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Objectives

1. Discuss anatomy of peritoneal lavage.
2. Enumerate the anatomical complication peritoneal lavage.
3. Discuss mechanism of peritoneal pain.
4. Enumerate the anatomy of the insertion of the Sengstaken Blakemore balloon for esophageal hemorrhage.
5. Discuss the structures that may impede the passage of nasogastric tube during nasogastric intubation.
6. Describe obliteration of abdominal aorta and iliac arteries.

7. Trace the pathway of bile (from liver till reaching the duodenum) before and after cholecystectomy.

Anatomy of peritoneal lavage

- It is used to sample the intraperitoneal space for evidence of damage to viscera and blood vessels.

Uses : A. It is diagnostic technique in cases of blunt abdominal trauma.

B. In nontraumatic situations it is used to:

1. Diagnosis of acute pancreatitis.
2. Diagnosis of primary peritonitis.
3. Conduct peritoneal dialysis.

Procedure:

1. The patient is placed in the supine position.
2. The urinary bladder is emptied by catheterization to descend to the pelvis.

3. The stomach is emptied by a nasogastric tube because a distended stomach may extend to the anterior abdominal wall.

4. The skin is anesthetized and 3-cm vertical incision is made.

Midline incision technique : The following structures are penetrated:

1. Skin **2.** Fatty and deep membranous layer of superficial fascia

3. Linea alba **4.** Fascia transversalis

5. Extraperitoneal fat. **6.** Parietal peritoneum.

Para umbilical incision technique :

The following structures are penetrated:

1. Skin **2.** Fatty and deep membranous layer of superficial fascia

3. Anterior wall of rectus sheath, rectus abdominis muscle and posterior wall of the rectus sheath.

4. Fascia transversalis **5.** Extraperitoneal fat.

6. Parietal peritoneum.

Notice: It is important that all the small blood vessels in the superficial fascia is not injured because bleeding from it produce a false-positive result.

Complications of peritoneal lavage

- 1.** In the midline technique, the incision or trocar may cause injury to vascular rectus abdominis muscle or branches of the epigastric vessels.
 - Bleeding from this source could produce a false-positive result.
- 2.** Perforation of the gut by the scalpel or trocar.
- 3.** Perforation of the mesenteric blood vessels or vessels on the posterior abdominal wall.
- 4.** Perforation of a full bladder
- 5.** Wound infection

Peritoneal pain

A. From the parietal peritoneum :

- It is supplied by the lower 6 thoracic nerves and the 1st lumbar nerve.
- It is somatic type and can be localized.
- If pain arises from one side of the midline it becomes lateralized.
- The somatic pain impulses from the abdomen reach the central nervous system in the segmental spinal nerves T7-12 and L1.
- The abdominal wall is innervated by the same nerves, these leads to cutaneous hypersensitivity, tenderness and increase in local reflexes of anterior abdominal wall.
- Rebound tenderness occurs when the parietal peritoneum is inflamed.

B. From the visceral peritoneum :

- It is innervated by autonomic nerves.
- Stretch caused by over distension of a viscus or pulling on a mesentery gives rise to the sensation of pain.
- Pain arising from the visceral peritoneum is dull and poorly localized.

- Many visceral afferent fibers that enter the spinal cord participate in reflex activity.
- Reflex sweating, salivation, nausea, vomiting and increased heart rate may accompany visceral pain.

Esophageal varices

- The lower 1/3 of the esophagus is an important site of portosystemic anastomosis.
- The esophageal tributaries of the left gastric vein (which drains into the portal vein) anastomosis with the esophageal tributaries of the azygos veins (systemic veins).

Cirrhosis of the liver: It leads to portal hypertension, resulting in dilatation and varicosity of the portosystemic anastomosis.

- Varicose esophageal veins may rupture, causing severe hematemesis.

Anatomy of the Insertion of the Sengstaken-

Blakemore Balloon for Esophageal Hemorrhage

Uses: It is used to control massive esophageal hemorrhage from esophageal varices.

Procedure:

- 1.** The tube is inserted through the nose or by using the oral route.
- 2.** In adult the average distance between: -
External orifices of the nose to the stomach is 17 in. (44 cm).
- Incisor teeth to the stomach is 16 in. (41cm).
- 3.** The lubricated tube is passed down into the stomach and the gastric balloon is inflated.
- 4.** A gastric balloon fix the tube against the gastro-esophageal junction.
- 5.** An esophageal balloon occludes the esophageal varices by counter pressure.

Complications of the tube:

- 1.** Difficulty in passing through the nose.
- 2.** Damage to the esophagus from over inflation of the esophageal tube
- 3.** Pressure on neighboring mediastinal structures as the esophagus is expanded by the balloon within its lumen
- 4.** Persistent hiccups caused by irritation of the diaphragm by the distended

esophagus and irritation of the stomach
by the blood

Nasogastric Intubation

Uses of nasogastric tube:

- 1.** It is used to empty the stomach in cases of:
 - Intestinal obstruction.
 - Before operations on the GIT.
- 2.** It may also be performed to obtain a sample of gastric juice for biochemical analysis.
- 3.** It is used in feeding in comatosed patient in ICU.
- 4.** It is used in gastric wash after ingestion of toxins

Procedure:

- 1.** The patient is placed in semi upright position or left lateral position to avoid aspiration.

2. The well-lubricated tube is inserted through the wider nostril and is directed backward along the nasal floor.
3. Once the tube has passed the soft palate and entered the oropharynx, the resistance decreased and the conscious patient will feel gagging.
4. In adult the distance from the nostril to the cardiac orifice of the stomach is about 17 inch.

5. Always aspirate for gastric contents to confirm successful entrance into the stomach

Anatomic structures that may impede the passage of the nasogastric tube:

1. A deviated nasal septum makes the passage of the tube difficult on the narrower side.
2. Three sites of esophageal narrowing may offer resistance to the nasogastric tube:
 - At the beginning of the esophagus behind the cricoid cartilage.
 - At the site of the left bronchus and arch of aorta cross in front of the esophagus.

- At the site of the esophagus enters the stomach.

Complications :1. The nasogastric tube enters the larynx instead of the esophagus.

2. Rough insertion of the tube into the nose will cause nasal bleeding from the mucous membrane.

3. Penetration of the wall of the esophagus or stomach.

Obliteration of the abdominal aorta and iliac arteries

- It is gradual occlusion of the bifurcation of the abdominal aorta produced by atherosclerosis and thrombus formation.

Clinical picture:

- Pain in the legs on walking (claudication).

- Impotence, caused by lack of blood in the internal iliac arteries.

- Because the progress of the disease is slow, some collateral circulation is established, but it is inadequate.
- The collateral blood flow prevent tissue death in both lower limbs but skin ulcers may occur.

Treatment:

- Surgical thromboendarterectomy or a bypass graft should be considered.

Pathway of bile before and after cholecystectomy

A. Before cholecystectomy:

- Bile is secreted by the liver cells at a constant rate of about 40 ml per hour.
- If digestion is not taking place, the bile is stored and concentrated in the gallbladder.

Hepatic ducts :

- Right and left hepatic ducts emerge from right and left lobes of the liver in the Porta hepatis.
- The hepatic ducts unite to form the common hepatic duct and it is present in the free margin of the lesser omentum..

- It is about 1.5 in. (4 cm) long and it is joined with the cystic duct to form the bile duct.

Bile duct : It is about 3 in. (8 cm) long.

- In the 1st part of its course, it lies in the right free

margin of the lesser omentum in front of the opening into the lesser sac.

- In the 2nd part of its course, it is situated behind the 1st part of duodenum.

- In the 3rd part of its course, it lies in a groove on the posterior surface of the head of the pancreas.

- Here, the bile duct join the main pancreatic duct to form hepatopancreatic ampulla (ampulla of Vater).

- The ampulla opens in major duodenal papilla at the middle of the 2nd part of duodenum.

B. After cholecystectomy: - Bile is secreted by the liver cells at a constant rate of about 40 ml per hour and accumulated in the bile duct till the digestive period where the

sphincter of oddi is relaxed to transfer the secretion to the duodenum.