

By the Name of ALLAH the Most Gracious the Most Merciful



The tropical Infection and Infestations L1

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To be read in

Bailey & Love's Short Practice of Surgery 28th Edition. Ch 6

- AMOEBIASIS
- TYPHOID
- HYDATID DISEASE.

AMOEBIASIS

- Amoebiasis is caused by *Entamoeba histolytica*.
- The majority remain asymptomatic carriers.
- It is transmitted via the faecal–oral due to substandard hygiene and sanitation; poorer socioeconomic state are more vulnerable.

- In the small bowel, the **cysts** hatch and a large number of **trophozoites** are released and carried to the colon, where flask-shaped ulcers form in the submucosa . The trophozoites multiply, ultimately forming **cysts**, which either enter the portal circulation or are passed in the faeces as an infective form .
- Having entered the portal circulation, the trophozoites are filtered and trapped in the interlobular veins of the liver.
- In the portal triads they multiply , causing focal infarction of hepatocytes and liquefactive necrosis as a result of proteolytic enzymes produced by the trophozoites ‘**amoebic hepatitis**’ . That eventually coalesce to form the **abscess cavity**.

Complications and sequelae

- Perforation
hemorrhage
(rare)

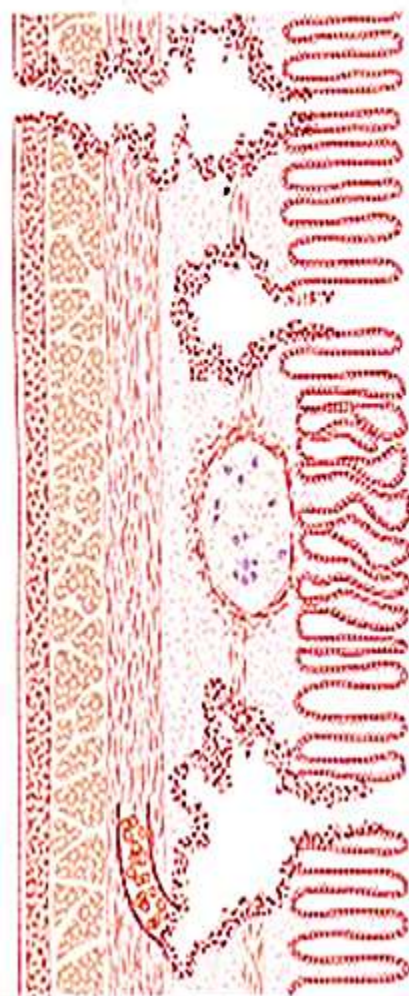
- Secondary
infection

Amoeboma

Obstruction
intussusception

- Invasion of
blood vessels.

- Direct extension
outside bowel



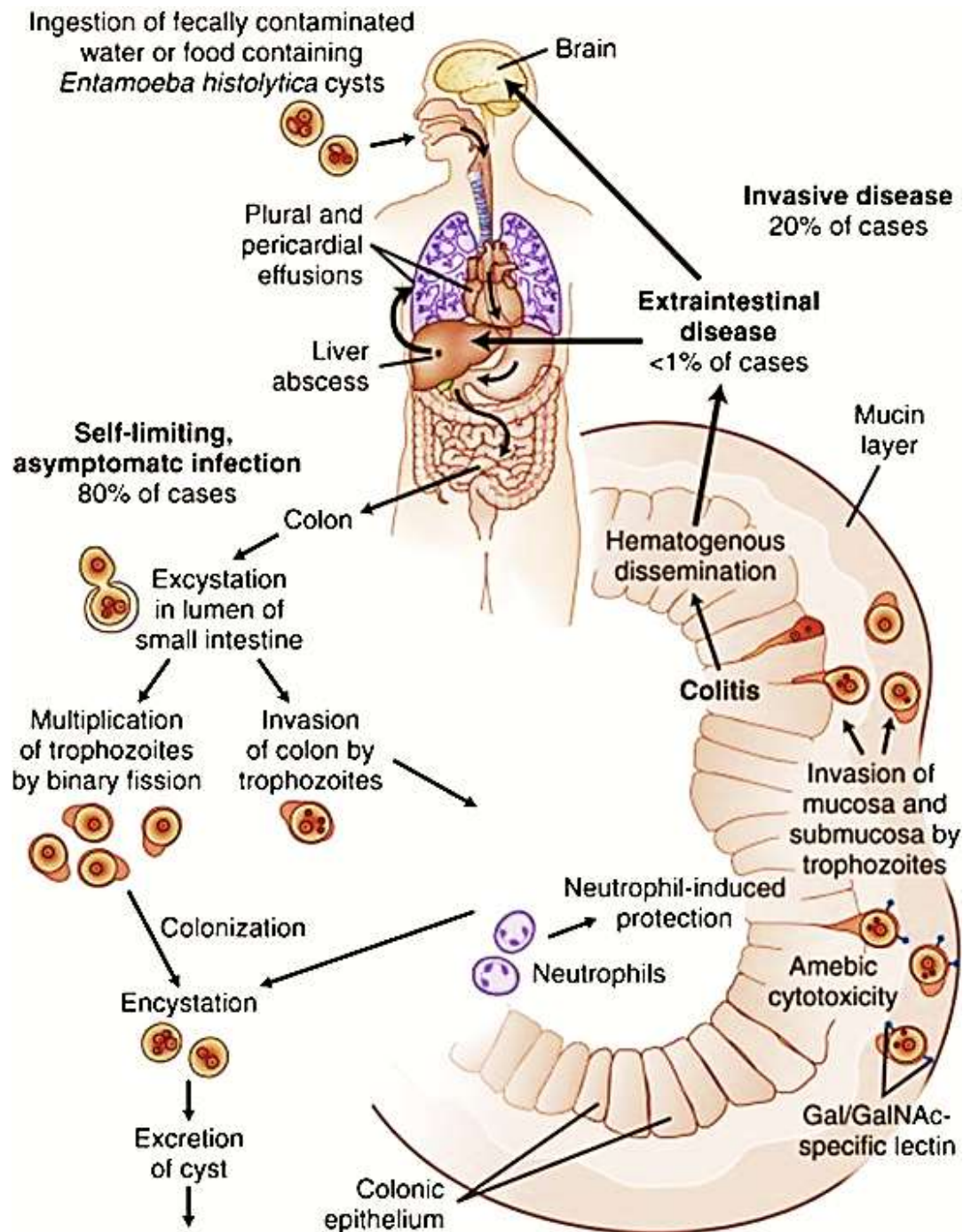
- Proctitis hemorrhagic

- Surrounding inflammatory
reaction

- A mass under edematous
mucosa

Amoeboma clinically
simulates neoplasm

- Extraintestinal lesion



- The right lobe is involved in 80% of cases, the left in 10% and the remainder are multiple (why ?). The abscesses are most common high in the diaphragmatic surface of the right lobe (why). This may cause pulmonary symptoms and chest complications.
- The **abscess cavity** contains chocolatecoloured, odourless, ‘anchovy sauce’-like fluid that is a mixture of necrotic liver tissue and blood. Secondary infection of the abscess may coexist , which causes the pus to smell. While pus in the abscess is sterile unless secondarily infected, trophozoites may be found in the abscess wall in a minority of cases.
- Untreated abscesses are likely to **rupture** (Pulmonary / Intraperitoneally).Chronic infection of the large bowel may result in a granulomatous lesion along the large bowel, most commonly seen in the caecum, called an **amoeboma**.

Amoebic dysentery

- Diarrhoea containing red blood and mucus abdominal pain, tenesmus , fever, possibly signs of dehydration.
- Rt iliac fossa mass (**amoeboma**).
- Abdominal distension due to toxic megacolon

Amoebic liver abscess

- A young adult male with a history of insidious onset of non-specific symptoms, such as abdominal pain, anorexia, fever, night sweats, malaise, cough and weight loss. With a past history of bloody diarrhoea or travel to an endemic area raises the index of suspicion.
- Specific symptoms of pain in the right upper abdomen and right shoulder tip, hiccoughs and a non-productive cough
- Examination : Patient who is toxic and anaemic. upper abdominal rigidity, tender hepatomegaly, often with tender and bulging intercostal spaces and overlying skin oedema,
- Late manifestation : (pleural effusion and basal pneumonitis).
- Occasionally, a tinge of jaundice or ascites may be present.
- Rarely, the patient may present as an emergency owing to the effects of rupture of an abscess into the peritoneal, pleural or pericardial cavity.

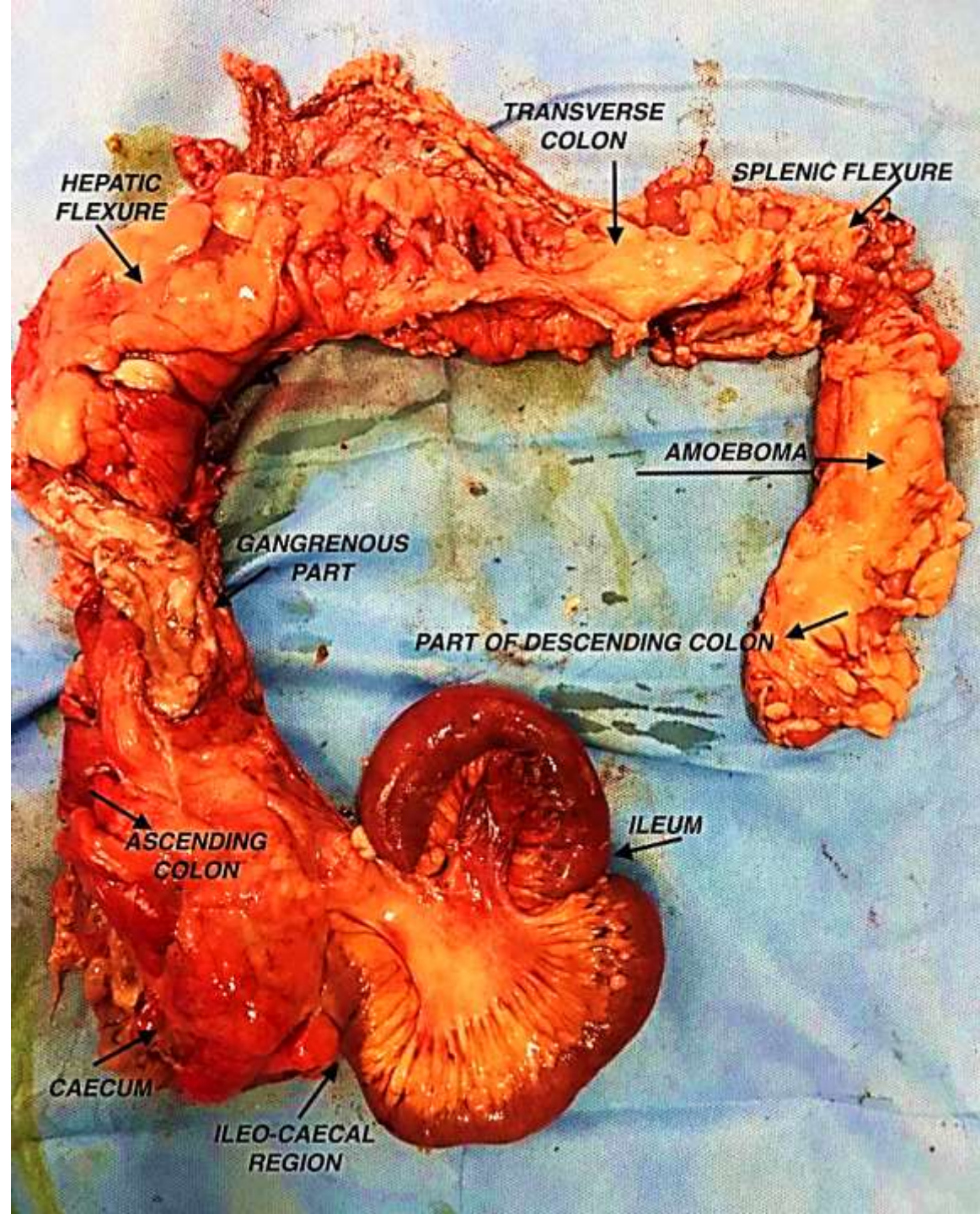
Investigations

- **Chronic infective process:** anaemia, leukocytosis, raised (ESR) and (CRP) – hypoalbuminaemia and elevated hepatic alkaline phosphatase.
- G.S.E.
- **Serological tests** are more specific, (high antibodies in serum). These can be detected by tests for complement fixation, (IHA), indirect immunofluorescence, counter-immunoelectrophoresis and (ELISA). These tests are extremely useful in detecting acute infection in non-endemic areas. IHA has a very high sensitivity in acute amoebic liver abscess in non-endemic regions and remains elevated for some time. The persistence of precludes its use as a diagnostic . A combination of serological tests detecting antibodies in combination with detection of the parasite by antigen detection or DNA (PCR) is likely to be more beneficial in such cases, .
- While amoebiasis may affect the entire colon, it has a predilection for the caecum and ascending colon. A **colonoscopy** may reveal discrete exudate-covered areas of ulceration with normal areas in between.

Invasive amebiasis and ameboma formation

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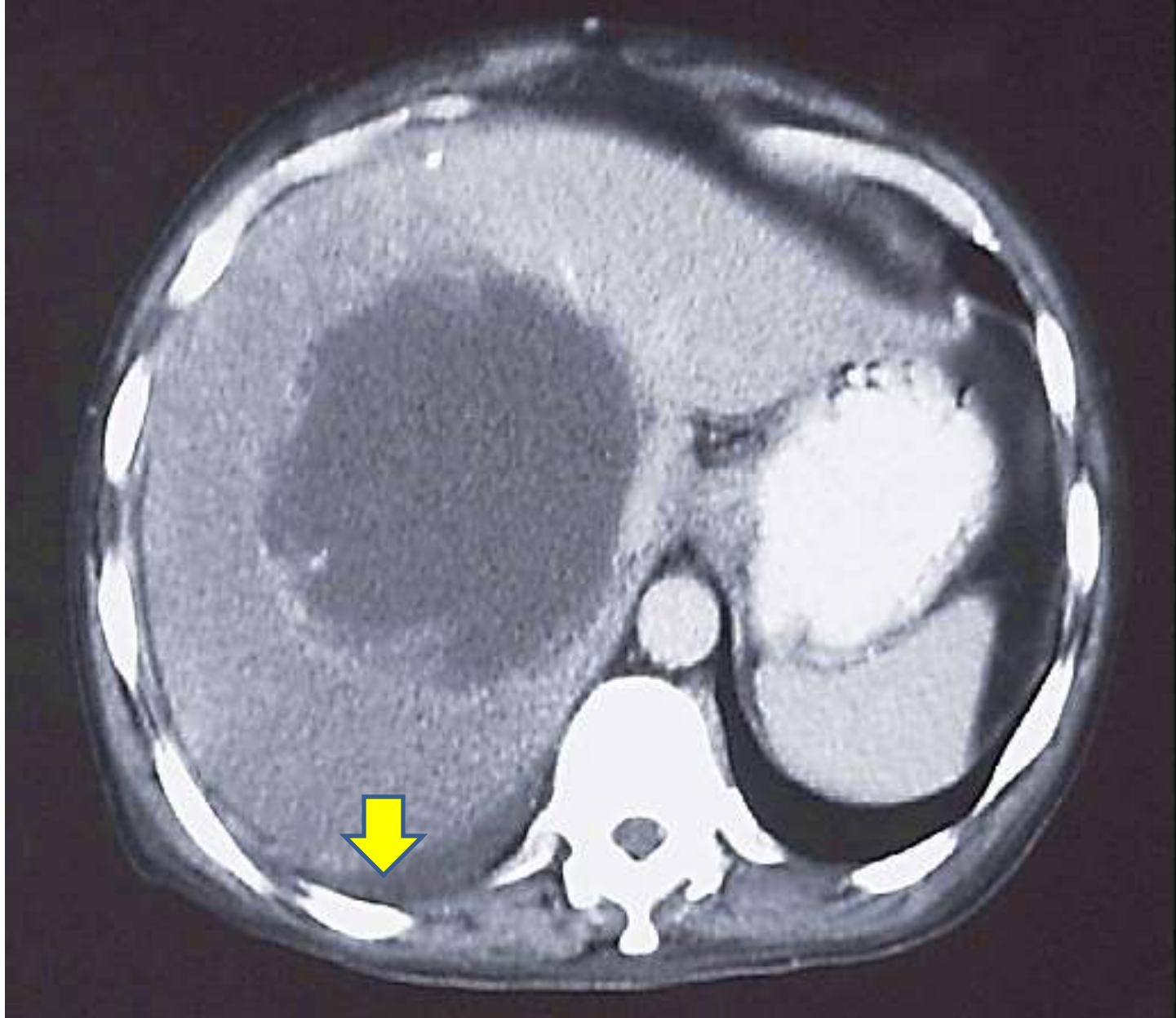


Imaging techniques

- Abdominal ultrasonography, an abscess cavity in the liver (a hypoechoic or anechoic lesion with ill-defined borders; internal echoes suggest necrotic material or debris) .The investigation is very accurate and is used for aspiration, both diagnostic and therapeutic. **Diagnostic aspiration** is of limited value except for establishing the typical colour of the aspirate, which is sterile and odourless unless it is secondarily infected.
- When there is doubt about the diagnosis, a computed tomography (CT) scan may be helpful , that may show a raised right hemidiaphragm, a pleural effusion and evidence of pneumonitis .



Ultrasound of the liver showing a large amoebic liver abscess with necrotic tissue in the right lobe.



Computed tomographic scan showing an amoebic liver abscess in the right lobe.

Colon

- A **colonoscopy with biopsy** is mandatory because the radiological and macroscopic appearance may be indistinguishable from a carcinoma.
- A deformity on **barium enema** an 'apple-core' would arouse suspicion of a carcinoma.
- In doubtful cases, vigorous medical treatment is given and the patient undergoes colonoscopy again in 3–4 weeks, as these masses are known to regress completely on a full course of drug therapy. If symptoms persist even partially following full medical treatment in a patient who has recently returned from an endemic area, a **colonic carcinoma must be excluded** forthwith. This is because a dormant colonic carcinoma may become apparent as a result of infestation with amoebic dysentery causing 'traveller's diarrhoea'. However, it must be borne in mind that an amoeboma and a carcinoma can coexist.



Treatment

- Medical treatment should be the first choice
- Surgery being reserved for complications.
- Metronidazole and tinidazole are the effective drugs. After treatment with metronidazole and tinidazole.
- Diloxanide furoate, a luminal amoebicide that is not effective against hepatic infestation, is used for 10 days to destroy any intestinal amoebae.
- Aspiration is carried out when imminent rupture of an abscess is expected, especially when involving the left lobe. Pigtail catheter drainage may be considered in those patients who are not responding to intravenous metronidazole in the first 48–72 hours to improve antibiotic penetration. If there is evidence of secondary infection, appropriate drug treatment is added. The threshold for draining a left liver lobe abscess should be low, given its propensity for rupture into either the peritoneal, pleural or pericardial cavity.

- Surgical treatment should be reserved for the complications of rupture into the pleural (usually the right side), peritoneal or pericardial cavities.
- Resuscitation, drainage and appropriate lavage with vigorous medical treatment are the key principles.
- In the large bowel, severe haemorrhage and toxic megacolon are rare complications. It is a surgical emergency, which managed as for any toxic megacolon. Resuscitation , resection of bowel with exteriorisation , vigorous supportive therapy. All such cases are managed in the intensive care unit.
- An amoeboma that has not regressed after full medical treatment should be managed with colonic resection, particularly if cancer cannot be excluded.

Infection Type	Agent	Dosage
Asymptomatic	Paromomycin	25 to 30 mg/kg/d in 3 divided doses for 7 days
Invasive disease	Metronidazole	750 mg 3 times daily for 10 days or 2.4 g once daily for 2-3 days
Invasive disease	Tinidazole	2 g once daily for 3 days
Amebic liver abscesses	Metronidazole	750 mg 3 times daily for 10 days
Amebic liver abscesses	Tinidazole	2 g once daily for 3-5 days
Amebic liver abscesses	Chloroquine*	600 mg once daily for 2 days, then 300 mg once daily for 14 to 21 days

TYPHOID

- Salmonella Typhi, (typhoid bacillus), a Gram-negative organism.
- Poor hygiene and inadequate sanitation (Faeco-oral).
- It is a medical disease, but the surgeon is called to treat of perforation of a typhoid ulcer.

Pathology

- Following ingestion of contaminated food or water, the organism colonises the Peyer's patches in the terminal ileum, causing hyperplasia of the lymphoid follicles followed by necrosis and ulceration (vertical).
- If the patient is left untreated or inadequately treated, the ulcers may lead to perforation and bleeding. The bowel may perforate at several sites, including the large bowel.

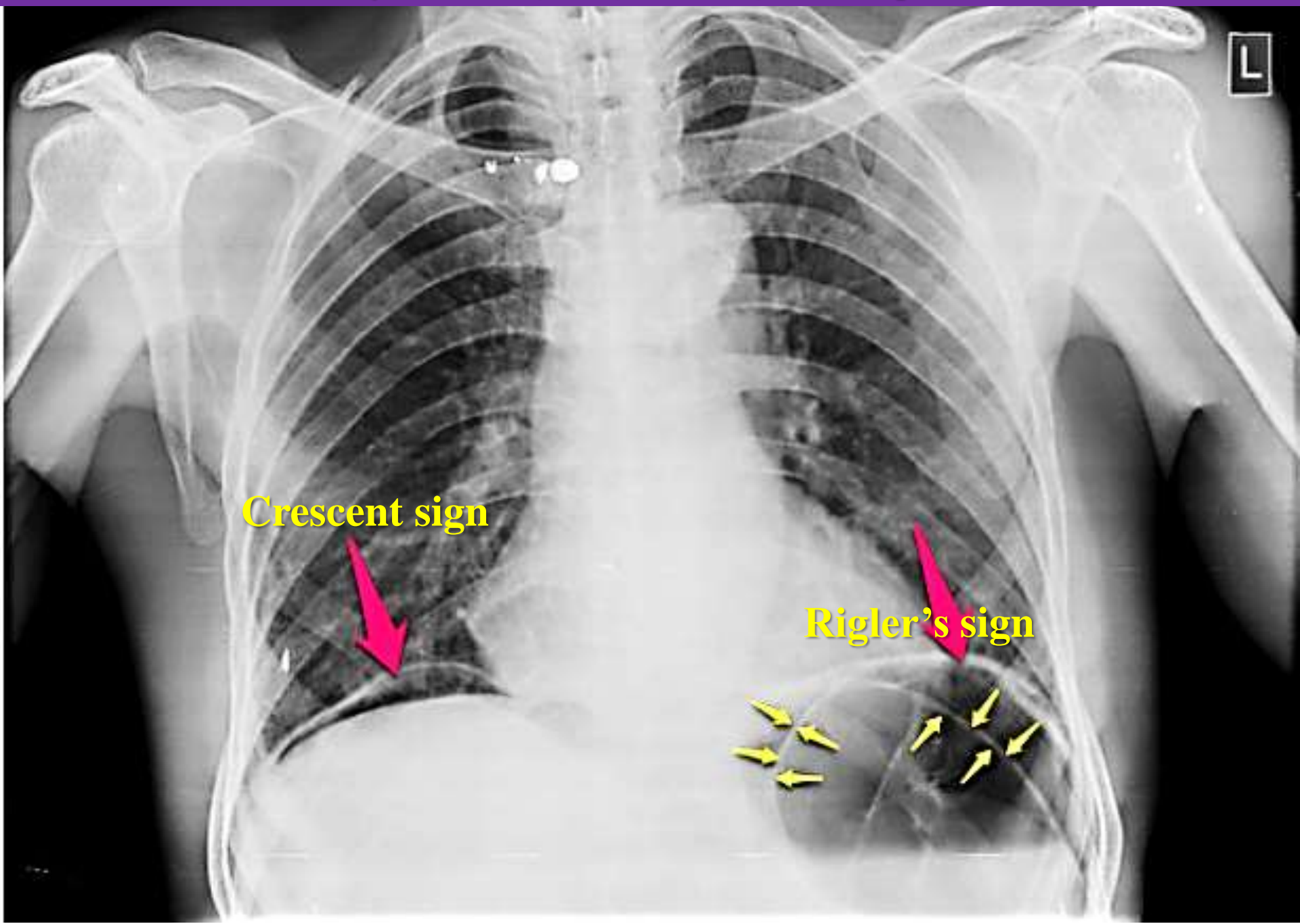
Clinical features

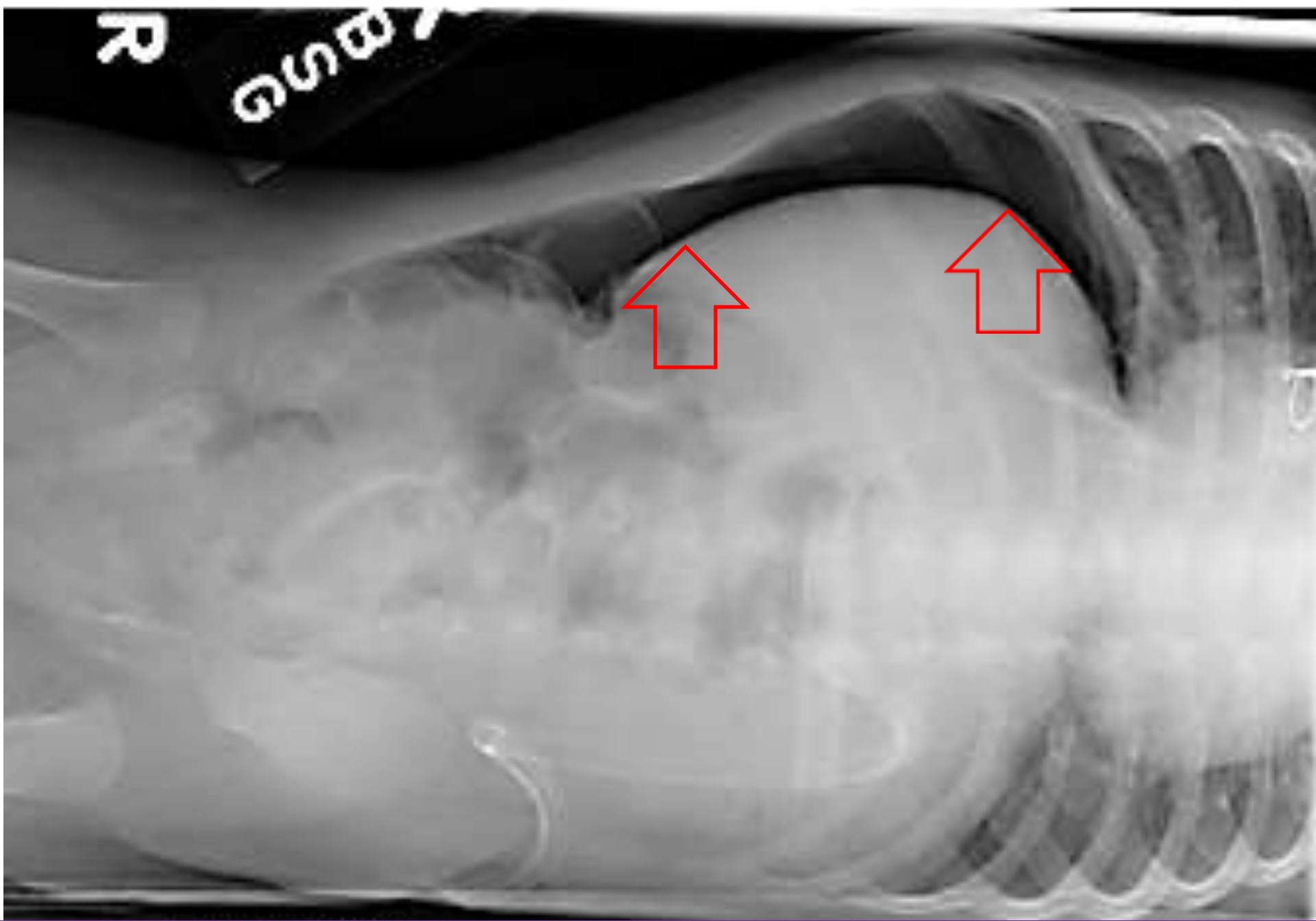
- A high fever for 2–3 weeks (recently visit ed an endemic area or restaurant).
- May have **hematochasia** (bleeding a typhoid ulcer); this can lead to hypovolaemia.
- Toxic with abdominal distension (paralytic ileus).
- In the second or third week of the illness, if there is severe generalised abdominal pain, this indicates a **perforated typhoid ulcer** unless with features of peritonitis. An erect chest radiograph or a lateral decubitus film (in the very ill, as they usually are) will show free gas in the peritoneal cavity.
- In fact, any patient being treated for typhoid fever who shows a sudden deterioration accompanied by abdominal signs should be considered to have a typhoid perforation until proven otherwise.

Diagnosis

- Blood and stool cultures exclude malaria.
- Widal test is (limited laboratory facilities) The test looks for the presence of agglutinins to O and H antigens of Salmonella Typhi and Paratyphi in the patient's serum.
- Sensitive and specific markers, are valuable when blood cultures are negative (as a result of prehospital treatment or self-medication with antibiotics) or facilities for such an investigation are not available.
 - MultiTest Dip-S-Ticks to detect immunoglobulin G (IgG).
 - Tubex to detect immunoglobulin M (IgM) .
 - TyphiDot to detect IgG and IgM.

Chest x-ray PA view (erect) shows (Pneumoperitoneum)





Plain X ray film (left lateral decubitus view) Pneumoperitoneum

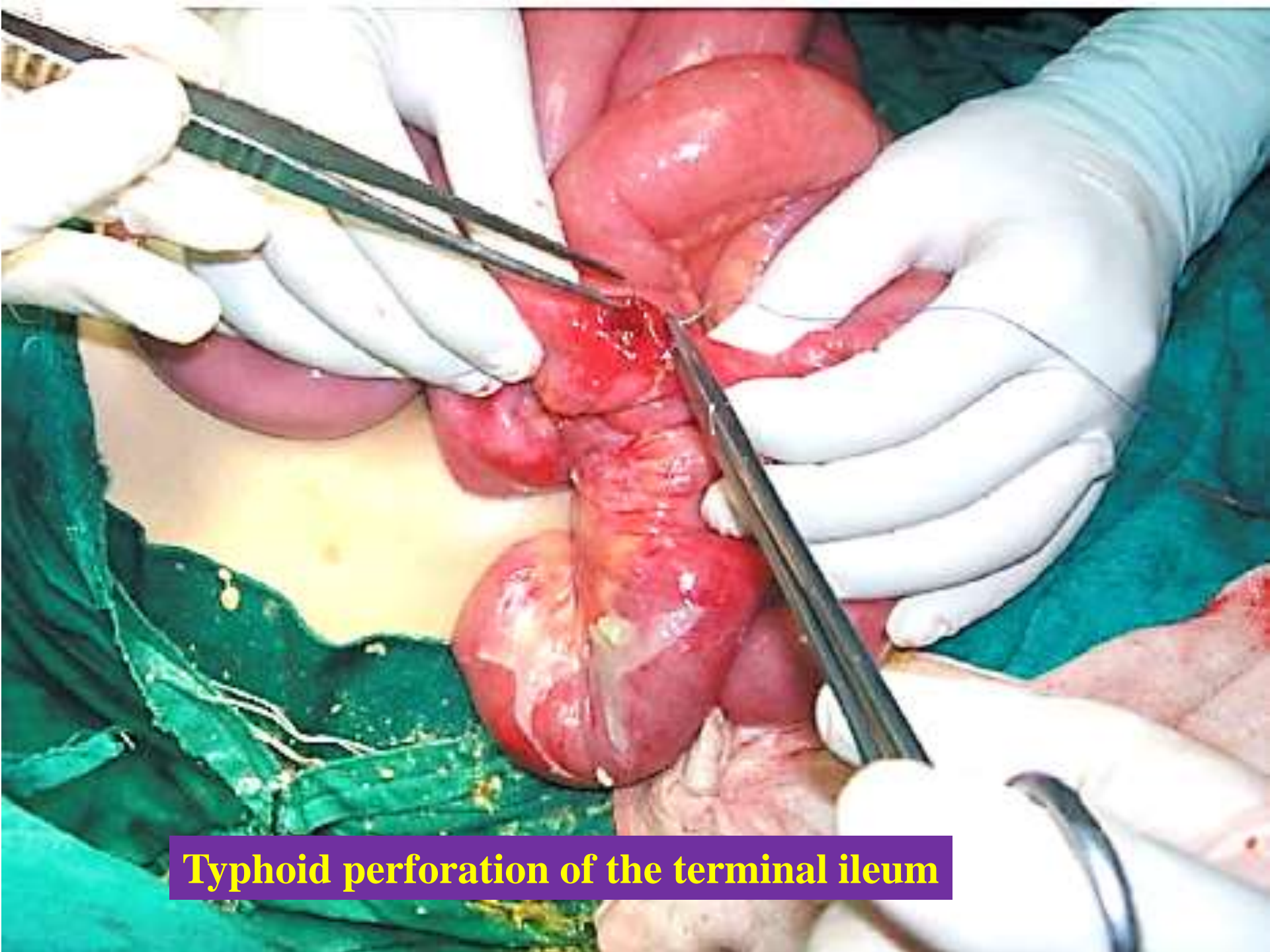
Diagnosis of bowel perforation secondary to typhoid

- The patient presents in, or has recently visited, an endemic area.
- The patient has persistent high temperature and is very toxic.
- Positive blood or stool cultures for Salmonella Typhi and the patient is already on treatment for typhoid
- After the second week, signs of peritonitis usually denote perforation, which is confirmed by the presence of free gas seen on a radiograph

Treatment

- Admission in the intensive care unit to stabilise patient's condition.
- Vigorous resuscitation with intravenous fluids and antibiotics in Metronidazole, cephalosporins and gentamicin are used in combination. Chloramphenicol, despite its potential side effect of aplastic anaemia, is still used occasionally in resource-poor countries. Laparotomy is then carried out.
- When a typhoid perforation occurs within the first week of illness, the prognosis is better than if it occurs after the second or third week because, in the early stages, the patient is less nutritionally compromised and the body's defences are more robust. Furthermore, the shorter the interval between diagnosis and operation, the better the prognosis.

- **The alternatives are closure of the perforation :**
 - After freshening the edges, wedge resection of the ulcer area and closure.
 - Resection of bowel with anastomosis or without anastomosis (exteriorisation),
 - Closure of the perforation and side-to-side ileotransverse anastomosis.
 - Ileostomy or colostomy where the perforated bowel is exteriorised after refashioning the edges.
- After closing an ileal perforation. look for other sites of perforation or necrotic patches in the small or large bowel that might imminently perforate, and deal with them appropriately.
- Thorough peritoneal lavage.
- The linea alba is closed, leaving the rest of the abdominal wound open for delayed closure, as wound infection is almost inevitable and dehiscence not uncommon. Or laparostomy may be a good alternative, in the presence of rampant infection,



Typhoid perforation of the terminal ileum

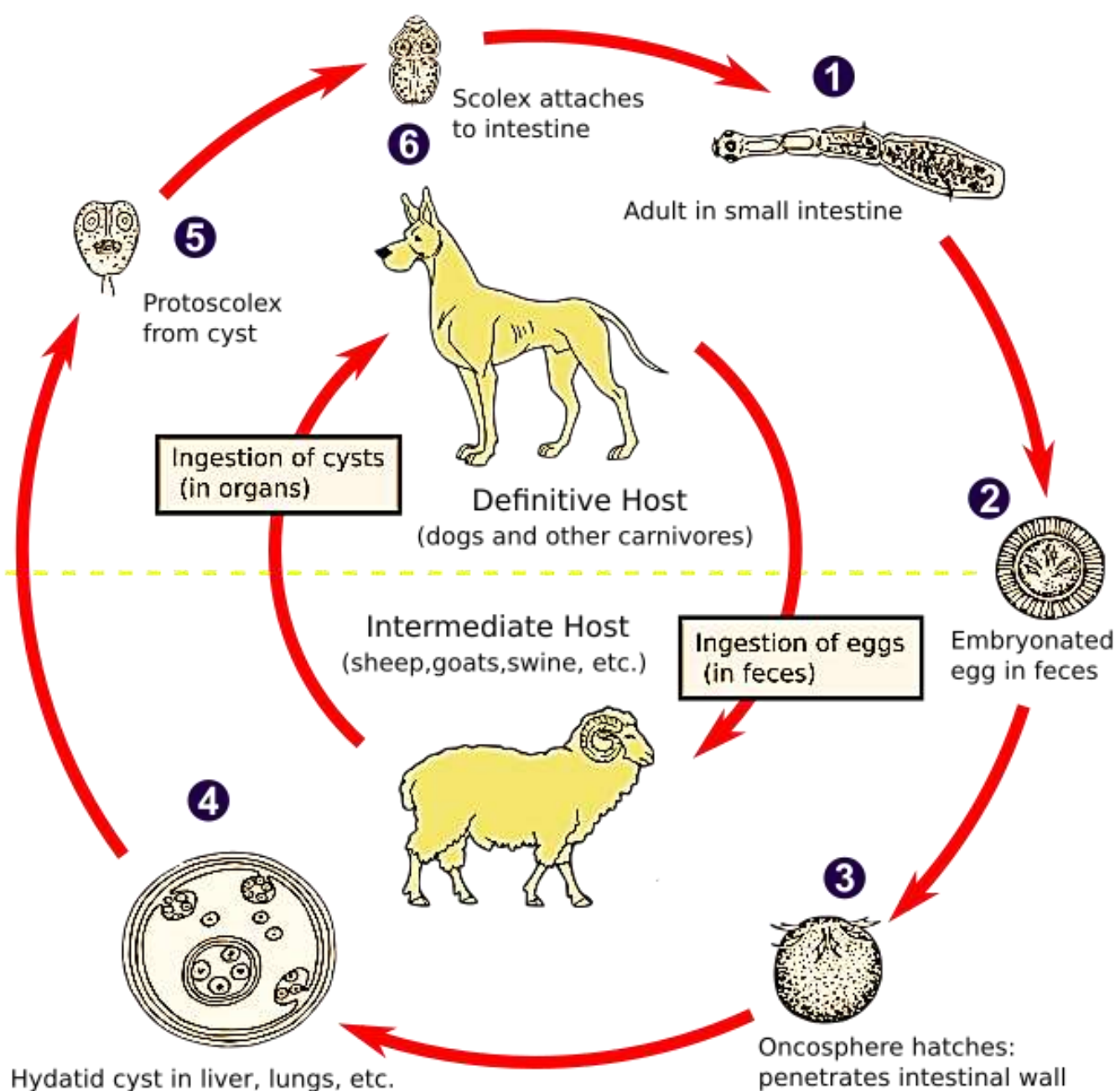
Treatment of bowel perforation from typhoid

- Manage in intensive care
- Resuscitate and give intravenous antibiotics
- Laparotomy – choice of various procedures
- Commonest site of perforation is the terminal ileum
- Having found a perforation, always look for others.
- In the very ill patient, consider some form of exteriorisation
- Close the peritoneum and leave the wound open for secondary closure .

HYDATID DISEASE

- Echinococcus granulosus, (dog tapeworm (Cestodes)).
- The dog is the definitive host and is the commonest source of infection transmitted to the intermediate hosts – humans, sheep and cattle.
- Faeco-oral rout.

- In the dog, the adult worm reaches the small intestine and the eggs are passed in the faeces. These eggs are highly resistant to extremes of temperature and may survive for long periods. In the dog's intestine, the cyst wall is digested, allowing the protoscolices to develop into adult worms. Close contact with an infected dog causes contamination by the oral route, with the ovum thus gaining entry into the human gastrointestinal tract.
- The liver is the organ most often affected. The lung is the next most common. The parasite can affect any organ or several organs in the same patient .



The cyst is characterised by three layers:

- 1) an outer pericyst, which is derived from compressed host organ tissues;
 - 2) an intermediate hyaline ectocyst, which is non-infective; .
 - 3) an inner endocyst, which is the germinal membrane and contains viable parasites that can separate, forming daughter cysts.
- A variant of the disease occurs in colder climates caused by *Echinococcus multilocularis*, in which the cyst spreads from the outset by actual invasion rather than expansion.

In 2003, the WHO Informal Working Group on Echinococcosis (WHO-IWGE) proposed a **Standardised Ultrasound Classification** based on the status of activity of the cyst , it helps to decide on the appropriate management

- **Group 1: Active group** – cysts larger than 2 cm and often fertile.
- **Group 2: Transition group** – cysts starting to degenerate and entering a transitional stage because of host resistance or treatment but may contain viable protoscolices.
- **Group 3: Inactive group** – degenerated, partially or totally calcified cysts; unlikely to contain viable protoscolices.

WHO-IWGE Classification of hepatic hydatid cyst .

Stage	Description
CL (cystic lesion)	Unilocular anechoic cystic lesion without internal echoes or septations
CE (cystic echinococcosis) 1	Uniformly anechoic cyst with nne internal echoes that represent protoscolices after rupture of a vesicle, called ‘hydatid sand’
CE 2	Cyst with internal septation representing the walls of the daughter cyst described as multivesicular,honeycomb, cartwheel or rosette formation
CE 3 (transitional stage) description of daughter cyst	3A: daughter cysts with detached laminated membrane. 3B- daughter cysts inside a solid matrix
CE 4 (inactive/degenerative)	Daughter cysts can no longer be seen Mixture of hypoechoic and hyperechoic features – like a bag of wool
CE 5	Calcincation of the wall; either partial or complete

Clinical features

A sheep farmer / slaughter / dog handler

- Asymptomatic and discovered coincidentally at postmortem or when an ultrasonography or CT scan is done for some other condition.
- Symptomatic (pressure effects) :
 - 1) Liver : gradually enlarging dull painful mass in the right upper quadrant (stretching of the liver capsule) , with the physical findings of a liver swelling (palpation & liver span). Daughter cysts may communicate with the biliary tree, causing obstructive jaundice (?)(parasitic infestation).
 - 2) Pulmonary lesion, if large enough, causes dyspnoea.
 - 3) Cerebral hydatid cyst : Features of raised intracranial pressure (Cushing' triad) or unexplained headaches in a patient from a sheep-rearing community .

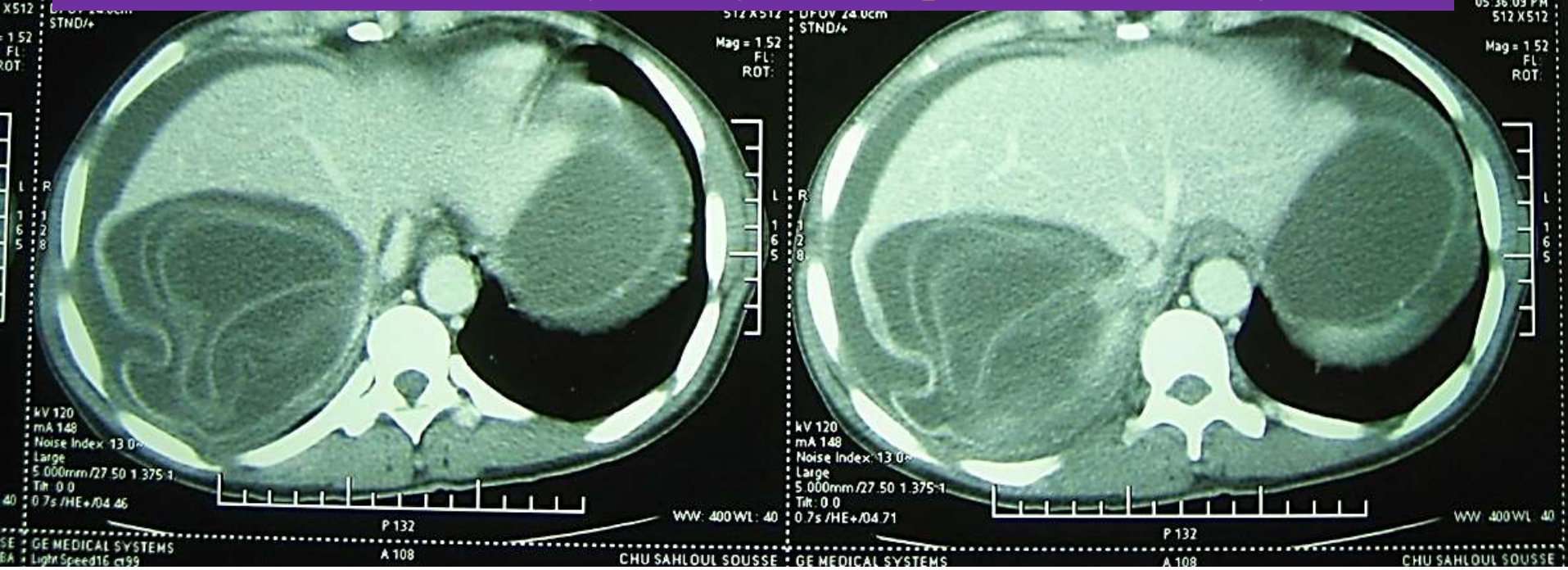
The patient may present as an emergency

- Severe abdominal pain following minor trauma, (peritonitis , how ?)when the CT scan may be diagnostic .
- Rarely, features of anaphylactic shock (how ?) without any obvious cause. Such a patient may subsequently cough up white material that contains scolices that have travelled into the tracheobronchial tree from rupture of a hepatic hydatid on the diaphragmatic surface of the liver.

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CT scan showing a rupture hydatid cyst of the liver in the peritoneum. lamellar membrane of the hydatid cyst that separated (water lily)

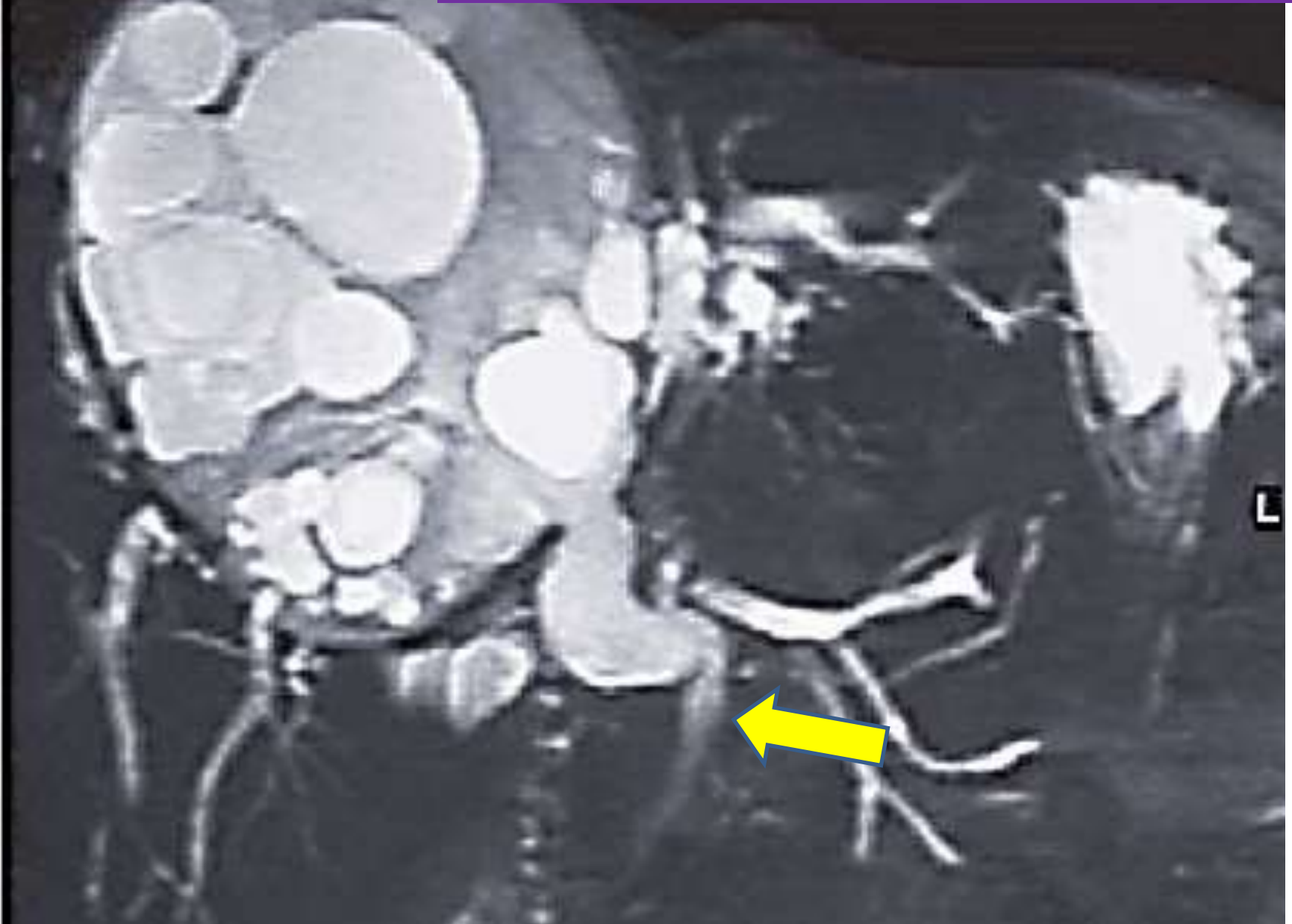


Diagnosis

Is made by a combination of good history and clinical examination supplemented by serology and imaging.

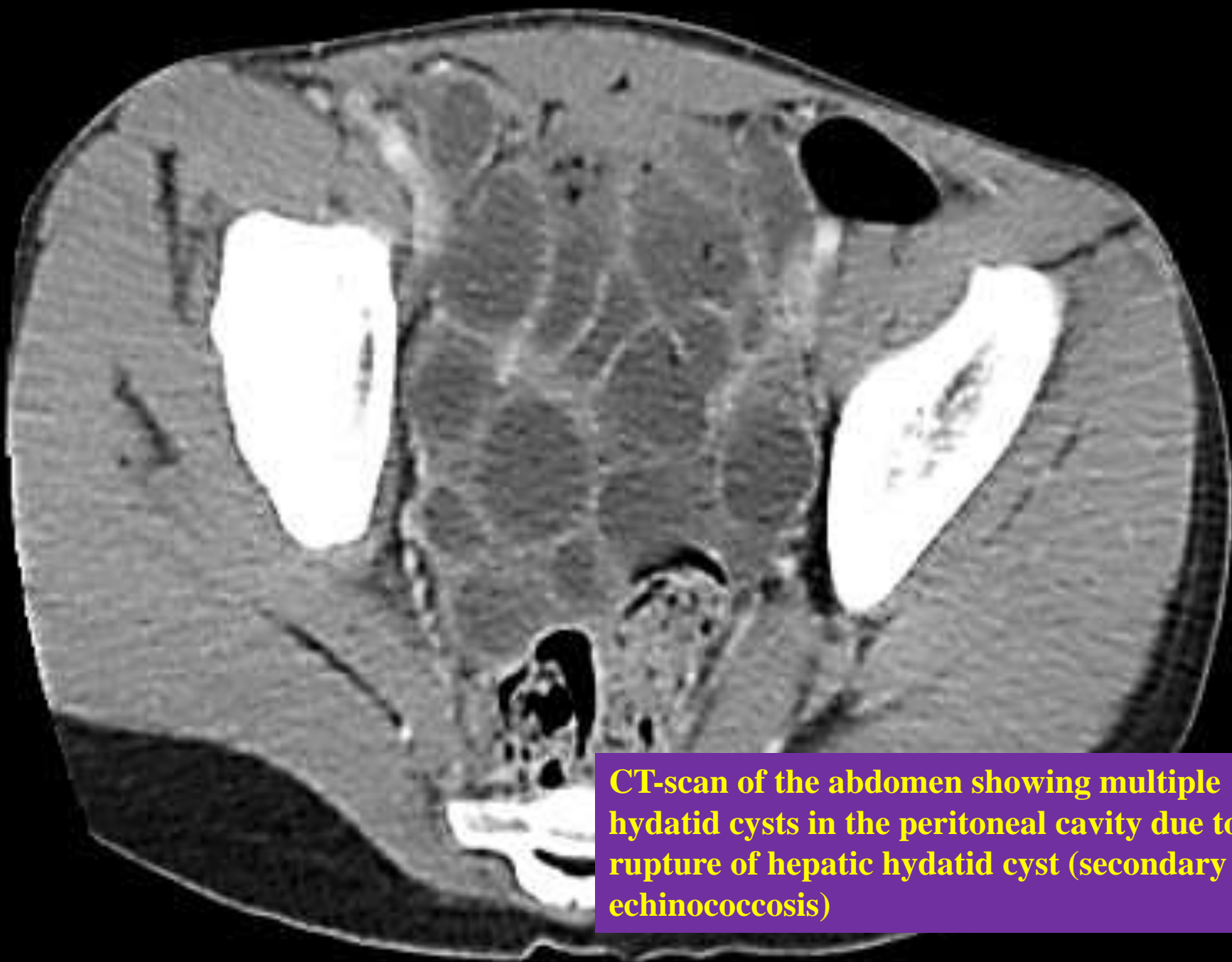
- Investigations :
- eosinophilia .
- serological tests, such as ELISA and immunoelectrophoresis.
- Imaging :
 1. CXR & abdomen .
 2. Ultrasonography and CT scan are the investigations of choice.
Ultrasonography of the biliary tract may show abnormality in the gallbladder and bile ducts, when hydatid infestation of the biliary system should be suspected.
 3. The CT scan shows a smooth space-occupying lesion with several septa.
 4. An MRCP may even show multiple cysts communicating with the biliary tree .

MRCP showing a large hepatic hydatid cyst with daughter cysts communicating with the common bile duct, causing obstruction and dilatation of the entire biliary tree



Gharbi Classification on Ultrasonography features of Hydatid Cyst

Type	Ultrasound Appearance
I	Pure fluid Collection
II	Fluid collection with a split wall (detached membrane)
III	Fluid collection with septa and/or daughter cysts
IV	Heterogeneous echo pattern (Hyperechoic with high internal echoes)
V	Reflecting walls (Cyst with reflecting calcified thick wall)



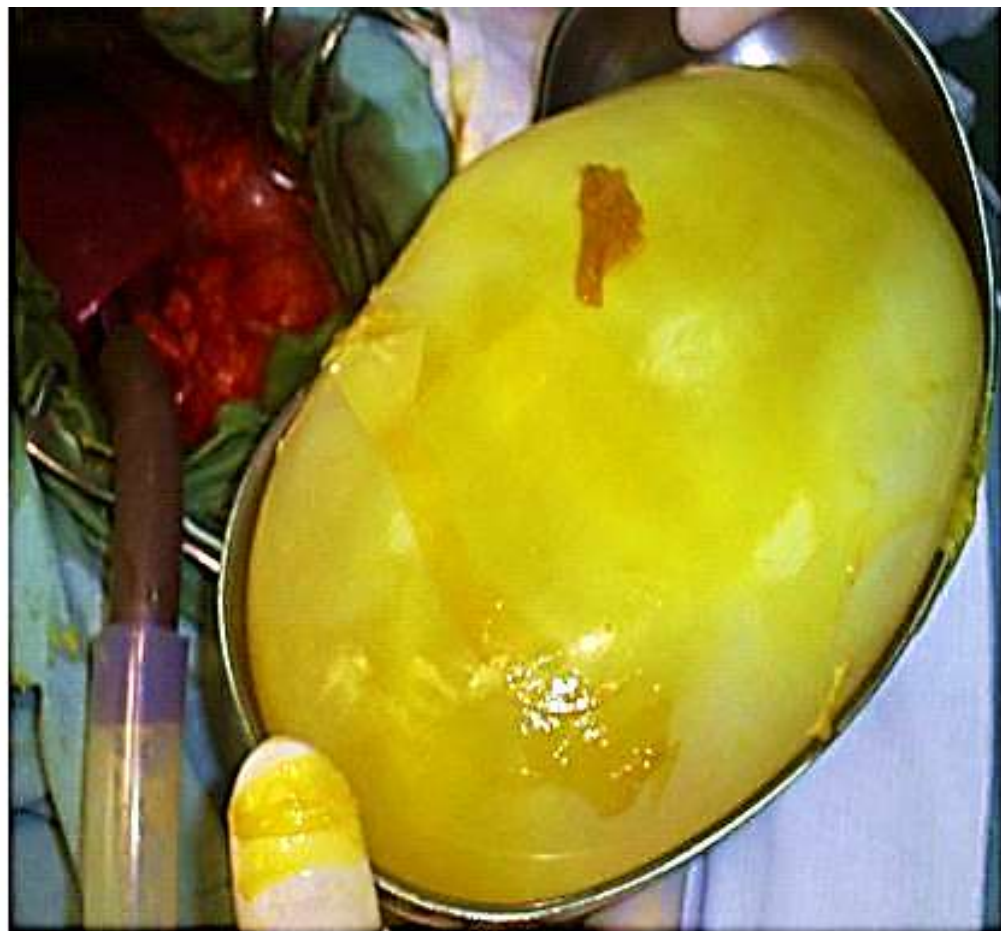
CT-scan of the abdomen showing multiple hydatid cysts in the peritoneal cavity due to rupture of hepatic hydatid cyst (secondary echinococcosis)



Multiple peritoneal cysts

Treatment of Hepatic Hydatid

- Here, the treatment of hepatic hydatid is outlined because the liver is most commonly affected, but the same general principles apply whichever organ is involved.
- These patients should be treated in a tertiary unit where good teamwork between an expert hepatobiliary surgeon, an experienced physician and an interventional radiologist is available.
- An asymptomatic cyst that is inactive (group 3) may be left alone.
- Surgical treatment by minimal access therapy is best summarised by the mnemonic PAIR (puncture, aspiration, injection and reaspiration). This is done after adequate drug treatment with albendazole and praziquantel.



Laparotomy

- Radical total or partial pericystectomy with omentoplasty .
- Hepatic segmentectomy (especially if the lesion is in a peripheral part of the liver) .
- During the operation, scolicidal agents are used, such as hypertonic saline (15–20%), ethanol (75–95%) or 10 % povidone–iodine. This may cause sclerosing cholangitis if biliary radicles are in communication with the cyst wall.

Laparoscopic

- Laparoscopic marsupialisation of the cyst (deroofing), consisting of removal of the cyst containing the endocyst along with daughter cysts, is the most common procedure. In the initial steps, the cyst is aspirated, taking care not to spill any contents, using povidone–iodine or hypertonic saline as a scolicidal agent. Any communication with the biliary tree is oversewn and pedicled omentum is sutured to the margins of the cyst.
- If the cyst is small and superficial, a cystopericystectomy is performed at centres experienced enough to do more advanced surgery, removing the entire cyst intact.

Approach , **O**pening , **R**esection and **C**ompleteness, **AORC** nomenclature system for CE surgery

Approach

Laparotomy

Laparoscopy

Robotic

Opening

Opened cyst

OP

Non-opened cyst

NOP

Resection

Cystectomy

Hepatectomy

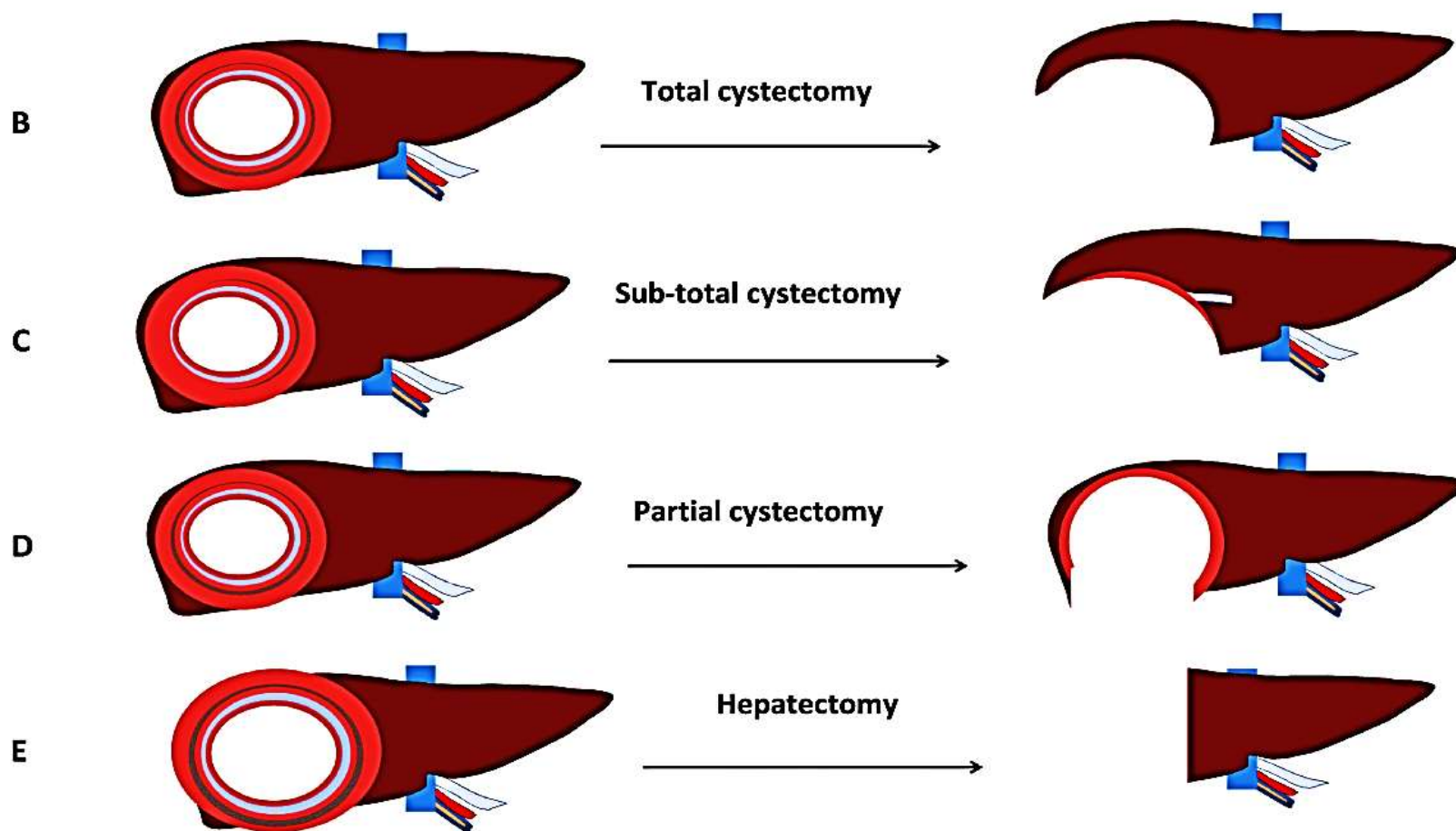
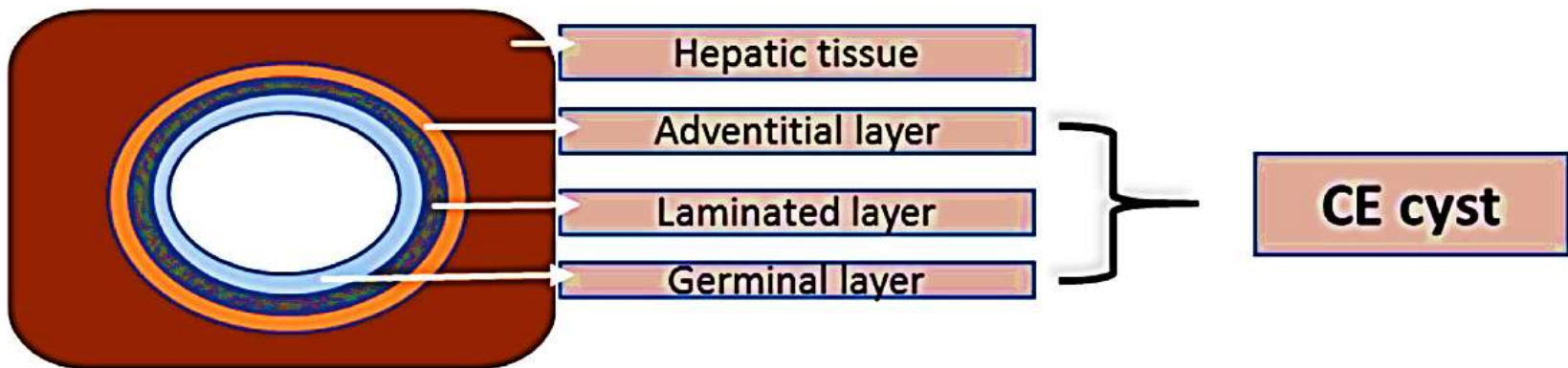
Liver Transplantation

Completeness

Total cystectomy

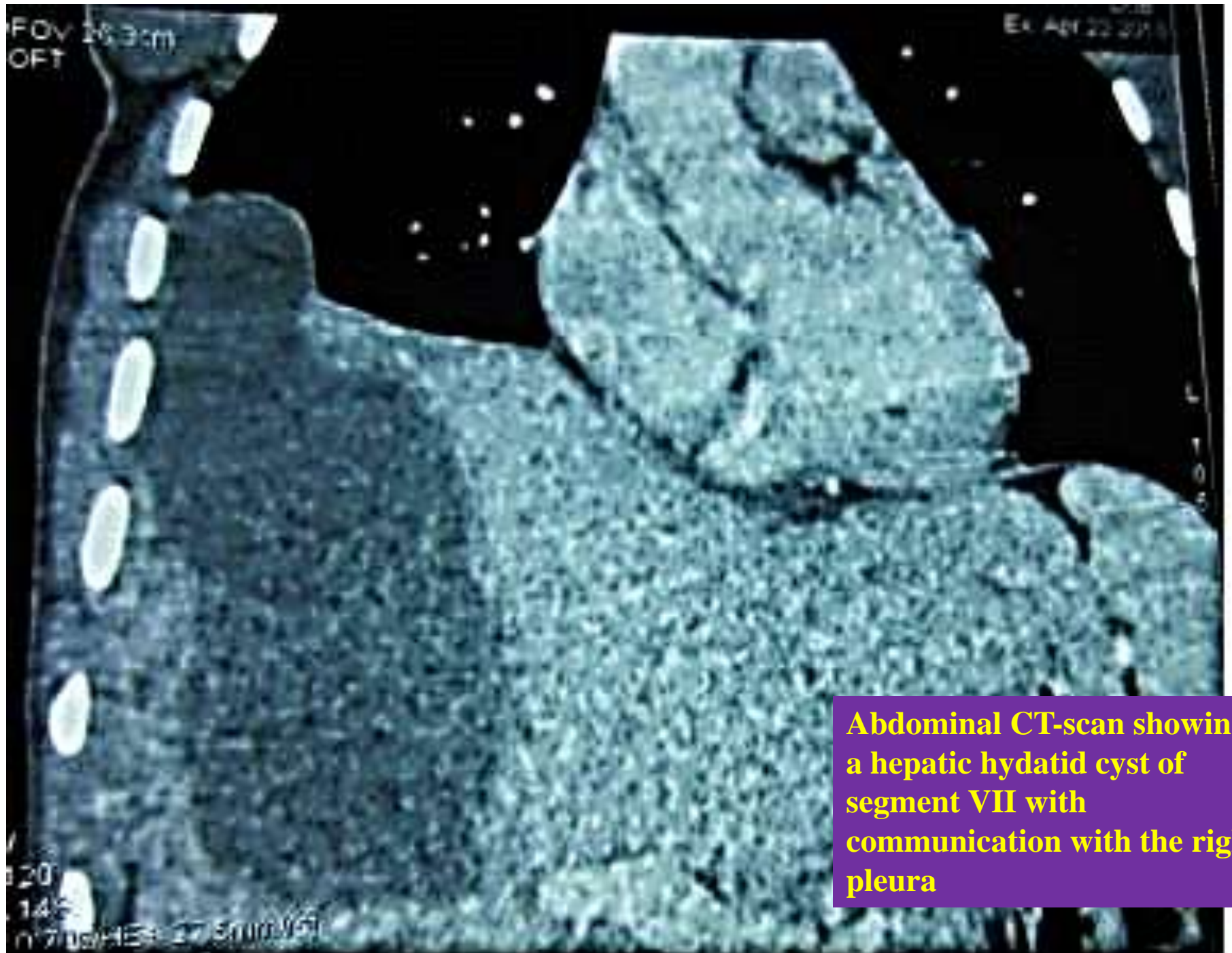
Sub-total cystectomy

Partial cystectomy



Pulmonary Hydatid Disease

- The lung is the second commonest organ affected after the liver.
 - The right lung and lower lobes are slightly more often involved. The cyst is usually single, although multiple cysts do occur and concomitant hydatid cysts in other organs, such as the liver, are not unknown.
- 1) The condition may be silent and found incidentally. Silent cysts may present as an emergency because of rupture or an allergic reaction.
 - 2) Symptomatic patients present with cough (laminated membrane), expectoration, fever, chest pain and sometimes haemoptysis.



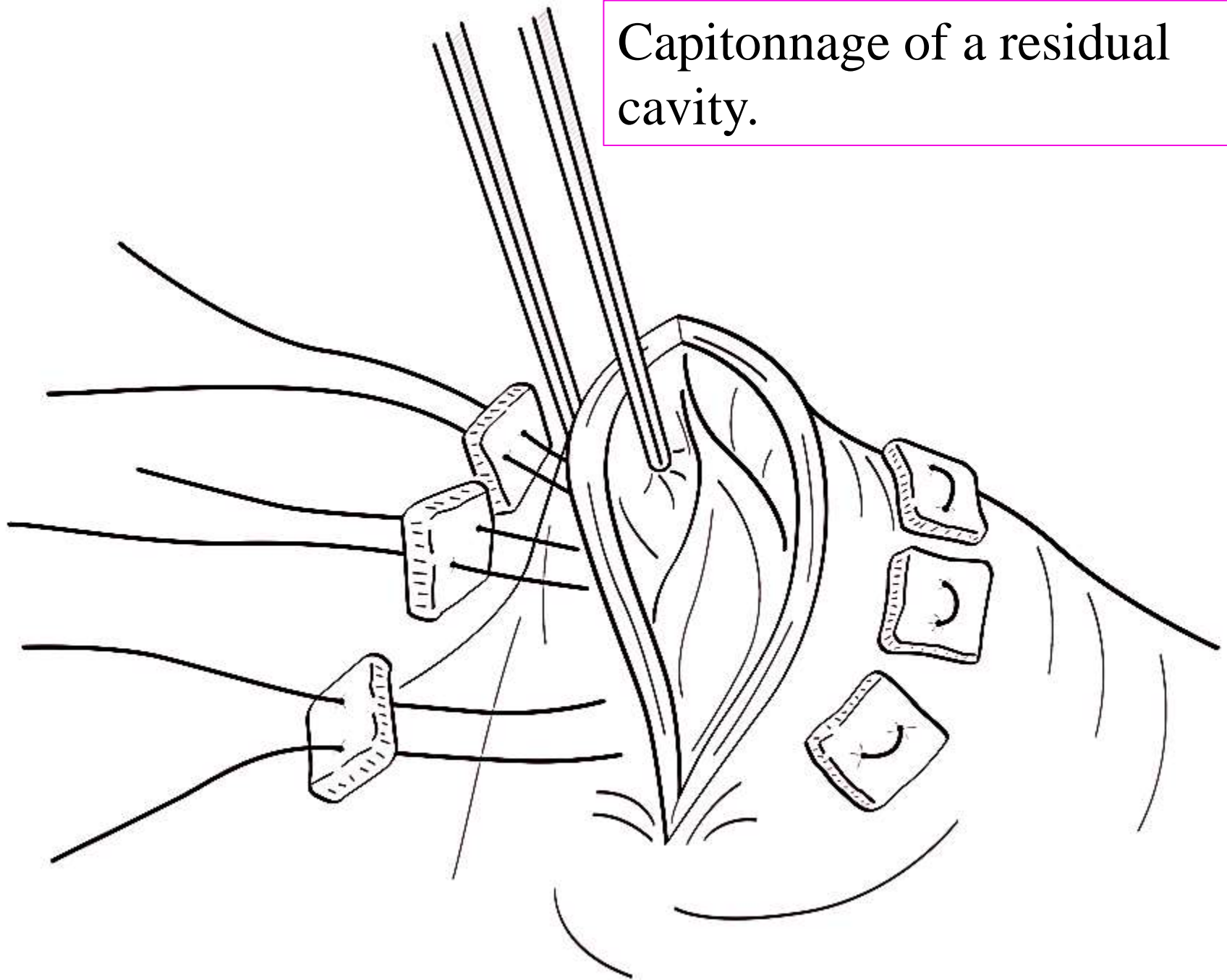
Abdominal CT-scan showing a hepatic hydatid cyst of segment VII with communication with the right pleura

- Uncomplicated cysts present as rounded or oval lesions on chest radiography.
- Complicated cysts
 - 1) The ‘meniscus’ or ‘crescent’ sign (Figure 6.15). This is often regarded as a sign of impending rupture, due to erosion of the bronchioles results in air being introduced between the pericyst and the laminated membrane and gives a fine radiolucent crescent.
 - 2) The ‘water-lily’ sign on CT scan When the cyst ruptures, the crumpled collapsed endocyst floats like a lily on the residual fluid .
 - A. Rupture into the pleural cavity results in pleural effusion.
CT scan defines the pathology in greater detail.
 - B. Bronchopulmonary fistula

Treatment of Pulmonary Hydatid

- Medical treatment is less successful and considered when surgery is not possible because of poor general condition or diffuse disease affecting both lungs, or recurrent or ruptured cysts.
- The mainstay of treatment is surgery.
- The principle of surgery is to preserve as much viable lung tissue as possible. The exact procedure can vary: cystotomy, capitonnage, pericystectomy, segmentectomy or occasionally pneumonectomy.

Capitonnage of a residual cavity.





PRAISE BE TO ALLAH