Peritoneum: Anatomy, functions
Acute Peritonitis
Intraperitoneal abscess
Special types of peritonitis
Peritoneal neoplasms

Dept. of Surgery

Surgical Anatomy

Peritoneum is the **largest serous membrane** in the body

Surface area: approx. 22,000 cm^2.

Divided into parietal and visceral portions

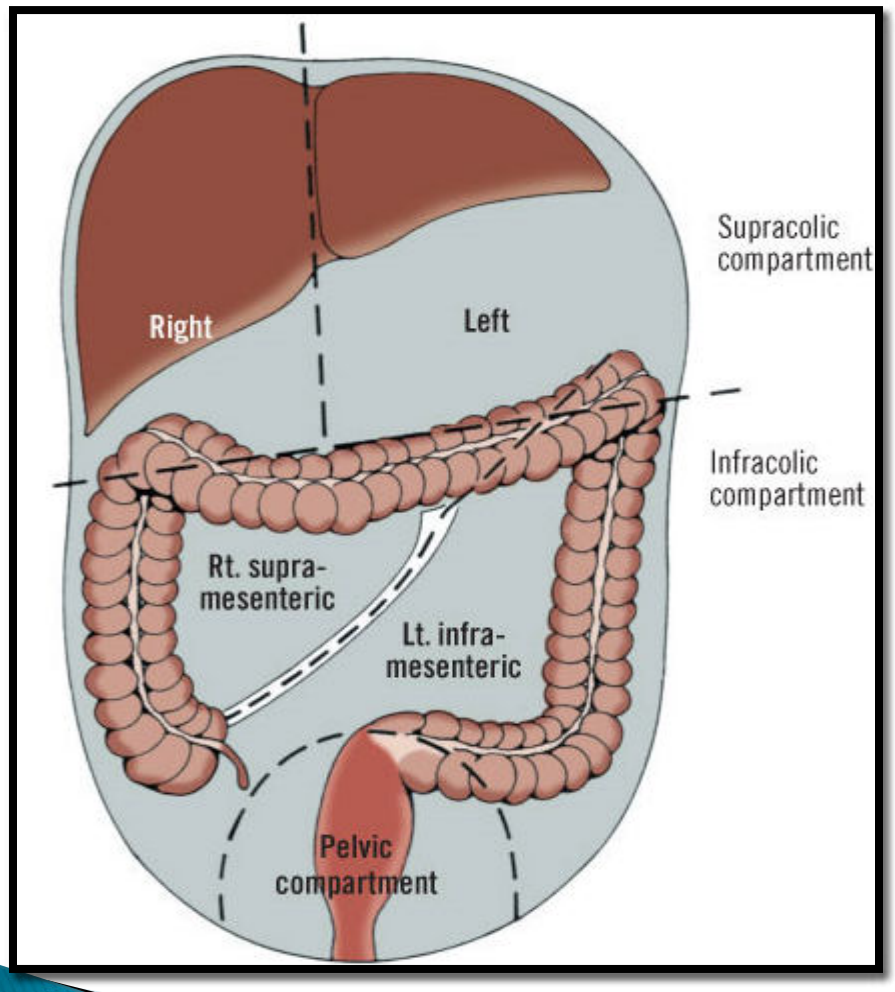
Parietal layer lines the abdominal and pelvic cavities and the abdominal surface of the diaphragm.

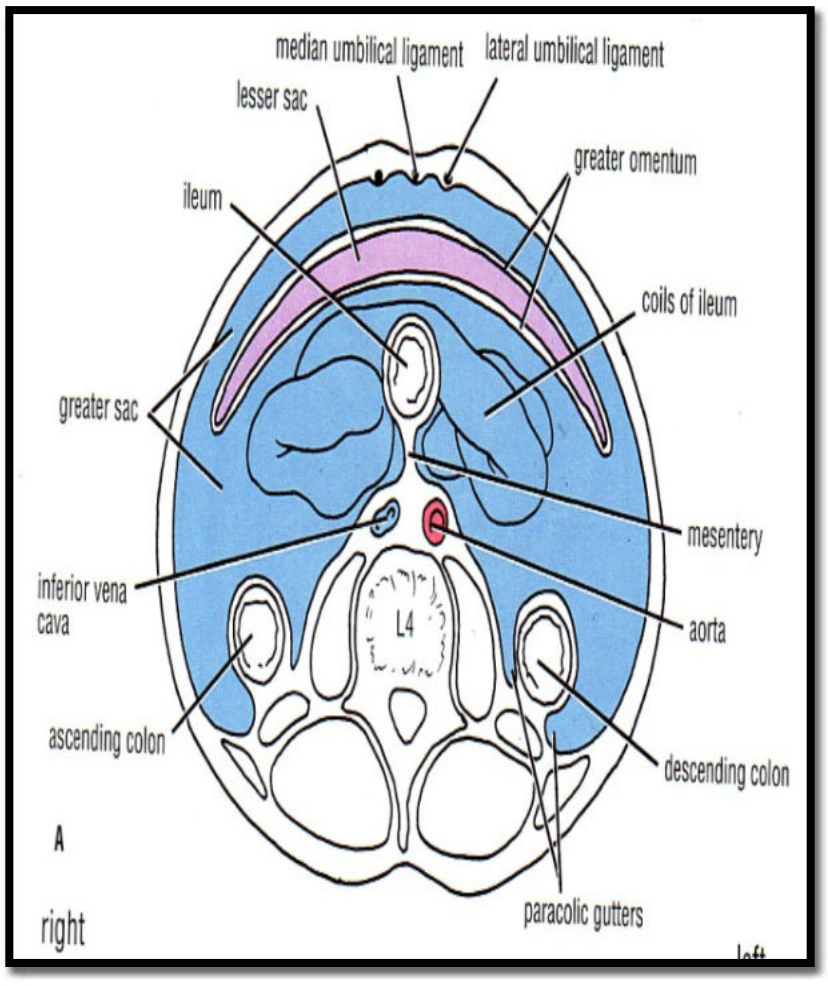
- loosely connected with the body wall, separated from it by an adipose layer, tela subserosa

Visceral layer covers the abdominal and pelvic viscera and includes the mesenteries.

- visceral peritoneum is usually tightly attached to the organs it covers.

- It does not line the entirety of the abdominopelvic cavity.
- It is lifted from the body wall, especially posteriorly, by organs located against the wall during embryologic development.
- This chain of events causes the formation of a retroperitoneal space between the peritoneum and the body wall, with organs situated within the space.
- An organ that is covered only in part by the peritoneum is referred to as a **retroperitoneal organ**.
- An organ that is covered by peritoneum essentially everywhere except for the site of entrance of vessels is referred to as an **intraperitoneal organ**.





Innervation of peritoneum

Parietal peritoneum is sensitive to pain, pressure, temperature & touch

- Parietal peritoneum is supplied by:
- T7-- T12,L1 nerve
- phrenic nerve.

Visceral peritoneum is sensitive to stretch & tearing.

It is supplied by autonomic afferent nerves which supply the viscera.

NB. Parietal peritoneum of the pelvis is supplied by Obturator nerve.

Functions of peritoneum

- It suspend the organs within the peritoneal cavity.
- It fixes some organs within the abdominal cavity.
- Storage of large amount of fat in the peritoneal ligaments (e.g.. Greater omentum)
- Peritoneal covering of intestine tends to stick together in infection
- Greater omentum is called the ***policeman*** of abdomen to prevent spread of infection
- *It secretes the peritoneal fluid*

Peritoneal fluid

- Peritoneal fluid is pale yellow fluid rich in leukocytes
- Mobile viscera glide easily on one another.
- Peritoneal fluid moves ***upward*** towards subphrenic spaces-whatever the position of the body *by:*
  - *Movements of diaphragm.*
  - *Movements of abdominal muscles*
  - *Peristaltic movements.*
- Peritoneum is extensive in the region of diaphragm.

Peritonitis

- **Peritonitis** – inflammation of the peritoneum which maybe localised or generalised

- **Peritonism** – refers to specific features found on abdominal examination in those with peritonitis
  - Characterised by tenderness with guarding
  - Rebound /percussion tenderness on examination
  - Eased by lying still and exacerbated by any movement
  - Maybe localised or generalised

- Generalised peritonitis is a **surgical emergency** – requires resuscitation and immediate surgery

Types

- **Primary:**
  - Not related to intraabdominal abnormality
  - Also called spontaneous bacterial peritonitis

- **Secondary:**
  - Due to spillage of GI or GU organisms into peritoneal space due to breach of mucosal barrier

- **Tertiary:**
  - clinical peritonitis and systemic signs of peritonitis persist after treatment of secondary peritonitis
  - No/low virulence organism isolated

Causes

Infective –

- bacteria cause peritonitis
- most common cause of peritonitis

- **Non-infective –**
  - leakage of certain sterile body fluids into the peritoneum can cause peritonitis.

Note: although sterile at first these fluids often become infected within 24-48 hrs of leakage from the affected organ resulting in a bacterial peritonitis

Clinical features

- Pain
  - Constant and severe
  - Worse on movement
  - Eased by lying still

- Signs of ileus (generalised peritonitis > localised peritonitis)
  - Distension
  - Vomiting
  - Tympanic abdomen with reduced bowel sounds

- Signs of systemic shock
  - Tachycardia, tachypnoea, hypotension, low urine output
  - More prominent with generalised than localised peritonitis

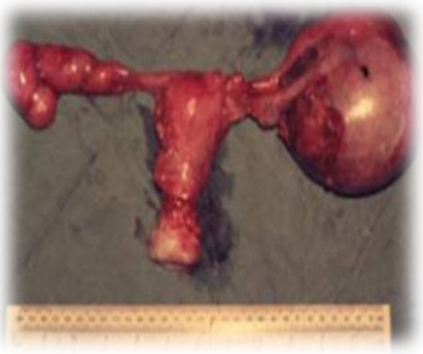
Investigations

- Diagnosis most often made on history and examination
- If localised peritonitis
  - Bloods tests
  - Chest X Ray
  - ECG
  - Complex investigations are requested depending on suspected diagnosis
- If generalised peritonitis
  - Surgical emergency – will require emergency operation
  - Following investigations should be performed:
    - Bloods: FBC, U&E, LFT, **Amylase!!** CRP, clotting, G&S, ABG
    - Chest X ray
    - CT scan

Management

- ABC
- Oxygen
- Fluid resuscitation
- IV antibiotics
- Analgesia
- Surgery

Pelvic Abscess



- Rare but the most serious late postop complication
- Involve one or both residual adnexa (tubo-ovarian abscess)
- occur almost exclusively in premenopausal women
  occur despite prophylactic AB
- often have a latent period of many between surgery and onset of symptoms

Clinical features

- fever (high spike late in the afternoon or early evening)
- palpable mass high in the pelvis
- WBC: around 20,000/mm
- ↑↑ESR

Ultrasonography and CT scan

- confirm the presence of a mass
- help to determine whether it is
  - Loculated
  - related to an intraperitoneal structure
  - drainable percutaneously

- Immediate drainage is not mandatory if it is inaccessible ⇨ AB therapy alone may be successful

- ↑ isolation of β-lactamase–producing Prevotella species ⇨ use of clindamycin, metronidazole, or other agents against gram-negative anaerobes

- Clindamycin + gentamicin → fails to respond → drainage

- Necrosis+infections → surgical exploration in some cases

- Aerobic and anaerobic culture of purulent material or tissue

Primary peritoneal tumours

- Defined As Tumors With Primary Manifestation In The Peritoneum In The Absence Of A Visceral Site Of Origin

- Arise From Mesothelial Cells, Sub Mesothelial Mesenchymal cells, and uncommitted stem cells

Classification

- Mesothelial tumors
  - Peritoneal malignant mesothelioma
  - Well-differentiated papillary mesothelioma
  - Multicystic mesothelioma
  - Adenomatoid tumor
- Epithelial tumors
  - Primary peritoneal serous carcinoma
  - Primary peritoneal serous borderline tumor
- Smooth muscle tumor
  - Leiomyomatosis peritonealis disseminata
- Tumors of uncertain origin
  - Desmoplastic small round cell tumor
  - Solitary fibrous tumor

Differential diagnosis

- Metastatic neoplasms
  - Carcinomatosis
  - Pseudomyxoma peritonei
  - Lymphomatosis
- Infectious and postinfectious lesions
  - Tuberculous peritonitis
  - Disseminated histoplasmosis
  - Inflammatory pseudotumor
- Miscellaneous
  - Endometriosis
  - Gliomatosis peritonei
  - Osseous metaplasia
  - Cartilagenous metaplasia
  - Melanosis
  - Splenosis

Peritoneal Malignant Mesothelioma

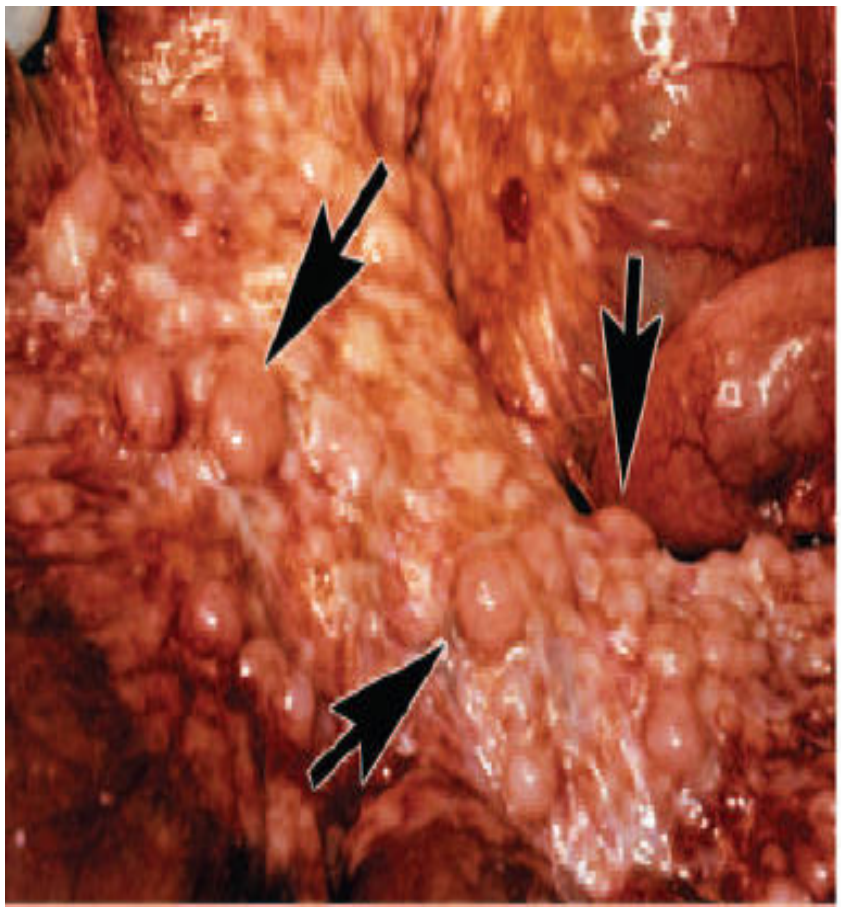
- Uncommon Malignant Neoplasm
- Arises From Mesothelial Cells Or Multipotential Subserosal Mesenchymal Cells
- Account for 6%–10% of malignant mesotheliomas
- **Diffuse:** highly aggressive, are incurable
- **Localized:** good prognosis following complete surgical excision

Etiology

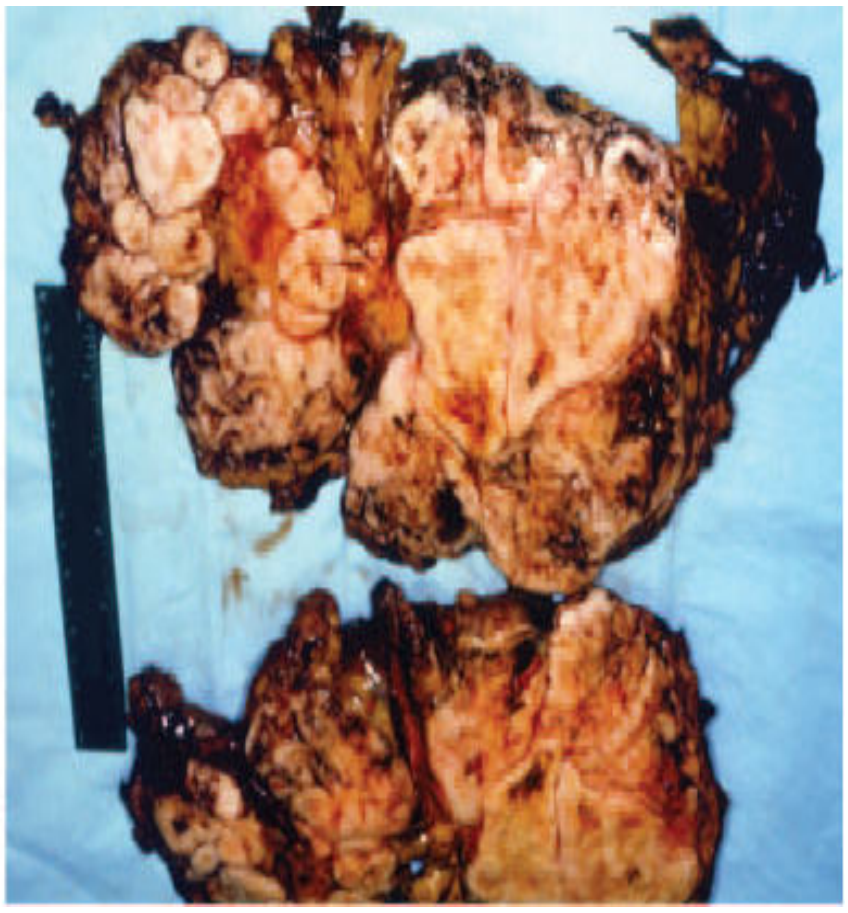
- Exposure To Higher Levels Of Asbestos, Erionite
- Therapeutic Irradiation
- Exposure To Simian Virus 40
- Chronic pleural or peritoneal irritation
- Majority in males
- Median age: 60 years

Clinical presentation

- Abdominal Pain Or Discomfort
- Abdominal Distension
- Increasing Abdominal Girth
- Nausea, Anorexia
- Weight Loss
- Bowel Obstruction
- Palpable Abdominal or pelvic mass



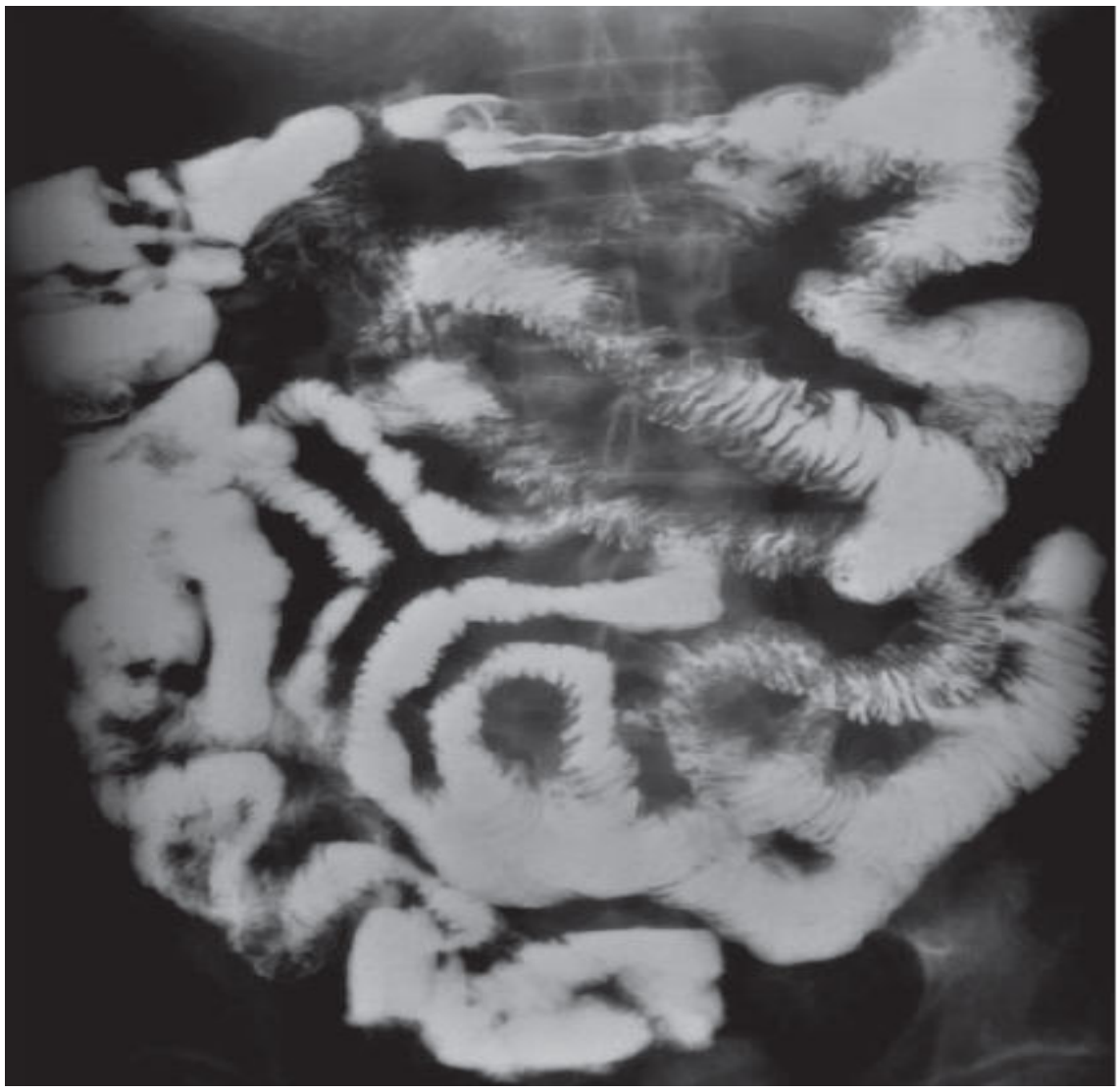
A:innumerable tumor nodules (arrows) scattered over the omental surfaces



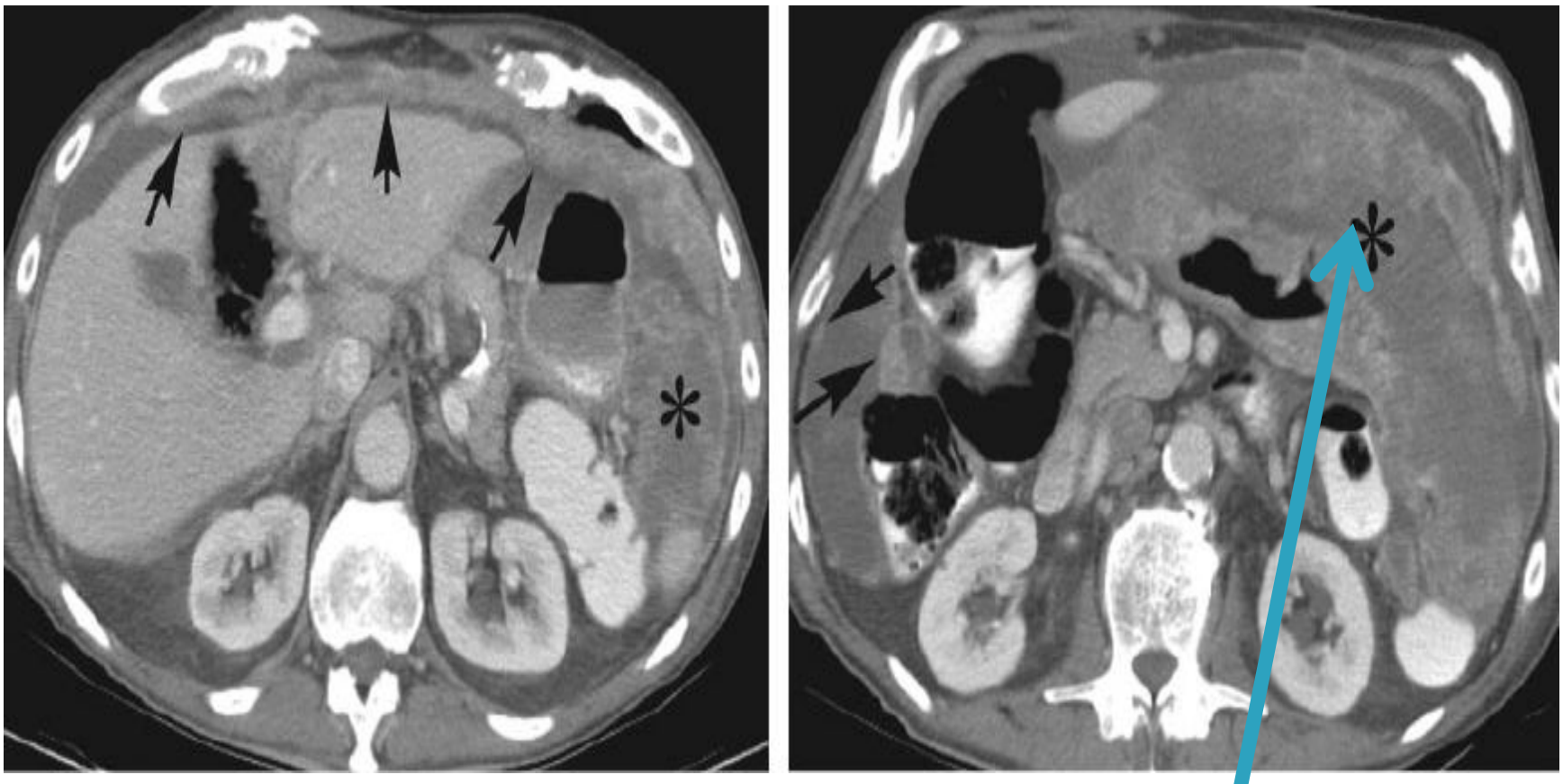
B: macrolobulated mass with foci of intratumoral degeneration and hemorrhage

Imaging Features

- Nodular Thickening Of The Peritoneum
- Omental Caking: Fine, Nodular, Soft-tissue Studding
- Ascites: diffuse to focal,small, loculated collections



Barium examination shows separation of small bowel segments and irregular fold thickening of small bowel segments



A: Axial CT scans: show ascites and omental nodule

B: large, heterogeneously enhancing mass in the greater omentum

Treatment

The most effective treatment for peritoneal mesothelioma is:

Cytoreductive Surgery

↓

Hyper thermic Intraperitoneal Chemotherapy (HIPEC)

Primary Peritoneal Serous Carcinoma

- Epithelial tumor that arises from the peritoneum
- Almost always occurs in women (mean age, 56–62 years)
- Clinical features:
  - abdominal distension
  - Pain, nausea and vomiting
  - Increasing abdominal girth
  - ascites
  - elevated serum levels of cancer antigen CA-125

- Multiple nodules on omentum
- Omental caking
- Psammoma bodies are commonly present

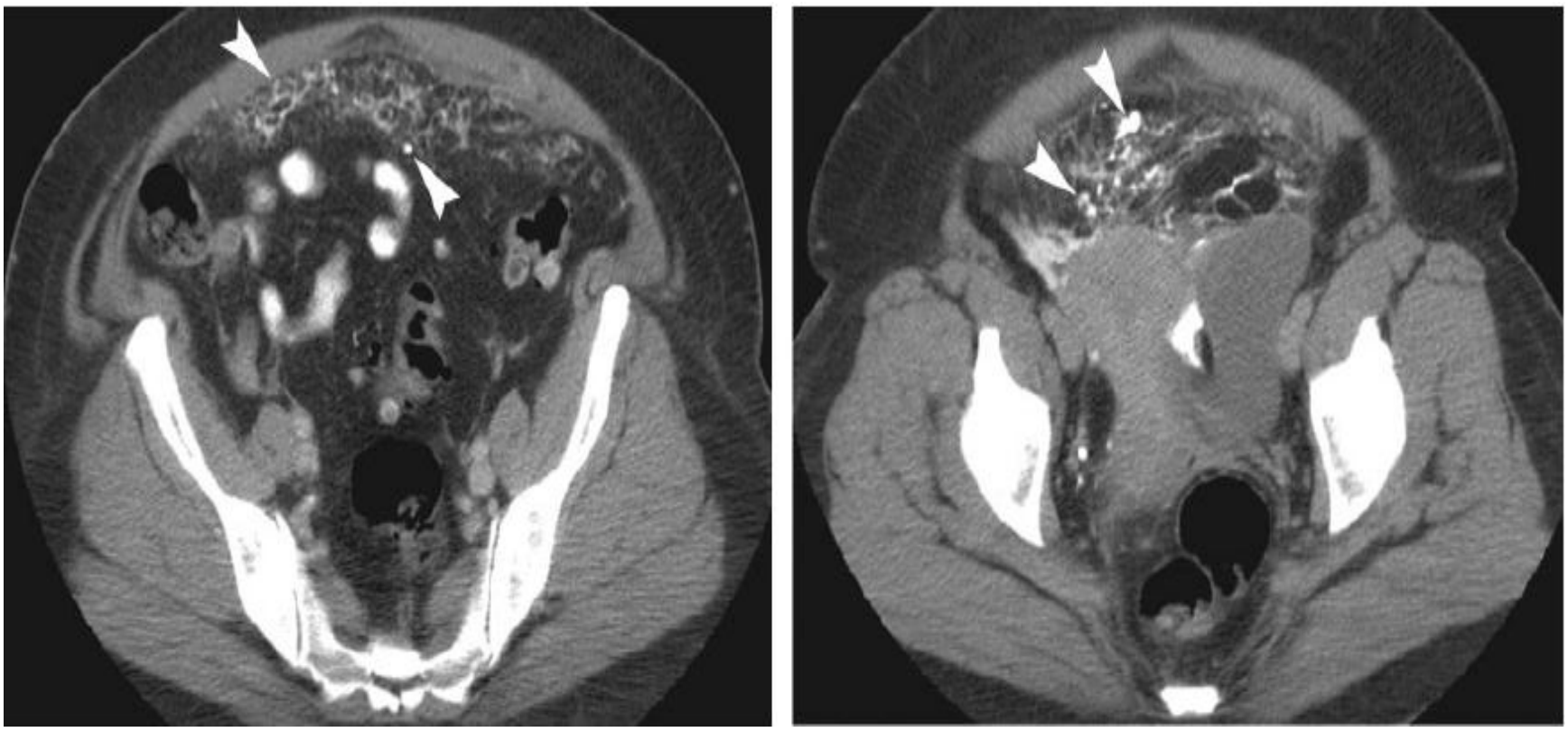
So reffered as psammomacarcinoma

The following criteria have been established to make the diagnosis of primary peritoneal serous carcinoma:

- Both ovaries are normal
- Involvement of extra ovarian sites must be greater than the involvement on the surface of either ovary
- Ovarian involvement is limited to ovarian surface epithelium, either without stromal invasion or involving the cortical stroma with tumor size less than 5 x5 mm

Imaging Features

- Ascites
- Peritoneal nodules and thickening
- Omental nodules and masses



CT scan: showing calcified nodules and soft-tissue caking of the greater omentum (arrowheads)

Treatment

- Cytoreductive Surgery

(optimal < 1 cm residual disease)

- Chemotherapy
- (Cisplatin,Taxol based)

Primary Peritoneal Serous Borderline Tumor

- Rare lesion of low malignant potential
- Tumor cells do not invade into the submesothelial layers of the peritoneum or omental fat
- Female patients,16- 67 years of age (mean:33 years)
- Treated by surgical resection (omentectomy, hysterectomy, and oophorectomy)
- Have a good long-term prognosis

Leiomyomatosis Peritonealis Disseminata
(diffuse peritoneal leiomyomatosis)

- Rare, benign entity
- Innumerable smooth muscle nodules throughout the peritoneal cavity
- Associated with high estrogen states, caused by pregnancy and oral contraceptive use
- **Spontaneous regression** of the leiomyomas or regression following withdrawal of ovarian hormones or oophorectomy