

By the Name of ALLAH the Most Gracious the Most Merciful



The peritoneum, mesentery, greater omentum and retroperitoneal space Part III

د . أحمد اسامة حسن

Specialist in General Surgery & Laparoscopic Surgery

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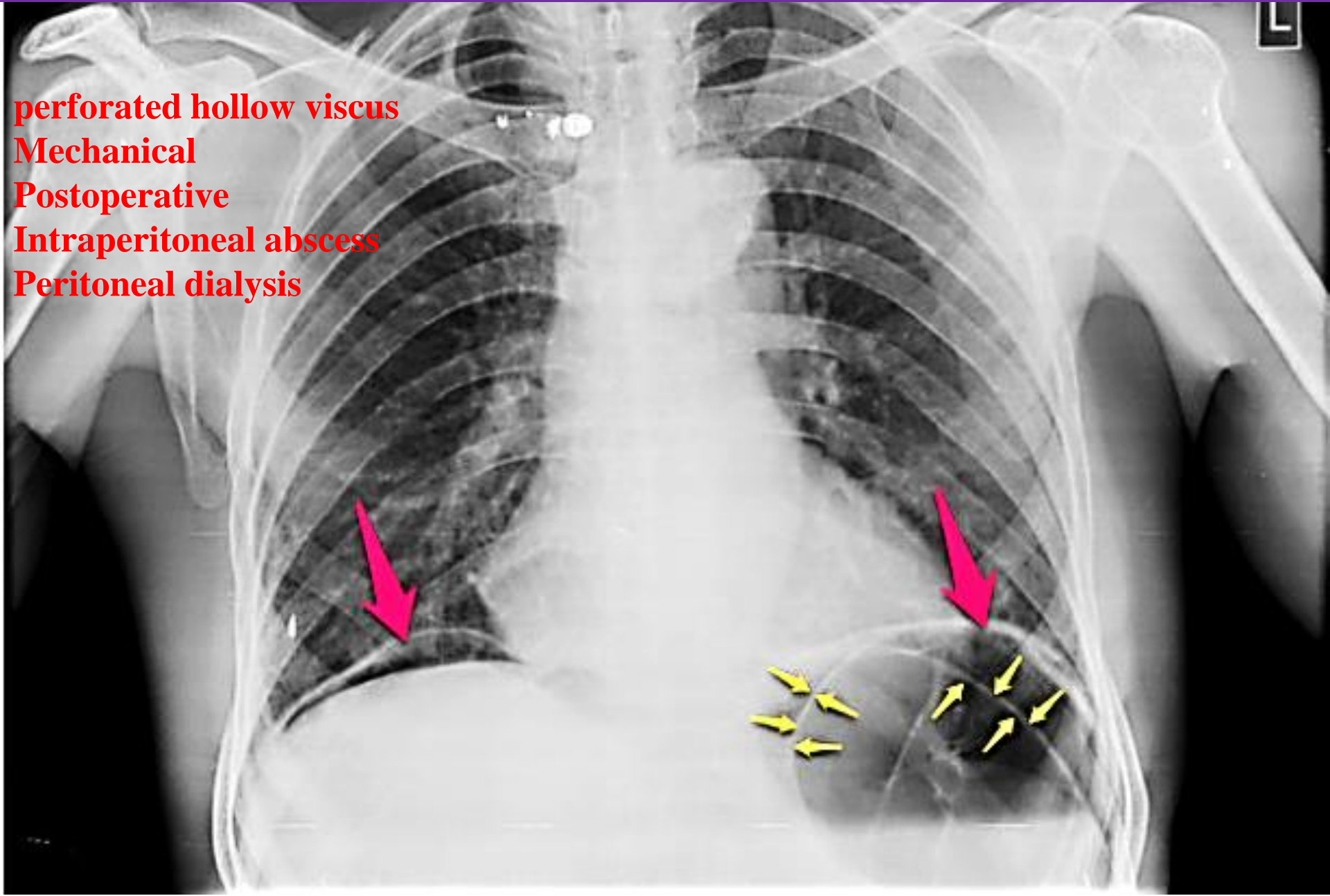
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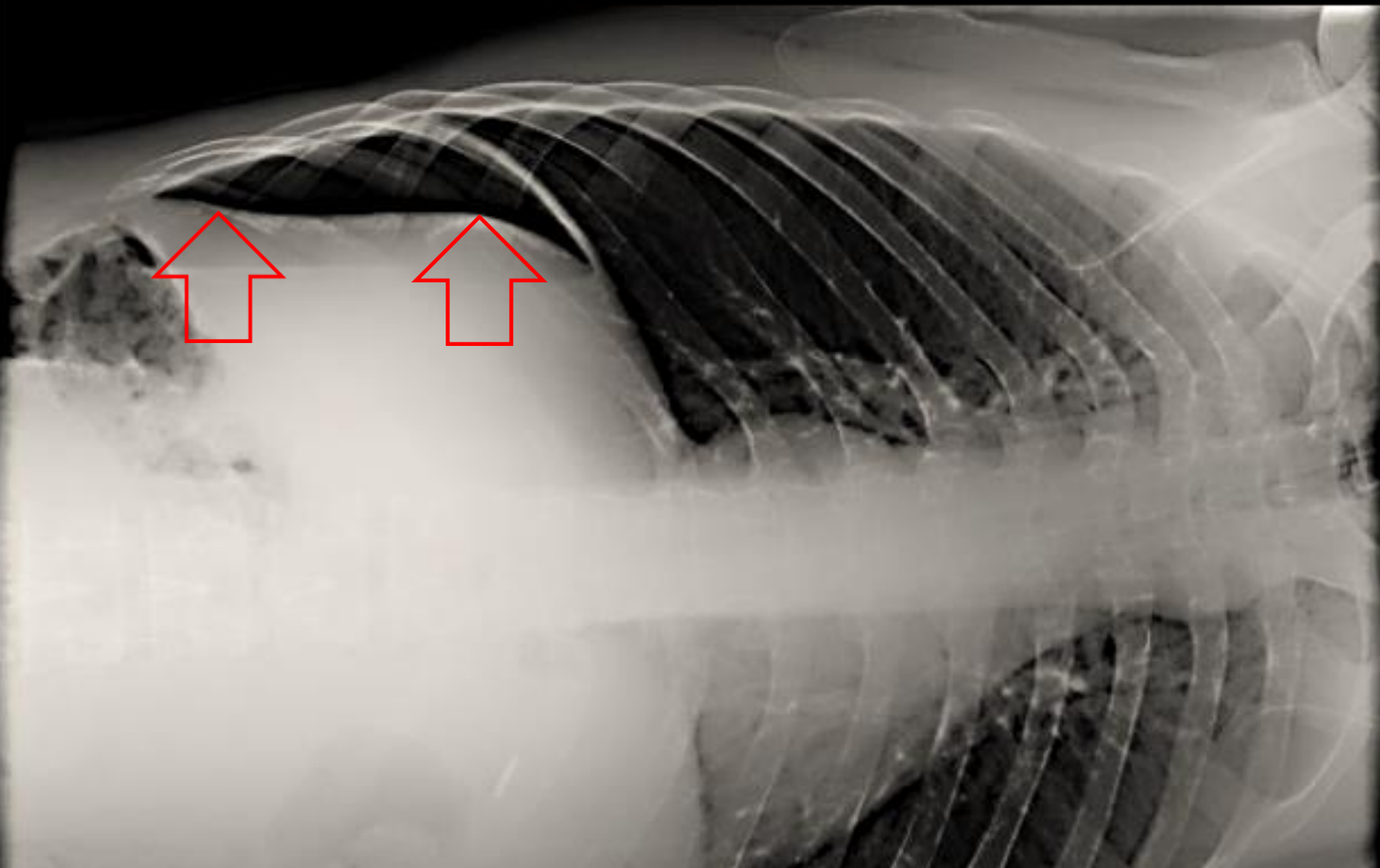
Bailey & Love's Short Practice of Surgery 27th Edition.

Ch 65.

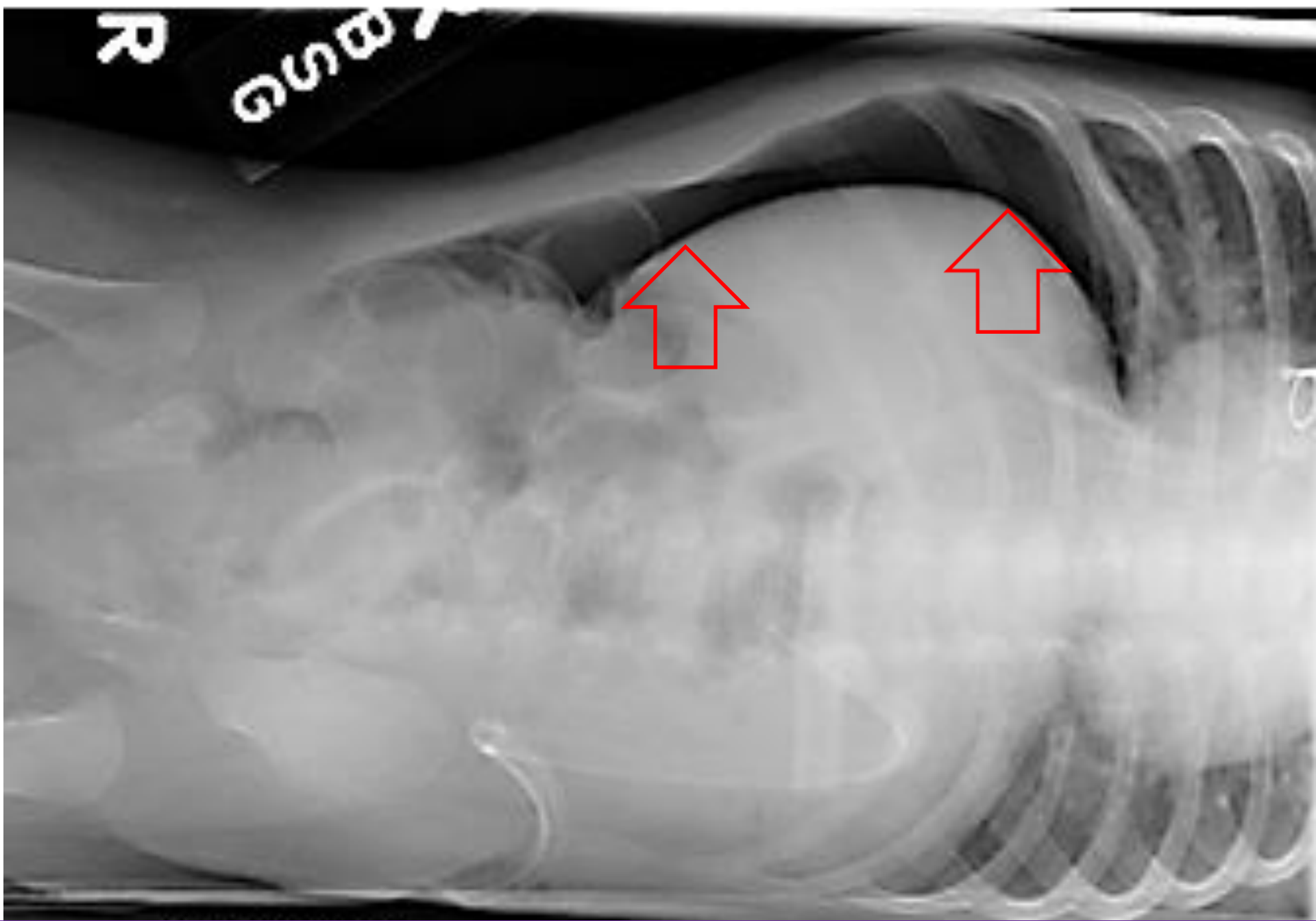
Chest x-ray PA view (erect) shows gas under the diaphragm (Crescent sign) and Rigler sign. (Pneumoperitoneum)

perforated hollow viscus
Mechanical
Postoperative
Intraperitoneal abscess
Peritoneal dialysis

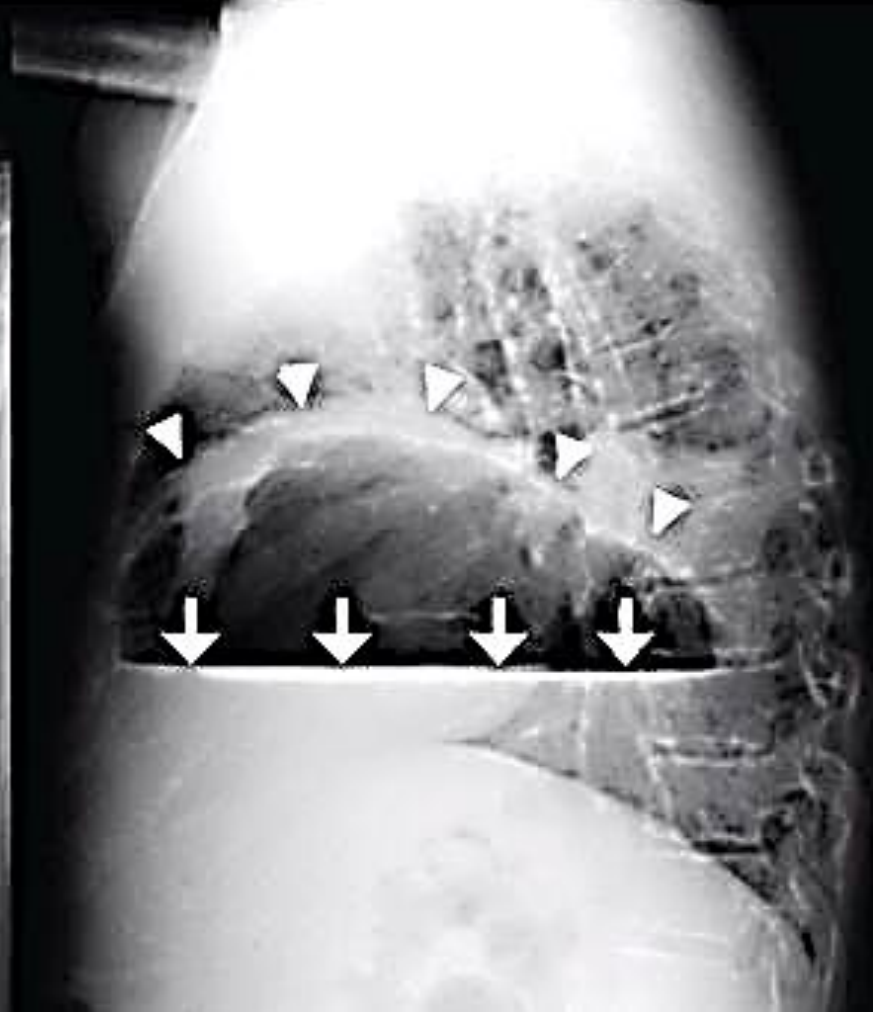
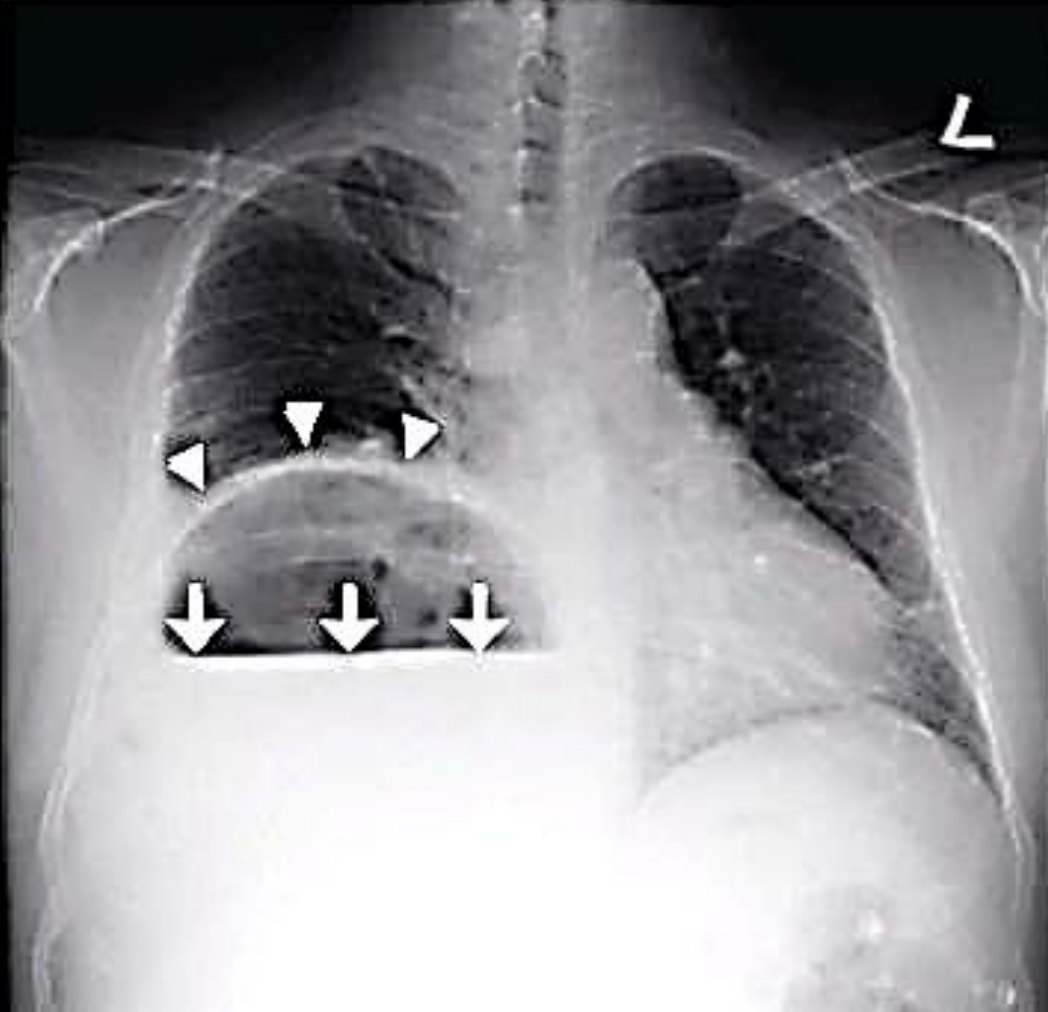




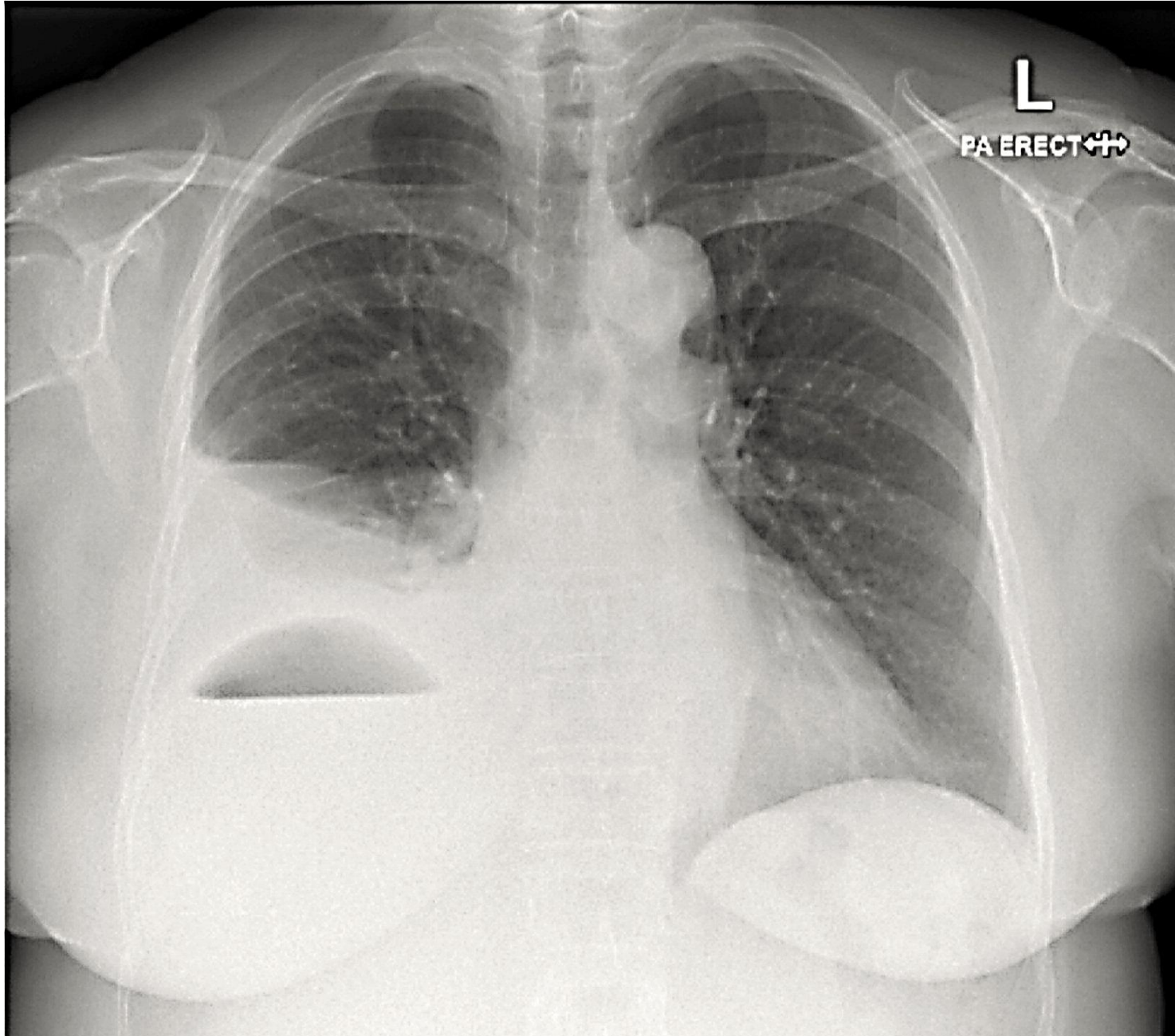
Plain X ray film (left lateral decubitus view) shows a large amount of intraperitoneal air is noted bounded by abdominal wall, lateral border of liver and inferior surface of diaphragm., suggestive of bowel perforation.



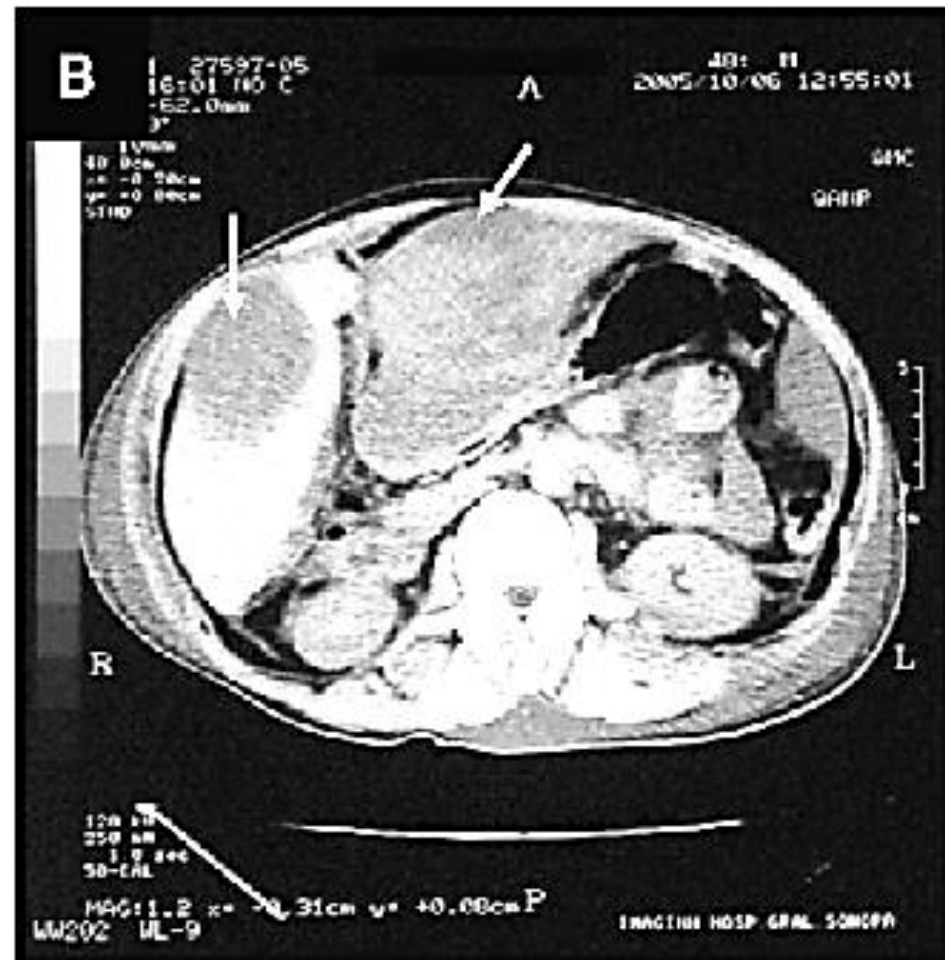
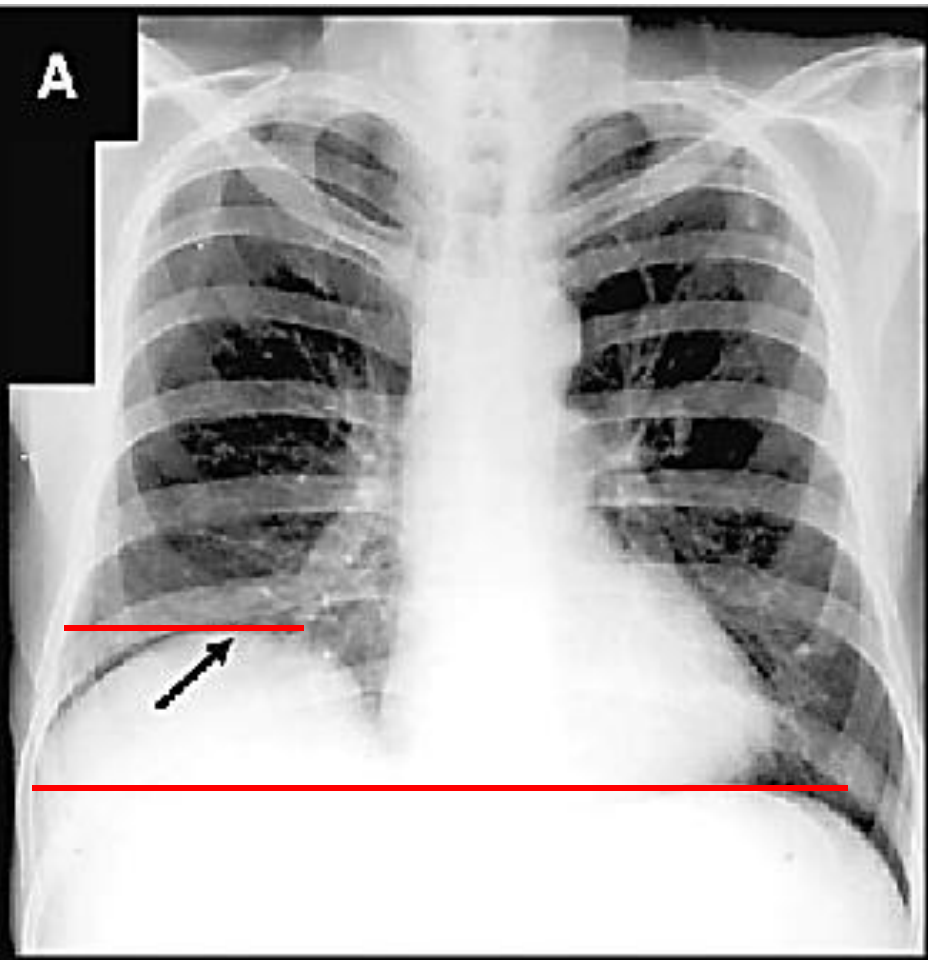
Plain X ray film (left lateral decubitus view) Pneumoperitoneum



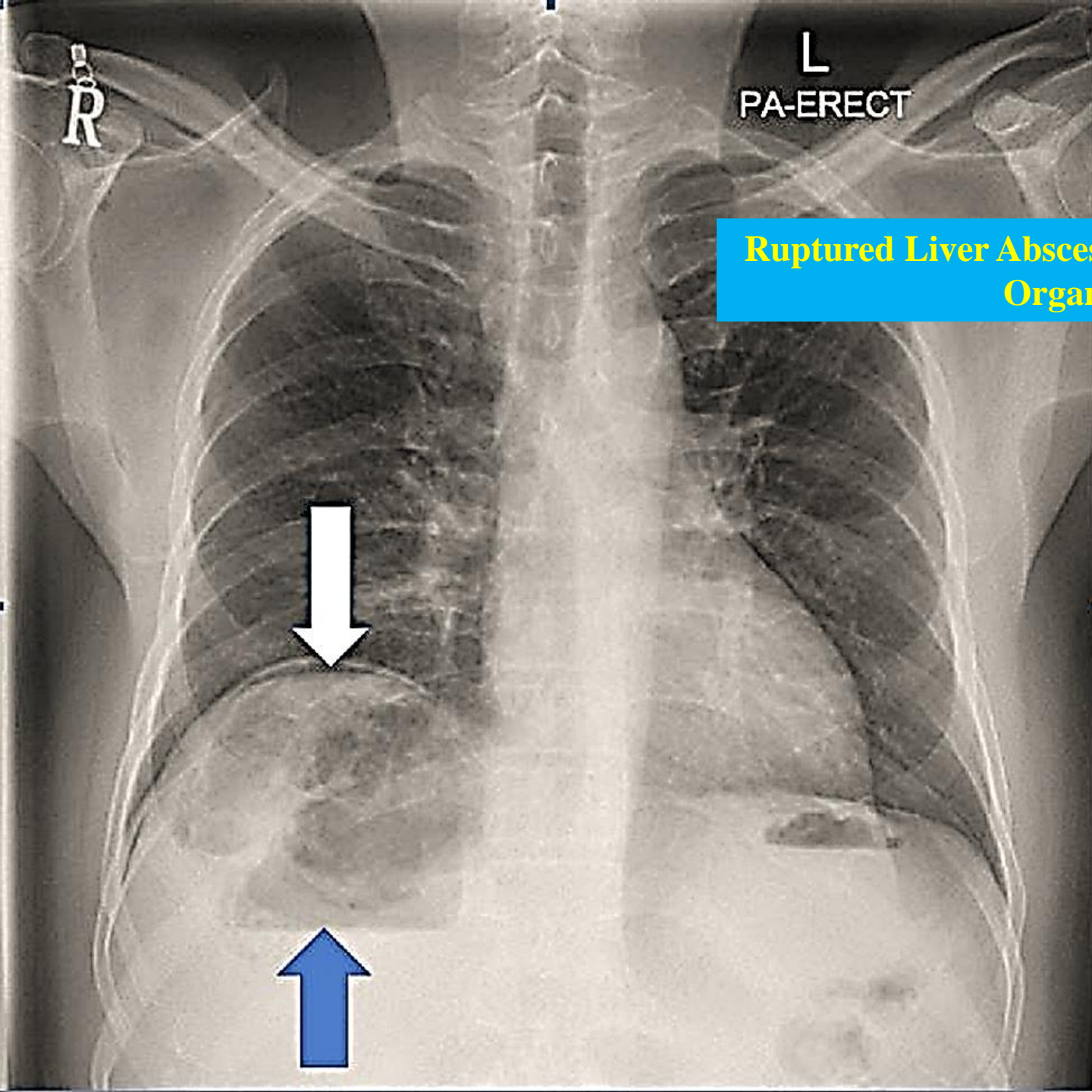
Plain chest radiography showed dramatic elevation of the right hemidiaphragm with a large subphrenic air-fluid level. Cultures of blood and the abscess yielded *Klebsiella pneumoniae*. The patient recovered after percutaneous drainage and a course of ceftriaxone.



Note the superior margin of the air crescent following the perceived diaphragmatic contour which alludes to this being abdominal in location and Rt pleural effusion.



Liver span to assess the upper border of the liver

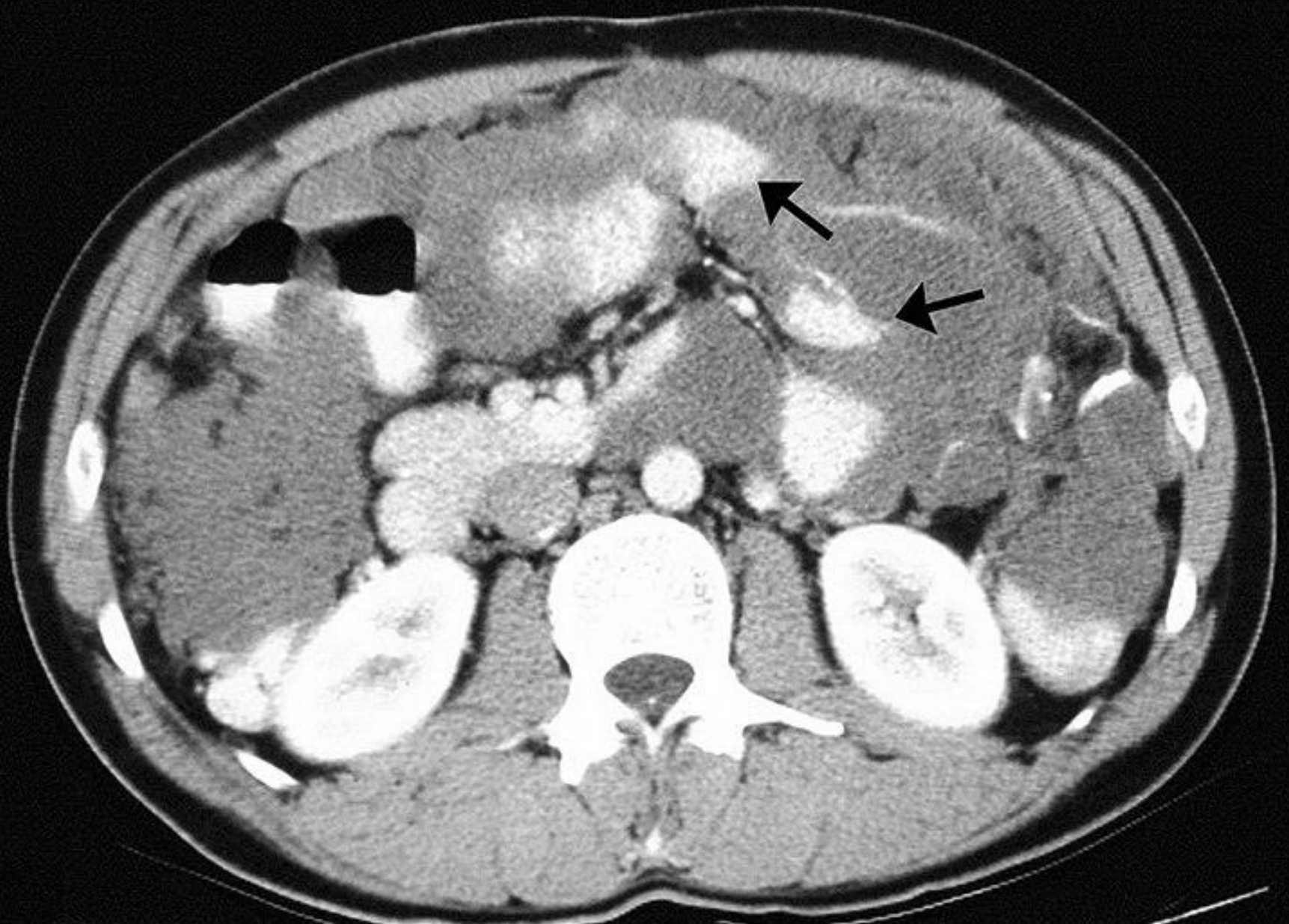


Ruptured Liver Abscess With Gas Forming Organism

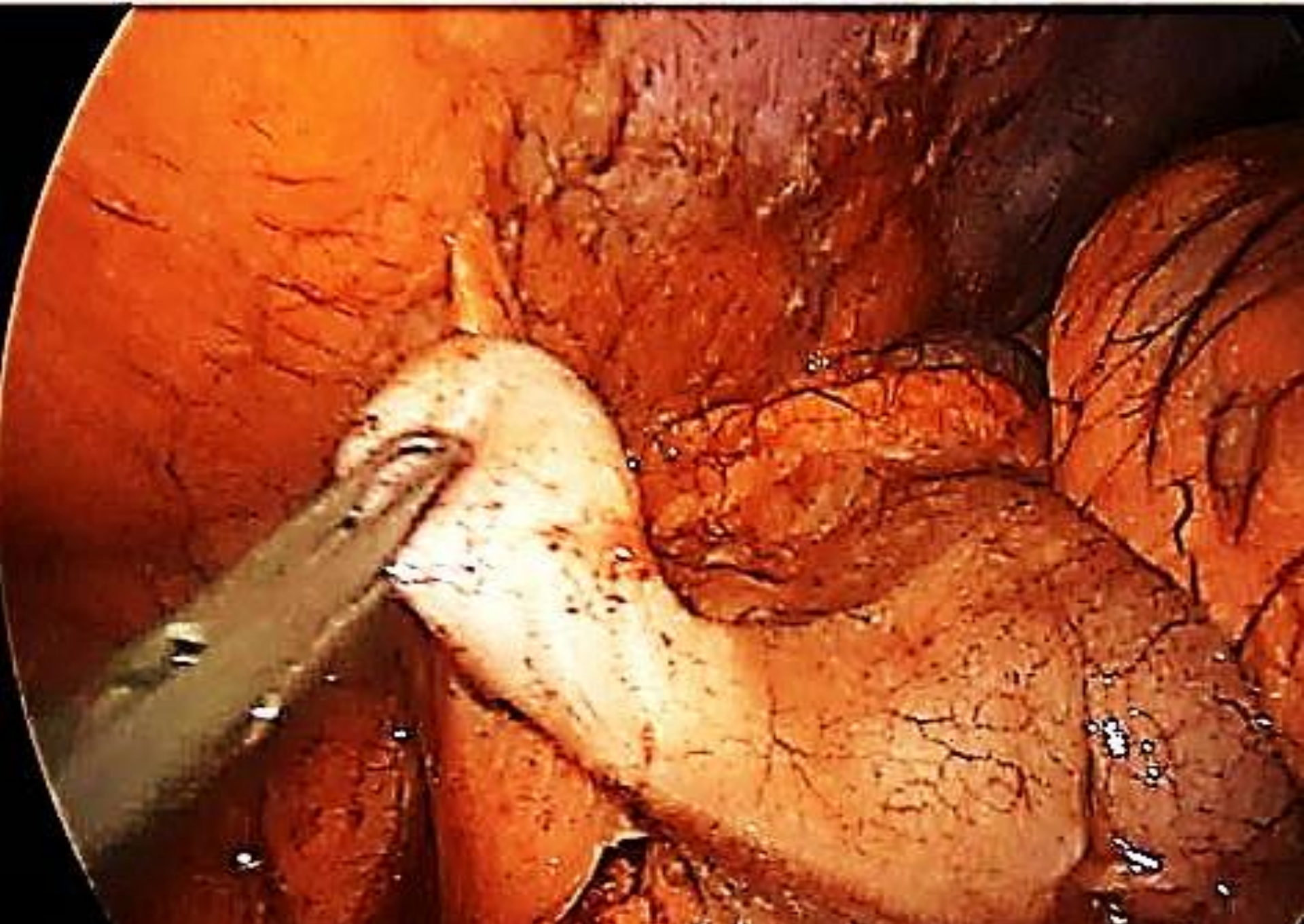
Chest X-ray revealed right subdiaphragmatic free air suggesting pneumoperitoneum, with heterogeneous liver shadow and air-fluid level

Pseudomyxoma peritonei

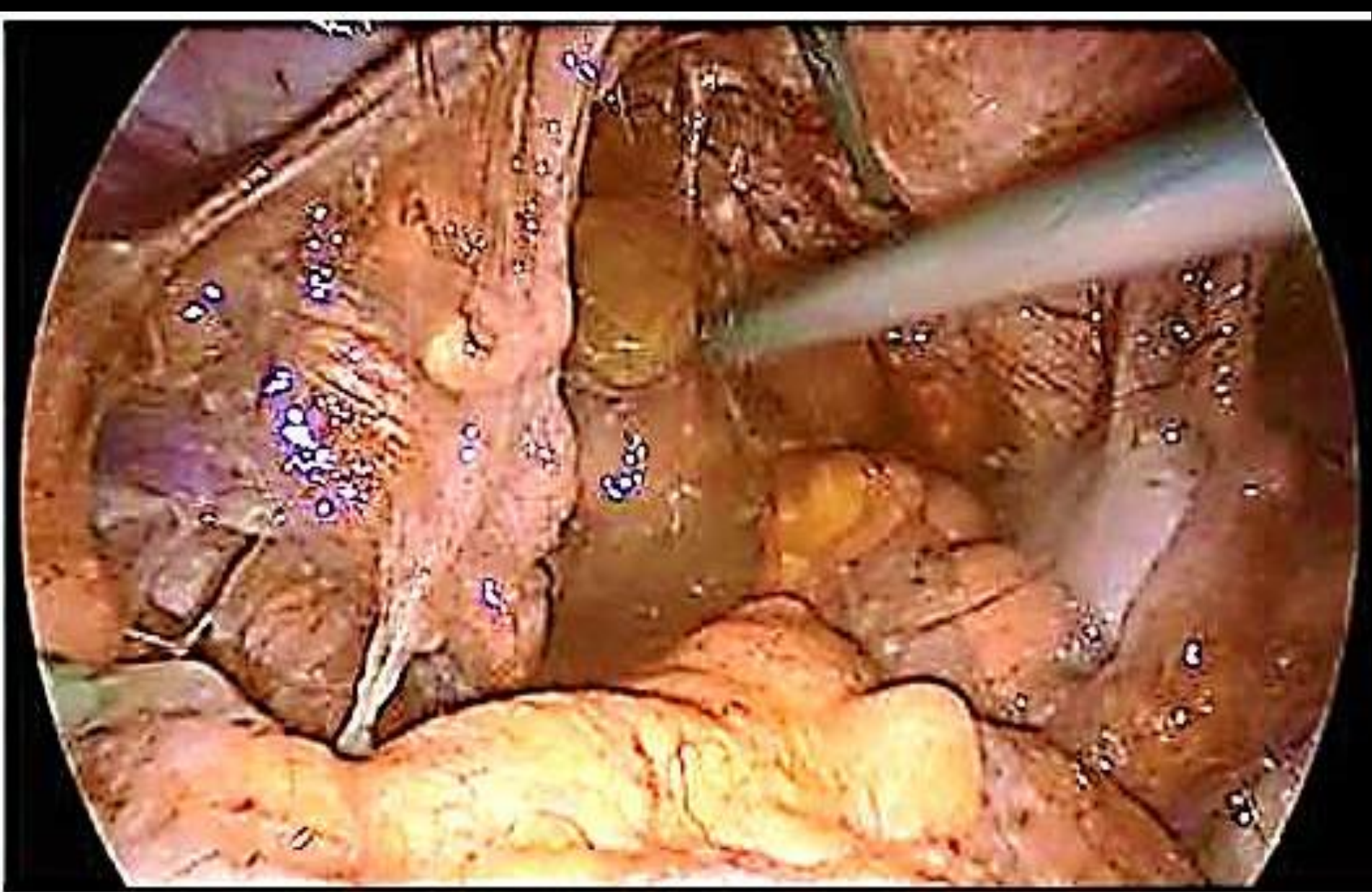
- Is caused by cancerous cells (mucinous adenocarcinoma) that produce abundant mucin or gelatinous ascites. The tumors cause fibrosis of tissues and impede digestion or organ function, and if left untreated, the tumors and mucin they produce will fill the abdominal cavity.
- This disease is most commonly caused by an appendiceal primary cancer (cancer of the appendix); mucinous tumors of the ovary .
- Treatment ranges from watchful waiting to debulking and hyperthermic intraperitoneal chemotherapy (HIPEC)with cytoreductive surgery.



Computed tomographic scan of an abdomen showing pseudomyxoma peritonei with multiple peritoneal masses (arrow) with "scalloping effect" seen.



Appendicular pseudomyxoma with enlarged base (female)



Gelatinous material in the Douglas' pouch (female)

- PERITONEAL INCLUSION CYSTS
- Primary peritoneal malignancy
- Secondary peritoneal malignancy
- Peritoneal carcinomatosis
- **THE MESENTRY**
- Tumours of the mesentery
- Diffuse Fibromatosis
- **THE GREATER OMENTUM**
- **THE RETROPERITONEAL SPACE AND RETROPERITONEUM**
- RETROPERITONEAL SPACE COLLECTIONS .
- THE RETROPERITONEUM
- Retroperitoneal haemorrhage.
- Retroperitoneal fibrosis
- Retroperitoneal (psoas) abscess
- Retroperitoneal lipoma
- Retroperitoneal sarcoma

PERITONEAL INCLUSION CYSTS

- These are benign cysts lined by peritoneal mesothelium.
- They can arise at any location of the peritoneum, in continuity with the surface of either parietal or visceral peritoneum.
- They can gradually expand and rarely rupture.
- Most are asymptomatic and are identified incidentally on cross-sectional imaging .
- There is a loose association with ovarian malignancy and thus MRI evaluation of the ovaries is advisable in the premenopausal context.
- If symptomatic an inclusion cyst may be drained under imaging control, deroofed or excised.
- Recurrent rates are high.

TUMOURS OF THE PERITONEUM

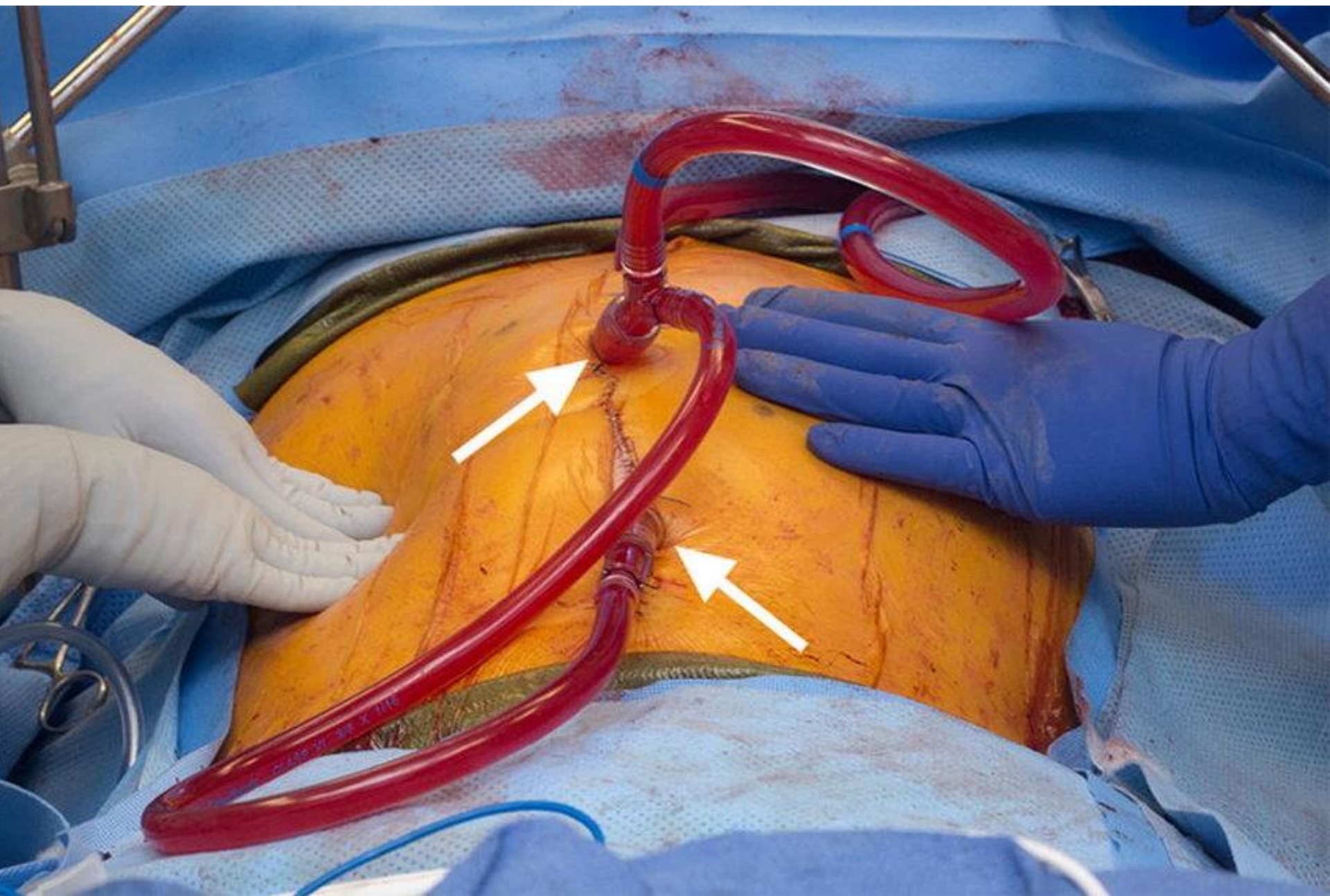
- Primary peritoneal malignancy
- Rare.
- They arise in the mesothelium of the peritoneum.
- Mesothelioma of the peritoneum is less frequent than in the pleural cavity but is equally lethal. Asbestos is a recognised cause. It has a predilection for the pelvic peritoneum. Cytoreductive surgery with heated intraperitoneal chemotherapy (HIPEC) or systemic cisplatin-based chemotherapy are the mainstays of treatment.
- Cytoreductive surgery (CRS) is a surgical procedure that aims to reduce the amount of cancer cells in the abdominal cavity for patients with tumors that have spread intraabdominally (peritoneal carcinomatosis). It is often used to treat ovarian cancer but can also be used for other abdominal malignancies. It is often used in combination with hyperthermic intraperitoneal chemotherapy (HIPEC),

Secondary peritoneal malignancy

- **Peritoneal carcinomatosis**
- Is common and refers to malignant nodules on the surface of the peritoneum.
- It arises in conjunction with ovarian malignancy or malignancy in an organ of the mesenteric domain.
- It can be localised or diffuse. Any peritoneal surface can be involved. Sometimes the omentum is diffusely involved, forming a mass termed an omental cake.
- The symptoms and signs are mainly related to the primary pathology. If the tumour burden is considerable, a mass may be palpable and the accompanying ascites substantial or SBO.

- Radiological cross-sectional imaging with CT or magnetic resonance imaging (MRI) is usually diagnostic; however, histological or cytological confirmation is essential to distinguish it from peritoneal TB. The visceral origin of peritoneal carcinomatosis is important as this can guide chemotherapy and cytoreductive or extirpative surgery.
- The visceral origin of peritoneal carcinomatosis is important because if curative resection of the primary tumour is deemed feasible and the peritoneal disease considered resectable, resection with peritonectomy and HIPEC should be considered.

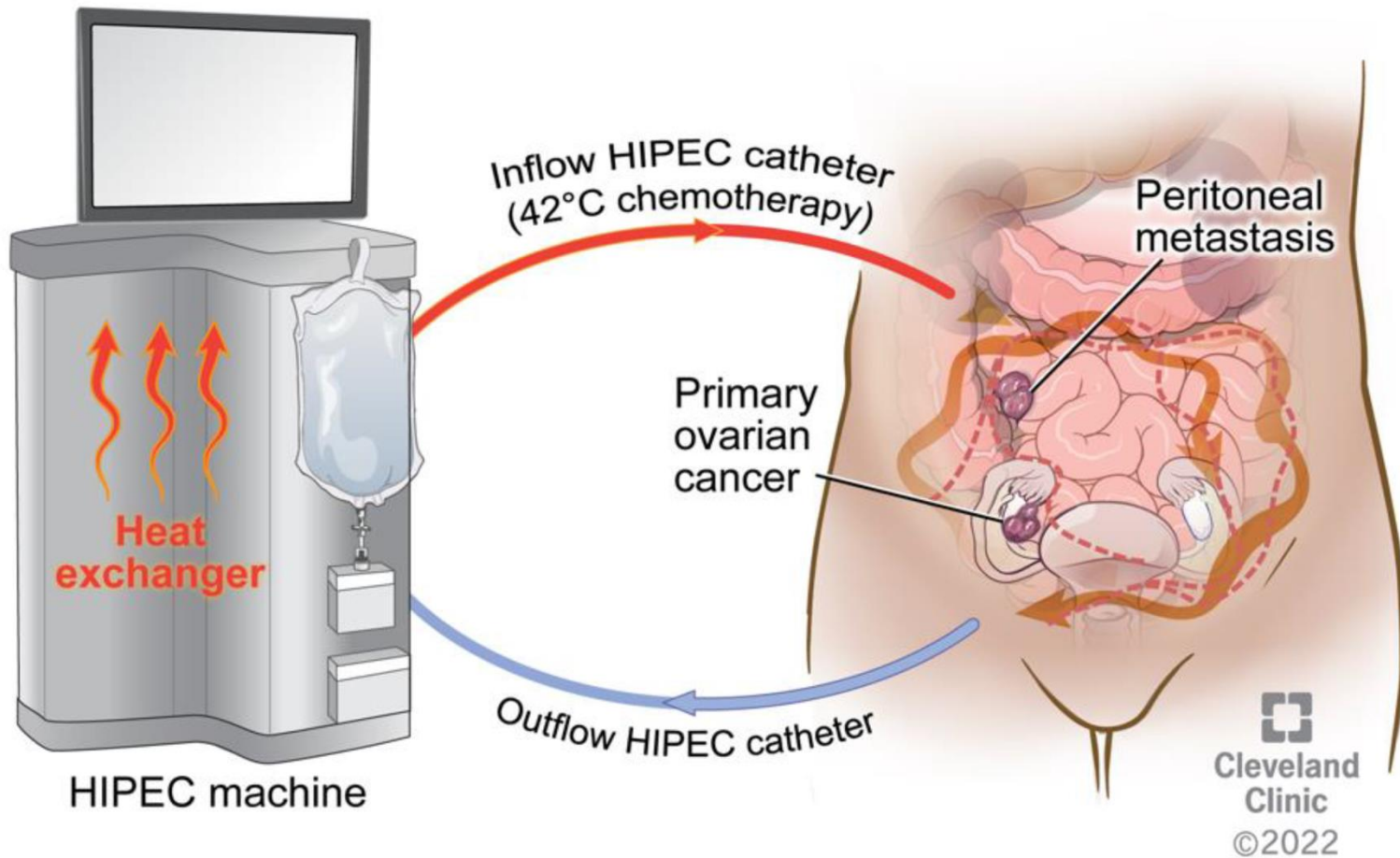
- HIPEC is a highly concentrated, heated (41–42°C) chemotherapy delivered directly into the abdomen for 90 minutes after cytoreductive surgery. HIPEC is particularly valuable in treatment of pseudomyxoma peritonei and has become the standard of care in carefully selected patients assessed in specialist centres (Sugarbaker) (see Chapter 76).
- In the majority of patients with peritoneal carcinomatosis treatment is palliative. Subacute intestinal obstruction may require intestinal bypass or a defunctioning stoma (Chapter 78). Malignant ascites may be drained externally or via a peritoneovenous shunt (LeVeen).





HIPEC Machine

HIPEC at time of interval debulking surgery



	IDS (months)	IDS + HIPEC (months)	HIPEC Benefit (months)
RFS	10.7	14.2	+3.5
OS	33.9	45.7	+11.8

Tumours of the mesentery

Benign

- Lipoma
- Fibroma
- Fibromyxoma
- Desmoid.

Malignant

- Lymphoma
- Secondary carcinoma.
- Neuroendocrine tumours.
- Lymphatic metastases.
- Tumour deposits (lymphovascular and perineural).
- Peritoneal carcinomatosis

- Primary tumours of the mesentery include carcinoid, lymphoma, sarcoma and desmoid tumours. The mesentery is affected in local lymphatic spread of carcinoma arising from abdominal viscera .
- If indicated, a benign tumour of the mesentery may be excised with resection of the adjacent intestine.
- A malignant tumour of the mesentery requires biopsy confirmation and specific, usually non-surgical, treatment, e.g. chemotherapy for lymphoma.

Diffuse Fibromatosis

- It is rare, characterised by an abnormal proliferation of myofibroblasts.
- Although non-metastasising, and said to be benign, it can nevertheless prove widely invasive, compressing and infiltrating surrounding tissues such as the bowel and mesentery with complications.
- There is an association with familial adenomatous polyposis (FAP).

THE GREATER OMENTUM

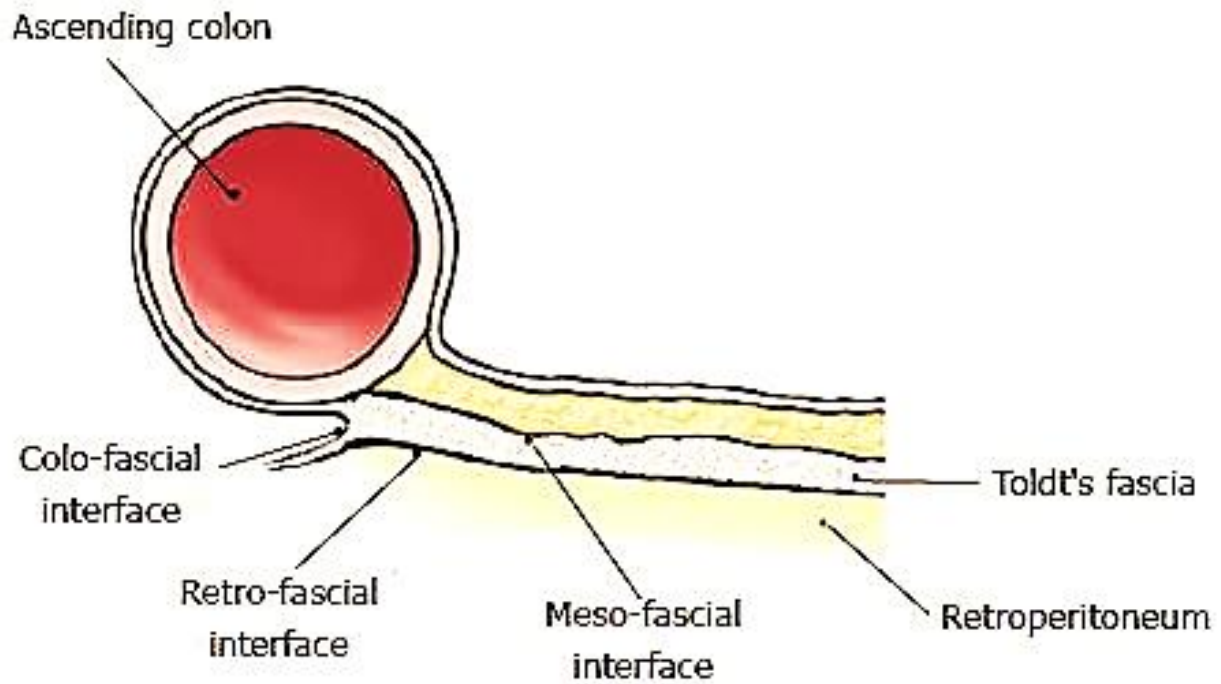
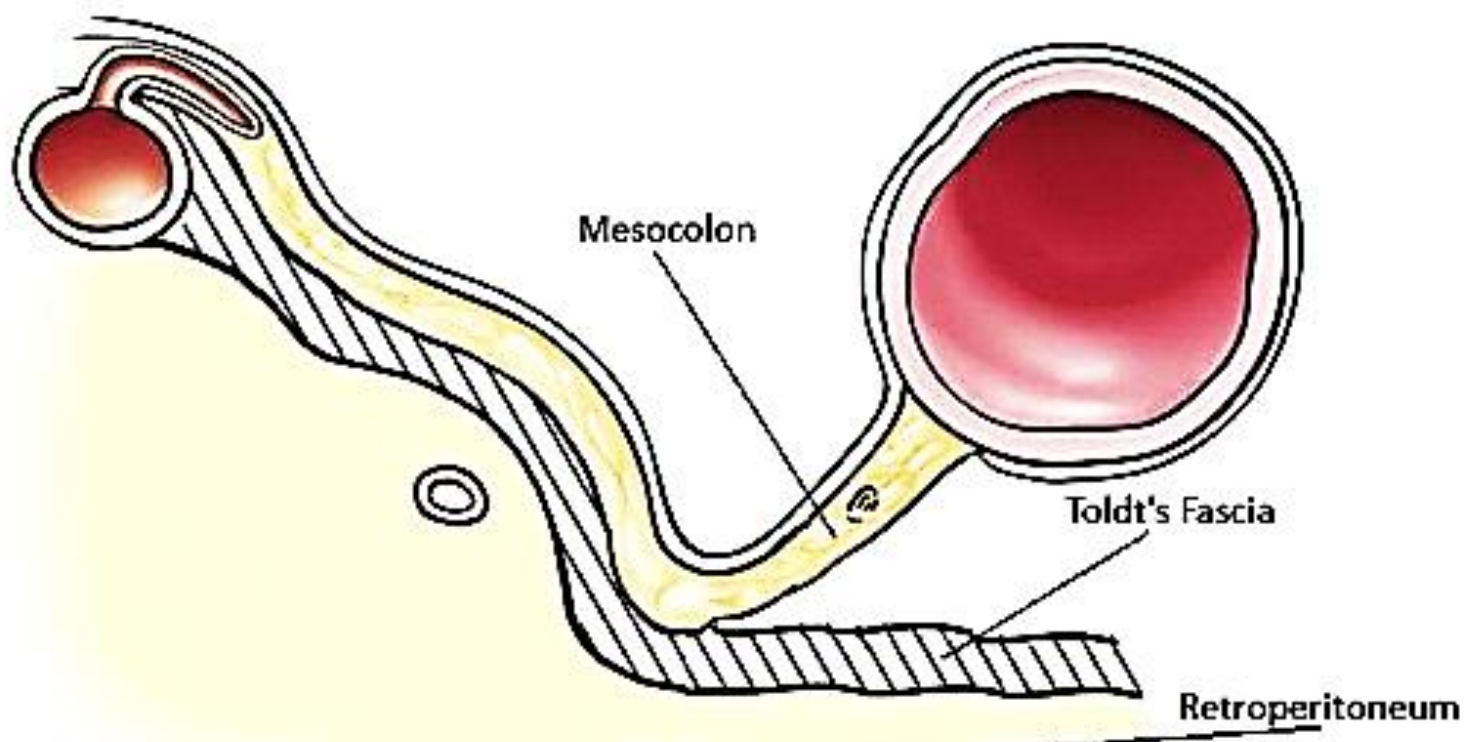
- The greater omentum corresponds to the anterior wall of the upper region of the mesentery.
- **Storage** of fat.
- ‘The **abdominal policeman**’. It attempts, often successfully, to limit intraperitoneal infective (an acutely inflamed appendix is often found wrapped in omentum, saving many patients developing diffuse peritonitis.
- It often **plugs** the neck of a hernial sac and prevents a trapped intestine coils becoming strangulated.
- It is used as a **plug** to control perforation as in modified Graham’ patch.
- It may be a cause of obstruction (acting as a large adhesion).
- It is usually involved in tuberculous peritonitis and carcinomatosis of the peritoneum.
- Splenunculi.
- Acute pancreatitis (calcified saponification).
- Mesh isolator.

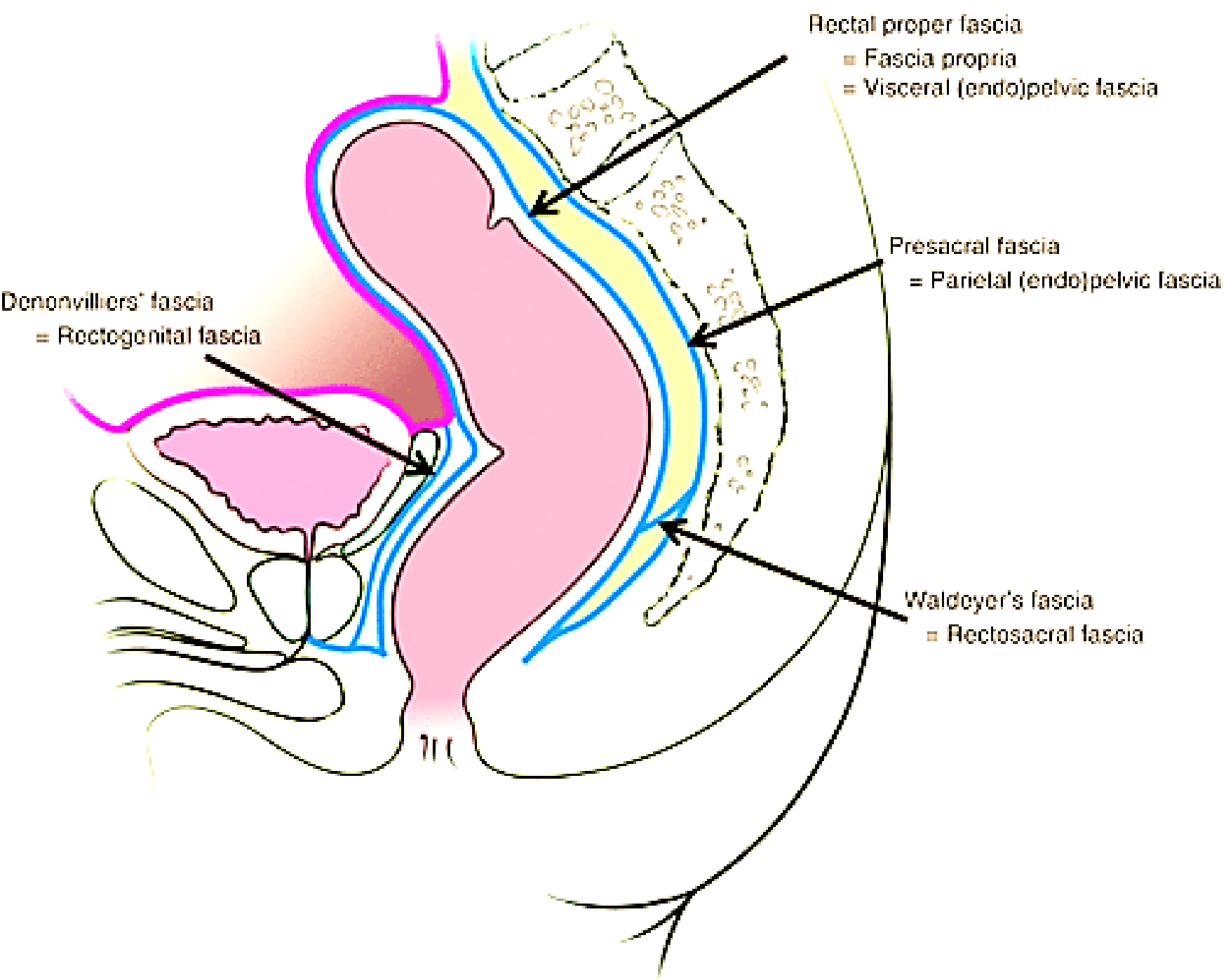
THE RETROPERITONEAL SPACE
AND
RETROPERITONEUM

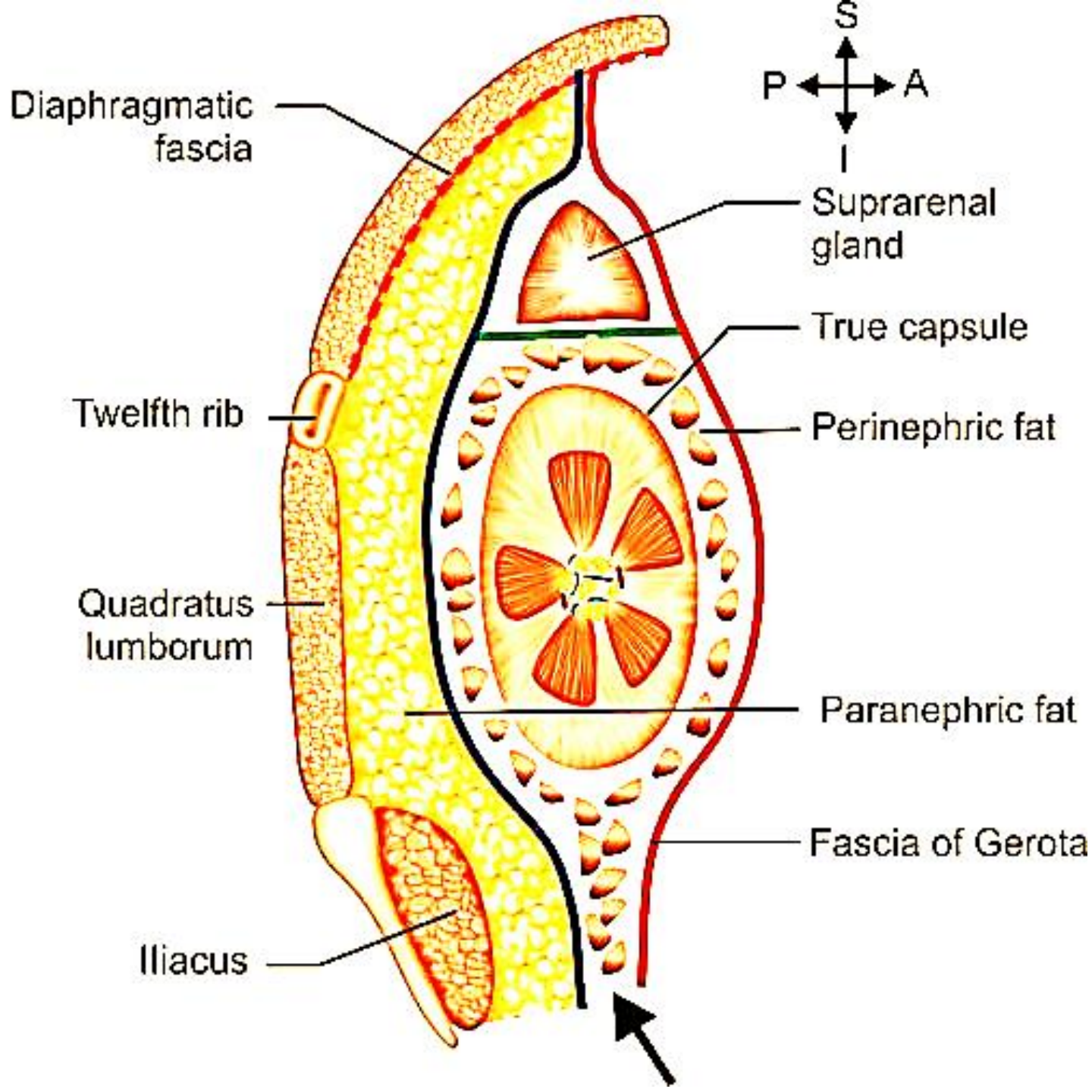
THE RETROPERITONEUM

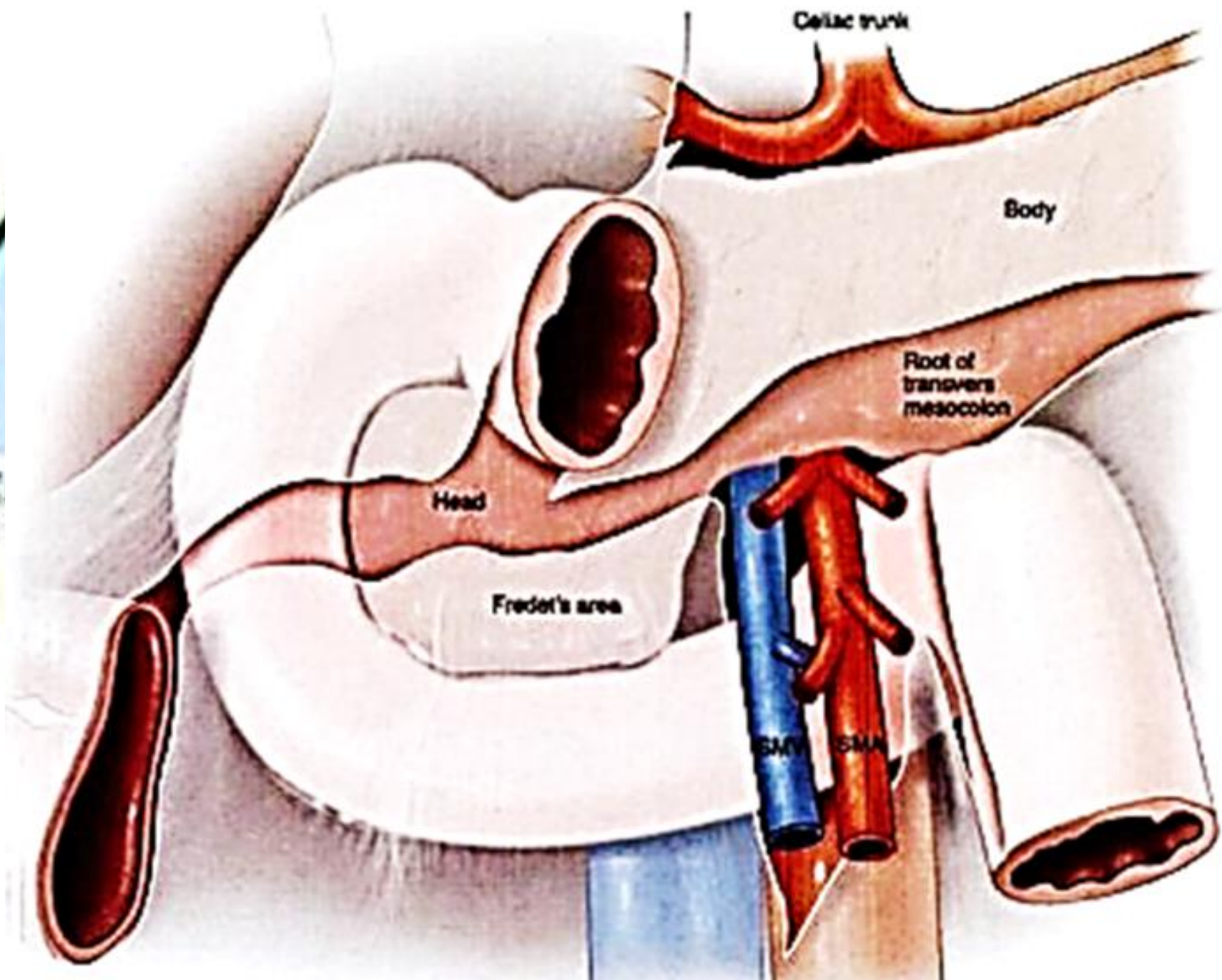
- The retroperitoneum is the region of the non-mesenteric domain deep to the retroperitoneal space. It contains the kidneys, adrenal glands, major vessels, ureters and gonadal vessels and is surrounded by adipose tissue.
- Swellings in the retroperitoneum include abscess, haematoma, cysts and malignancy from retroperitoneal organs (kidney, ureter, adrenal). The term retroperitoneal tumour refers to primary tumours arising in connective tissues in this region.

- The non-mesenteric domain is posterior to the mesenteric domain. The space between both is termed the retroperitoneal . It is a conceptual space as it contains areolar connective tissue.
- Regions of the connective tissue were separately named **Toldt's, Waldeyer's, Denonvilliers', Gerota's and Fredet's fascia**, as if they are separate entities. These are merely different zones of the same connective tissue layer that is interposed between the mesenteric domain in front and the non-mesenteric domain behind.
- The **space continues** into the thorax and thereafter into the neck. This explains why, on occasion, a patient with an intestinal perforation during colonoscopy develops surgical emphysema and crepitus at the neck level. In these cases, perforation occurs into the retroperitoneal .Gas tracks along the space into the thorax and thereafter into the neck, where it accesses subcutaneous tissue to generate surgical emphysema and crepitus. The volume of gas insufflated can be considerable given that the peritoneal cavity will not have been entered and the endoscopist may not recognise the perforation.
- The space may be obliterated following radiation treatment, in Crohn's disease or in longstanding diverticular inflammation. This presents considerable challenges for the surgeon who needs access to the plane whenever conducting visceral surgery.







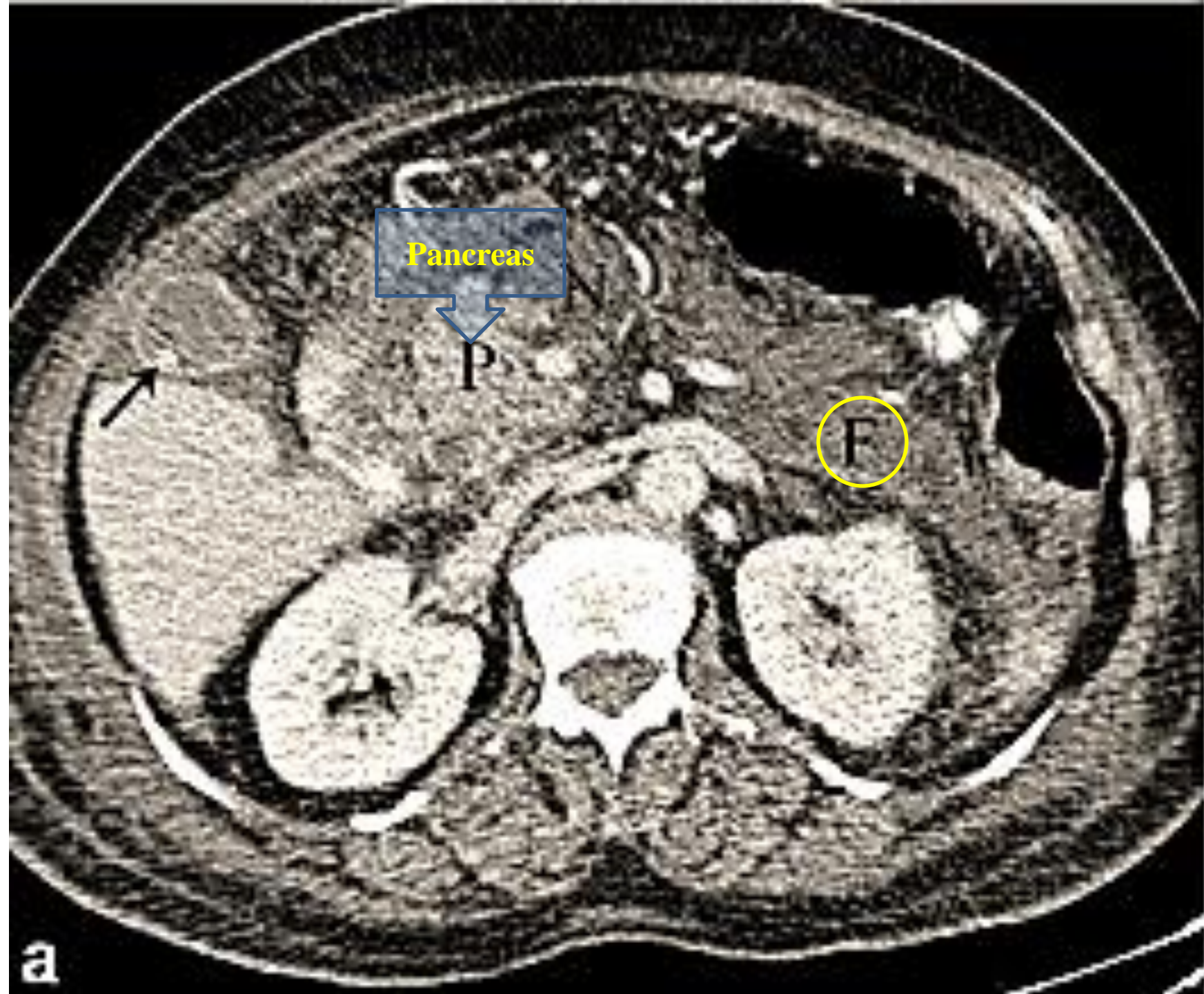


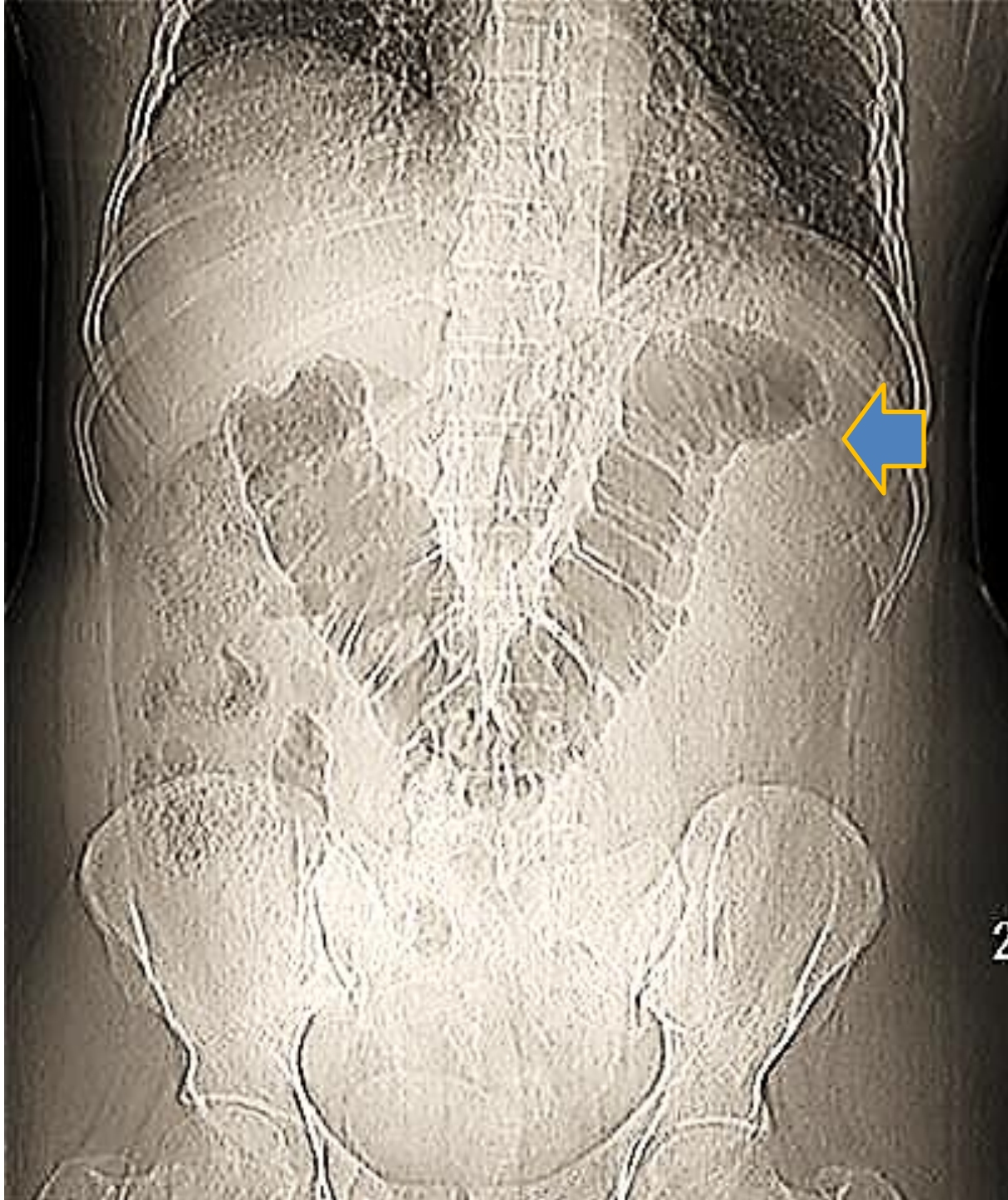
RETROPERITONEAL SPACE COLLECTIONS

- These are fluid collections in the retroperitoneal space and these differ from intraperitoneal collections because of their location .
- They are a common finding in moderate to severe acute pancreatitis. Fluid accumulates as a result of pancreatic inflammation, dissecting the left mesocolon of the underlying fascia and posterior abdominal wall. With continued expansion retroperitoneal space collections track subperitoneally around the flanks.
- A rapidly expanding retroperitoneal collection, such as occurs with a ruptured aortic aneurysm, may rupture intraperitoneally

EXAMPLE (acute pancreatitis)

- Halo's sign. F
- Cut off sign.
- Retroperitoneal Hemorrhage. (Grey Turner sign).

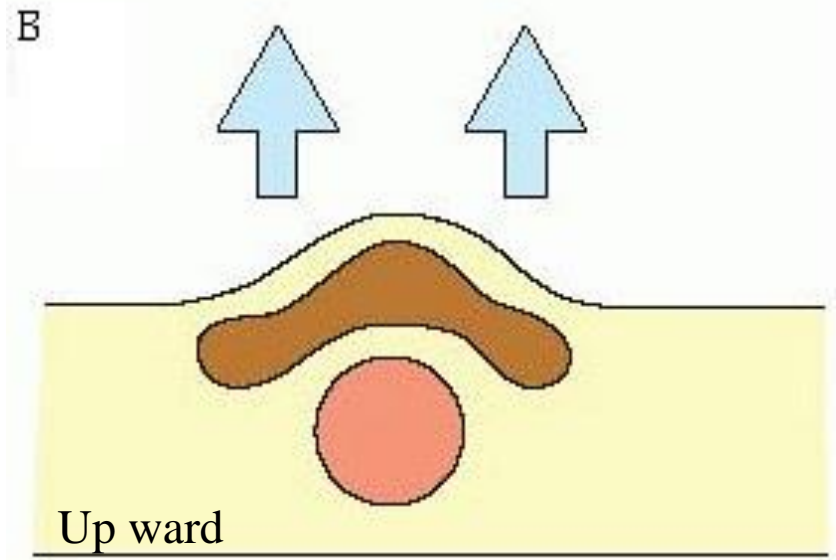
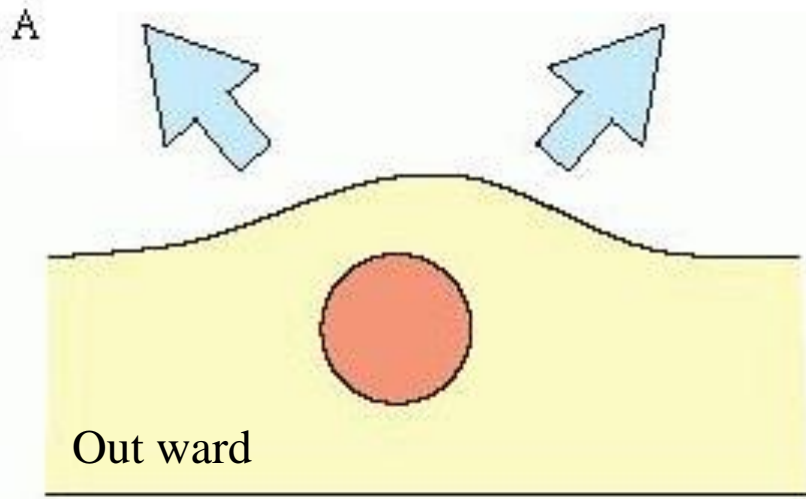




- Cut off sign.

EXAMPLE (Aortic Aneurysm)

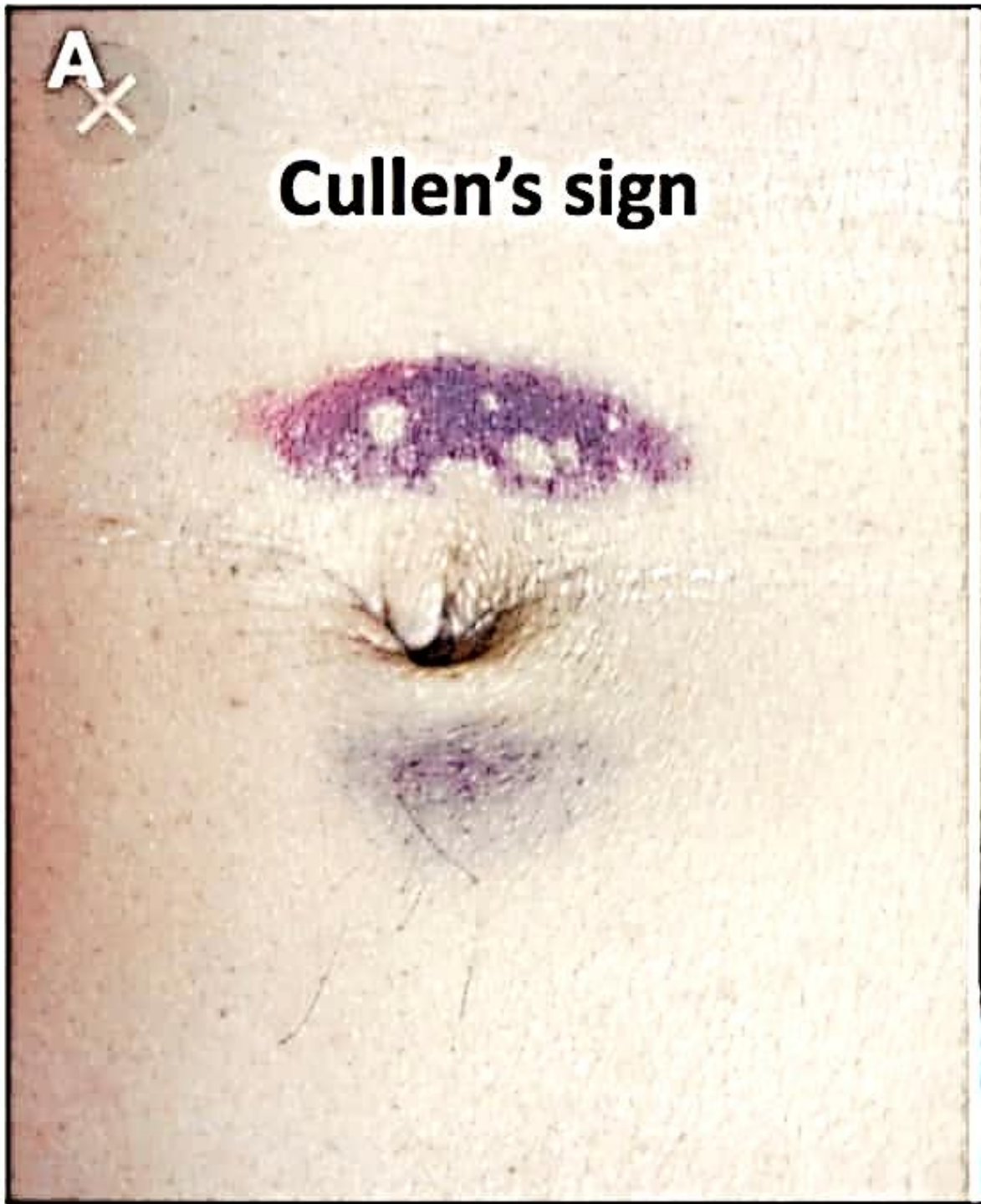
- Thrill.
- Expansile pulsation (A).
- Posterior : Retroperitoneal Hemorrhage. (Grey Turner sign) 1.
- Anterior : Intra-abdominal Hemorrhage. (Cullen's sign) 2.





A
X

Cullen's sign



Axial computed tomography section of the abdomen demonstrating gas (arrows) in the retroperitoneal space



Retroperitoneal fibrosis

- This is a relatively rare diagnosis characterised by development of a flat grey/white plaque of tissue that usually develops in the low lumbar region and later spreads laterally and upwards to encase the common iliac vessels, ureters and aorta. Histological appearances vary from active inflammation with a high cellular content interspersed with bundles of collagen through to one of relative acellularity and mature fibrosis/calcification. Its aetiology is obscure in most cases (idiopathic; synonym Ormond's disease), being allied to other fibromatoses (others being Dupuytren's contracture and Peyronie's disease).

Causes of Retroperitoneal Fibrosis

Benign

- Idiopathic (Ormond's disease)
- Chronic inflammation
- Extravasation of urine
- Retroperitoneal irritation by leakage of blood or intestinal content
- Aortic aneurysm (inflammatory type)
- Trauma
- Drugs (chemotherapeutic agents and previously methysergide)

Malignant

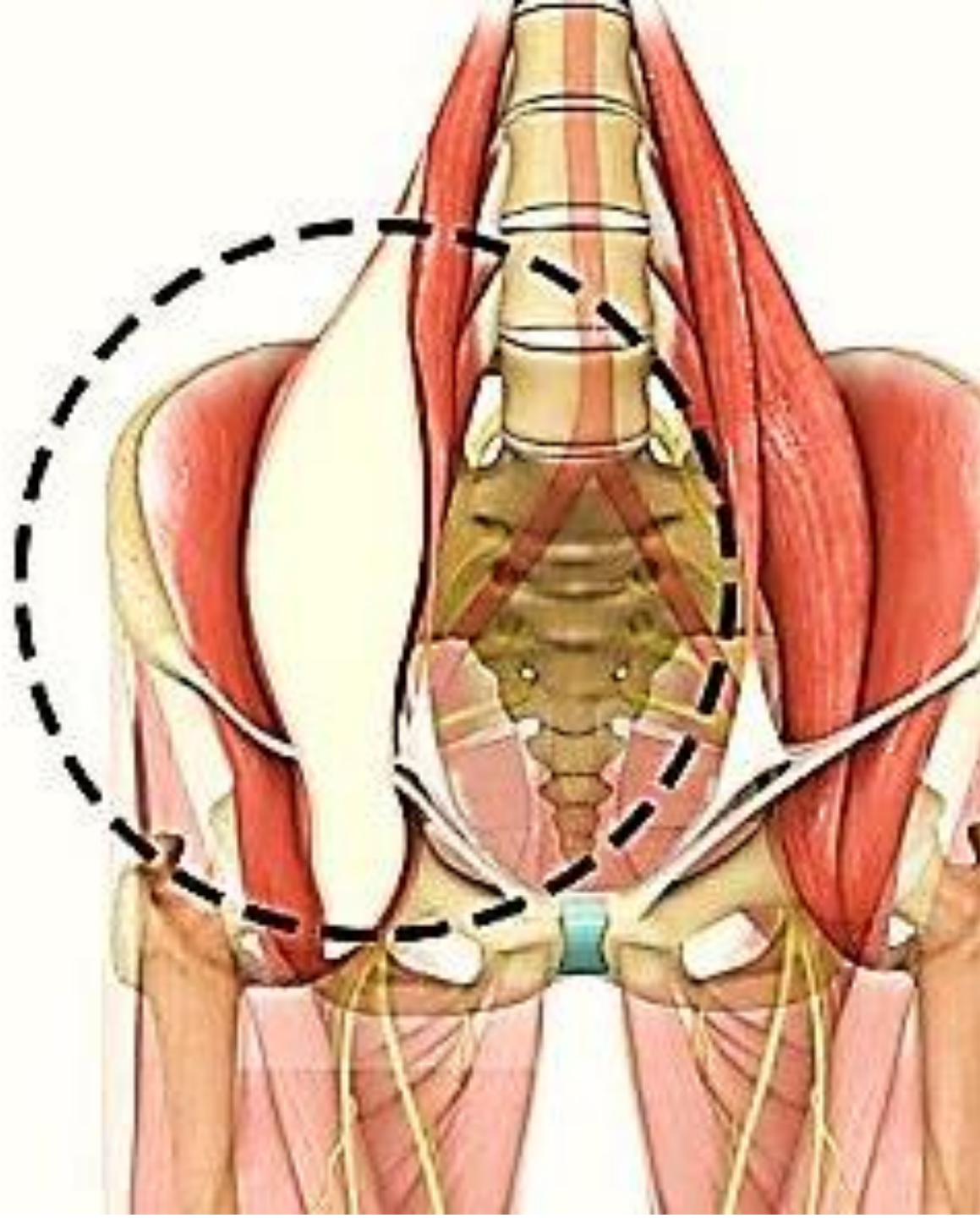
- Lymphoma
- Carcinoid tumours
- Secondary deposits (especially from carcinoma of stomach, colon, breast and prostate)

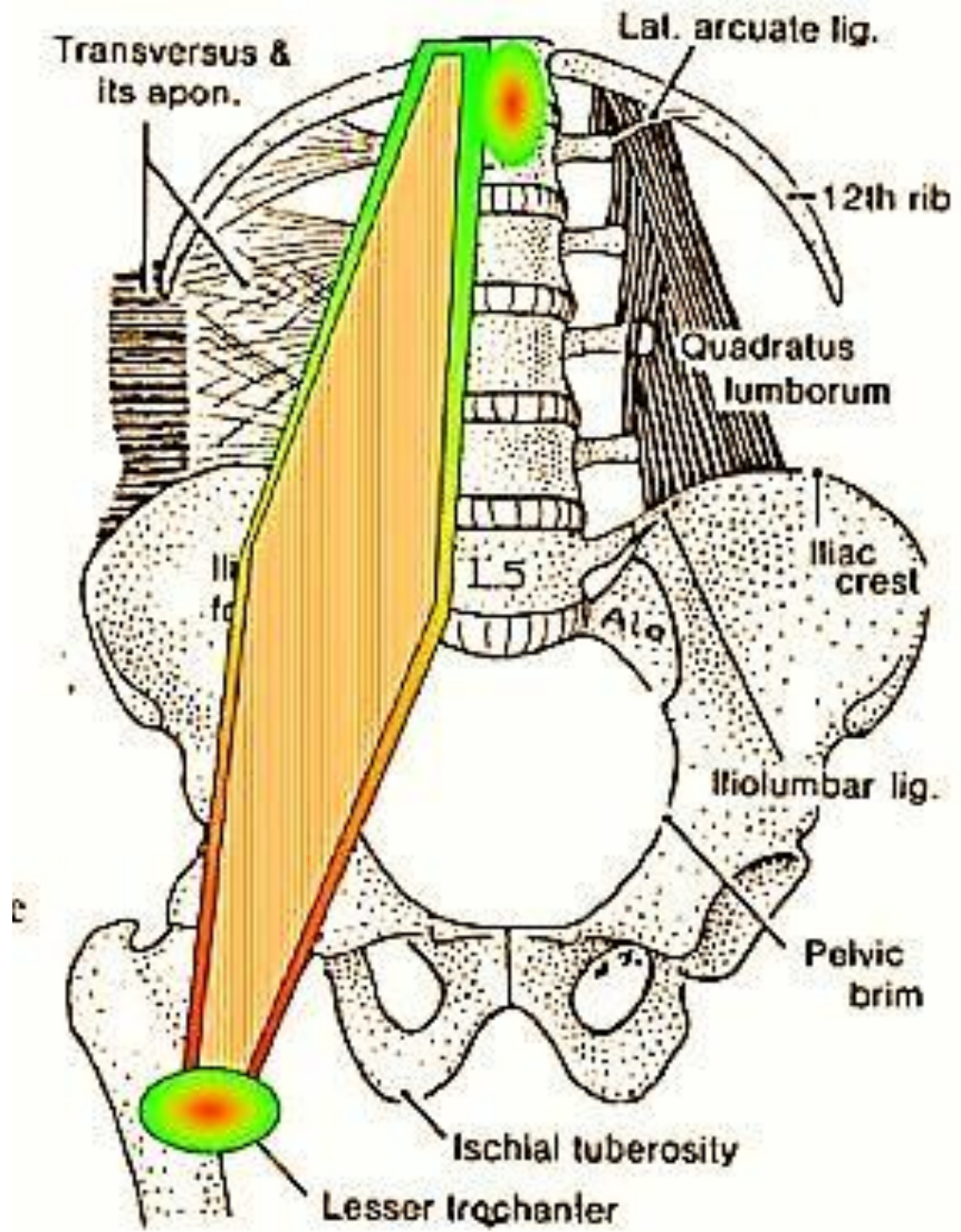
Retroperitoneal (psoas) abscess

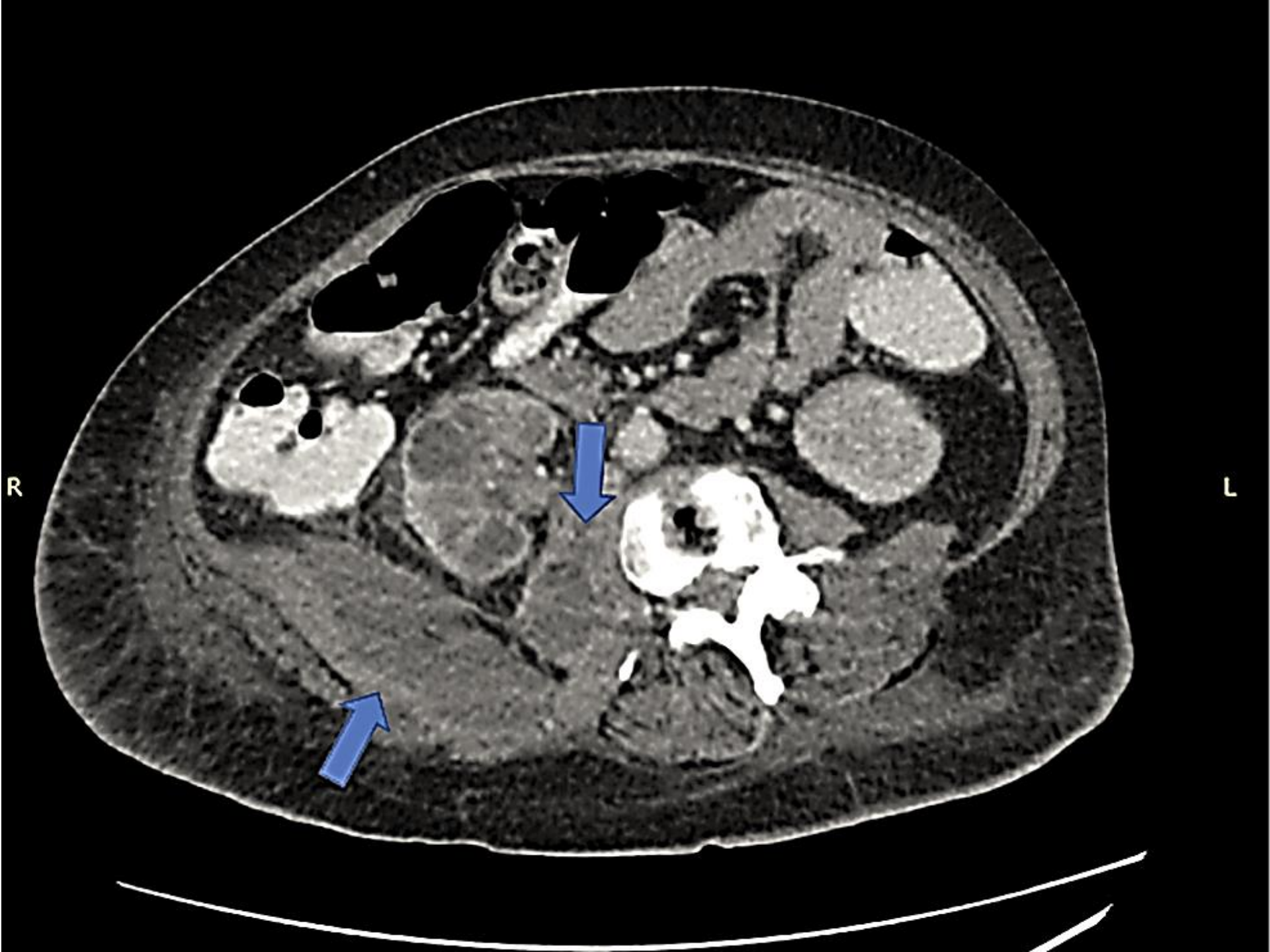
- The psoas abscess is an abscess of the retroperitoneum .
- TB of the spine (Pott's disease),.
- Secondary to direct spread of infection from the inflamed digestive or urinary tract with or without perforation.
- Recently it is most commonly seen in advanced Crohn's disease.
- Rarely, it arises due to haematogenous spread from an occult source in immunocompromised patients and in association with intravenous drug misuse.
- **History**
- Clinical presentation is with back pain, lassitude and fever. A swelling may point to the groin as it tracks distally along the iliopsoas muscle, under the inguinal ligament. (DDX Femoral H.)
- Pain may be elicited by passive extension of the hip or a fixed flexion of the hip evident on inspection.

Investigation and treatment

- CT scan.
- Treatment is usually by percutaneous CT-guided drainage and appropriate antibiotic therapy.
- Surgical intervention is required if these are unsuccessful.







Retroperitoneal lipoma

- The patient may seek advice on account of a swelling or because of indefinite abdominal pain. The swelling sometimes reaches an immense size.
- Diagnosis is usually by CT scan.
- A retroperitoneal lipoma sometimes undergoes myxomatous degeneration, a complication that does not occur in a lipoma in any other part of the body. A lesion that rapidly increases in size is often malignant (liposarcoma).

Retroperitoneal sarcoma

- Retroperitoneal sarcomas are rare tumours accounting for only 1–2% of all solid malignancies (10–20% of all sarcomas are retroperitoneal). The peak incidence is in the fifth decade of life, although they can occur at almost any age.
- The most frequently encountered cell types are:
 - 1) Liposarcoma.
 - 2) Leiomyosarcoma
 - 3) Malignant fibrous histiocytoma.
- **History and examination**
- Presentation is late because these tumours arise in the large potential spaces of the retroperitoneum and can grow to a considerable size without producing symptoms. Moreover, when symptoms do occur, they are non-specific, such as abdominal pain and fullness, and are easily dismissed as being caused by other less serious processes. Retroperitoneal sarcomas are therefore often very large at the time of presentation.
- Some times it makes a pressure symptoms (ureter, Aorta, IVC) , invasion to the kidney or bowel displacement .

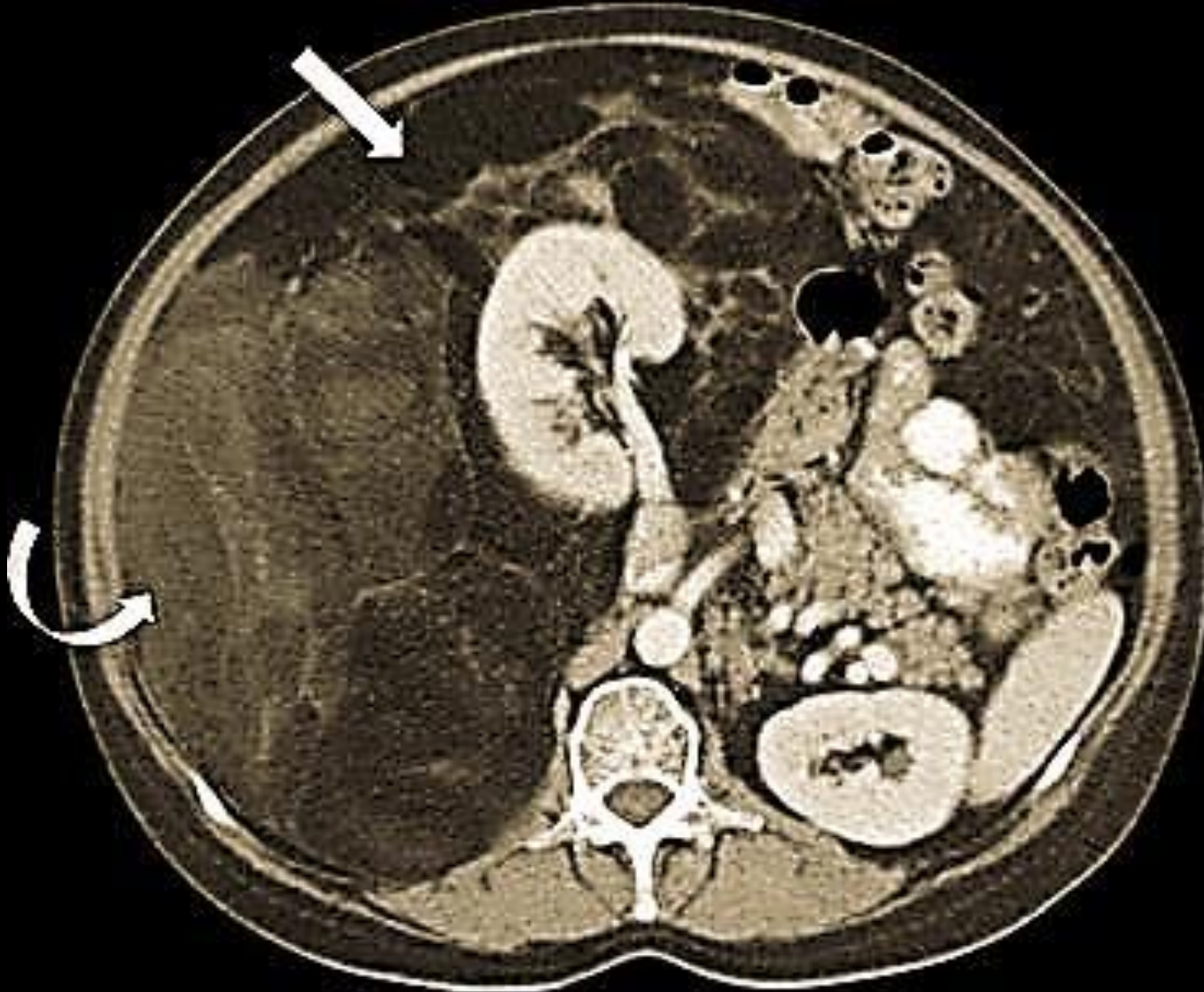
- **Investigation**

- Detailed multiplanar imaging (CT and MRI) with reconstructions is required not only for tumour detection, staging and surgical planning but also for guiding percutaneous or surgical biopsy of these tumours.

- **Treatment**

- The definitive treatment of primary retroperitoneal sarcomas is surgical resection.
- Chemotherapy and radiotherapy without surgical debulking have rarely been beneficial, when used alone or in combination.
- A multidisciplinary treatment approach with imaging review will be required when assessing operability (based on adjacency or involvement of vital structures) and approach.

- Up to 75% of retroperitoneal sarcoma resections involve resection of at least one adjoining intra-abdominal visceral organ (commonly large or small bowel or kidney).
- The most common types of vascular involvement precluding resection are involvement of the proximal superior mesenteric vessels or involvement of bilateral renal vessels.
- **Prognosis**
- Survival rates are in general poor, even after complete resection, being of the order of 35–50% (excluding low-grade liposarcomas, which may frequently be cured by resection).



CT scan of the abdomen and pelvis with intravenous and oral contrast demonstrates the presence of a large, complex, predominantly fat containing right sided retroperitoneal mass displacing both the right kidney and loops of bowel anteromedially (arrow). Several septations are noted within the lesion and there are focal areas of higher attenuation (curved arrow)

حَمْدُ اللَّهِ

PRAISE BE TO ALLAH