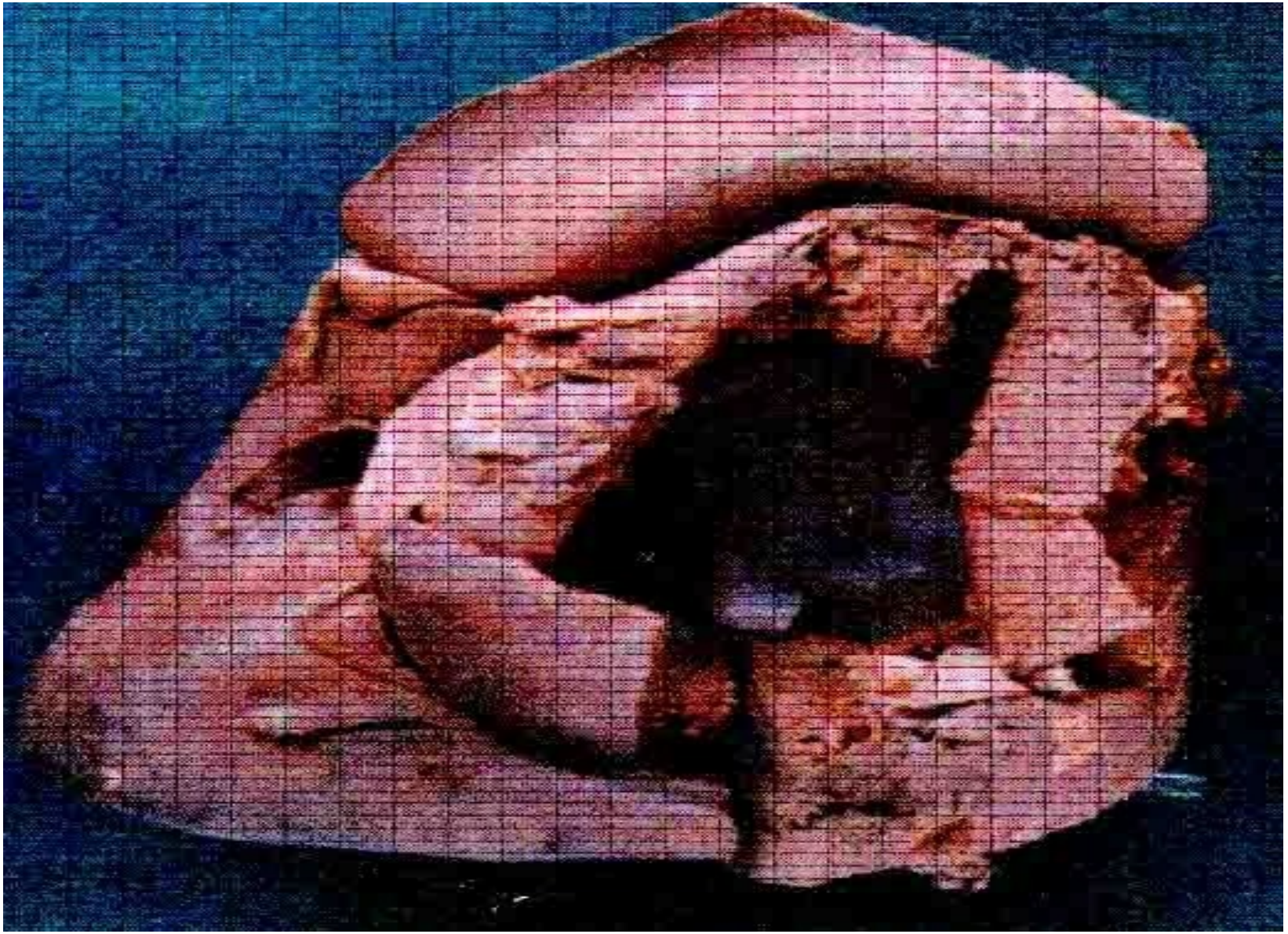


Hydatid cyst Spermatic cord

Hydatid Cysts



Hydatid cysts in Liver



Hydatid Cysts of Liver