

pathology of peritoneal cavity

hernias

peritoneum – anatomy

❖ serous membrane

- soft, shiny, plain membrane lining abdominal cavity and covering abdominal organs
- closed in whole extension
 - communication with external environment only in women (Fallopian tubes)
- parietal and visceral layer

❖ peritoneal duplicatures

- free – omentum
- attached to organs – mesenteria
- blood and lymphatic vessels, nerves, lymph nodes

peritoneum – histology

❖ sparse collagen fibres

- network of disperse elastic fibres
- disperse free cells (macrophages, leukocytes, fibroblasts)
- blood and lymphatic vessels, nerves

❖ mesothelium

- one layer of cells fasten on the basal membrane
- flat to cuboidal (polyedric) cells
- short microvilli on top surface

peritoneum – function

❖ resorption / secretion

- large surface area (larger than skin surface)
- specific anatomy of blood and lymphatic vascular network

❖ ballance between these functions

- origination of pathologic content (peritoneal effusion)
- usefull in several treatment modalities

peritoneum – pathology

- ❖ pathologic content in the peritoneal cavity
 - ❖ inflammation – peritonitis
 - ❖ hernias
 - ❖ tumors of peritoneum
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- ❖ often combination of several pathological units (processes)

pathologic content

- ❖ inflammatory (peritonitis)
- ❖ non-inflammatory
 - liquid (transsudate, blood, lymph, bile, urine, mucus)
 - gas/air (pneumoperitoneum)
 - solid corpuscles (foreign, own, parasites)

liquid in the peritoneal cavity I

- ❖ peritoneal effusion
- ❖ variable amount and duration of filling
 - according to aetiology of effusion and type of liquid
- ❖ descent according to gravity
 - lowest parts of the cavity
 - peritoneal recessi and sacs
 - diagnostics: palpation (over the belly, per rectum – DRE), auscultation, imaging methods
- ❖ general symptoms (regardless of aetiology)
 - pressure on abdominal and pelvic organs, joints, diaphragm

liquid in the peritoneal cavity II

❖ ascites

- bright yellowish liquid
 - transsudate constitution
 - poor on protein
- portal vein hypertension
 - liver diseases
 - cirrhosis, tumors, failure
 - extrahepatal causes
 - portal vein thrombosis
 - heart failure (left-sided)
 - hypoalbuminaemia

liquid in the peritoneal cavity III

❖ haemascos (haemoperitoneum)

- liquid or coagulated blood
- rupture of bowel or organ capsule (liver, spleen)
 - traumatic (iatrogenic)
 - infectious diseases and inflammatory changes
 - tumors
- rupture of great vessels
- rupture of GEU (extrauterine pregnancy)
- larger bleeding is life-threatening
 - anemy, hypotension, circulatory collaps

liquid in the peritoneal cavity IV

❖ mucus

- pseudomyxoma peritonei (mucinous ascites)
- mucinous substances in peritoneal cavity
 - similar to myxoid matter (mimicking myxoma)
- peritoneal dissemination of mucinous tumor (mucus overproduction)
 - GIT (appendix, stomach, intestines, pancreas)
 - „ovary“
 - rare
 - mucinous component of teratoma

liquid in the peritoneal cavity V

❖ cholascos

- bile in the peritoneal cavity
- gallbladder or extrahepatic bile ducts perforation
- mild irritation of peritoneum
 - chemical (serous to serofibrinous) peritonitis

❖ chylascos

- lymph in peritoneal cavity
- blocade or traumatic injury of lymphatic vessels
- milky liquid with addition of fat droplets

liquid in the peritoneal cavity V

❖ treatment

- puncture of the cavity
 - liquid evacuation
 - cytologic examination
- solving the primary cause
 - stopping of bleeding
 - treatment liver or cardiac disorders
 - closing organ perforation

air in the peritoneal cavity

❖ pneumoperitoneum

- perforation of the digestive canal
- subdiaphragmatic signs in native X-ray
- fast resorption (when the inflammation is not starting)

❖ kapnoperitoneum

- regulated (iatrogenic) CO₂ insufflation into the cavity
- laparoscopic / robotic surgery
- fast resorption after breaking the insufflation

corpuscles in the peritoneal cavity

- ❖ appendices epiploicae
 - lipomatous tags of peritoneum or mesenterium
- ❖ subserous pendulating uterine leiomyomas
- ❖ GEU – extrauterine pregnancy
- ❖ foreign body
 - surgical instruments and material
 - after injury
- ❖ parasites

peritonitis I

- ❖ inflammation of the peritoneum
 - aseptic (chemical irritation)
 - infectious (infectious aetiology – bacterial, mycotic)
- ❖ dominantly exsudative type of inflammation
- ❖ 2 components
 - inflammation of the serous membrane
 - inflammatory cells on the top surface
 - inflammation in the interstitium
 - inflammatory liquid (exsudate) in peritoneal cavity

peritonitis II

- ❖ several possibilities of classification
- ❖ variable symptoms and morphology
 - aetiology
 - aseptic x infectious
 - duration of the inflammation
 - acute x subacute x chronic
 - location
 - circumscribed x diffuse
 - type of the inflammatory exsudation
 - specific x non-specific
 - phase of inflammation
 - exsudative x proliferative (productive)

chemical peritonitis

- ❖ sterile (aseptic, non-infectious)
- ❖ small amount of bile or pancreatic juices (enzymes)
- ❖ starting as serous (serofibrinous) inflammation
 - secondary superinfection – purulent peritonitis
 - digestion of tissues (Balsler's necroses, bleeding)
 - granulomatous reaction
 - foreign body granulomas (sewing fibres, glove-powder)

infectious peritonitis I

- ❖ infections in the abdominal cavity
 - bacteria, mycoses, parasites
 - infection of the abdominal and pelvic organs
 - rupture of appendix, ulcer perforation, diverticulitis, salpingitis...
 - spreading from outside (injury, vulners, surgery)
 - migration of ordinary intestinal bacteria

infectious peritonitis II

❖ variable pathogenesis

- through the intact bowel wall
 - spontaneous bacterial peritonitis
 - spreading without of an obvious contamination
 - higher permeability of the bowel wall
 - liver cirrhosis, nephrotic syndrome
 - ischaemia, inflammation of the bowel wall
- organ perforation
 - bowel content contamination – stercoral peritonitis
- induced peritonitis
 - porogenic spreading from other compartments (pleural cavity, pericardium, retroperitoneum, lower pelvis)
- haematogenic dissemination (rare)

infectious peritonitis III

❖ clinical manifestation

- general symptoms
 - circulation instability, temperature elevation, nausea, vomiting...
- local symptoms
 - peritoneal irritation, pain, disturbance or loss of peristaltics...
- elevated inflammatory parameters in blood examination
 - sedimentation, WBC, CRP...
- typical imaging findings
 - exsudate - effusion, bowel distension...

infectious peritonitis IV

❖ gross (morphology)

- loss of brightness of peritoneum, tarnish
- hyperaemia of the peritoneum
- fibrin coating on the surface
- exsudate:

serous **→** serofibrinous **→** fibrinosopurulent **→** purulent

- possible addition of blood

infectious peritonitis V

- ❖ extension (spreading) possibilities
 - spreading all over the peritoneum
 - diffuse peritonitis
 - large resorption area
 - overall intoxication – peritoneal sepsis
 - paralytic ileus
 - rise of fibrin
 - favourable conditions for encapsulation
 - circumscribed peritonitis
 - chronic abscess (subphrenic, periappendicular)

peritonitis – histology I

- ❖ inflammatory liquid (exsudate) in the abdominal cavity
 - cytologic examination
 - inflammatory cells
 - neutrophils
 - other cells (macrophages, plasma cells, lymphocytes, eosinophils)
 - cellular debris
 - fibrin

peritonitis – histology II

❖ changes of the membrane

- inflammatory exsudate on the surface
 - fibrin, inflammatory cells (neutrophils), necrosis, blood
 - mesothelium damage
 - reactive changes (hyperplasia) of remaining mesothelium
- signs of acute inflammation in underlying soft tissue
 - oedema
 - dilatation of blood vessels, hyperaemia
 - inflammatory cells
 - fibrin exsudation
- activation of abdominal lymph nodes

tuberculous peritonitis

❖ spreading

- haematogenous spreading by milliary dissemination
- porogenic spreading from surrounding organs

❖ morphology

- fibrinous exsudation with massive haemorrhagic addition
- nodules with tuberculous granulomas
 - caseous desintegration
- proliferative phase (healing)
 - massive fibroproduction
 - peritoneal adhaesions

peritonitis – treatment

- ❖ draining of the exsudation and abscessi
- ❖ solving the primary cause
 - resection of necrotic bowel
 - closing of the perforation
 - cleaning the cavity (washing with antibiotics)
- ❖ systemic therapy
 - antibiotics
 - antiinflammatory treatment

peritonitis – reparation

- ❖ part of proliferative phase of the inflammation
- ❖ several possibilities
 - total resorption of the exsudate and inflammation
 - no residual signs
 - encapsulation of the inflammation
 - chronic abscess development
 - organisation of the exsudate
 - fibroproduction, fibrous adhaesions (productive peritonitis)
 - complications (intestine strangulation, ileus, bowel ischaemia, necrosis)

hernias

- ❖ sacculate protrusion of the peritoneum, containing parts of abdominal organs
 - true
 - all over lined by peritoneum
 - false
 - prolapse
- ❖ miscellaneous factors of origin
 - weakness or defect in the abdominal wall
 - inherited, acquired, anatomy of the abdominal wall
 - rise of intraabdominal pressure

hernias – morphology I

❖ hernial sac

- pouchlike, serosa-lined sac with accessory parts of abdominal wall
- sliding hernia (missing peritoneal covering)

❖ hernial content

- mostly bowel loop
 - possibly more loops, other abdominal organs or part of them
 - sometimes just part of the bowel wall (Littré's hernia)
- evaluation of fixation to the hernial sac wall
 - free / with adhaesions

hernias – morphology II

❖ hernial neck

- opening between the hernial sac and the peritoneal cavity
- the narrowest part of hernia
- weak parts of peritoneum, peritoneal folds
- important for the seriousness of the hernia
 - possibility of reposition (together with fixation of the content)
 - severity of complications

sliding hernia

- ❖ contains bowel, without its own mesenterium
- ❖ hernial sac not covered by peritoneum
 - peritoneum intact
 - aside of the hernial content

hernias - complications

❖ incarceration

- obstruction of the intestine (strangulation ileus)
- obstruction of the supporting blood vessels
 - ischaemic damage of intestine
 - haemorrhagic infarsation
 - gangraene with perforation
 - peritonitis

❖ volvulus in hernia

- rotation of the loop along the mesenterium
- same conclusions like by the incarceration

types of incarceration I

❖ elastic incarceration

- incarceration in the same time like origination of the hernia
- elastic contraction of the hernial neck after intraabdominal pressure release

types of incarceration II

❖ obstipative incarceration

- development in longer interval
- wide neck of hernia
- incarceration after crowding of the intestinal loops

types of incarceration III

- ❖ retrograde hernia (Maydl's)
 - two loops in hernia, one middle loop back in abdominal cavity
 - both possibilities of incarceration
 - the worst prognosis for the middle loop

hernias – classification I

❖ acquired

❖ inherited

➤ indirect inguinal

➤ umbilical

➤ abdominal fissure (fissura abdominalis)

- fissure in the umbilical cord anulus

- hernial sac formed by amnion and peritoneum

- several types

- hernia funiculi umbilicalis (umbilical cord inserting to hernial sac)

- fissura abdominalis (large sac containing also liver)

- eventeration (large part of abdominal wall is missing)

hernias – classification II

❖ external

- hernial sac out of peritoneal cavity
- hernial neck in weak parts of abdominal wall

❖ internal

- herniation of the loops into peritoneal recessi
- hernial neck formed by atypical peritoneal folds or adhaesions

external hernias

- ❖ inguinal (direct, indirect, scrotal, labial)
- ❖ femoral, popliteal, obturator
- ❖ fissures of aponeuroses of the abdominal muscles (linea alba, lumbar, epigastric)
- ❖ umbilical
- ❖ hernia in cicatrice (post-operative)

internal hernias I

- ❖ mesocolic (Treitz)
 - recessus duodenojejunalis
 - containing small intestine
- ❖ retrocaecal
 - recessus ileocaecalis sup. / inf.
- ❖ hernia bursae omentalis
 - foramen epiploicum (Winslowi)
 - large and small bowel

internal hernias II

❖ diaphragmatic

➤ inherited

- false hernia (prolapse in the diaphragmatic defect)
- hypoplasia of the lungs as conclusion

➤ acquired

- true hernia
- hiatal (paraesophageal - rolling, sliding, mixed)
- lumbar, parasternal

treatment of hernias

❖ reposition

- width of the neck
- fixation of the hernial content to the hernial sac

❖ conservative

- wide neck
- reposition
- external fixation (belts, training of the abdominal wall...)

❖ surgery

- reposition
- suture of the neck
- mesh onlay implantation

tumors of the peritoneum

- ❖ pseudotumors
 - cysts
 - endometriosis
- ❖ true tumors
 - benign
 - malignant

peritoneal tumors – benign

❖ mesothelial

- adenomatoid tumor

❖ soft tissue tumors

- lipomas, haemangiomas
- leiomyomatosis peritonealis disseminata

peritoneal tumors – malignant

❖ primary

- mesothelial
- primary epithelial (Müllerian type)
- tumors of uncertain origin
- peritoneal angiosarcoma

❖ secondary

primary peritoneal tumors I

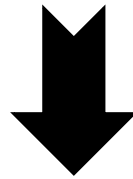
❖ mesothelioma

- same morphology, properties and classification than supradiaphragmatic (pleural) type
- several variants according to histological pattern and cell differentiation
 - papillary, multicystic, diffuse, epithelioid, sarcomatoid
 - miscellaneous biological behaviour and prognosis

primary peritoneal tumors II

❖ primary peritoneal carcinoma

- necessary to exclude metastasis of other primary location (especially female genital tract)
- tubular or cribriform pattern
- cuboid to columnar cells without distinctive mucus production



- on the 1st place exclude metastasis of the ovarian high-grade serous adenocarcinoma

primary peritoneal tumors III

❖ other tumors rare

- soft tissue sarcomas
- haematologic tumors (lymphomas)
- desmoplastic small round cell tumor

peritoneal tumors – secondary

- ❖ peritoneal dissemination (carcinomatosis)
 - metastases of carcinomas
 - GIT, female genital tract, breast, lung...
 - metastatic melanoma
- ❖ direct spreading from surrounding tissues
 - carcinomas, sarcomas, lymphoma, neuroblastoma...

pathology of peritoneal cavity

- ❖ complicated anatomy
- ❖ large area for resorption and secretion
 - conclusions of damage are severe
- ❖ variable pathological disorders
 - painful
 - life threatening
- ❖ widespread differential diagnosis
 - inherited x acquired
 - inflammations x tumors