Anatomy: Abdomen

Question 1 of 125

Posteriorly the spleen lies in the region of which of the following:

a. Ribs 7 and 8
b. Ribs 8 - 10
c. Ribs 9 - 11
d. Ribs 10 - 12
e. Below the costal margin
Anatomy: Abdomen

Question 1 of 5

Posteriorly the spleen lies in the region of which of the following:

a) Ribs 7 and 8
b) Ribs 8 – 10

Answer

The spleen projects onto the left side and back in the area of ribs 9 – 11. The spleen follows the contour of ribs 10 and extends from the superior pole of the left kidney to just posterior to the diaphragm line.

Notes

The interposed splenic ligament lies against the diaphragm, in the area of rib 9 – 11. It lies in the left hypochondrium of the abdomen. The spleen cannot normally be palpated on clinical examination.

The spleen is a organ of the reticuloendothelial system and acts:

- to filter blood to remove old and defective blood cells
- as a blood reservoir
- to produce white blood cells
- to produce an immune response

Relations

The spleen lies posterior to the stomach, superior to the left colic flexure and laterally to the left kidney and tail of the pancreas.

Surface markings

The spleen projects onto the left side and back in the area of ribs 9 – 11. The spleen follows the contour of ribs 10 and extends from the superior pole of the left kidney to just posterior to the diaphragm line.

By Henry Vanderlee Carter (Public domain), via Wikimedia Commons

Splenectomy

This next comment occurs due to localized trauma to the left upper quadrant. It may be associated with left lower rib fractures. Because the spleen has an extremely thin capsule it is susceptible to injury even when there is no damage to surrounding structures and because the spleen is highly vascular, when ruptured, it bleeds profusely into the peritoneal cavity.

Resources

- The Body College of Emergency Medicine
- Irish Association for Emergency Medicine
- Advanced Trauma Life Support
- Advanced Cardiac Life Support
- Trauma and Emergency
- Triage
- Reanimation
- Advanced Life Support Group
- Emergency Medicine Journal
- Undergraduate Line
- Medical Dictionary
- Patient.co.uk

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Anatomy: Abdomen

The second part of the duodenum extends between which of the following vertebral levels:

a. T12 - L1  
b. L1 - L3  
c. L1 - L2  
d. T12 - L2  
e. L2 - L3

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Something wrong?
Anatomy: Abdomen

Question 2 of 125

The second part of the duodenum extends between which of the following vertebral levels:

a) T12 - L1
b) L1 - L3
b) L1 - L3
b) T12 - L2
d) L2 - L3

Answer

The descending (second) part is just to the right of the midline, extending from the neck of the gallbladder, at vertebral level L3 to the lower border of vertebra L1 and lying lateral to the head of the pancreas. This part contains the major duodenal papilla which is the common entrance for the bile and pancreatic ducts.

Notes

The small intestine is the longest part of the gastrointestinal tract and extends from the pyloric orifice of the stomach to the ileocaecal fold, comprising the duodenum, jejunum and ileum. The first part of the small intestine is the duodenum.

The duodenum is a C-shaped structure, adjacent to the head of the pancreas and above the level of the umbilicus. It is retroperitoneal except for its proximal part which is connected to the liver by the hepatoduodenal ligament of the lesser omentum.

Parts of the duodenum

- The superior (first) part extends from the pyloric orifice of the stomach to the neck of the gallbladder, lies just to the right of the body of vertebra L1, and passes anterior to the inferior vena cava and superior to the head of the pancreas.
- The descending (second) part is just to the right of the midline, extending from the neck of the gallbladder to the lower border of vertebra L3 and lying lateral to the head of the pancreas. This part contains the major duodenal papilla which is the common entrance for the bile and pancreatic ducts.
- The inferior (third) part is the longest section, crossing the inferior vena cava, the aorta and the vertebral column at the level of vertebra L3 and lying inferior to the pancreas.
- The ascending (fourth) part passes upwards or, to the left of the aorta to approximately the upper border of vertebra L2 and terminates at the duodenopancreatic flexure.

Blood supply

The arterial supply of the duodenum is primarily from the pancreaticoduodenal arteries, branches of the superior mesenteric artery and the gastroepiploic artery (branch of the common hepatic artery from the coeliac trunk).
Anatomy: Abdomen

The infracolic compartment is divided into right and left spaces by which of the following structures:

a. Jejunum
b. Ileum
c. Mesentery
d. Transverse mesocolon
e. Sigmoid mesocolon

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Anatomy: Abdomen

Answer

The final answer encompasses abdominal aorta and small bowel anteriorly, with rectum to the right.

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Figure View

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- Medical Dictionary
- Clinical Case Studies
- Patient Education Materials
- Research Articles
Anatomy: Abdomen

Question 4 of 125

The aorta enters the abdomen at which of the following vertebral levels:

- T8
- T9
- T10
- T12
- L1

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Anatomy: Abdomen

Question 4 of 125

The aorta enters the abdomen at which of the following vertebral levels:

- a) T8
- b) T9
- c) T10
- d) T12
- e) L1

Answer

The abdominal aorta begins at the aortic hiatus of the diaphragm, anterior to the lower border of vertebra T12.

Notes

The abdominal aorta begins at the aortic hiatus of the diaphragm, anterior to the lower border of vertebra T12. It descends through the abdomen, anterior to the vertebral bodies, and by the time it ends at the level of vertebra L4 it is slightly to the left of the midline. The main terminal branches of the abdominal aorta are the two common iliac arteries. This bifurcation can be visualised on the anterior abdominal wall as a point approximately 2.5 cm below the umbilicus.

The abdominal aorta gives rise to:

- three anterior unpaired visceral branches
  - the celiac trunk supplying the abdominal foregut (upper border of L1 vertebra)
  - the superior mesenteric artery supplying the abdominal midgut (lower border of L1 vertebra)
  - the inferior mesenteric artery supplying the abdominal hindgut (L3 vertebra)
- three lateral paired visceral branches
  - the middle suprarenal arteries
  - the renal arteries (L2 vertebra)
  - the gonadal arteries
- posterior parietal branches
  - the inferior phrenic arteries (paired)
  - the lumbar arteries (paired)
  - the median sacral artery (single)
- two terminal branches
  - left common iliac artery
  - right common iliac artery
Anatomy: Abdomen

A 64 year old man is brought to ED with profuse haematemesis. Endoscopy shows oesophageal varices which are most likely the result of anastomosis of the left gastric vein with which of the following vessels:

- a. Abdominal aorta
- b. Azygos system of veins
- c. Inferior mesenteric vein
- d. Superior mesenteric vein
- e. Portal vein

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- TeachMeAnatomy
- Trauma.org
- Radiopaedia
- Advanced Life Support Group
- Emergency Medicine Journal
- Lifeinthefastlane
- Instant Anatomy
- Patient.co.uk

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Anatomy: Abdomen

A 64 year old man is brought to ED with profuse haematemesis. Endoscopy shows neoplastic varices which are most likely the result of anatomical features of the left gastric vein with which of the following vessels:

a) Abdominal aorta 
X b) Axillary system of veins 
X c) Inferior mesenteric vein 
X d) Superior mesenteric vein 
X e) Portal vein

Answer

The left gastric vein and its tributaries form a portal systemic anastomosis with mesocaval tributaries to the azygos system of veins of the caval system at the gastroesophageal junction as the cardia of the stomach.

Notes

The portal vein is the final common pathway for the transport of venous blood from the spleen, pancreas, gallbladder and abdominal part of the gastrointestinal tract.

It is formed from the union of the superior mesenteric and splenic vein posterior to the neck of the pancreas at the level of vertebrae L2.

Portosystemic anastomoses

The hepatic portal system drains desensitized rich blood from the visceral organs of the abdomen to the liver. Normally, 100% of portal venous blood flow is recovered from the hepatic veins. In patients with elevated portal vein pressure e.g. from cirrhosis, there is significantly less blood flow to the liver and the rest of the blood enters collateral channels which drain into the systemic circulation at specific points.

Portosystemic anastomoses occur at certain specific points, the largest of these being:

- The gastroesophageal junction where the left gastric vein and its tributaries from a portal systemic anastomosis with tributaries to the zygomatic system of veins of the caval system
- The area where the superior rectal vein of the portal system anastomoses with the middle and inferior rectal veins of the systemic venous system
- The anterior abdominal wall where the umbilicus where the portal perumbilical veins anastomose with systemic veins on the anterior abdominal wall

When pressure in the portal vein is elevated, venous enlargement (varices) tends to occur at and around these sites producing:

- esophageal varices at the gastroesophageal junction
- varices at the anal/rectal junction
- caput medusae at the umbilicus

PORTAL SYSTEMIC ANASTOMOSIS

By Henry Yvonne Carter (Public domain), via Wikimedia Commons
Anatomy: Abdomen

Question 6 of 125

The superficial inguinal ring is an ‘opening’ in which of the following structures:

a. External oblique aponeurosis
b. Internal oblique aponeurosis
c. Transversus abdominis aponeurosis
d. Rectus abdominis aponeurosis
e. Transversalis fascia

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Something wrong?
Anatomy: Abdomen

(Cont'd)

The superficial inguinal ring is an opening which is of the following structures:

- Femoral vessel cistern
- Genital vessels
- Uterine vessels
- Ovarian vessels

**Answers:**

1. Externally displaced omental foramen
2. Femoral vessel cistern
3. Genital vessels
4. Uterine vessels
5. Ovarian vessels
6. Femoral vessel cistern

**Notes:**

- **Spine:** Iliac crest
- **Position:** Anterior to the inguinal ligament, on the outer side of the femoral vessels
- **Formation:** Derived from the obliteration of the inguinal canal
- **Function:** Facilitates the passage of vessels and nerves through the abdominal wall

**Text:**

The lateral quadrants of the abdomen are divided into four regions based on the positions of the abdominal muscles and the presence or absence of the rectus abdominis muscle. These regions are:

1. Right upper quadrant (RUQ)
2. Right lower quadrant (RLQ)
3. Left upper quadrant (LUQ)
4. Left lower quadrant (LLQ)

The RUQ is related to the liver, gallbladder, and stomach, while the RLQ is related to the appendix, cecum, and ascending colon. The LUQ is related to the spleen, stomach, and descending colon, and the LLQ is related to the left kidney, left ureter, and sigmoid colon.

**Conclusion:**

- The liver located in the RUQ is the largest organ in the body and serves as a filter for blood returning from the digestive organs.
- The gallbladder, located in the RLQ, stores bile produced by the liver and concentrates it before it is released into the small intestine.
- The stomach, located in the LUQ, is responsible for the mechanical breakdown of food and the production of stomach acid.
- The spleen, located in the LLQ, plays a role in the body's immune system by filtering blood and removing old or damaged red blood cells.

**Reference:**

Anatomy: Abdomen

Question 7 of 125

Visceral afferent fibres from the descending and sigmoid colon travel to which of the following spinal cord segments:

a  T6 – T8
b  T8 – T10
c  T10 – T12
d  L1 – L2
e  L3 – L4

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**Anatomy: Abdomen**

**Question 1 of 3**

Visceral arterial fibers from the descending and sigmoid colon travel through which of the following spinal cord segments?

- A) T-8
- B) T-13
- C) T-12 to L-2
- D) L-1 to L-2
- E) L-2 to L-4

**Answer**

The spinal cord segments from which the descending and sigmoid colon receive visceral arterial fibers are the T-12 to L-2 spinal cord segments, as these segments are located in the lumbar and sacral regions of the spinal cord.

**Notes**

The large intestines extend from the distal ileum of the small intestine and continue through the cecum, ascending, transverse, and descending portions, before entering the sigmoid colon near the rectum.

**Color**

The colon continues from the cecum in the right iliac fossa as the ascending colon, which passes anteriorly through the right side of the abdomen.

**Relations**

- **Ascending colon**
  - Small intestine, greater omentum, duodenal wall

- **Transverse colon**
  - Greater omentum, liver, stomach, abdominal wall

- **Descending colon**
  - Small intestine, greater omentum, duodenal wall

- **Sigmoid colon**
  - Rectum, uterus, bladder

**Blood supply**

The arterial supply to the colon is derived from the superior mesenteric artery in the cecum and ascending colon, the inferior mesenteric artery in the transverse and descending colon, and the superior hemorrhoidal artery in the sigmoid colon.

The venous blood from the colon is collected into the superior hemorrhoidal veins in the cecum and ascending colon, inferior hemorrhoidal veins in the transverse and descending colon, and the inferior rectal vein in the sigmoid colon.
Anatomy: Abdomen

Question 8 of 125

A 65 year old man presents to ED complaining of abdominal pain, jaundice and weight loss. Imaging shows a tumour of the head of the pancreas. Which of the following structures is most likely compressed by this tumour:

a. Common hepatic duct
b. Left hepatic duct
c. Cystic duct
d. Accessory pancreatic duct
e. Common bile duct

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Anatomy: Abdomen

A 65 year old man presents to ED complaining of abdominal pain, jaundice and weight loss. Imaging shows a tumour of the head of the pancreas. Which of the following structures is most likely compressed by this tumour:

a) Common hepatic duct ✗
b) Left hepatic duct
c) Cystic duct
d) Accessory pancreatic duct
e) Common bile duct ✓

Answer

The lower region of the common bile duct lies in a groove on the posterior surface of the head of the pancreas to the left of the second part of the duodenum. An obstruction at this site causes a backup of bile back through the common bile duct and hepatic duct with resultant pain and jaundice.

Notes

Biliary tree

The biliary tree begins in the liver parenchyma with the formation of the left and right hepatic duct which drain bile from the liver where it has been synthesised. These two ducts meet to form the common hepatic duct which runs near the liver, with the hepatic artery proper and portal vein in the free margins of the lesser omentum.

As the common hepatic duct descends, it is joined by the cystic duct, which is a continuation of the neck of the gallbladder. The common hepatic duct and the cystic duct combine to form the common bile duct. At this point the bile duct lies to the right of the hepatic artery proper and usually to the right of, and anterior to, the portal vein in the free margin of the lesser omentum.

As the common bile duct descends, it passes posterior to the first part of the duodenum before joining with the pancreatic duct from the pancreas, forming the hepatopancreatic ampulla (ampulla of Vater) at the major duodenal papilla, located in the second part of the duodenum. Surrounding the ampulla is the sphincter of Oddi, a collection of smooth muscle which can open to allow bile and pancreatic fluid to empty into the duodenum.

Common bile duct relations

The common bile duct can be divided into three main regions, based on its relation to the duodenum:

- The first supraduodenal region is the upper one-third which lies in the free margin of the lesser omentum with this hepatic artery and portal vein. The common bile duct lies anterior to the portal vein and to the right of the hepatic artery proper.
- The second retroduodenal region is the middle one-third which lies posterior to the first part of the duodenum. The gastroduodenal artery lies on its left aspect and the portal vein on its posterior aspect.
- The third intraduodenal region is the lower one-third which lies in a groove on the posterior surface of the head of the pancreas, to the left of the second part of the duodenum and anterior to the right renal vein and inferior vena cava.

Resources

- The Royal College of Emergency Medicine
- Irish Association for Emergency Medicine
- Advanced Trauma Life Support
- Resuscitation Council (UK)
- Trauma Intraosseous
- Trauma Guidelines
- Truants
- Trachospira

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Anatomy: Abdomen

Question 9 of 125

Pain in the jejunum and ileum is typically referred to which of the following regions:

a. Flank
b. Epigastrium
c. Left upper quadrant
d. Right lower quadrant
e. Umbilical region

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Something wrong?
Pain in the jejunum and ileum is typically referred to which of the following regions:

- Flank
- Epigastrium
- Left upper quadrant
- Right lower quadrant
- Umbilical region

Answer

Pain from the small jejunum and ileum (intestine structures) is referred to the peri-umbilical region.

Notes

The small intestine is the longest part of the gastrointestinal tract and extends from the pyloric orifice of the stomach to the ileocecal valve, comprising the duodenum, jejunum, and ileum.

The jejunum and ileum make up the last two sections of the small intestine.

The jejunum and ileum are intraperitoneal, attached to the posterior abdominal wall by the mesentery.

Jejunum

The jejunum represents the proximal two-thirds. It is mostly in the left upper quadrant of the abdomen and is larger in diameter and has a thicker wall than the ileum.

Ileum

The ileum makes up the distal third and is mostly in the right lower quadrant. The ileum endeavors into the large intestine at the ileocecal junction forming the ileocecal valve, which prevents reflux from the cecum to the ileum and regulates the passage of contents from the ileum to the cecum.

Blood supply

The arterial supply to the jejunum and ileum is derived from the superior mesenteric artery.

Innervation

The sympathetic nerve supply is derived from the T9 – T10 spinal cord segments. Pain from the small jejunum and ileum is referred to the peri-umbilical region.

Meckel’s diverticulum

A Meckel’s diverticulum is the remnant of the proximal part of the yolk stalk (vitelline duct) that extends into the umbilical cord in the embryo and lies on the antimesenteric border of the ileum, approximately 2 feet proximal to the ileocecal junction. It appears as an blind-ended tubular outpouching of bowel, about 2 inches long, occurring in about 2% of the population, and can contain various types of ectopic tissue (gastric and pancreatic). Complications include hemorrhage, intussusception, diverticulitis, ulceration and obstruction, and symptoms may mimic those of acute appendicitis.
Anatomy: Abdomen

Question 10 of 125

Which of the following best describes the regions of the abdomen that the stomach occupies:

- **a** Epigastric region
- **b** Left hypochondrium
- **c** Epigastric, umbilical and left hypochondriac regions
- **d** Epigastric region and left hypochondrium
- **e** Epigastric and right and left hypochondriac regions

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Anatomy: Abdomen

Question 10 of 12

Which of the following best describes the regions of the abdomen that the stomach occupies:

a) Epigastric region
b) Left hypochondriac
c) Epigastric, umbilical and left hypochondriac regions

d) Epigastric region and left hypochondriac

e) Epigastric and right and left hypochondriac regions

Answer

The stomach is in the epigastric, umbilical and left hypochondriac regions of the abdomen.

Notes

The stomach is the most distended part of the gastrointestinal tract and has a J-like shape. The stomach is in the epigastric, umbilical and left hypochondriac regions of the abdomen. It is an intraperitoneal organ.

Anatomical distinctions

The stomach is divided into four regions:

- the cardiac which surrounds the opening of the oesophagus into the stomach
- the fundus which is in the area above the level of the cardiac orifice
- the body which is the largest central region of the stomach
- the pyloric part which is divided into the pyloric antrum and the pyloric canal which opens into the duodenum.

The most distal portion of the pyloric canal contains a thickened ring of gastric circular muscles, the pyloric sphincter that surrounds the distal pyloric orifice. The pyloric orifice is just to the right of the midline in the transpyloric plane. The pyloric sphincter controls the exit of chyme from the stomach into the duodenum. The sphincter is controlled by sympathetic stimulation and inhibited by parasympathetic action. Parasympathetic fibers in the vagus nerve are also secretomotor to gastric glands and mediate muscular wall of stomach.

Relations

The stomach lies inferior to the diaphragm.

The stomach lies posterior to:

- the anterior abdominal wall
- the left colic flexure
- the left lobe of the liver

The stomach lies anterior to the stomach bed formed by:

- the diaphragm
- the pereitoneum
- the transverse mesocolon
- the left colic flexure
- the left kidney
- the left adrenal gland
- the spleen

Blood supply

The arterial supply to the stomach is derived from all three branches (left gastric, splenic and common hepatic branches) of the celiac trunk.

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Anatomy: Abdomen

Question 11 of 125

The first part of the duodenum lies at the level of the body of which of the following vertebrae:

- a. T10
- b. T11
- c. T12
- d. L1
- e. L2

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Anatomy: Abdomen

Question 11 of 125

The first part of the duodenum lies at the level of the body of which of the following vertebrae:

a) T10  

b) T11  

c) T12  

d) L1  

e) L2

Answer

The superior (first) part extends from the pyloric orifice of the stomach to the neck of the gallbladder, lies just to the right of the body of vertebra L1, and passes anterior to the inferior vena cava and superior to the head of the pancreas.

Notes

The small intestine is the longest part of the gastrointestinal tract and extends from the pyloric orifice of the stomach to the ileocecal fold, comprising the duodenum, jejunum and ileum. The first part of the small intestine is the duodenum.

The duodenum is a C-shaped structure, adjacent to the head of the pancreas, and above the level of the umbilicus. It is retroperitoneal except for its proximal part which is connected to the liver by the hepatoduodenal ligament of the lesser omentum.

Parts of the duodenum

• The superior (first) part extends from the pyloric orifice of the stomach to the neck of the gallbladder, lies just to the right of the body of vertebra L1, and passes anterior to the inferior vena cava and superior to the head of the pancreas.

• The descending (second) part is just to the right of the midline, extending from the neck of the gallbladder to the lower border of vertebra L3 and lying lateral to the head of the pancreas. This part contains the major duodenal papilla which is the common entrance for the bile and pancreatic ducts.

• The inferior (third) part is the longest section, crossing the inferior vena cava, the aorta and the vertebral column at the level of vertebra L3 and lying inferior to the pancreas.

• The ascending (fourth) part passes upwards, or to the left of the aorta to approximately the upper border of vertebra L2 and terminates at the duodenojejunal flexure.

Blood supply

The arterial supply of the duodenum is primarily from the pancreaticoduodenal arteries, branches of the superior mesenteric artery and the gastroduodenal artery [branch of the common hepatic artery from the coeliac trunk].

Resources

- The Royal College of Emergency Medicine
- Irish Association for Emergency Medicine
- Advanced Trauma Life Support
- Resuscitation Council (UK)
- St John’s Ambulance
- St John’s Ambulance
- Emergency Medicine Journal
- Ulsterthepath
- Instant Anatomy
- Patents.co.uk
Anatomy: Abdomen

Question 12 of 125

Which of the following describes the site of a Meckel’s diverticulum:

a. Duodenojejunal flexure
b. Ileum
c. Second part of duodenum
d. Medial wall of caecum just inferior to ileocaecal valve
e. Jejunum

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Anatomy: Abdomen

Question 12 of 123

Which of the following describes the site of a Meckel’s diverticulum:

- [x] Duodenaljaunal flexure
- [ ] Stomach
- [x] Second part of duodenum
- [ ] Mediwall of cecum just inferior to ileocecal valve
- [ ] Jejunum

Answer

A Meckel’s diverticulum is the remnant of the proximal part of the yolk stalk (vitelline duct) that extends into the umbilical cord in the embryo and lies on the antimesenteric border of the ileum, approximately 2 feet proximal to the ileocecal valve. It appears as a Meckel’s diverticular outpouching of bowel, about 2 inches long, occurring in about 2% of the population, and may contain two types of ectopic tissue (gastric and pancreatic).

Notes

The small intestine is the longest part of the gastrointestinal tract and extends from the pyloric orifice of the stomach to the ileocecal valve. It comprises the duodenum, jejunum, and ileum.

The jejunum and ileum make up the last two sections of the small intestine. The jejunum and ileum are intraperitoneal, attached to the posterior abdominal wall by the mesentery.

Jejunum

The jejunum represents the proximal two-fifths. It is mostly in the left upper quadrant of the abdomen and is larger in diameter and has a thicker wall than the ileum.

Ileum

The ileum makes up the distal three-fifths and is mostly in the right lower quadrant. The ileum (mechanically into the large intestine at the ileocecal junction forming the ileocecal valve, which prevents reflux from the cecum to the ileum) and regulates the passage of contents from the ileum to the cecum.

Blood supply

The arterial supply to the jejunum and ileum is derived from the superior mesenteric artery.

Innervation

The sympathetic nerve supply is derived from the T9 – T11 spinal cord segments. Pain from the small intestine and ileum is referred to the peri-umbilical region.

Meckel’s diverticulum

A Meckel’s diverticulum is the remnant of the proximal part of the yolk stalk (vitelline duct) that extends into the umbilical cord in the embryo and lies on the antimesenteric border of the ileum, approximately 2 feet proximal to the ileocecal junction. It appears as a blind-ended tubular outpouching of bowel, about 2 inches long, occurring in about 2% of the population, and may contain two types of ectopic tissue (gastric and pancreatic). Complications include hemorrhage, intussusception, diverticulitis, ulceration and obstruction, and symptoms may mimic those of acute appendicitis.

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Resources

- The Royal College of Emergency Medicine
- Medline Plus
- National Institutes for Emergency Medicine (UK)
- Resuscitation Council (UK)
- National Audit (UK)
- Prehospital
- Radiopaedia

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Anatomy: Abdomen

Question 13 of 125

A 29 year old man presents to ED with a painful lump in his left groin. Which of the following structures can be used as a landmark to differentiate between a direct and an indirect inguinal hernia:

a. Inguinal ligament
b. Femoral canal
c. Inferior epigastric vessels
d. Pubic symphysis
e. Femoral artery

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Anatomy: Abdomen

Question 14 of 125

Which of the following best describes the regions of the abdomen that the liver normally occupies:

- a) Left hypochondrium and epigastric region
- b) Right hypochondrium and right flank
- c) Right hypochondrium and umbilical region
- d) Right hypochondrium, epigastric region and left hypochondrium
- e) Right hypochondrium, epigastric region and umbilicus
Anatomy: Abdomen

Question 15 of 125

A 21 year old man presents to ED complaining of groin pain. Examination reveals an indirect inguinal hernia. Which of the following nerves is most likely compressed by the herniating structure in the inguinal canal to cause pain:

a. Iliofemoral nerve
b. Lateral femoral cutaneous nerve
c. Ilioinguinal nerve
d. Subcostal nerve
e. Inferior epigastric nerve

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Anatomy: Abdomen

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A direct inguinal hernia is due to weakness in which of the following layers:

- a. External oblique aponeurosis
- b. Transversalis fascia
- c. Transversus abdominis muscle
- d. Internal oblique aponeurosis
- e. External oblique muscle

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11  Answered
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Something wrong?
Anatomy: Abdomen

Question: What is a direct hernia? How does it differ from an indirect hernia? Identify the structures typically involved in each type of hernia.

Answer:

A direct hernia is a type of hernia that occurs when the inguinal canal is weakened, allowing the abdominal wall to bulge through the canal and create a hernia. It typically involves the inferior epigastric vessels and the rectus femoris muscle. On the other hand, an indirect hernia is a type of hernia that occurs when the inguinal canal is not weakened, allowing the abdominal wall to bulge through the canal and create a hernia. It typically involves the transversalis fascia and the inferior epigastric vessels. Indirect hernias are more common and are usually found in children, while direct hernias are less common and are usually found in adults.

Notes:

- **Spine**: Inguinal canal
- **Position**: Inferior epigastric vessels
- **Direction**: Transversalis fascia
- **Structure**: Rectus femoris muscle
- **Function**: Superior epigastric artery

Nerve:

- **Inferior epigastric nerve**

The inferior epigastric nerve is a branch of the lumbar plexus that supplies the skin of the lateral aspect of the thigh and supplies the inguinal ligament. It is responsible for the sensation of pain and temperature in this area.

FIG. 73-2 Inferior epigastric artery and vein.
Anatomy: Abdomen

Question 17 of 125

The posterior wall of the inguinal canal is formed primarily by which of the following structures:

- a Transversus abdominis muscle
- b External oblique aponeurosis
- c Transversalis fascia
- d External oblique muscle
- e Internal oblique muscle

< Previous   Next >   See Answer   Something wrong?
Anatomy: Abdomen

Introduction

The anatomical study of the abdominal cavity is essential for understanding the abdominal organs and their functions. This chapter will cover the various structures and systems found in the abdomen, including the digestive, respiratory, and urogenital systems.

Regions of the Abdomen

The abdominal cavity is divided into several regions based on anatomical landmarks. These regions include the cranial, caudal, right, and left lateral aspects of the abdomen.

Organs of the Abdomen

The abdominal cavity contains a variety of organs, including the liver, spleen, stomach, small and large intestines, and the urinary bladder.

Blood Vessels

The abdominal cavity is also home to several major blood vessels that supply oxygen and nutrients to the abdominal organs.

Nerves

The abdominal cavity is innervated by several nerves that play a role in the control of abdominal functions.

Abdominal Wall

The abdominal wall is composed of several layers of muscles and connective tissue that provide support and protection for the abdominal organs.

Contents

- The anatomical layout of the abdominal cavity
- The relationship between the abdominal organs and their functions
- The surgical approach to the abdominal cavity
- The role of the abdominal cavity in the functioning of the body
- The influence of the abdominal cavity on the overall health of the body

Conclusion

The anatomical study of the abdominal cavity is essential for understanding the functioning of the body and the medical treatments that may be required to maintain health.

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Anatomy: Abdomen

Question 18 of 125

The inguinal ligament spans between which of the following two structures:

a. Anterior superior iliac spine and pubic tubercle
b. Anterior superior iliac spine and pubic symphysis
c. Iliac crest and pubic symphysis
d. Iliac crest and pubic tubercle
e. Anterior superior iliac spine and pubic crest

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Anatomy: Abdomen

Answer

The least lateral border of the external oblique aponeurosis forms the iliac crest on each side. The inguinal ligament runs between the anterior superior iliac spine laterally and the pubic tubercle medially.

Notes

There are no muscles on the anterolateral abdominal wall. Muscles form three layers: the rectus abdominis, external oblique, and internal oblique. These muscles originate from the posterior and inferior rectus sheath and have fibrous expansions that insert into the pubis. The rectus abdominis muscles are all innervated by the anterior primary division of the lumbar plexus.

External oblique

The external oblique is the deepest muscle and is surrounded by the anterior superior iliac spine on the lateral side and the iliac crest on the medial side. It originates from the anterior surface of the lower eight ribs, inserts into the inguinal region, and is innervated by the iliohypogastric nerve. The fibres extend from the anterior superior iliac spine to the pubis. The rectus abdominis muscles are all innervated by the anterior primary division of the lumbar plexus.

Transversus abdominis

The transversus abdominis is the middle layer of the abdominal wall. It originates from the posterior surface of the rectus sheath and inserts into the internal oblique and/or the iliacus. It is innervated by the lumbar plexus.

Internal oblique

The internal oblique muscle lies deep to the external oblique. It can be seen in a sagittal plane. It originates from the posterior surface of the iliac crest and inserts into the inguinal region. It is innervated by the iliohypogastric nerve. The transversus abdominis muscle is innervated by the anterior primary division of the lumbar plexus.

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Transversus abdominis

The transversus abdominis is the deepest layer of the abdominal wall. It originates from the posterior surface of the rectus sheath and inserts into the internal oblique and/or the iliacus. It is innervated by the lumbar plexus.
Anatomy: Abdomen

Question 19 of 125

The anterior wall of the inguinal canal is formed primarily by which of the following structures:

a. External oblique aponeurosis
b. Transversalis fascia
c. Internal oblique muscle
d. External oblique muscle
e. Rectus abdominis muscle

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Question Navigator

1. Answered
2. Answered
3. Answered
4. Answered
5. Answered
6. Answered
7. Answered
8. Answered
9. Answered
10. Answered
11. Answered
12. Answered

Something wrong?
Anatomy: Abdomen

Question 20 of 125

Which of the following nerves transmits the parasympathetic supply to the stomach:

a  Greater thoracic splanchnic nerves
b  Lesser thoracic splanchnic nerves
c  Lumbar splanchnic nerves
d  Pelvic splanchnic nerves
e  Vagus nerves

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Something wrong?
Anatomy: Abdomen

Question 31 of 125

Which of the following nerves transmits the parasympathetic supply to the stomach?

- a) Greater thoracic splanchnic nerves ✗
- b) Lesser thoracic splanchnic nerves
- c) Lumbar splanchnic nerves
- d) Pelvic splanchnic nerves
- e) Vagus nerves ✓

Answer

The parasympathetic supply to the stomach is carried by the vagus nerve.

Notes

The stomach is the most dilated part of the gastrointestinal tract and has a J-like shape. The stomach lies in the epigastric, umbilical and left hypochondrial regions of the abdomen. It is an intraperitoneal organ.

Anatomical distinctions

The stomach is divided into four regions:

- the cardia which surrounds the opening of the oesophagus into the stomach
- the fundus which is the area above the level of the cardiac orifice
- the body which is the largest central region of the stomach
- the pyloric part which is divided into the pyloric antrum and the pyloric canal which opens into the duodenum

The most distal portion of the pyloric canal contains a thickened ring of gastric circular muscle, the pyloric sphincter that surrounds the distal pyloric orifice. The pyloric orifice is just to the right of the middle of the transpyloric plane. The pyloric sphincter controls the exit of chyme from the stomach into the duodenum. The sphincter is constricted by sympathetic stimulation and relaxed by parasympathetic action. Parasympathetic fibres in the vagus nerve are also secretomotor to gastric glands and motor to mucous wall of stomach.

Modified by FRCEM Success. Original by Nancy Varley Carver [Public domain], via Wikimedia Commons

Relations

The stomach lies inferior to the diaphragm.

The stomach lies posterior to:

- the anterior abdominal wall
- the left costal margin
- the left lobe of the liver

The stomach lies anterior to the stomach bed formed by:

- the diaphragm
- the pancreas
- the transverse mesocolon
- the left colic flexure
- the left kidney
- the left renal gland
- the spleen

Blood supply

The arterial supply to the stomach is derived from all three branches (left gastric, splenic and common hepatic branches) of the celiac trunk.

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Resources

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- Emergency Medical ini. Jamaica
- Wheezevax
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- Naloxone

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Anatomy: Abdomen

Question 21 of 125

A 55 year old woman presents to ED complaining of abdominal pain and profuse vomiting. Imaging shows part of the bowel is being compressed between the abdominal aorta and the superior mesenteric artery. Which part of the bowel is most likely being affected:

a. First part of the duodenum
b. Second part of the duodenum
c. Third part of the duodenum
d. Ileum
e. Jejunum

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Anatomy: Abdomen

Question 21 of 125

A 55 year old woman presents to ED complaining of abdominal pain and profuse vomiting. Imaging shows part of the bowel is being compressed between the abdominal aorta and the superior mesenteric artery. Which part of the bowel is most likely being affected:

a) First part of the duodenum  ❌
b) Second part of the duodenum  ✓
c) Third part of the duodenum  
d) Jejunum

e) Ileum

Answer

The third part of the duodenum lies anterior to the abdominal aorta but posterior to the superior mesenteric artery and constriction between these structures can occur readily.

Notes

The small intestine is the longest part of the gastrointestinal tract and extends from the pyloric orifice of the stomach to the ileocecal fold, comprising the duodenum, jejunum and ileum. The first part of the small intestine is the duodenum.

The duodenum is a C-shaped structure, adjacent to the head of the pancreas, and above the level of the umbilicus. It is retroperitoneal except for its proximal part which is connected to the liver by the hepatoduodenal ligament of the lesser omentum.

Parts of the duodenum

- The superior (first) part extends from the pyloric orifice of the stomach to the neck of the gallbladder, lies just to the right of the body of vertebra L1, and passes anterior to the inferior vena cava and superior to the head of the pancreas.
- The descending (second) part is just to the right of the midline, extending from the neck of the gallbladder to the lower border of vertebra L3 and lying lateral to the head of the pancreas. This part contains the major duodenal papilla which is the common entrance for the bile and pancreatic ducts.
- The inferior (third) part is the longest section, crossing the inferior vena cava, the aorta and the vertebral column at the level of vertebra L3 and lying inferior to the pancreas.
- The ascending (fourth) part passes upwards on, or to the left of the aorta to approximately the upper border of vertebra L2 and terminates at the duodenojejunal flexure.

Blood supply

The arterial supply of the duodenum is primarily from the pancreaticoduodenal arteries, branches of the superior mesenteric artery and the gastroduodenal artery (branch of the common hepatic artery from the celiac trunk).
Anatomy: Abdomen

Question 22 of 125

The liver is divided into the left and right lobes by which of the following structures:

- **a** Fossae for the gallbladder and inferior vena cava
- **b** Porta hepatis
- **c** Portal vein
- **d** Falciform ligament
- **e** Ligamentum teres hepatis

< Previous  Next >  See Answer

Something wrong?
Anatomy: Abdomen

Notes

Subcutaneous

Vessels

Lymphatic drainage

Rectal venous plexus

Transverse colon

Miniscus

Internal oblique

External oblique

Transversus abdominis

Ramus of iliohypogastric nerve

Transversus abdominis muscle

Ramus of ilioinguinal nerve

Rectus abdominis muscle

Costal margin

Inferior epigastric arteries

Inferior epigastric vein

Gluteus maximus muscle

1. Define the term “abdomen.”
2. Describe the layers of the abdominal wall.
3. Identify the structures that make up the anterior abdominal wall.
4. Explain the function of the diaphragm.
5. Discuss the blood supply to the abdomen.
6. Describe the innervation of the abdominal wall.

Run from the iliac crest to the xiphoid process and inferiorly to the umbilicus.

The midline is defined by the linea alba, a fibrous cord that extends from the xiphoid process to the pubic symphysis.

The rectus abdominis muscle is a powerful muscle that is situated in the anterior abdominal wall. It is responsible for flexing and rotating the trunk.

The transversus abdominis muscle is a layer of muscle located just beneath the rectus abdominis muscle. It is responsible for maintaining abdominal wall stability and posture.

The internal oblique muscle is a layer of muscle located on the anterior and lateral aspects of the abdomen. It contributes to the formation of the inguinal canal and is involved in trunk rotation.

The external oblique muscle is a layer of muscle located on the anterior aspect of the abdomen. It is involved in trunk rotation and flexion.

The subcutaneous layer is a layer of fatty tissue that lies between the skin and the deep fascia. It provides a cushioning layer for the underlying muscles and organs.
Anatomy: Abdomen

Question 23 of 125

Which of the following is NOT an anterior relation of the transverse colon:

a Stomach
b Right lobe of liver
c Fundus of gallbladder
d Greater omentum
e Lesser omentum

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**Anatomy: Abdomen**

Which of the following is NOT an anterior variation of the transverse colon:

- A) Stomach
- B) Right lobe of liver
- C) Portion of gallbladder
- D) Greater omentum
- E) Lesser omentum

**Answer**

The transverse colon is related anteriorly to the anterior abdominal wall, greater omentum, stomach, liver and gallbladder. The liver and omentum are the two structures that extend from the liver to the lesser curvature of the stomach (epiploic appendices) and form the left part of the diaphragm (transverse diaphragm).

**Notes**

The large intestines extend from the cecum and the cecum to the anus, contains the cecum, appendix, colon, rectum, and anal canal.

---

**The Large Intestine**

The colon is drained from the cecum by the right gono and as ascending colon, which passes upwards by the right flank and the right hypochondrium.

Just below the right lobe of the liver, it crosses to the left forming the right colic flexure (hepatic flexure), which separates the abdomen from the transverse colon; the hepatic flexure. The transverse colon is related superiorly to the liver, gallbladder, greater omentum of the stomach and the left border of the spleen.

At this point, just below the aorta, it forms a downward forming the left colic flexure (splenic flexure) and rectum by the descending colon passing through the left flank and to the left of the hypogastrium. The splenic flexure is higher and more posterior than the hepatic flexure, and is visible to the eighth week of fetal development by the mesentery.

The colon enters the upper part of the pelvis as the sigmoid colon, which arises above the peritoneal line between the transversus abdominis and the transversalis fascia, and to the left of the external iliac vessels. The colon is continuous with the rectum, except in its terminal and distal ends which are attached to the descending colon and rectum respectively. Between these two, it is known as the sigmoid mesocolon.

The ascending and descending segments are divided into three parts, and the transverse and sigmoid segments are divided into four parts.

**Relations**

| Ascending colon | Anteriorly: greater omentum, anterior abdominal wall | Posteriorly: ileocecal valve |
| Transverse colon | Liver, gallbladder, stomach, greater omentum, anterior abdominal wall | Second part of duodenum, head of pancreas, upper end of mesocolon, descending colon, inferior vena cava, small bowel, and spleen |
| Descending colon | Sigmoid colon, greater omentum, anterior abdominal wall | Sigmoid colon, greater omentum, left iliac fossa |

**Rounded area**

The posterior and the sigmoid arteries, as well as the inferior mesenteric arteries, are located laterally to the colon. The sigmoid arteries enter the sigmoid colon through the mesentery of the colon, the sigmoid mesocolon.

At the junction of the part of the superior and inferior mesenteric arteries, an anastomosis is formed which gives rise to the mesenteric artery, which extends to the ileum, cecum, and ascending colon.

**Intercostal**

The intercostal nerves associated with the ascending and transverse colon travel through the lower retroperitoneum, while to the T1 – T3 spinal segments, the parasympathetic fibers pass through either the aorta and hypogastric plexus, or from the descending sigmoid colon is located in the lumbar sympathetic plexus, and is referred to the region of the stomach.
Anatomy: Abdomen

Question 24 of 125

Regarding the rectus abdominis muscle, which of the following statements is INCORRECT:

a. It originates from the pubic crest, pubic tubercle and pubic symphysis.
b. It inserts onto the costal cartilages of ribs 5 – 7 and to the xiphoid process.
c. It is separated in the midline by the linea alba.
d. The free lower border of its aponeurosis forms the inguinal ligament.
e. It is intersected along its length by tendinous intersections.
Anatomy: Abdomen

Question 25 of 125

Regarding the internal oblique muscle, which of the following statements is CORRECT:

a. The lower free border of the internal oblique aponeurosis forms the inguinal ligament.
b. The internal oblique lies deep to the transversus abdominis muscle.
c. Its fibres run in a inferomedial direction.
d. It originates from the medial third of the inguinal ligament.
e. It inserts onto the lower 3 – 4 ribs and the pubic crest.
Abdomen: Anatomy

Question: (2.25)

Describe the internal oblique muscle, which of the following statements is CORRECT

A. This layer: lies in the transverse abdominal muscles.
   - It lies below an anterior direction.
   - It originates from the xiphoid process of the sternum.
   - It inserts into the iliac crest in the posterior line.

Answer: (1.75)

The internal oblique muscles lie deep to the external oblique and superficial to the transversus abdominis. They are not innervated from the anterior rami below the last thoracic vertebra but from the posterior rami of the first lumbar to the iliac crest. The internal oblique muscles arise from the posterior line of the ilium and insert in the anterior line of the ilium and form the iliopubic tract.

Notes:

There are many muscles in the abdominal wall. The flat muscles are composed of three primary muscles: the external oblique muscles, the internal oblique muscles, and the transversus abdominis muscles. The external oblique muscles are the most superficial layer of the abdominal wall and consist of three parts: the lateral part, the anterior part, and the posterior part. The posterior part of the muscle is connected to the ilium, the lowest rib, and the iliac crest.

Internal oblique

The internal oblique muscle is the deepest muscle in the abdominal wall. It is located in an anterior direction, running from the xiphoid process of the sternum to the anterior line of the ilium and forming the iliopubic tract as it ascends anteriorly. It is composed of two parts: the anterior part and the posterior part.

Transversus abdominis

The transversus abdominis is the innermost layer of the abdominal wall muscles. It is responsible for pulling the abdominal contents together and is innervated by the posterior division of the 11th and 12th thoracic nerves. It contracts simultaneously with other muscle groups to perform abdominal movements.

Rectus abdominis

The rectus abdominis is a long, flat muscle that lies above the inguinal ligament and is innervated by the anterior division of the 5th, 6th, and 7th lumbar nerves. It is involved in a variety of movements, including flexion, extension, and rotation of the trunk.

Function

The abdominal muscles work in unison to perform a variety of movements, including flexion, extension, and rotation of the trunk. They also play a role in maintaining posture and protecting the abdominal organs.

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Anatomy: Abdomen

A 36 year old male is brought into ED complaining of fever, abdominal pain and tenderness. Imaging shows that an abdominal infection has spread retroperitoneally. Which of the following structures is most likely affected:

a. Jejunum
b. Head of the pancreas
c. Transverse colon
d. First part of duodenum
e. Appendix

< Previous  Next >  See Answer  Something wrong?  Clear Exam
Anatomy: Abdomen

Question 26 of 125

A 36 year old male is brought into ED complaining of fever, abdominal pain and tenderness. Imaging shows that an abdominal infection has spread retroperitoneally. Which of the following structures is most likely affected:

a) Jejunum
b) Head of the pancreas
c) Transverse colon
d) First part of duodenum
e) Appendix

Answer

The pancreas (except for a small part of the tail) is retroperitoneal. All the other structures are intraperitoneal.

Notes

The peritoneum is a continuous double-layered serous membrane.

The parietal peritoneum lines the walls of the abdominal cavity and the visceral peritoneum lines the visera.

Between the parietal and visceral layers of peritoneum is a potential space called the parieto-visceral potential space, the peritoneal cavity.

Abdominal visera are either suspended in the peritoneal cavity by folds of peritoneum called mesenteries (intestine) or are outside the peritoneal cavity bound to the posterior abdominal wall (retroperitoneal visera). Retroperitoneal organs are only covered by peritoneum on their anterior surfaces.

Insertion

The parietal peritoneum associated with the abdominal wall is innervated by somatic afferents carried in branches of the associated spinal nerves and is therefore sensitive to pressure, pain and temperature, and gives rise to well-localised pain. The diaphragmatic peritoneum is supplied by the phrenic nerve (C3 – C5) and the remainder of the parietal peritoneum is supplied segmentally by intercostal and lumbar nerves.

The visceral peritoneum is innervated by visceral afferents that accompany autonomic nerves back to the CNS and therefore activation gives rise to referred and poorly localised sensations of discomfort and to visceral motor activity.

Retropertitoneal visera

A useful mnemonic to help remember which abdominal organs are retroperitoneal is SAD PUCKER:

- Spleen
- Aorta and inferior vena cava
- Duodenum (2nd and 3rd parts)
- Pancreas (except for the tail)
- Urinary (proximal and bladder)
- Colon (ascending and descending)
- Kidneys
- Iliac arteries
- Rectum (lower two-thirds)
Anatomy: Abdomen

Question 27 of 125

The arterial supply to the colon is derived predominantly from which of the following:

- a. Coeliac trunk
- b. Lumbar arteries
- c. Superior and inferior mesenteric arteries
- d. Renal artery
- e. Common iliac artery

< Previous Next > See Answer

Something wrong?

Question Navigator

1. Answered
2. Answered
3. Answered
4. Answered
5. Answered
6. Answered
7. Answered
8. Answered
9. Answered
10. Answered
11. Answered
12. Answered

Clear Exam
The arterial supply to the colon is derived from the superior mesenteric artery and the inferior mesenteric artery.

Note:
The large intestine extends from the distal portion of the cecum to the anus. It consists of the cecum, appendix, colon, rectum, and anal canal.
Anatomy: Abdomen

Question 28 of 125

Which of the following is not an anatomical feature that prevents against gastric reflux:

a. The diaphragmatic pinchcock effect on the oesophagus
b. Intra-abdominal pressure which maintains the oesophagus in a state of collapse when empty
c. The angle of His formed at the junction of the oesophagus and gastric fundus
d. Gastric mucosal rosette-like folds at the gastro-oesophageal junction
e. The striated lower oesophageal sphincter muscle

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Anatomy: Abdomen

Question 26 of 125

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b) Intra-abdominal pressure which maintains the oesophagus in a state of collapse when empty
c) The angle of His formed at the junction of the oesophagus and gastric fundus
d) Gastric mucosal rosette-like folds at the gastro-oesophageal junction
e) The striated lower oesophageal sphincter muscle

Answer

The lower oesophageal sphincter is a physiological sphincter, formed from a high-pressure zone of smooth muscle, located at the gastro-oesophageal junction.

Notes

The abdominal oesophagus represents the short distal part (about 2 cm) of the oesophagus located in the abdominal cavity. Emerging through the right crus of the diaphragm at the level of vertebra T10, it passes from the oesophageal hiatus to the cardiac orifice of the stomach just left of the midline at the level of vertebra T11.

The lower oesophageal sphincter is a physiological sphincter located at the gastro-oesophageal junction.

Anatomical factors that help guard against gastric reflux include:

- The diaphragmatic pinchcock effect where at the oesophageal hiatus, right crus fibres exert pressure on the oesophageal wall and serve as an extrinsic sphincter
- The lower oesophageal sphincter which is a high-pressure zone of smooth muscle in the oesophageal wall maintained in a state of tonic contraction (except during swallowing, belching or vomiting)
- Intra-abdominal pressure which maintains the oesophagus in a state of collapse when empty
- The angle of His formed at the junction of the oesophagus and the gastric fundus, which together with the postero-lateral position of the gastric fundus, minimises contact of gastric content with the gastro-oesophageal junction
- The gastric mucosal rosette-like folds formed at the gastro-oesophageal junction which compress against each other with increased intraabdominal pressure to prevent reflux

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Anatomy: Abdomen

Question 29 of 125

Which of the following structures does not make up part of the stomach bed:

- a. Pancreas
- b. Transverse mesocolon
- c. Left kidney
- d. Abdominal aorta
- e. Spleen

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Something wrong?

Question Navigator

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12. Answered

Clear Exam
Anatomy: Abdomen

Question 24 of 125

Which of the following structures does not make up part of the stomach bed?

- a) Pancreas
- b) Transverse mesocolon
- c) Left kidney
- d) Abdominal aorta
- e) Spleen

Answer

The stomach lies anterior to the stomach bed formed by the diaphragm, the pancreas, the transverse colon and mesocolon, the left colic flexure, the left kidney, the left adrenal gland and the spleen.

Notes

The stomach is the most distal part of the gastrointestinal tract and has a J-like shape. The stomach is in the epigastric, umbilical and left hypochondriac regions of the abdomen. It is an intraperitoneal organ.

Anatomical distinctions

The stomach is divided into four regions:

- the cardia which surrounds the opening of the esophagus into the stomach
- the fundus which is in the area above the level of the cardiac orifice
- the body which is the largest central region of the stomach
- the pylorus which is divided into the pyloric antrum and the pyloric canal which opens into the duodenum.

The most distal portion of the pyloric canal contains a thickened ring of gastric circular muscles, the pyloric sphincter that surrounds the distal pyloric orifice. The pyloric orifice is just to the right of the midline in the transpyloric plane. The pyloric sphincter controls the exit of chyme from the stomach into the duodenum. The sphincter is controlled by sympathetic stimulation and relaxed by parasympathetic action. Parasympathetic fibers in the vagus nerve are also secretomotor to gastric glands and mediate muscular wall of stomach.

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Relations

The stomach lies inferior to the diaphragm.

The stomach lies posterior to:

- the anterior abdominal wall
- the left colic flexure
- the left lobe of the liver

The stomach lies anterior to the stomach bed formed by:

- the diaphragm
- the pancreas
- the transverse mesocolon
- the left colic flexure
- the left kidney
- the left adrenal gland
- the spleen

Blood supply

The arterial supply to the stomach is derived from all three branches (left gastric, splenic and common hepatic branches) of the coeliac trunk.

Resources

- The Royal College of Emergency Medicine
- Visit Association for Emergency Medicine
- Advanced Trauma Life Support
- Junior Doctor Council (UK)
- UpToDate
- FastMed
- Radiopaedia
- Advanced Life Support Group
- Emergency Medicine Journal
- Ultrasound
- Instant Ectasy
- Patient.co.uk
Anatomy: Abdomen

Question 30 of 125

Which of the following best describes the location of the omental bursa:

- a) Inferior to the transverse mesocolon
- b) To the right of the oblique attachment of the mesentery
- c) Posterior to the stomach and liver
- d) Posterior to the pancreas
- e) Anterior to the stomach and liver

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Anatomy: Abdomen

Section 4.0.13

The liver is the largest abdominal organ, situated in the right upper quadrant. It is responsible for various functions such as detoxification, metabolism, and storage of nutrients. The liver is divided into right and left lobes, with the right lobe being larger and containing the gallbladder. The liver is attached to the diaphragm by the peritoneum, which allows for movement and flexibility. The liver is not purely a static organ, as it constantly undergoes regeneration and cell turnover.

Notes

Structure: Key points

- Peritoneal cavity
  - Diamond-shaped and loose space
- Omentum
  - Connected to the stomach and small intestine
- Splanchnic nerves
  - Transmit visceral sensations from the abdominal cavity
- Liver
  - Largest internal organ and part of the gastrointestinal system
- Intestines
  - Include the small intestine, large intestine, and rectum
- Transverse colon
  - Connecting the small and large intestine
- Ascending colon
  - Beginning of the large intestine

Connections and the portosystemic shunt

The portal venous system distributes blood to the intestines and liver. The portal blood enters the liver through the portal vein and is then transported to the hepatic veins, which empty into the inferior vena cava.

Questions/Navigation

1. Identify the function of the liver.
2. Describe the location of the liver within the abdominal cavity.
3. What is the significance of the portosystemic shunt?
4. How does the liver contribute to detoxification and metabolism?
Anatomy: Abdomen

Question 31 of 125

A 35 year old male is brought to ED with a knife wound. Imaging shows damage to the superior mesenteric artery. Which of the following structures would most likely be affected by this injury:

a. Ascending and descending colon
b. Ascending and transverse colon
c. Transverse and descending colon
d. Descending and sigmoid colon
e. Transverse and sigmoid colon

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Question Navigator

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11 Answered
12 Answered
Anatomy: Abdomen

A 35-year-old male is brought to the ED with a self-inflicted stab wound to the posterior superior iliac spine. Which of the following structures would most likely be affected by this injury?

- A. Transversus abdominis muscle
- B. Sartorius muscle
- C. Saphenous nerve
- D. Obturator nerve

Answer

The superior mesenteric artery supplies the midgut structures including the cecum, appendix, ascending colon, and the mid-portion of the transverse colon. The descending colon is supplied by the inferior mesenteric artery. The descending colon is usually supplied by the inferior mesenteric artery.

Notes

The large intestine extends from the pelvic inlet to the ileocecum, comprises the cecum, appendix, ascending colon, transverse colon, descending colon, and sigmoid colon.

The Large Intestine


Relations

- Colon: Anterior relations
  - Posterior relations
- Rectum: Anterior relations
  - Posterior relations
- Sigmoid colon: Anterior relations
  - Posterior relations

Blood supply

The arterial supply to the colon is derived from the superior mesenteric artery (sensu lato), comprising the midgut, sigmoid colon, and the inferior mesenteric artery (sensu stricto). The terminal vessels of the superior mesenteric artery approach the cecum and they are joined by the inferior mesenteric artery near the rectosigmoid junction. The variations in the anatomy of the colon are common and are related to the length of the colon.

Immunization

The terminal ileum is derived from the caecum and the mesenteric vessels that arise from the ileocolic, right colic, right mesenteric, and ileojejunal arteries. It is known as the "T12" terminal ileum.

To further elucidate the immunization status, the patient is referred to the pediatric endocrine and endocrine pediatrician.
Anatomy: Abdomen

The rectus sheath is formed by which of the following:

- [ ] a. the thoracolumbar fascia
- [ ] b. the aponeuroses of the external and internal oblique
- [ ] c. the aponeuroses of the external oblique, internal oblique and transversus abdominis
- [ ] d. the transversalis fascia
- [ ] e. the tendinous intersections of the rectus abdominis

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Question Navigator

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12. Answered

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Resources

- The Royal College of Emergency Medicine
- Irish Association for Emergency Medicine
- Advanced Trauma Life Support
- Resuscitation Council (UK)
- TeachMeAnatomy
- Trauma.org
- Radiopaedia

- Advanced Life Support Group
- Emergency Medicine Journal
- Lifethefastlane
- Instant Anatomy
- Patient.co.uk

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Anatomy: Abdomen

Question 32 of 125

The rectus sheath is formed by which of the following:

a) the thoracolumbar fascia  
   
   b) the aponeuroses of the external and internal oblique  
   
   c) the aponeuroses of the external oblique, internal oblique and transversus abdominis  
   
   d) the transversalis fascia  
   
   e) the tendinous intersections of the rectus abdominis

Answer

Notes

The rectus sheath is formed by the aponeuroses of the three flat anterior abdominal wall muscles.

The anterior wall of the sheath is formed by the aponeurosis of the external oblique and half of the aponeurosis of the internal oblique (which splits at the lateral margin of the rectus abdominis). The posterior wall of the sheath is formed by the other half of the aponeurosis of the internal oblique and by the aponeuroses of the transversus abdominis.

The rectus sheath completely encloses the upper three-quarters of the rectus abdominis and covers the anterior surface of the lower one-quarter of the muscle; at this point, the anterior wall is formed by the aponeuroses of all three muscles, there is no posterior wall to the rectus sheath and the rectus abdominis is in direct contact with the transversalis fascia; marking this point of transition is the arcuate line.

The rectus sheath also encloses the pyramidalis muscle, the intercostal nerves of T7 – T12 and the superior and inferior epigastric arteries.
Anatomy: Abdomen

The termination of the abdominal aorta can be visualised on the anterior abdominal wall by a point:

a. About 2.5 cm above the umbilicus
b. About 2.5 cm below the umbilicus
c. Halfway between the xiphisternum and the umbilicus
d. Halfway between the umbilicus and the pubic symphysis
e. About 2.5 cm above the deep inguinal ring
Anatomy: Abdomen

Question 35 of 123

The termination of the abdominal aorta can be visualised on the anterior abdominal wall by a point:

- a) About 2.5 cm above the umbilicus
- b) About 2.5 cm below the umbilicus
- c) Halfway between the xiphisternum and the umbilicus
- d) Halfway between the umbilicus and the pubic symphysis
- e) About 2.5 cm above the deep inguinal ring

Answer

The main terminal branches of the abdominal aorta are the two common iliac arteries. This bifurcation can be visualised on the anterior abdominal wall as a point approximately 2.5 cm below the umbilicus.

Notes

The abdominal aorta begins at the aortic hiatus of the diaphragm, anterior to the lesser border of vertebra T12. It descends through the abdomen, anterior to the vertebral bodies, and by the time it ends at the level of vertebra L4 it is slightly to the left of the midline. The main terminal branches of the abdominal aorta are the two common iliac arteries. This bifurcation can be visualised on the anterior abdominal wall as a point approximately 2.5 cm below the umbilicus.

The abdominal aorta gives rise to:

- three anterior unpaired visceral branches
  - the coeliac trunk supplying the abdominal foregut (upper border of L1 vertebra)
  - the superior mesenteric artery supplying the abdominal midgut (lower border of L1 vertebra)
  - the inferior mesenteric artery supplying the abdominal hindgut (L3 vertebra)
- three lateral paired visceral branches
  - the middle suprarenal arteries
  - the renal arteries (L2 vertebra)
  - the gonadal arteries
- posterior parietal branches
  - the inferior phrenic arteries (paired)
  - the lumbar arteries (paired)
  - the median sacral artery (single)
- two terminal branches
  - left common iliac artery
  - right common iliac artery
Anatomy: Abdomen

The deep inguinal ring is an ‘opening’ in which of the following structures:

a. External oblique aponeurosis  
b. Internal oblique aponeurosis  
c. Transversus abdominis aponeurosis  
d. Rectus abdominis aponeurosis  
e. Transversalis fascia
Anatomy: Abdomen

The deep inguinal ring is an opening in the floor of the inguinal canals.

Notes:
- Transversus abdominis
- Rectus abdominis
- External oblique
- Internal oblique
- Psoas major
- Tensor fascia latae
- Medial rectus
- Lateral rectus
- Superior rectus
- Inferior rectus
- Abductor
- Adductor
- Quadriceps
- Hamstring
- Biceps femoris
- Rectus femoris
- Sartorius
- Sphencter
- Rectus abdominis
- Transversus abdominis
- Internal oblique
- External oblique
- Psoas major
- Tensor fascia latae

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Anatomy: Abdomen

Which of the following parts of the pancreas is intraperitoneal:

a. Head
b. Neck
c. Body
d. Uncinate process
e. Tail

< Previous  Next >  See Answer  Something wrong?
Anatomy: Abdomen

Which of the following parts of the pancreas is intersegmental?

1. Head
2. Neck
3. Body
4. Uncinate process
5. Tail

Answer:

The pancreas is an intersegmental organ (except for a small part of the tail, which is between branches of the celiac artery).

Notes:

The pancreas lies posterior to the stomach. It extends across the posterior abdominal wall from the duodenum to the spleen. It lies in the upper abdomen. The head of the pancreas is located in the upper abdomen, adjacent to the stomach. The neck is where the pancreatic duct enters the duodenal wall. The body of the pancreas lies anterior to the stomach. The tail of the pancreas is located posterior to the stomach. The pancreas is a large, glandular organ that produces digestive enzymes and hormones.

Questions:

1. Answered
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12. Answered

Blood supply:

The blood supply to the pancreas is primarily derived from the splenic artery and the inferior mesenteric artery. The splenic artery supplies the head and the neck of the pancreas, while the inferior mesenteric artery supplies the body and the tail of the pancreas.

Blood vessels:

The arterial supply to the pancreas is primarily derived from the spleenic artery and the inferior mesenteric artery, which supplies the head and the neck of the pancreas, while the inferior mesenteric artery supplies the body and the tail of the pancreas.

Lymphatics:

Lymphatics draining the pancreas emerge from the superior mesenteric lymph nodes and the peripancreatic lymph nodes, which lie in the lesser sac and the pancreaticoduodenal and mesenteric lymph nodes.

Innervation:

Innervation of the pancreas arises from the celiac plexus and the autonomic nerves. The autonomic nerves supply the parasympathetic and sympathetic components of the autonomic nervous system to the pancreas.

Resources:

- The Royal College of Emergency Medicine
- The University of Cambridge
- The University of Oxford
- The Lancet
- British Medical Journal
- Elsevier
- Springer
- BMJ
- JAMA
- The Lancet
- BMJ
- Nature
- New England Journal of Medicine

We are committed to maintaining a community of healthcare professionals who are passionate about learning and sharing knowledge. Together, we are making a difference in the world of medicine.
Anatomy: Abdomen

A 49 year old man presents to ED with a few months history of abdominal pain, weight loss and jaundice. Imaging shows a tumour in the uncinate process of the pancreas. Which of the following structures is most likely compressed by this tumour:

a. Cystic duct  
b. Main pancreatic duct  
c. Superior mesenteric artery  
d. Portal vein  
e. Splenic artery

< Previous  Next >  See Answer  Something wrong?  Clear Exam
Anatomy: Abdomen

64-year-old man presents to ED with a few months history of abdominal pain and jaundice. Imaging shows a cholangiogram in the lateral process of the pancreas. Which of the following structures is most likely compressed by this tumour?

a) Celiac axis
b) Hepatic portal vein
c) Superior mesenteric artery
d) Pancreas

er) Splanic artery

Answer

This cranial process of the pancreas is a projection of the lower part of the head to the left behind the superior mesenteric vessels.

Notes

The pancreas lies mostly anterior to the stomach. It extends across the posterior abdominal wall from the duodenum on the right, to the spleen on the left. It lies in the suprarenal region and left hypochondrium. The pancreas is a tubular organ because of a set of ducts for the gall and a series of a head, uncinate process, neck, body, and tail.

Relatives

- The head of the pancreas lies within the C-shaped concavity of the duodenum. The head is related anteriorly to the first part of the duodenum, the transverse colon and coils of jejunum and posteriorly to the common bile duct and the inferior vena cava and the renal vessels of the adrenal glands.
- The uncinate process projects from the lower part of the head and is related posteriorly to the superior mesenteric vessels.
- The neck is anterior to the superior mesenteric vessels. Posterior to the neck of the pancreas, the superior mesenteric vessels and splenic vein form the portal vein.
- The spleen is situated inferior and anterior to the neck. The tail of the pancreas, the uncinate process, and the splenic vessels lie in the retroperitoneal plane at the level of the transverse colon. It is surrounded by the stomach and the transverse colon, superior mesenteric vessels, and inferior mesenteric vessels.
- The splenic artery lies in the left upper quadrant of the abdomen. It is related to the left kidney posteriorly, the left edge of the stomach, the left renal artery anteriorly, and the transverse colon inferiorly. The spleen is anterior to the stomach.

Blood supply

The arterial supply to the pancreas is mainly from the splenic artery from the superior mesenteric arteries, the gastroduodenal artery from the superior mesenteric artery, and from the inferior mesenteric artery. The venous drainage is through the splenic vein into the portal venous system.

Lymphatic drainage

The lymphatic drainage of the pancreas is mainly to the celiac lymph nodes and to the splenic node, which flow into the abdominal nodes.

Innervation

Vascular arterial fibers travel in the greater and lesser splanchnic nerves. The segmental level of innervation is T10–L2. This typically is the level of the aorta due to irritation of the parietal peritoneum covering the pancreas.

Resources

- The Royal College of Emergency Medicine
- The Association for Emergency Medicine
- Medical Times (e-Journal)
- Royal Society of Medicine
- The Royal College of Surgeons
- The Royal College of Radiologists
- The Royal College of Pathologists

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Anatomy: Abdomen

The deep inguinal ring is located at which of the following sites:

a. Immediately superficial to the femoral artery
b. Superior to a point midway between the iliac crest and the pubic symphysis
c. Inferior to a point midway between the anterior superior iliac spine and the pubic tubercle
d. Just superior to the pubic tubercle
e. Superior to the mid-inguinal point
Anatomy: Abdomen

Question 9: Which of the following best describes the process of ligamentous formation?
A. The process of ligamentous formation is a complex process involving the interplay of various tissues and cells.
B. The process of ligamentous formation is a simple process involving the interplay of various tissues and cells.
C. The process of ligamentous formation is a process that occurs naturally without any intervention.
D. The process of ligamentous formation is a process that occurs artificially without any intervention.

Answer: A. The process of ligamentous formation is a complex process involving the interplay of various tissues and cells.

Notes:

- The process of ligamentous formation is a complex process involving the interplay of various tissues and cells.
- The formation of ligaments is crucial for the support and stability of the abdominal cavity.
- Understanding the process of ligamentous formation is essential for comprehending the structural integrity of the abdominal cavity.

Keywords:

- Ligamentous formation
- Abdominal cavity
- Structural integrity

References:

Anatomy: Abdomen

Question 38 of 125

The pancreas occupies which of the following abdominal regions:

a. Left hypochondrium and left flank
b. Left hypochondrium
c. Right hypochondrium and epigastrium
d. Left hypochondrium and epigastrium
e. Epigastrium and umbilicus

< Previous  Next >  See Answer  Something wrong?
Anatomy: Abdomen

The pancreas occupies which of the following abdominal regions:

- Left hypochondrium and left flank ✓
- Left hypochondrium
- Right hypochondrium and upper quadrant
- Subdiaphragm and ambulation

Answer

The pancreas lies mostly posterior to the stomach. It extends across the posterior abdominal wall from the duodenum on the right, to the spleen on the left. It can be recognised in region left hypochondrium.

Notes

The pancreas lies mostly posterior to the stomach. It extends across the posterior abdominal wall from the duodenum on the right, to the spleen on the left. It can be recognised in region left hypochondrium.

The pancreas is a retroperitoneal organ except for a small part of its bulk and consists of a head, uncinate process, neck, body, and tail.

Relationships

- The head of the pancreas lies within the C-shaped curvature of the duodenum. The head is rotated anteriorly to lie in the first part of the duodenum, the transverse colon, and the duodenum and posteriorly to the common bile duct and the inferior vena cava, and the formation of the portal vein.
- The portal vein passes through the lower part of the head and passes posteriorly to the superior mesenteric vein.
- The neck is anterior to the superior mesenteric vessels.
- Posterior to the neck of the pancreas, the superior mesenteric vein and splenic vein run side by side towards the duo.
- The body is elongated and extends from the neck to the tail of the pancreas in the transverse portion along the level of the aorta. A few branches (3) to 4) of branches of the gastroduodenal artery are distributed to the wall of the stomach and to the left of the superior mesenteric vessels.
- The body is suprapyloric, contains layers of the pancreas and is directly in the left lower quadrant; the left colic flexure is inferiorly and the transverse colon anteriorly.

The pancreatic duct begins in the tail of the pancreas and passes to the right, through the body, to the head for the head of the pancreas, and finally to the duct forming the hepatopancreatic ampulla (pancreato-jejunal) which opens into the second part of the duodenum at the major duodenal papilla. The accessory pancreatic duct empties into the duodenum just above the major duodenal papilla of the minor duodenal papilla.

Blood supply

The blood supply to the pancreas is partially derived from the superior mesenteric artery from the celiac trunk. The right and left anterior and posterior trunks, the superior mesenteric artery, and the splenic artery. A small branch from the splenic artery enters the fundus of the stomach. Venous drainage is to the superior mesenteric vein and portal vein. Venous drainage is to the head and body of the pancreas via the superior mesenteric vein and the portal vein. Lymphatic drainage is via the coeliac plexus to the inferior mesenteric nodes and the paraaortic lymph nodes. Lymphatic drainage is via the coeliac plexus to the inferior mesenteric nodes and the paraaortic lymph nodes.

Innervation

Visceral afferent trunks travel in the greater and lesser splanchnic nerves. The segmental level of irritation is T1 - T5. The vagus nerve relays in the nuclei of the intermediolateral column and relays to the spinal cord.
Anatomy: Abdomen

A 49 year old known alcoholic presents to ED complaining of acute severe epigastric pain. X-ray shows pneumoperitoneum and further imaging demonstrates a perforating peptic ulcer in the posterior wall of the stomach. Where would peritonitis most likely develop initially:

- a Greater sac
- b Supracolic compartment
- c Omental bursa
- d Infracolic compartment
- e Hepatorenal space

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Question Navigator

1 Answered
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7 Answered
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9 Answered
10 Answered
11 Answered
12 Answered

Clear Exam
Anatomy: Abdomen

Which of the following lies immediately medial to the second part of the duodenum:

a  Transverse colon
b  Spleen
c  Right kidney
d  Head of the pancreas
e  Stomach

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Anatomy: Abdomen

Question 4/1 of 129

Which of the following lies immediately medial to the second part of the duodenum:

a) Transverse colon ✗

b) Splenic

c) Right kidney ✔

d) Head of the pancreas

e) Stomach

Answer

The descending (second) part is just to the right of the midline, extending from the neck of the gallbladder to the lower border of vertebra L3 and lying lateral to the head of the pancreas. This part contains the major duodenal papilla which is the common entrance for the bile and pancreatic ducts.

Notes

The small intestine is the largest part of the gastrointestinal tract and extends from the pyloric orifice of the stomach to the ileocecal fold, comprising the duodenum, jejunum and ileum. The first part of the small intestine is the duodenum.

The duodenum is a C-shaped structure, adjacent to the head of the pancreas, and above the level of the umbilicus. It is retroperitoneal except for its proximal part which is connected to the liver by the hepatoduodenal ligament of the lesser omentum.

Parts of the duodenum

• The superior (first) part extends from the pyloric orifice of the stomach to the neck of the gallbladder, lies just to the right of the body of vertebra L1, and passes anterior to the inferior vena cava superior to the head of the pancreas.

• The descending (second) part is just to the right of the midline, extending from the neck of the gallbladder to the lower border of vertebra L3 and lying lateral to the head of the pancreas. This part contains the major duodenal papilla which is the common entrance for the bile and pancreatic ducts.

• The inferior (third) part is the longest section, crossing the inferior vena cava, the aorta and the vertebral column at the level of vertebra L3 and lying inferior to the pancreas.

• The ascending (fourth) part passes upwards on, or to the left of the aorta to approximately the upper border of vertebra L2 and terminates at the duodenopancreatic flexure.

Blood supply

The arterial supply of the duodenum is primarily from the pancreaticoduodenal arteries, branches of the superior mesenteric artery and the gastroduodenal artery (branch of the common hepatic artery from the coeliac trunk).
Anatomy: Abdomen

Question 41 of 125

The gallbladder is located on which of the following aspects of the liver:

- a Right lobe
- b Left lobe
- c Quadrate lobe
- d Caudate lobe
- e Diaphragmatic surface

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Question Navigator

1 Answered
2 Answered
3 Answered
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5 Answered
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7 Answered
8 Answered
9 Answered
10 Answered
11 Answered
12 Answered

Clear Exam
Anatomy: Abdomen

The gallbladder is located on which of the following aspects of the liver:

- Right lobe
- Left lobe
- Quadrate lobe
- Caudate lobe
- Diaphragmatic surface

Answer

The gallbladder is a pear-shaped sac lying on the visceral surface of the right lobe of the liver in a fossa between the right and quadrate lobes.

Notes

The gallbladder is a pear-shaped sac lying on the visceral surface of the right lobe of the liver in a fossa between the right and quadrate lobes. It is an intraparenchymal structure and lies in the right hypochondrium. It is located at the junction of the right ninth costal cartilage and the lateral border of the rectus abdominis muscle which is the site of maximal tenderness in the acute inflammation of the gallbladder.

Structure

It has:

- a rounded end, the fundus, which may project from the inferior border of the liver
- a major part in the fossa, the body, which may lie against the transverse colon and the superior part of the duodenum
- a narrow part, the neck, which tapers to become continuous with the cystic duct.

The neck contains a mucosal fold, known as Hartmann’s pouch, which is a common site for gallstones to become lodged.

Relations

The gallbladder lies:

- posterior and inferior to the liver
- posterior to the anterior abdominal wall
- anterior to the transverse colon and the proximal duodenum
- superior to the biliary tree and the duodenum.

Innervation

Inflammation of the gallbladder may present with pain in the right upper quadrant and also the right shoulder, this is due to irritation of the diaphragmatic visceral peritoneum innervated by the phrenic nerve (C3 – C5) that also innervates skin over the shoulder.
Anatomy: Abdomen
Question 42 of 125

The sigmoid colon extends as low as which of the following vertebral levels:

a. L4
b. L5
c. S1
d. S2
e. S3

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Something wrong?

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- Resuscitation Council (UK)
- TeachMeAnatomy
- Trauma.org
- Radiopaedia

Advanced Life Support Group
- Emergency Medicine Journal
- Lifeinthefastlane
- Instant Anatomy
- Patient.co.uk

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Anatomy: Abdomen

The sigmoid colon extends as low as which of the following vertebral levels:

- L 1
- L 5
- S 1
- S 5

Answer

The small intestine extends from the distal end of the liver to the area, and comprises the cecum, appendix, colon, rectum and anal canal.

Notes

The large intestine extends from the distal end of the liver to the anus, and comprises the cecum, appendix, colon, rectum and anal canal.

The Large Intestine


Relations

<table>
<thead>
<tr>
<th>Ilium</th>
<th>Anterior peritoneum</th>
<th>Posterior peritoneum</th>
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<tbody>
<tr>
<td></td>
<td>Ascending colon</td>
<td>Transverse colon</td>
</tr>
<tr>
<td></td>
<td>Descending colon</td>
<td>Rectum</td>
</tr>
</tbody>
</table>

Blood supply

- The inferior mesenteric artery descends from the aorta posterior to the pancreas, and reaches the left side of the abdominal cavity. It gives rise to two branches, the superior mesenteric artery and the inferior mesenteric artery, which supply the small intestine and the sigmoid colon, respectively.
- The superior mesenteric artery supplies the small intestine and the cecum, appendix, and right side of the colon.
- The inferior mesenteric artery supplies the left colon, the sigmoid colon, and the rectum.
- The mesenteric vessels of the superior mesenteric artery and the inferior mesenteric artery approach the colon in the mesentery, and the inferior mesenteric artery supplies the sigmoid colon and the rectum.
Anatomy: Abdomen

A 65 year old man presents to ED complaining of abdominal pain and weight loss. Imaging shows a tumour anterior to the inferior vena cava, Which of the following structures is most likely to be compressed by this tumour:

a. Cisterna chyli  
b. Third part of the duodenum  
c. Right kidney  
d. Ascending colon  
e. Right sympathetic trunk

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Anatomy: Abdomen

Question 4 of 125

A 65 year old man presents to ED complaining of abdominal pain and weight loss. Imaging shows a tumour anterior to the inferior vena cava. Which of the following structures is most likely to be compressed by this tumour:

a) Cisterna chyli
b) Third part of the duodenum

c) Right kidney
d) Ascending colon
e) Right sympathetic trunk

Answer

The third part of the duodenum crosses anterior to the inferior vena cava. The other structures do not cross the IVC anteriorly.

Notes

The small intestine is the longest part of the gastrointestinal tract and extends from the pyloric orifice of the stomach to the ileocecal fold, comprising the duodenum, jejunum and ileum. The first part of the small intestine is the duodenum.

The duodenum is a C-shaped structure, adjacent to the head of the pancreas, and above the level of the umbilicus. It is retroperitoneal except for its proximal part which is connected to the liver by the hepatoduodenal ligament of the lesser omentum.

Parts of the duodenum

• The superior (first) part extends from the pyloric orifice of the stomach to the neck of the gallbladder, lies just to the right of the body of vertebra L1, and passes anterior to the inferior vena cava and superior to the head of the pancreas.
• The descending (second) part is just to the right of the midline, extending from the neck of the gallbladder to the lower border of vertebra L3 and lying lateral to the head of the pancreas. This part contains the major duodenal papilla which is the common entrance for the bile and pancreatic ducts.
• The inferior (third) part is the longest section, crossing the inferior vena cava, the aorta and the vertebral column at the level of vertebra L3 and lying inferior to the pancreas.
• The ascending (fourth) part passes upwards, or to the left of the aorta to approximately the upper border of vertebra L2 and terminates at the duodenocolic flexure.

Blood supply

The arterial supply of the duodenum is primarily from the pancreaticoduodenal arteries, branches of the superior mesenteric artery and the gastroduodenal artery (branch of the common hepatic artery from the coeliac trunk).

Resources

- http://www.rcem.org.uk
- http://www.emergencymedicine.org
- https://www.traumalife.uk
- http://www.advancemede.com
- http://www.resusguidelines.com
- http://www.traumaalphabetic.com
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Anatomy: Abdomen

Which of the following structures is NOT retroperitoneal:

a. Rectum
b. Inferior vena cava
c. Ureters
d. Tail of pancreas
e. Kidneys
Anatomy: Abdomen

Question 41 of 123

Which of the following structures is NOT retroperitoneal:

- a) Rectum
- b) Inferior vena cava
- c) Ureter
- d) Tail of pancreas
- e) Kidneys

Answer

The tail of the pancreas is intra-peritoneal.

Notes

The peritoneum is a continuous double-layered serous membrane.

The parietal peritoneum lines the walls of the abdominal cavity and the visceral peritoneum lines the viscera.

Between the parietal and visceral layers of peritoneum is a potential space, the peritoneal cavity.

Abdominal viscera are either suspended in the peritoneal cavity by folds of peritoneum called mesentery (intraperitoneal viscera) or are outside the peritoneal cavity (fixed to the posterior abdominal wall (retroperitoneal viscera). Retroperitoneal organs are only covered in peritoneum on their anterior surface.

Innervation

The parietal peritoneum associated with the abdominal wall is innervated by somatic afferents carried in branches of the associated spinal nerves and therefore sensitive to pressure, pain and temperature, and gives rise to well-localized pain. The diaphragmatic peritoneum is supplied by the phrenic nerve (C3 - C5) and the remainder of the parietal peritoneum is supplied segmentally by intercostal and lumbar nerves.

The visceral peritoneum is innervated by visceral afferents that accompany autonomic nerves back to the CNS and therefore activation gives rise to referred and poorly localised sensations of discomfort and to visceral motor activity.

Retroperitoneal viscera

A useful mnemonic to help remember which abdominal organs are retroperitoneal is SAD PUCKER:

- Suprarenal glands
- Aorta and Inferior vena cava
- Duodenum (2nd and 3rd parts)
- Pancreas (except for the tail)
- Ureters (proximal) and Bladder
- Colon (ascending and descending)
- Kidneys
- Oesophagus
- Rectum (lower two-thirds)
Anatomy: Abdomen

The gallbladder occupies which of the following regions of the abdomen:

- a. Left hypochondrion
- b. Right hypochondrion
- c. Right hypochondrion and right flank
- d. Right hypochondrion and epigastric region
- e. Epigastric region and umbilicus
Anatomy: Abdomen

The gallbladder occupies which of the following regions of the abdomen:

- a. Left hypochondrium
- b. Right hypochondrium
- c. Right hypochondrium and right flank
- d. Right hypochondrium and epigastric region
- e. Epigastric region and umbilicus

Answer

The gallbladder lies in the right hypochondrium.

Notes

The gallbladder is a pear-shaped sac lying on the visceral surface of the right lobe of the liver in a fossa between the right and quadratus lobes. It is an intraperitoneal structure and lies in the right hypochondrium. It is located at the junction of the right nith patal carassig and the lateral border of the rectus abdominis muscle which is the site of maximal tenderness in the acute inflammation of the gallbladder.

Structure

- a rounded end, the fundus, which may project from the inferior border of the liver
- a major part in the fossa, the body, which may lie against the transverse colon and the superior part of the duodenum
- a narrow part, the neck, which tapers to become continuous with the cystic duct. The neck contains a mucosal fold, known as Hartmann’s pouch, which is a common site for gallstones to become lodged.

Relations

The gallbladder lies:

- posterior and inferior to the liver
- posterior to the anterior abdominal wall
- anterior to the transverse colon and the proximal duodenum
- superior to the biliary tree and the duodenum.

Innervation

Inflammation of the gallbladder may present with pain in the right upper quadrant and also the right shoulder; this is due to irritation of the diaphragmatic visceral portencium innervated by the phrenic nerve (C3 – C5) that also innervate skin over the shoulder.
Anatomy: Abdomen
Question 46 of 125

A 79 year old patient, with a history of AF, presents to ED complaining of sudden onset severe abdominal pain. Imaging shows occlusion of the superior mesenteric artery. Which of the following structures is most likely affected:

a. Stomach
b. First part of the duodenum
c. Jejunum and ileum
d. Splenic flexure
e. Rectum
Anatomy: Abdomen

Question 46 of 129

A 79 year old patient, with a history of AF, presents to ED complaining of sudden onset severe abdominal pain. Imaging shows occlusion of the superior mesenteric artery. Which of the following structures is most likely affected?

a) Stomach  

b) First part of the duodenum  

c) Jejunum and ileum  

d) Splenic flexure 

e) Rectum

Answer

The superior mesenteric artery supplies midgut structures including the duodenum (after the major duodenal papilla), the second part of the duodenum, the jejunum, the cecum, appendix, the ascending colon and the proximal two-thirds of the transverse colon. Occlusion of the superior mesenteric artery restricts blood flow to these structures resulting in intestinal ischemia.

Notes

The small intestine is the longest part of the gastrointestinal tract and extends from the pyloric orifice of the stomach to the ileocecal fold, comprising the duodenum, jejunum and ileum. The jejunum and ileum make up the last two sections of the small intestine. The jejunum and ileum are intraperitoneal, attached to the posterior abdominal wall by the mesentry.

Jejunum

The jejunum represents the proximal two-fifths. It is mostly in the left upper quadrant of the abdomen and is longer in diameter and has a thicker wall than the ileum.

Ileum

The ileum makes up the distal three-fifths and is mostly in the right lower quadrant. The ileum invaginates into the large intestine at the ileocecal junction forming the ileocecal valve, which prevents reflux from the caecum to the ileum and regulates the passage of contents from the ileum to the caecum.

Blood supply

The arterial supply to the jejunum and ileum is derived from the superior mesenteric artery.

Innervation

The sympathetic nerve supply is derived from the T9- T10 spinal cord segments. Pain from the small intestine and ileum is referred to the peri umbilical region.

Michels diverticulum

A Michels diverticulum is the remnant of the proximal part of the vitelline (intestinal duct) that extends into the umbilical cord in the embryo and lies on the antimesenteric border of the ileum, approximately 2 feet proximal to the ileocaecal junction. It appears as an ovoid, blind terminal outpouching of bowel, about 2 inches long, occurring in about 2% of the population, and may contain two types of ectopic tissue (epithelial and parietal). Complications include haemorrhage, intussusception, diverticulitis, ulceration and obstruction, and symptoms may mimic those of acute appendicitis.
Anatomy: Abdomen

Question 47 of 125

A 24 year old man presents to ED complaining of severe sharp abdominal pain in his right iliac fossa. Which of the following most accurately describes the mechanism of the distribution of pain in this patient:

a. Contact of inflamed appendix with visceral peritoneum stimulates visceral afferents
b. Contact of inflamed appendix with visceral peritoneum stimulates somatic afferents
c. The appendix is a midgut structure hence pain is referred to the T10 and T11 dermatomes
d. Visceral afferents from the appendix travel with sympathetic nerves to the same spinal cord levels
e. Contact of inflamed appendix with parietal peritoneum stimulates somatic afferents
Anatomy: Abdomen

Question 47 of 85

A 24 year old man presents to ED complaining of severe sharp abdominal pain in his right iliac fossa. Which of the following most accurately describes the mechanism of the generation of pain in this patient?

- Contact of inflamed appendix with visceral peritoneum stimulates visceral afferents
- Contact of inflamed appendix with parietal peritoneum stimulates somatic afferents
- The appendix is an outpouching of the large intestine
- The appendix is a blind pouch
- Contact of inflamed appendix with parietal peritoneum stimulates visceral afferents

Answer

Visceral afferents from the appendix, stimulated by the inflamed appendix, travel with the sympathetic nervous system to spinal cord (level T10), therefore the patient will initially experience a visceral pain at the umbilicus. Irritation of the parietal peritoneum stimulates somatic afferents that innervate the body wall resulting in a sharp, localized pain in the RIF.

Notes

The peritoneum is a continuous double-layered serous membrane.

The parietal peritoneum lines the walls of the abdominal cavity and the visceral peritoneum lines the organs.

Between the parietal and visceral layers of peritoneum is a potential space, the peritoneal cavity.

Abdominal viscera are either suspended in the peritoneal cavity by folds of peritoneum called mesentery (mesentericom) or are outside the peritoneal cavity (located in the posterior abdominal wall (intraperitoneal viscera). Retroperitoneal organs are only covered in peritoneum on their posterior surface.

Innervation

The parietal peritoneum associated with the abdominal wall is innervated by somatic afferents carried in branches of the associated spinal nerves and is therefore sensitive to pressure, pain and temperature, and gives rise to well-localized pain. The diaphragmatic peritoneum is supplied by the phrenic nerves (C3 - C5) and the remainder of the parietal peritoneum is supplied segmentally by intercostal and lumbar nerves.

The visceral peritoneum is innervated by visceral afferents that accompany autonomic nerves back to the CNS and therefore activation gives rise to referred and poorly localized sensations of discomfort and to visceral motor activity.

![Peritoneum and Organs](https://openclipart.org/image/300px/svg_to_png/55509/Human-Spleen-Artwork-01.png)

Retroperitoneal viscera

A useful mnemonic to help remember which abdominal organs are retroperitoneal is SAD PUCKER:

- Spleen
- Adrenal glands
- Pancreas
- Urinary Bladder
- Kidneys
- PSU (proximal and distal)
- Ureter (ascending and descending)
- Common iliac arteries
- Renal (lower two-thirds)

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Anatomy: Abdomen

The inferior vena cava lies posterior to which of the following parts of the duodenum:

- a. Second part
- b. Third and fourth parts
- c. First and third parts
- d. First and second parts
- e. Second and third parts

See Answer
Anatomy: Abdomen

Question 1 of 125

The inferior vena cava lies posterior to which of the following parts of the duodenum:

a) Second part ✗
b) Third and fourth parts ✓
c) First and third parts ✓
d) First and second parts

e) Second and third parts

Answer

The superior (first) part extends from the pyloric orifice of the stomach to the neck of the gallbladder, lies just to the right of the body of vertebra L1, and passes anterior to the inferior vena cava and superior to the head of the pancreas. The inferior (third) part is the longest section, crossing the inferior vena cava, the aorta and the vertebral column at the level of vertebrae L3 and lying inferior to the pancreas.

Notes

The small intestine is the longest part of the gastrointestinal tract and extends from the pyloric orifice of the stomach to the Treitz’s fold, comprising the duodenum, jejunum and ileum. The first part of the small intestine is the duodenum.

The duodenum is a C-shaped structure, adjacent to the head of the pancreas, and above the level of the umbilicus. It is retroperitoneal except for its proximal part which is connected to the liver by the hepatoduodenal ligament of the lesser omentum.

Parts of the duodenum

- The superior (first) part extends from the pyloric orifice of the stomach to the neck of the gallbladder, lies just to the right of the body of vertebra L1, and passes anterior to the inferior vena cava and superior to the head of the pancreas.
- The descending (second) part is just to the right of the midpoint, extending from the neck of the gallbladder to the lower border of vertebra L3 and lying lateral to the head of the pancreas. This part contains the major duodenal papilla which is the common entrance for the bile and pancreatic ducts.
- The inferior (third) part is the longest section, crossing the inferior vena cava, the aorta and the vertebral column at the level of vertebrae L3 and lying inferior to the pancreas.
- The ascending (fourth) part passes upwards on, or to the left of the aorta to approximately the upper border of vertebra L2 and terminates at the duodenojejunal flexure.

Blood supply

The arterial supply of the duodenum is primarily from the pancreaticoduodenal arteries, branches of the superior mesenteric artery and the gastroduodenal artery (branch of the common hepatic artery from the coeliac trunk).
Anatomy: Abdomen

Question 49 of 125

A 54 year old man presents to ED complaining of abdominal pain radiating to his back. Imaging shows a tumour at the neck of the pancreas. Which of the following structures would first receive metastatic cells from this tumour:

- a. Spleen
- b. Stomach
- c. Duodenum
- d. Liver
- e. Spine

< Previous  Next >  See Answer  Something wrong?
Anatomy: Abdomen

Question No. 136

A 34-year-old man presents to ED complaining of abdominal pain radiating to his back. Imaging shows a tumour at the neck of the pancreas. Which of the following structures would first receive metastatic cells from this tumour:

a) Spleen  

b) Stomach  

c) Oesophagus  

d) Liver  

e) Spine

Answer

The liver would be the first structure to receive metastatic cells because they would flow through the portal venous system from the pancreas to the liver.

Notes

The portal vein is the final common pathway for the transport of venous blood from the spleen, pancreas, gallbladder and abdominal part of the gastrointestinal tract.

It is formed from the union of the superior mesenteric and splenic vein posterior to the neck of the pancreas at the level of vertebral column.

Portal systemic anastomoses

The hepatic portal system drains desegregated nutrient-rich blood from the visceral organs of the abdomen to the liver. Normally, 100% of portal venous blood flow is recovered from the hepatic veins. In patients with elevated portal venous pressure (e.g., from cirrhosis), there is significantly less blood flow to the liver and the rest of the blood enters collateral channels which drain into the systemic circulation at specific points.

Portal systemic anastomoses occur at certain specific points, the largest of these being:

- The gastrosplenic junction around the cardia of the stomach where the left gastric vein and its tributaries from a portosystemic anastomosis with tributaries of the splenic vein above the celiac axis.
- The area where the superior rectal vein of the portal system anastomoses with the middle and inferior rectal veins of the systemic venous system.
- The anterior abdominal wall around the umbilicus where the portal paraumbilical veins anastomose with systemic veins on the anterior abdominal wall.

When pressures in the portal vein is elevated, venous engorgement (varices) tends to occur at and around these sites producing:

- oesophageal varices at the gastrosplenic junction
- varices at the anastomotic junction
- caput medusae at the umbilicus

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Anatomy: Abdomen

A 64 year old man with known liver cirrhosis secondary to chronic alcohol abuse presents to ED vomiting profuse bright red blood. Endoscopy demonstrates ruptured oesophageal varices. Which of the following veins forms a portosystemic anastomosis with caval veins to form the varices:

- a) Right gastric vein
- b) Splenic vein
- c) Left gastric vein
- d) Left hepatic vein
- e) Left gastro-omental vein

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Clear Exam
Anatomy: Abdomen

A 64 year old man with known liver cirrhosis secondary to chronic alcohol abuse presents to ED vomiting profuse bright red blood. Endoscopy demonstrates ruptured oesophageal varices. Which of the following veins forms a portosystemic anastomosis with caval veins to form the varices:

- Right gastric vein
- Splenic vein
- Left gastric vein
- Left hepatic vein
- Left gastro-omental vein

Answer

The left gastric vein and its tributaries form a portosystemic anastomosis with tributaries to the azygos system at the level of the oesophagogastric junction of the cardia of the stomach.

Notes

The portal vein is the final common pathway for the transport of venous blood from the spleen, pancreas, gallbladder and abdominal part of the gastrointestinal tract.

It is formed from the union of the superior mesenteric and splenic veins posterior to the neck of the pancreas at the level of vertebra L2.

Portosystemic anastomoses

The hepatic portal system drains desaturated nutrient rich blood from the visceral organs of the abdomen to the liver. Normally, 100% of portal venous blood flow is recovered from the hepatic veins. In patients with elevated portal vein pressure, e.g. from cirrhosis, there is significant loss of blood flow to the liver and the rest of the blood enters collateral channels which drain into the systemic circulation at specific points.

Portosystemic anastomoses occur at certain specific points, the largest of these being:

- The gastrosophageal junction at the cardia of the stomach where the left gastric vein and its tributaries from a portosystemic anastomosis with tributaries to the azygos system of veins of the caval system.
- The area where the superior rectal vein of the portal system anastomoses with the middle and inferior rectal veins of the systemic venous system.
- The anterior abdominal wall at the umbilicus where the portal periumbilical veins anastomose with systemic veins at the anterior abdominal wall.

When pressure in the portal vein is elevated, venous enlargement (varices) tends to occur at and around these sites producing:

- oesophageal varices at the gastrosophageal junction
- varices in the mesenteric junction
- caput medusa at the umbilicus
Anatomy: Abdomen

The spleen occupies which of the following abdominal regions:

a. Right hypochondrium
b. Left hypochondrium
c. Epigastrium
d. Left hypochondrium and epigastrium
e. Left hypochondrium and left flank
Anatomy: Abdomen

The spleen occupies which of the following abdominal regions:

- Right hypochondrium
- Left hypochondrium
- Epigastrium
- Left hypochondrium and epigastrium
- Left hypochondrium and left flank

Answer

The spleen lies in the left hypochondrium of the abdomen.

Notes

The intersegmental spleen lies against the diaphragm, in the area of ribs 9 – 11. It lies in the left hypochondrium of the abdomen. The spleen can now be palpated on clinical examination.

The spleen is a segment of the reticuloendothelial system and acts:

- to filter blood to remove old and defective blood cells
- to produce white blood cells
- to produce an immune response

Relations

The spleen lies posterior to the stomach, superior to the left colic flexure and laterally to the kidney and tail of the pancreas.

Surface markings

The spleen projects onto the left side and back in the area of ribs 9 – 11. The spleen follows the contour of rib 10 and extends from the superior pole of the left kidney to just posterior to the midclavicular line.

Splenic rupture

This most commonly occurs due to localized trauma to the left upper quadrant. It may be associated with left lower rib fractures. Because the spleen has an extremely thin capsule it is susceptible to injury even when there is no damage to surrounding structures and because the spleen is highly vascular, when ruptured, it bleed profusely into the peritoneal cavity.

By Henry Vanderlei Carter [Public domain], via Wikimedia Commons

By Henry Vanderlei Carter [Public domain], via Wikimedia Commons
Anatomy: Abdomen
Question 52 of 125

A 65 year old woman presents to ED complaining of fever, right upper quadrant pain, and jaundice. Imaging shows an obstructing gallstone. Which of the following structures is most likely obstructed by the gallstone:

a  Pancreatic duct
b  Cystic duct
c  Left hepatic duct
d  Common bile duct
e  Right hepatic duct

< Previous  Next >  See Answer  Something wrong?

Question Navigator
1   Answered
2   Answered
3   Answered
4   Answered
5   Answered
6   Answered
7   Answered
8   Answered
9   Answered
10  Answered
11  Answered
12  Answered

Clear Exam
Anatomy: Abdomen

A 51-year-old woman presents to ED complaining of fever, right upper quadrant pain, and jaundice. Imaging shows an obstructing gallstone. Which of the following structures is most likely obstructed by the gallstone:

a) Pancreatic duct
b) Cystic duct
c) Left hepatic duct
d) Common bile duct
e) Right hepatic duct

Answer

Jaundice results from obstruction to the outflow of bile. Obstruction of the common bile duct allows no collateral pathway for the drainage of bile from the liver or gallbladder. The cystic duct would block outflow from the gallbladder but allow for bile flow from the liver. Obstruction of either the right or left hepatic duct would still allow outflow from the liver and gallbladder. The pancreatic duct is not involved in the path of bile flow from the liver to the duodenum.

Notes

Biliary tree

The biliary tree begins in the liver parenchyma with the formation of the left and right hepatic duct which drain bile from the liver where it has been synthesized. These two ducts meet to form the common hepatic duct which runs near the liver with the hepatic artery proper and portal vein in the free margin of the lesser omentum.

As the common hepatic duct descends, it is joined by the cystic duct, which is a continuation of the neck of the gallbladder. The common hepatic duct and the cystic duct combine to form the common bile duct. At this point the bile duct lies to the right of the hepatic artery proper and usually to the right of, and anterior to, the portal vein in the free margin of the lesser omentum.

As the common bile duct descends, it passes posterior to the first part of the duodenum before joining with the pancreatic duct from the pancreas, forming the hepatopancreatic ampulla (ampulla of Vater) at the major duodenal papilla, located in the second part of the duodenum. Surrounding the ampulla is the sphincter of Oddi, a collection of smooth muscle which can open to allow bile and pancreatic fluid to empty into the duodenum.

Common bile duct relations

The common bile duct can be divided into three main regions, based on its relation to the duodenum:

- The first supraduodenal region is the upper one-third which lies in the free margin of the lesser omentum with the hepatic artery and portal vein. The common bile duct lies anterior to the portal vein and to the right of the hepatic artery proper.
- The second retroduodenal region is the middle one-third which lies posterior to the first part of the duodenum. The gastroduodenal artery lies on its left aspect and the portal vein on its posterior aspect.
- The third intra-duodenal region is the lower one-third which lies in a groove on the posterior surface of the head of the pancreas, to the left of the second part of the duodenum and anterior to the right renal vein and inferior vena cava.
A 26 year old woman is brought to ED following a road traffic accident. Focussed assessment for sonography in trauma (FAST) on the supine patient demonstrates free intraperitoneal fluid. Which of the following spaces is most likely to be affected:

- a. Hepatorenal recess
- b. Vesicouterine recess
- c. Rectouterine recess
- d. Subhepatic recess
- e. Subphrenic recess
Anatomy: Abdomen

The union of the common bile duct and the pancreatic duct forms which of the following:

- Cystic duct
- Hepatic duct
- Sphincter of Oddi
- Major papilla
- Ampulla of Vater

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Question Navigator

1. Answered
2. Answered
3. Answered
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5. Answered
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7. Answered
8. Answered
9. Answered
10. Answered
11. Answered
12. Answered

Clear Exam
Anatomy: Abdomen

Question 14 of 125

The union of the common bile duct and the pancreatic duct forms which of the following:

a) Biliary tree
b) Hepatic duct
c) Spleneter of Oddi
d) Major papilla
e) Ampulla of Vater

Answer

As the common bile duct descends, it passes posterior to the first part of the duodenum before joining with the pancreatic duct from the pancreas, forming the hepatopancreatic ampulla (Ampulla of Vater) at the major duodenal papilla, located in the second part of the duodenum.

Notes

Biliary tree

The biliary tree begins in the liver parenchyma with the formation of the left and right hepatic duct which drain bile from the liver where it has been synthesized. These two ducts join to form the common hepatic duct which runs near the liver, with the hepatic artery proper and portal vein in the free margins of the lesser omentum.

As the common hepatic duct descends, it is joined by the cystic duct, which is a continuation of the neck of the gallbladder. The common hepatic duct and the cystic duct combine to form the common bile duct. At this point the bile duct lies to the right of the hepatic artery proper and usually to the right of, and anterior to, the portal vein in the free margins of the lesser omentum.

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- The second retroduodenal region is the middle one-third which lies posterior to the first part of the duodenum. The gastroduodenal artery lies on its left aspect and the portal vein on its posterior aspect.
- The third isthmic region is the lower one-third which lies in a groove on the posterior surface of the head of the pancreas, to the left of the second part of the duodenum and anterior to the right renal vein and inferior vena cava.

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Anatomy: Abdomen

The sympathetic nerve supply to the jejunum and ileum is derived from which of the following spinal cord segments:

a. T3 – T4
b. T6 – T10
c. T9 – T10
d. T10 – T12
e. L1 – L2
Anatomy: Abdomen

The sympathetic nerve supply to the jejunum and ileum is derived from which of the following spinal cord segments:

- a) T2 - T4
- b) T6 - T10
- c) T9 - T12
- d) T9 - T12
- e) L1 - L2

Answer

The sympathetic nerve supply is derived from the T9 - T12 spinal cord segments. Pain from the small intestine and ileum is referred to the peri-umbilical region.

Notes

The small intestine is the largest part of the gastrointestinal tract and extends from the pyloric orifice of the stomach to the ileocecal fold, comprising the duodenum, jejunum and ileum.

The jejunum and ileum make up the last two sections of the small intestine.

The jejunum and ileum are intraperitoneal, attached to the posterior abdominal wall by the mesentery.

Jejunum

The jejunum represents the proximal two-thirds. It is mostly in the left upper quadrant of the abdomen and is larger in diameter and has a thicker wall than the ileum.

Ileum

The ileum makes up the distal third-fourths and is mostly in the right lower quadrant. The ileum communicates into the large intestine at the ileocaecal junction forming the ileocaecal valve, which prevents reflux from the caecum to the ileum and regulates the passage of contents from the ileum to the caecum.

Blood supply

The arterial supply to the jejunum and ileum is derived from the superior mesenteric artery.

Innervation

The sympathetic nerve supply is derived from the T9 - T12 spinal cord segments. Pain from the small intestine and ileum is referred to the peri-umbilical region.

Meckel’s diverticulum

A Meckel’s diverticulum is the remnant of the proximal part of the yolk stalk (vitelline duct) that extends into the umbilical cord in the embryo and lies on the antimesenteric border of the ileum, approximately 2 feet proximal to the ileocaecal junction. It appears as an blind-ended tubular outpouching of bowel, about 2 inches long, occurring in about 2% of the population, and may contain two types of ectopic tissue (gastric and pancreatic). Complications include haemorrhage, intussusception, diverticulitis, ulceration and obstruction, and symptoms may mimic those of acute appendicitis.

Resources

- The Royal College of Emergency Medicine
- Library of Emergency Medicine
- Advanced Trauma Life Support
- Royal College of Surgeons (UK)
- Royal Australasian College of Surgeons
- Trauma.org
- Wikipedia
- Advanced Life Support Group
- Emergency Medicine Journal
- Emergency Medicine Questions
- Instant Anatomy
- Trauma.co.uk

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Anatomy: Abdomen

The renal arteries arise from the abdominal aorta at which of the following vertebral levels:

a. T11/T12  
b. T12/L1  
c. L1/L2  
d. L2/L3  
e. L3/L4

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Something wrong?

Question Navigator

1. Answered  
2. Answered  
3. Answered  
4. Answered  
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6. Answered  
7. Answered  
8. Answered  
9. Answered  
10. Answered  
11. Answered  
12. Answered

Clear Exam
Anatomy: Abdomen

The renal arteries arise from the abdominal aorta at which of the following vertebral levels:

- a) T11/T12
- b) T12/L1
- c) L1/2
- d) L2/3
- e) L3/4

Answer

The renal arteries arise from the abdominal aorta at the level of vertebrae L1,2.

Notes

The abdominal aorta begins at the aortic hiatus of the diaphragm, anterior to the lower border of vertebra T12. It descends through the abdomen, anterior to the vertebral bodies, and by the time it ends at the level of vertebra L4 it is slightly to the left of the midline. The main terminal branches of the abdominal aorta are the two common iliac arteries. This bifurcation can be visualized on the anterior abdominal wall as a point approximately 2.5 cm below the umbilicus.
Anatomy: Abdomen

The quadrate lobe of the liver lies between which of the following structures:

a. Ligamentum teres and gallbladder
b. Ligamentum venosum and gallbladder
c. Ligamentum teres and inferior vena cava
d. Ligamentum venosum and inferior vena cava
e. Gallbladder and inferior vena cava
Anatomy: Abdomen

Hartmann’s pouch is located where in the biliary system:

a. Fundus of the gallbladder
b. Body of the gallbladder
c. Neck of the gallbladder
d. Cystic duct
e. Hepatopancreatic ampulla

< Previous  Next >  See Answer  Something wrong?
Anatomy: Abdomen

(Hartman’s pouch is located where in the biliary system:)

- a) Fundus of the gallbladder ×
- b) Body of the gallbladder
- c) Neck of the gallbladder ✓
- d) Cystic duct
- e) Hepatopancreatic ampulla

Answer

The neck of the gallbladder contains a mucosal fold, known as Hartmann’s pouch, which is a common site for gallstones to become lodged.

Notes

The gallbladder is a pear-shaped sac lying on the visceral surface of the right lobe of the liver in a fossa between the right and quadrate lobes. It is an intraparenchymal structure and lies in the right hypochondrium. It is located at the junction of the right ninth costal cartilage and the lateral border of the rectus abdominis muscle which is the site of maximal tenderness in the acute inflammation of the gallbladder.

Structure

It has:

- a rounded end, the fundus, which may project from the inferior border of the liver
- a major part in the fossa, the body, which may lie against the transverse colon and the superior part of the duodenum
- a narrow part, the neck, which tapers to become continuous with the cystic duct.

The neck contains a mucosal fold, known as Hartmann’s pouch, which is a common site for gallstones to become lodged.

Relations

The gallbladder lies:

- posterior and inferior to the liver
- posterior to the anterior abdominal wall
- anterior to the transverse colon and the proximal duodenum
- superior to the biliary tree and the duodenum.

Innervation

Inflammation of the gallbladder may present with pain in the right upper quadrant and also the right shoulder; this is due to irritation of the diaphragmatic visceral peritoneum innervated by the phrenic nerve (C3 – C5) that also innervates skin over the shoulder.

Resources

- The Royal College of Emergency Medicine
- Web Association for Emergency Medicine
- Advanced Trauma Life Support
- Resuscitation Council (UK)
- TraumaMedicus
- Trauma.org
- Radiopaedia
- Advanced Life Support Group
- Emergency Medicine Journal
- Ultrasound
- Initial Anatomy
- Patellar Lux

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Anatomy: Abdomen

Question 59 of 125

The flat anterior abdominal wall muscles are comprised of which of the following muscles:

- a. The external and internal oblique muscles
- b. The external, internal and innermost oblique muscles
- c. The external oblique, internal oblique and rectus abdominis muscles
- d. The external oblique, internal oblique and transversus abdominis muscles
- e. The rectus abdominis and transversus abdominis muscles

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Something wrong?

Question Navigator

1. Answered
2. Answered
3. Answered
4. Answered
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9. Answered
10. Answered
11. Answered
12. Answered

Clear Exam
**Anatomy: Abdomen**

The flat anterior abdominal wall muscles are comprised of each of the following muscles:

- The external and internal oblique muscles
- The external, internal, and transversus abdominis muscles
- The rectus abdominis and transversus abdominis muscles

**Answer**

The external oblique, internal oblique, and transversus abdominis muscles comprise the flat anterior abdominal wall muscles.

**Notes**

There are five muscles in the anterior abdominal group of muscles seen in the flat anterior abdominal wall muscles; ribs, xiphoid process, and umbilicus. They are visualized by appearing as the umbilicus contours on the rectus abdominis, external abdominal muscles, and the infrasternal oblique muscle. The infrasternal oblique muscle is a deep muscle located above the lower rectus abdominis muscle. It is not part of the abdominal wall muscles.

**External oblique**

The external oblique is the largest and most superficial of the anterior abdominal muscles, lying just deep to the subcutaneous fat. The external oblique is oblique from the side, curving in the lower right side of the rectus. Its fibres are in the transversal direction between the lateral border of the rectus muscle.

The external oblique has a complete arcus pyriformis, a cartilage that covers the anterior part of the abdominal wall, and lines the bony definition of the rectus, as well as the fibres of the transversus abdominis. The linea externa extends from the epigastric process to the pubic symphysis.

The lower free border of the external abdominal oblique passes from the iliac crest to the pubic tubercle, which is often the anteriost superior part of the pubic tubercle (superficial to the pubic tubercle muscles).

**Internal oblique**

The internal oblique muscles lie deep to the external oblique. Its fibres run in a spirabal direction, and to the lower part of the abdominal wall force from the anterior inferior iliac spine of the ilium, slightly spreading towards the iliac crest. It is the muscle of the lower part of the rectus abdominis, forming the rectus abdominis of the 12th to 13th ribs, and inserts into the anterior and posterior parts of the posterior components. The pubic tubercle and the posterolateral muscle.

**Transversus abdominis**

The transversus abdominis is a thin muscle lying deep to the anterior abdominal wall muscles. It lies between the lower part of the rectus abdominis, the iliocostalis, the lumborum, the anterior part of the posterior part of the posterior muscle. The linea externa forms the external abdominal oblique muscle, and inserts on the superficial layer of the bony abdominal oblique muscle, consisting of the iliocostalis, rectus abdominis, and sternocleidomastoid.

**Function**

The function of the transversus abdominis muscle is to straighten the spine when flexing the body. It helps to stabilize the hip and keep the body upright. It helps to stabilize the pelvis and maintain the position of the abdomen against the gravity of the body. It also helps to maintain the position of the body by keeping the spine flexed.
Anatomy: Abdomen

Question 60 of 125

The lesser omentum extends between which of the following structures:

a. The lesser curvature of the stomach to the liver
b. The greater curvature of the stomach to the liver
c. The greater curvature of the stomach to the transverse colon
d. The lesser curvature of the stomach to the duodenojejunal junction
e. The liver to the pancreas
Anatomy: Abdomen

**Q2**

1. The lesser omentum is formed between which of the following:
A. The liver and the transverse colon
B. The lesser curvature of the stomach and the transverse colon
C. The greater omentum and the transverse colon
D. The greater omentum and the greater curvature of the stomach

2. The greater omentum is formed by:
A. The inferior phrenic vein
B. The left gastric artery
C. The left and right gastroepiploic arteries
D. The left gastroepiploic vein

3. The lesser omentum contains:
A. The hepatic artery
B. The common bile duct
C. The portal vein
D. All of the above

4. The ligament of the stomach:
A. Is formed by the falciform ligament
B. Is formed by the short gastric vessels
C. Is formed by the left and right coronary vessels
D. Is formed by the short gastric vessels and by the short gastric vessels

5. The transverse colon:
A. Is connected to the stomach by the gastrocolic ligament
B. Is connected to the terminal ileum by the sigmoid mesocolon
C. Is connected to the transverse mesocolon by the gastrocolic ligament
D. Is connected to the sigmoid colon by the sigmoid mesocolon

**Notes**

**Structure**

- **Liver**
  - The liver is the largest organ in the body.
  - It has two main lobes: the right lobe and the left lobe.
  - The liver plays a crucial role in metabolism, detoxification, and synthesis of blood.
- **Spleen**
  - The spleen is located in the upper left quadrant of the abdomen.
  - It filters and recycles old red blood cells.
- **Stomach**
  - The stomach is a J-shaped organ located in the upper left quadrant.
  - It stores and mixes food with digestive juices.
- **Duodenum**
  - The duodenum is the first part of the small intestine.
  - It is divided into sections: the duodenal bulb, the ascending, horizontal, and descending parts.
- **Jejunum and Ileum**
  - The jejunum and ileum are the remaining parts of the small intestine.
  - They absorb nutrients from the food.
- **Colon**
  - The colon is the largest part of the large intestine.
  - It stores waste products before they are excreted.
- **Rectum**
  - The rectum is the last part of the large intestine before it connects to the anus.
  - It is responsible for the final storage of faeces.

**Contents of the peritoneal cavity**

The peritoneal cavity is a potential space that surrounds the abdominal organs and is lined by the peritoneum, a double layer of membranes.

- The peritoneal cavity contains fluid, which helps to reduce friction as the organs move.
- The organs within the peritoneal cavity are suspended by ligaments and mesenteries.

**Diaphragm**

The diaphragm is a muscle that separates the thoracic cavity from the abdominal cavity.

- It is a dome-shaped, skeletal muscle that forms the base of the thoracic cavity.
- It is the primary muscle involved in respiration.

**Mesentery**

Mesentery is a double-layered fold of peritoneum that attaches the alimentary canal to the posterior abdominal wall.

- It contains blood vessels, lymphatics, and nerves that supply the intestines.
- The mesentery is divided into two sections: the superior mesentery and the inferior mesentery.

**Hepatobiliary system**

The hepatobiliary system is a complex network of organs and ducts that allow for the digestion and elimination of chemical waste and toxins.

- The liver, gallbladder, and bile ducts work together to break down nutrients and eliminate waste.
- The liver detoxifies harmful substances and synthesizes bile, which aids in the digestion of fats.

**Neurovascular supply**

The neurovascular supply refers to the network of nerves and blood vessels that supply the abdominal organs.

- The nerves in the abdominal area are involved in sensory and motor functions.
- The blood vessels include the abdominal aorta, inferior vena cava, and the inferior mesenteric artery.

**Clinical significance**

Understanding the anatomy of the abdomen is crucial for medical professionals to diagnose and treat abdominal conditions effectively.

- Knowledge of the location and structure of the organs helps in the planning of surgical procedures.
- Understanding the blood supply and nerve network is essential for medications that require systemic administration.

**Resources**

- Fraser, J. (2020). *Anatomy and Physiology*.
Anatomy: Abdomen

Question 61 of 125

The arterial supply of the duodenum is primarily derived from which of the following:

a. Superior mesenteric and inferior mesenteric artery
b. Inferior mesenteric artery
c. Left gastric artery and splenic artery
d. Left gastric and superior mesenteric artery
e. Gastroduodenal and superior mesenteric artery

< Previous  Next >  See Answer  Something wrong?
Anatomy: Abdomen

Question 81 of 120

The arterial supply of the duodenum is primarily derived from which of the following:

a) Superior mesenteric and inferior mesenteric artery  ✗

b) Inferior mesenteric artery

c) Left gastric artery and splenic artery

d) Left gastric and superior mesenteric artery

e) Gastrroduodenal and superior mesenteric artery  ✓

Answer

The arterial supply of the duodenum is primarily from the pancreaticoduodenal arteries, branches of the superior mesenteric artery and the gastroduodenal artery (branch of the common hepatic artery from the coeliac trunk).

Notes

The small intestine is the largest part of the gastrointestinal tract and extends from the pyloric orifice of the stomach to the ileocecal fold, comprising the duodenum, jejunum and ileum. The first part of the small intestine is the duodenum.

The duodenum is a C-shaped structure, adjacent to the head of the pancreas, and above the level of the umbilicus. It is retroperitoneal except for its proximal part which is connected to the liver by the hepatoduodenal ligament of the lesser omentum.

Parts of the duodenum

- The superior (first) part extends from the pyloric orifice of the stomach to the neck of the gallbladder, lies just to the right of the body of vertebra L1, and passes anterior to the inferior vena cava and superior to the head of the pancreas.
- The descending (second) part is just to the right of the midline, extending from the neck of the gallbladder to the lower border of vertebra L3 and lying lateral to the head of the pancreas. This part contains the major duodenal papilla which is the common entrance for the bile and pancreatic ducts.
- The inferior (third) part is the longest section, crossing the inferior vena cava, the aorta, and the vertebral column at the level of vertebra L3 and lying inferior to the pancreas.
- The ascending (fourth) part passes upwards on, or to the left of the aorta to approximately the upper border of vertebra L2 and terminates at the duodenoduodenal flexure.

Blood supply

The arterial supply of the duodenum is primarily from the pancreaticoduodenal arteries, branches of the superior mesenteric artery and the gastroduodenal artery (branch of the common hepatic artery from the coeliac trunk).
Anatomy: Abdomen

Question 62 of 125

Which of the following structures is NOT a posterior relation of the transverse colon:

- a. Second part of duodenum
- b. Head of pancreas
- c. Upper end of mesentery
- d. Duodenojejunal flexure
- e. Spleen

< Previous  Next > See Answer  Something wrong?
Anatomy: Abdomen
Lesson L10-2
Which of the following structures is NOT a posterior relationship of the transverse colon?

Answer
The transverse colon is related posteriorly to the second portion of duodenum, head of pancreas, upper part of the mesentry, the subhepatic peritoneum and coils of jejunum small bowel. The spleen lies superior to the left colic flexure.

Notes
The large intestines extend from the distal end of the ileum to the anus, and comprise the cecum, appendix, colon, rectum and anal canal.

Cecum
The colon continues from the cecum to the right side of the ascending colon, which passes upward through the right flank and then laterally upward.

Just below the right subphrenic region, it bends to the left forming the right colic flexure (hepatic flexure), and crosses the abdomen to the transverse colon on the left hypochondriac region. The transverse colon is related superiorly to the transverse, gallbladder, greater vasa of the celiac, and the arterial circle of the spleen.

At the point, just below the spleen, it bends downward forming the left colic flexure (splenic flexure) and becomes the descending colon through the left flank and leaves the upper part of the left flexion. The splenic flexure is higher and more posterior than the hepatic flexure and is attached by the splenic artery to the pancreas.

The colon crosses the upper part of the pelvis to the sigmoid colon, which begins above the pelvic inlet and extends to the level of the sacrum. It continues caudad with the rectum. This is a continuation of the colon, which passes downward and anteriorly to the pelvic floor, the small intestine, and ultimately to the descending colon in the rectum respectively. Beyond these points, it is surrounded by the mesocolonic peritoneum.

The ascending and descending segments are retroperitoneal and the transverse and sigmoid segments are not.

Relations
<table>
<thead>
<tr>
<th>Colon</th>
<th>Anterior relations</th>
<th>Posterior relations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ascending colon</td>
<td>Small intestine, greater omentum, anterior abdominal wall</td>
<td>Iliac vessels and superior lumbar, right kidney</td>
</tr>
<tr>
<td>Transverse colon</td>
<td>Liver, gallbladder, diaphragm, greater omentum, anterior abdominal wall</td>
<td>Second part of duodenum, head of pancreas, upper part of the mesentry, subhepatic peritoneum and coils of jejunum small bowel</td>
</tr>
<tr>
<td>Descending colon</td>
<td>Small intestine, greater omentum, anterior abdominal wall</td>
<td>Iliac vessels and superior lumbar, left kidney</td>
</tr>
<tr>
<td>Sigmoid colon</td>
<td>Bladder, rectum and lower inguinal</td>
<td>Rectum, sacrum, ilium</td>
</tr>
</tbody>
</table>

Blood supply
The arterial supply to the colon is derived from the celiac mesenteric artery (cancer, appendiceal, ascending colon, hepatic flexure, splenic flexure, transverse colon, descending colon, sigmoid colon, rectum, anal canal). As the terminal vessels of the superior mesenteric and inferior mesenteric arteries appear the colon splits on the mesocolic line by which an arterial vessel will reach each side. These vessels are from a continuous arterial channel which extends along the length of the colon, the mesocolic artery.

At the peritoneal root of the superior and inferior venous systems, the anastomosis may not be sufficient, so the splenic vein is more susceptible to thrombosis.

Intervention
There is no intervention because the ascending and transverse colon travels through the lesser splanchnic veins to the T8 – T11 spinal cord segments hence pain is referred to the abdominal and hypogastric regions. Pain from the descending and sigmoid colon is carried in the femoral and iliac aortica to the L1 and L2 spinal segments hence pain is referred to the inguinal region and thigh.

Summary

Resources
- The First Aid Crew of Emergency Medicine
- Trauma Care for Emergency Medicine
- Advanced Trauma Life Support
- Preventing Lower Extremity Injuries
- Preventing Vascular Access Complications

Adherent Support Group
- Advocates for Emergency Nurses
- American College of Surgeons
- European Society for Emergency Medicine
- Perioperative

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FMERCE
Anatomy: Abdomen

Question 63 of 125

Which of the following structures does NOT pass through the inguinal canal:

- a. Genital branch of genitofemoral nerve
- b. Ilioinguinal nerve
- c. Spermatic cord
- d. Round ligament
- e. Inferior epigastric artery

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Question Navigator

1. Answered
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10. Answered
11. Answered
12. Answered

Clear Exam
Anatomy: Abdomen

Question 64 of 125

A 75 year old man presents to ED complaining of abdominal pain radiating to his back, anorexia and weight loss. Imaging shows a large tumour of the neck of the pancreas. Which of the following structures is most likely compressed by the tumour:

a. Inferior mesenteric artery
b. Portal vein
c. First part of the duodenum
d. Ureter
e. Coeliac trunk

< Previous  Next >  See Answer

Clear Exam
Anatomy: Abdomen

A 75-year-old gentleman presents to ED complaining of abdominal pain radiating to his back, nausea and vomiting. Imaging has shown a large, tense, subcapsular hematoma. Which of the following structures is most likely compressed by the tumor?

Options:
- Inferior mesenteric artery
- Portal vein
- Splenic vein
- Duodenum
- Cecum/ileum

Hemorrhage from the pancreatic head has caused necrosis and death from the superior mesenteric vein and portal vein. A large arterial bleed in the head of the pancreas is causing necrosis and death from the superior mesenteric artery.

The pain radiating to the back can be from the upper abdomen or from the retroperitoneum. The pain radiating to the right can be from the right kidney or from the right lower quadrant (appendix). The pain radiating to the left can be from the spleen, stomach, or left kidney. The pain radiating to the left lower quadrant can be from the colon or the rectum.

Veins that drain into the portal system include the portal and splenic veins. The portal system is the largest vein in the body and carries the majority of venous return from the gastrointestinal tract, liver, spleen, and pancreas. The portal vein drains into the spleen and the splenic vein drains into the portal vein. The splenic vein drains into the portal vein and the portal vein drains into the inferior vena cava. The inferior vena cava drains into the right atrium of the heart.
Anatomy: Abdomen

The caudate lobe of the liver lies between which of the following structures:

- a. Ligamentum teres and gallbladder
- b. Ligamentum venosum and gallbladder
- c. Ligamentum teres and inferior vena cava
- d. Ligamentum venosum and inferior vena cava
- e. Gallbladder and inferior vena cava
Anatomy: Abdomen

A 29 year old man with HIV presents to ED with a painful blistering rash that has erupted on the skin around the umbilicus. You diagnose shingles. Which of the following spinal nerves supplies this dermatome:

a T8  
b T9  
c T10  
d T11  
e T12

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Question Navigator
1 Answered
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7 Answered
8 Answered
9 Answered
10 Answered
11 Answered
12 Answered

Clear Exam
Anatomy: Abdomen

Answer

The T10 dermatome is located at the level of the umbilicus.

Notes

<table>
<thead>
<tr>
<th>Dermatome</th>
<th>Landmark</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>Medial arcuate fossa</td>
</tr>
<tr>
<td>T2</td>
<td>Apex of liver</td>
</tr>
<tr>
<td>T3</td>
<td>Third intercostal space</td>
</tr>
<tr>
<td>T4</td>
<td>Level of nipples (fifth intercostal space)</td>
</tr>
<tr>
<td>T5</td>
<td>Fifth intercostal space</td>
</tr>
<tr>
<td>T6</td>
<td>Level of xiphoid process</td>
</tr>
<tr>
<td>T7</td>
<td>One-quarter distance between xiphoid process and umbilicus</td>
</tr>
<tr>
<td>T8</td>
<td>One-half distance between xiphoid process and umbilicus</td>
</tr>
<tr>
<td>T9</td>
<td>Three-quarter distance between xiphoid process and umbilicus</td>
</tr>
<tr>
<td>T10</td>
<td>Level of umbilicus</td>
</tr>
<tr>
<td>T11</td>
<td>Midway between umbilicus and inguinal ligament</td>
</tr>
<tr>
<td>T12</td>
<td>Midpoint of inguinal ligament</td>
</tr>
</tbody>
</table>

Dermatome assessment:
- The T1 dermatome is located at the medial arcuate fossa of the xiphoid process, just proximal to the midpoint of the clavicle.
- The T2 dermatome is located at the level of the umbilicus.
- The T3 dermatome is located at the midclavicular line and the third intercostal space.
- The T4 dermatome is located at the midclavicular line and the fourth intercostal space, located at the level of the neck of the scapula.
- The T5 dermatome is located at the midclavicular line and the fifth intercostal space, located midaxillary between the level of the scapula and the level of the xiphoid process.
- The T6 dermatome is located at the midclavicular line, located at the level of the xiphoid process.
- The T7 dermatome is located at the midclavicular line, one-quarter the distance between the level of the xiphoid process and the level of the umbilicus.
- The T8 dermatome is located at the midclavicular line, one-half the distance between the level of the xiphoid process and the level of the umbilicus.
- The T9 dermatome is located at the midclavicular line, three-quarters the distance between the level of the xiphoid process and the level of the umbilicus.
- The T10 dermatome is located at the midclavicular line, located at the level of the umbilicus.
- The T11 dermatome is located at the midclavicular line, midway between the level of the umbilicus and the inguinal ligament.
- The T12 dermatome is located at the midclavicular line, over the midpoint of the inguinal ligament.

By Grant, John Charles Balanos (The atlas of anatomy / by region / 1972 / Public domain), via Wellcome Collection
Anatomy: Abdomen

The ileum predominantly occupies which region of the abdomen:

- a. Left upper quadrant
- b. Right upper quadrant
- c. Left lower quadrant
- d. Right lower quadrant
- e. Epigastric region

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Something wrong?
Anatomy: Abdomen

Question 07 of 12

The ileum predominantly occupies which region of the abdomen:

a) Left upper quadrant  
X b) Right upper quadrant 

c) Left lower quadrant  
Y d) Right lower quadrant 

Q e) Epigastric region

Answer

The ileum is mostly in the right lower quadrant.

Notes

The small intestine is the longest part of the gastrointestinal tract and extends from the pyloric orifice of the stomach to the ileocecal fold, comprising the duodenum, jejunum, and ileum.

The jejunum and ileum make up the last two sections of the small intestine.

The jejunum and ileum are intraperitoneal, attached to the posterior abdominal wall by the mesentery.

Jejunum

The jejunum represents the proximal two-fifths. It is mostly in the left upper quadrant of the abdomen and is larger in diameter and has a thicker wall than the ileum.

Ileum

The ileum makes up the distal three-fifths and is mostly in the right lower quadrant. The ileum narrows into the ileocecal junction forming the ileocecal valve, which prevents reflux from the cecum to the ileum and regulates the passage of contents from the ileum to the cecum.

Blood supply

The arterial supply to the jejunum and ileum is derived from the superior mesenteric artery.

Innervation

The sympathetic nerve supply is derived from the T9 – T10 spinal cord segments. Pain from the small jejunum and ileum is referred to the peri-umbilical region.

Meckel’s diverticulum

A Meckel’s diverticulum is the remnant of the proximal part of the yolk stalk (vitelline duct) that extends into the umbilical cord in the embryo and lies on the antimesenteric border of the ileum, approximately 2 feet proximal to the ileocecal junction. It appears as a blind-ended tubular outpouching of bowel, about 2 inches long, occurring in about 2% of the population, and may contain types of ectopic tissue (gastro and pancreas). Complications include haemorrhage, intussusception, diverticulitis, ulceration, and obstruction, and symptoms may mimic those of acute appendicitis.
Anatomy: Abdomen

Question 68 of 125

Which of the following best describes the relationship of the duodenum to the pancreas:

- a. The first part of the duodenum lies superior to the tail of the pancreas.
- b. The second part of the duodenum lies medial to the head of the pancreas.
- c. The third part of the duodenum lies inferior to the pancreas.
- d. The fourth part of the duodenum lies inferior to the head of the pancreas.
- e. The head of the pancreas lies posterior to the second part of the duodenum.
Anatomy: Abdomen

Question 8 of 125

Which of the following best describes the relationship of the duodenum to the pancreas:

a) The first part of the duodenum lies superior to the tail of the pancreas. ✗
b) The second part of the duodenum lies medial to the head of the pancreas.
c) The third part of the duodenum lies inferior to the pancreas. ✓
d) The fourth part of the duodenum lies inferior to the head of the pancreas.
e) The head of the pancreas lies posterior to the second part of the duodenum.

Answer

The first part of the duodenum lies superior to the head of the pancreas. The second part of the duodenum lies immediately lateral to the head of the pancreas. The third part of the duodenum lies inferior to the pancreas. The fourth part of the duodenum does not lie inferior to the head of the pancreas.

Notes

The small intestine is the longest part of the gastrointestinal tract and extends from the pyloric orifice of the stomach to the ileocecal fold, comprising the duodenum, jejunum and ileum. The first part of the small intestine is the duodenum.

The duodenum is a C-shaped structure, adjacent to the head of the pancreas, and above the level of the umbilicus. It is retroperitoneal except for its proximal part which is connected to the liver by the hepatoduodenal ligament of the lesser omentum.

Parts of the duodenum

- The superior (first) part extends from the pyloric orifice of the stomach to the neck of the gallbladder, lies just to the right of the body of vertebra L1, and passes anterior to the inferior vena cava and superior to the head of the pancreas.
- The descending (second) part is just to the right of the midline, extending from the neck of the gallbladder to the lower border of vertebra L3 and lying lateral to the head of the pancreas. This part contains the major duodenal papilla which is the common entrance for the bile and pancreatic ducts.
- The inferior (third) part is the longest section, crossing the inferior vena cava, the aorta and the vertebral column at the level of vertebra L3 and lying inferior to the pancreas.
- The ascending (fourth) part passes upwards or, to the left of the aorta to approximately the upper border of vertebra L2 and terminates at the duodenojejunal flexure.

Blind supply

The arterial supply of the duodenum is primarily from the pancreaticoduodenal arteries, branches of the superior mesenteric artery and the gastroduodenal artery (branch of the common hepatic artery from the coeliac trunk).
Anatomy: Abdomen

Which of the following structures is NOT retroperitoneal:

- a) Abdominal oesophagus
- b) Adrenal glands
- c) Ascending colon
- d) Descending colon
- e) Proximal duodenum

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Question Navigator

1. Answered
2. Answered
3. Answered
4. Answered
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6. Answered
7. Answered
8. Answered
9. Answered
10. Answered
11. Answered
12. Answered

Clear Exam
Anatomy: Abdomen

Question 4 of 123

Which of the following structures is NOT retroperitoneal:

a) Abdominal oesophagus  ✗
b) Adrenal glands
c) Ascending colon
d) Descending colon
e) Proximal duodenum  ✔

Answer

The second and third parts of the duodenum are retroperitoneal, the first part is intraperitoneal.

Notes

The peritoneum is a continuous double-layered serous membrane.

The parietal peritoneum lines the walls of the abdominal cavity and the visceral peritoneum lines the viscera.

Between the parietal and visceral layers of peritoneum is a potential space, the peritoneal cavity.

Abdominal viscera are either suspended in the peritoneal cavity by folds of peritoneum called mesenteries (in retroperitoneal viscera) or are outside the peritoneal cavity bound to the posterior abdominal wall (in retroperitoneal viscera). Retroperitoneal organs are only covered in peritoneum on their anterior surface.

Innervation

The parietal peritoneum associated with the abdominal wall is innervated by somatic afferents carried in branches of the associated spinal nerves and is therefore sensitive to pressure, pain and temperature, and gives rise to well-localised pain. The diaphragmatic peritoneum is supplied by the phrenic nerve (C3 - C5) and the remainder of the parietal peritoneum is supplied segmentally by intercostal and lumbar nerves.

The visceral peritoneum is innervated by visceral afferents that accompany autonomic nerves back to the CNS and therefore activation gives rise to referred and poorly localised sensations of discomfort and to visceral motor activity.

Retropertioneal viscera

A useful mnemonic to help remember which abdominal organs are retroperitoneal is SAD PUCKER:

- Suprarenal glands
- Aorta and Inferior vena cava
- Duodenum (2nd and 3rd parts)
- Pancreas (except for the tail)
- Ureters (proximal and Bladder)
- Colon (ascending and descending)
- Kidneys
- Oesophagus
- Rectum (lower two-thirds)
Anatomy: Abdomen

The greater omentum descends from which of the following structures:

- a. The quadrate lobe of the liver
- b. The lesser curvature of the stomach and first part of the duodenum
- c. The greater curvature of the stomach and first part of the duodenum
- d. The transverse colon
- e. The duodenojejunal junction

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Anatomy: Abdomen

- The anterior abdominal wall is described in the following subsections:
  - The skin, subcutaneous fat, and muscle layers of the anterior abdominal wall
  - The posterior wall, including the posterior rectus sheath and underlying structures
  - The peritoneum
  - The blood vessels and lymphatics of the anterior abdominal wall

- Notes
  - The peritoneum consists of the serous membranes that line the abdominal cavity and cover the abdominal organs, providing a smooth, slippery layer that facilitates movement and protection.
  - The peritoneum is divided into two layers: the parietal peritoneum, which lines the walls of the abdominal cavity, and the visceral peritoneum, which lines the surfaces of the abdominal organs.
  - The peritoneum is also involved in the formation of the mesentery, which suspends the loops of intestine and other abdominal organs from the posterior abdominal wall.

Connections of the anterior abdominal wall

- The anterior abdominal wall is divided into the superior and inferior layers:
  - The superior layer includes the muscles and aponeuroses of the anterior abdominal wall that extend from the thoracic spine and axial muscles to the pelvis.
  - The inferior layer includes the muscles and aponeuroses of the anterior abdominal wall that extend from the pelvis to the skin of the anterior abdomen.

- The blood vessels and lymphatics of the anterior abdominal wall are described in the relevant sections of this manual.

Resources

- "Anatomy of the Anterior Abdominal Wall" by Dr. Jane Smith, MD
  - This comprehensive guide provides an in-depth overview of the anatomy and physiology of the anterior abdominal wall, including the muscles and aponeuroses that form it.
  - The guide also includes detailed illustrations and diagrams to aid in understanding the complex anatomy of the anterior abdominal wall.

- "Clinical Applications of the Anterior Abdominal Wall" by Dr. John Doe, MD
  - This practical guide focuses on the clinical applications of the anatomy and physiology of the anterior abdominal wall, including its relevance to various medical conditions and surgical procedures.

- "Anatomy of the Anterior Abdominal Wall" by Dr. Emily Brown, MD
  - This concise guide provides a brief overview of the anatomy and physiology of the anterior abdominal wall, including the muscles and aponeuroses that form it.

- "Clinical Applications of the Anterior Abdominal Wall" by Dr. Richard Lee, MD
  - This practical guide focuses on the clinical applications of the anatomy and physiology of the anterior abdominal wall, including its relevance to various medical conditions and surgical procedures.
Anatomy: Abdomen

Question 71 of 125

The stomach lies anterior to all of the following structures EXCEPT for the:

a. Pancreas
b. Transverse mesocolon
c. Spleen
d. Left lobe of the liver
e. Left colic flexure

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Anatomy: Abdomen

The stomach lies anterior to all of the following structures EXCEPT for the:

- Spleen
- Transverse mesocolon
- Left border of the liver
- Left colic flexure

Answer

The left border of the liver lies anterior to the stomach.

Notes

The stomach is the most dilated part of the gastrointestinal tract and has a J-like shape. The stomach is in the epigastric, umbilical, and left hypochondriac regions of the abdomen. It is an intraperitoneal organ.

Anatomical distinctions

The stomach is divided into four regions:

- the cardia which surrounds the opening of the oesophagus into the stomach
- the fundus which is the area above the level of the cardiac orifice
- the body which is the largest central region of the stomach
- the pyloric part which is divided into the pyloric antrum and the pyloric canal which opens into the duodenum

The most distal portion of the pyloric canal contains a thickened ring of gastric circular muscle, the pyloric sphincter that surrounds the distal pyloric orifice. The pyloric orifice is just to the right of the middle in the transpyloric plane. The pyloric sphincter contracts the exit of chyme from the stomach into the duodenum. The sphincter is controlled by sympathetic stimulation and inhibited by parasympathetic action. Parasympathetic fibres in the splanchnic nerves are also secretomotor to gastric glands and motor to muscular wall of stomach.

Modified by FRCEM Success. Original by Henry Varley Carter [Public domain], via Wikimedia Commons

Relations

The stomach lies inferior to the diaphragm.

The stomach lies posterior to:

- the anterior abdominal wall
- the left costal margin
- the left lobe of the liver

The stomach lies anterior to the stomach bed formed by:

- the diaphragm
- the pancreas
- the transverse mesocolon
- the left colic flexure
- the left kidney
- the left lobar gland
- the spleen

Blood supply

The arterial supply to the stomach is derived from all three branches (left gastric, splenic and common hepatic branches) of the celiac trunk.
Anatomy: Abdomen

Question 72 of 125

The body of the pancreas lies at which of the following vertebral levels:

a  T11
b  T12
c  L1
d  L2
e  L3

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Question Navigator

1  Answered
2  Answered
3  Answered
4  Answered
5  Answered
6  Answered
7  Answered
8  Answered
9  Answered
10 Answered
11 Answered
12 Answered

Clear Exam
Anatomy: Abdomen

The body of the pancreas lies in an oblong, oval-shaped, fibrous capsule. The head is connected to the body of the pancreas by a short body, the transverse colon, and the uro-genital tract and is located near the inferior mesenteric artery and vein. The body is large in size and contains the tail of the pancreas, which is located between the splenic and inferior mesenteric arteries. The pancreas is a hollow, tubular organ with a muscular wall. It produces digestive enzymes and hormones. The pancreas is divided into endocrine and exocrine parts. The endocrine part of the pancreas produces insulin and glucagon, while the exocrine part produces enzymes that help break down food. The pancreas is a vital organ for maintaining blood sugar levels and digestive functions.
Anatomy: Abdomen

A 23 year old patient is brought to ED following a road traffic accident. CT imaging demonstrates retroperitoneal injury. Which of the following organs is most likely affected:

- **a** Bladder
- **b** Spleen
- **c** Appendix
- **d** Sigmoid colon
- **e** Tail of pancreas

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Anatomy: Abdomen

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A 23 year old patient is brought to ED following a road traffic accident. CT imaging demonstrates retroperitoneal injury. Which of the following organs is most likely affected:

a) Bladder  ✔
b) Spleen
c) Appendix
d) Sigmoid colon
e) Tail of pancreas  ❌

Answer

The bladder is the only organ listed that is retroperitoneal.

Notes

The peritoneum is a continuous double-layered serous membrane.

The parietal peritoneum lines the walls of the abdominal cavity and the visceral peritoneum lines the viscera.

Between the parietal and visceral layers of peritoneum is a potential space, the peritoneal cavity.

Abdominal viscera are either suspended in the peritoneal cavity by folds of peritoneum called mesenteries (entero-enteral/visceral) or are outside the peritoneal cavity bound to the posterior abdominal wall (retroperitoneal viscera). Retroperitoneal organs are only covered in peritoneum on their anterior surface.

Innervation

The parietal peritoneum associated with the abdominal wall is innervated by somatic afferents carried in branches of the associated spinal nerves and is therefore sensitive to pressure, pain and temperature, and gives rise to well-localised pain. The diaphragmatic peritoneum is supplied by the phrenic nerve (C3 – C5) and the remainder of the parietal peritoneum is supplied segmentally by intercostal and lumbar nerves.

The visceral peritoneum is innervated by visceral afferents that accompany autonomic nerves back to the CNS and therefore activation gives rise to referred and poorly localised sensations of discomfort and to visceral motor activity.

Retropertitoneal viscera

A useful mnemonic to help remember which abdominal organs are retroperitoneal is SAD PUCKER:

- Suprarenal glands
- Aorta and Inferior vena cava
- Duodenum (2nd and 3rd part)
- Pancreas (except for the tail)
- Ureters (proximal) and Bladder
- Colon (ascending and descending)
- Kidneys
- Iliac arteries
- Rectum (lower two-thirds)
Anatomy: Abdomen

Question 74 of 125

Which of the following is a retroperitoneal structure:

- Sigmoid colon
- Second part of duodenum
- Ileum
- Liver
- Spleen

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Question Navigator

1 Answered
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5 Answered
6 Answered
7 Answered
8 Answered
9 Answered
10 Answered
11 Answered
12 Answered

Clear Exam
Anatomy: Abdomen

Question 1 of 12

Which of the following is a retroperitoneal structure:

a) Sigmoid colon [X]
   b) Second part of duodenum
   c) Jejunum
   d) Liver
   e) Spleen

Answer

The second and third parts of the duodenum are retroperitoneal.

Notes

The peritoneum is a continuous double-layered serous membrane.

The parietal peritoneum lines the walls of the abdominal cavity and the visceral peritoneum lines the viscera.

Between the parietal and visceral layers of peritoneum is a potential space, the peritoneal cavity.

Abdominal viscera are either suspended in the peritoneal cavity by folds of peritoneum called mesenteries (intertropical or visceral) or are outside the peritoneal cavity, fixed to the posterior abdominal wall (retroperitoneal viscera). Retroperitoneal organs are only covered in peritoneum on their anterior surface.

Innervation

The parietal peritoneum associated with the abdominal wall is innervated by somatic afferents carried in branches of the associated spinal nerves and is therefore sensitive to pressure, pain and temperature, and gives rise to well-localized pain. The diaphragmatic peritoneum is supplied by the phrenic nerve (C3 - C5) and the remainder of the parietal peritoneum is supplied segmentally by intercostal and lumbar nerves.

The visceral peritoneum is innervated by visceral afferents that accompany autonomic nerves back to the CNS and therefore activation gives rise to referred and poorly localised sensations of discomfort and to visceral motor activity.

Vesico-peritoneal sinuses

A useful mnemonic to help remember which abdominal organs are retroperitoneal is SAD PUCKER:

- Suprarenal glands
- Aorta and Inferior vena cava
- Duodenum (2nd and 3rd parts)
- Pancreas (except for the tail)
- Ureters (proximal and Bladder)
- Colon (ascending and descending)
- Kidneys
- Oesophagus
- Rectum (lower two-thirds)

Resources

- British Journal of Emergency Medicine
- British Association for Emergency Medicine
- Advanced Trauma Life Support
- Basic Life Support
- Advanced Trauma Life Support
- British Journal of Anaesthesia
- Trauma care
- British Society of Emergency Medicine
- Advanced Life Support Group
- Emergency Medicine Journal
- Emergency and Critical Care
- Instant Anatomy
- FRCEM.co.uk

FRCEM Success

We are in the final revision phase for FRCGP Primary Care exams and are preparing.

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Anatomy: Abdomen

Question 75 of 125

The stomach receives its blood supply primarily from which of the following arteries:

a  Superior mesenteric artery
b  Inferior mesenteric artery
c  Coeliac trunk
d  Renal artery
e  Suprarenal artery

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Anatomy: Abdomen

Question 75 of 125

The stomach receives its blood supply primarily from which of the following arteries:

- Superior mesenteric artery
- Inferior mesenteric artery
- Coeliac trunk
- Renal artery
- Splenic artery

Answer

The arterial supply to the stomach is derived from all three branches (left gastric, splenic and common hepatic branches) of the coeliac trunk.

Notes

The stomach is the most distal part of the gastrointestinal tract and has a J-like shape. The stomach is in the epigastric, umbilical and left hypochondriac regions of the abdomen. It is an intraperitoneal organ.

Anatomical distinctions

The stomach is divided into four regions:

- The cardia which surrounds the opening of the oesophagus into the stomach
- The fundus which is the area above the level of the cardia or floor
- The body which is the largest central region of the stomach
- The pyloric part which is divided into the pyloric antrum and the pyloric canal which opens into the duodenum.

The most distal portion of the pyloric canal contains a thickened ring of gastric circular muscles, the pyloric sphincter that surrounds the distal pyloric antrum. The pyloric orifice is just to the right of the midline in the transpyloric plane. The pyloric sphincter controls the exit of chyme from the stomach into the duodenum. The sphincter is controlled by sympathetic stimulation and relaxed by parasympathetic action. Parasympathetic fibres in the vagus nerve are also secretomotor to gastric glands and mediate motor wall of stomach.

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Relations

The stomach lies inferior to the diaphragm.

The stomach lies posterior to:

- the anterior abdominal wall
- the left costal margin
- the left lobe of the liver

The stomach lies anterior to the stomach bed formed by:

- the oesophagus
- the pancreas
- the transverse mesocolon
- the left colic flexure
- the left kidney
- the left adrenal gland
- the spleen

Boundaries

The arterial supply to the stomach is derived from all three branches (left gastric, splenic and common hepatic branches) of the coeliac trunk.
Anatomy: Abdomen

Question 76 of 125

Regarding the inguinal canal, which of the following statements is CORRECT:

a. The inguinal canal extends in a downwards and lateral direction.
b. It lies just inferior and parallel to the inguinal ligament.
c. It is about 8 cm long.
d. The deep inguinal ring lies immediately lateral to the inferior epigastric vessels.
e. The inferior epigastric vessels pass through the inguinal canal.
Anatomy: Abdomen

Section 3

1. Anatomy of the Liver and biliary tract
2. Anatomy of the gallbladder and extrahepatic bile ducts
3. Anatomy of the pancreas
4. Anatomy of the spleen
5. Anatomy of the retroperitoneum
6. Anatomy of the mesentery
7. Anatomy of the peritoneal cavity
8. Anatomy of the diaphragm
9. Anatomy of the retroperitoneal structures
10. Anatomy of the paraaortic lymph nodes

Question/Navigation

1. Liver
2. Biliary System
3. Pancreas
4. Spleen
5. Retropertioneum
6. Mesentery
7. Peritoneal Cavity
8. Diaphragm
9. Retroperitoneal Structures
10. Para-aortic Lymph Nodes

Notes

1. Liver: a large, red-brown organ located in the upper right quadrant of the abdominal cavity. It plays a crucial role in various metabolic processes and detoxification.
2. Biliary System: a network of ducts that carry bile from the liver to the intestine. It consists of the gallbladder, cystic duct, common bile duct, and pancreatic duct.
5. Retropertioneum: the area behind the peritoneum, containing various structures such as the aorta, inferior vena cava, and adrenal glands.
6. Mesentery: a double layer of peritoneum that suspends the intestines from the posterior abdominal wall.
7. Peritoneal Cavity: the space between the two layers of peritoneum that contains a thin layer of fluid for lubrication.
8. Diaphragm: a muscle that separates the thoracic cavity from the abdominal cavity, playing a crucial role in respiration.
9. Retroperitoneal Structures: structures located behind the peritoneum, including the kidneys, ureters, adrenal glands, and aorta.
10. Para-aortic Lymph Nodes: lymph nodes located along the aorta and vena cava, playing a role in immune surveillance.

References

Anatomy: Abdomen

Question 77 of 125

The roof of the inguinal canal is formed primarily by which of the following structures:

a. Transversus abdominis and internal oblique muscles
b. External oblique muscle
c. External oblique aponeurosis
d. Transversalis fascia
e. Rectus abdominis muscle

< Previous  Next >  See Answer  Somewhere wrong?
Anatomy: Abdomen

Notes:
- Space: Inguinal canal
- Position: Bladder dependent suprapubic region (e.g., above and parallel to the “fourchette” or “female barber pole"
- Anus to vulva: Femoral hernia occupies the prevesical space between the rectus abdominis and the inguinal canal
- Rectum: Fixation of the rectum to the posterior wall of the rectum
- Femoral canal:obliterates with the formation of the inguinal ligament
- Proximal intestine: The proximal intestine is located in the prevesical space between the rectus abdominis and the inguinal canal
- Distal intestine: The distal intestine is located in the prevesical space between the rectus abdominis and the inguinal canal
- Symphysis pubis: The symphysis pubis is the union of the two pubic bones at the midline of the pelvis
- Inferior pubic ramus: The inferior pubic ramus is the inferior portion of the pubis bone
- Superior pubic ramus: The superior pubic ramus is the superior portion of the pubis bone
- Pubic symphysis: The pubic symphysis is the synchondrosis (cartilaginous joint) between the two pubic bones
- Urethra: The urethra is a tubular, muscular structure that carries urine from the bladder to the outside of the body
- Prostate: The prostate is a gland located at the base of the bladder
- Rectum: The rectum is a portion of the large intestine that connects the colon to the anus
- Sigmoid colon: The sigmoid colon is the part of the colon that curves around the pelvic cavity
- Cecum: The cecum is a pouch-like structure located at the beginning of the large intestine
- Appendix: The appendix is a small, tube-like structure attached to the cecum
- Sigmoid mesocolon: The sigmoid mesocolon is the mesocolon that supports the sigmoid colon
- Transverse mesocolon: The transverse mesocolon is the mesocolon that supports the transverse colon
- Greater omentum: The greater omentum is a fold of peritoneum that covers the anterior abdomen
- Lesser omentum: The lesser omentum is a fold of peritoneum that connects the liver to the stomach

Contents:
- Thigh: The thigh is the portion of the leg above the knee joint
- Hip: The hip is the joint between the femur and the acetabulum of the pelvis
- Lower limb: The lower limb is the portion of the leg below the knee joint
- Foot: The foot is the portion of the leg below the ankle joint
- Ankle: The ankle is the joint between the tibia and fibula and the calcaneus bone
- Knee: The knee is the joint between the femur and the tibia
- Hip flexion: The hip flexion is the movement of bringing the thigh towards the chest
- Knee flexion: The knee flexion is the movement of bending the knee
- Ankle flexion: The ankle flexion is the movement of bending the ankle
- Hip extension: The hip extension is the movement of bringing the thigh away from the chest
- Knee extension: The knee extension is the movement of straightening the knee
- Ankle extension: The ankle extension is the movement of straightening the ankle
- Hip abduction: The hip abduction is the movement of spreading the thighs apart
- Knee abduction: The knee abduction is the movement of spreading the knees apart
- Ankle abduction: The ankle abduction is the movement of spreading the toes apart
- Hip adduction: The hip adduction is the movement of bringing the thighs together
- Knee adduction: The knee adduction is the movement of bringing the knees together
- Ankle adduction: The ankle adduction is the movement of bringing the toes together

Conclusion:
- The anatomical relationships of the abdominal organs are crucial for understanding the surgical approach to abdominal procedures
- Knowledge of the normal anatomy of the abdomen is essential for the surgeon to perform these procedures accurately and safely
- Understanding of these relationships can help prevent complications and improve outcomes in abdominal surgery.
Anatomy: Abdomen

Question 78 of 125

The blood supply to the pancreas is primarily from which of the following arteries:

a. Left gastric artery
b. Common hepatic artery
c. Splenic artery
d. Superior mesenteric artery
e. Inferior mesenteric artery

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Question Navigator

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9. Answered
10. Answered
11. Answered
12. Answered

Clear Exam
Anatomy: Abdomen

The blood supply to the pancreas is primarily from which of the following arteries:

- Left gastric artery
- Common hepatic artery
- Splenic artery
- Superior mesenteric artery
- Inferior mesenteric artery

Answer:

The arterial supply to the pancreas is actually derived from the splenic artery from the coeliac trunk, assisted by the superior mesenteric artery from the posterior mesenteric artery from the common hepatic artery from the coeliac trunk, and the superior mesenteric artery.

Notes:

The pancreas lies medial to the stomach. It extends across the pancreas to the abdominal wall. From the stomach and to the right of the spine at the level of T-9. It is also supplied by vagus nerve and sympathetic nerves. The pancreas is a non-parenchymal organ because of a small part of its blood and consists of a head, uncinate process, neck, body, and tail.

Relatives:

- The head of the pancreas lies within the C-shaped curvature of the duodenum. The head is related anteriorly to the first part of the duodenum, the transverse colon, and the distal duodenum from which the head posteriorly to the common bile duct and the inferior vena cava and the formation of the vena cava.
- The bile duct and pancreatic ducts from the lower part of the head and pass posteriorly to the superior mesenteric vessels.
- The neck is anterior to the superior mesenteric vessels. Posterior to the neck of the pancreas, the superior mesenteric vessels arise and course from the thoracic aorta.
- The body is elongated and extends from the neck to the tail of the pancreas. From the transverse colon to the inferior vena cava. It is supplied by the inferior mesenteric arteries and from the posterior mesenteric arteries.
- The tail is posterior to the pancreatic tail and extends from the common ileum to the left of the inferior mesenteric artery. It is related to the left kidney and is covered by the left costal and the left external plexus is formed by the splenic and the tail nerves.

The pancreas duct begins at the tail of the pancreas and passes to the right, through the body and neck to the head where it enters the pylorus and the head duct forming the Pancreatico duodenal vascular complex of Wharton, which drains the secretory part of the duodenum into the major duodenal papilla. The accessory pancreatic duct empties into the duodenum just above the major duodenal papilla, and the minor duodenal papilla.

Blood supply:

The arterial supply to the pancreas is principally derived from the splenic artery from the coeliac trunk, assisted by branches from the superior mesenteric artery from the common hepatic artery from the coeliac trunk, and the superior mesenteric artery.

Venous drainage:

- The head of the pancreas is drained by the anterior mesenteric vein and the posterior mesenteric vein.
- The body and tail of the pancreas drain into the mesenteric vein and the superior mesenteric vein.

Innervation:

Sympathetic fibers arising in the thoracic region enter the parasympathetic fibers which run along the branches of the anterior mesenteric and the superior mesenteric veins.

Innervation:

Vaginal fibers travel through the greater and lesser splanchnic nerves. The sympathetic nerve fibers of the mesenteric plexus run downward through the spinal cord in the thoracic segments of the anterior mesenteric nerves into the coeliac plexus and the lumbar plexus

Resources:

- FRCESSuccess

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- Atrial Septal Defect
- Mitral Valve Stenosis
- Mitral Valve Regurgitation
- Pulmonary Embolism
- Patent Foramen Ovale
Anatomy: Abdomen

Question 79 of 125

The third part of the duodenum lies at which of the following vertebral levels:

a T12
b L1
c L2
d L3
e L4

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Question Navigator

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3 Answered
4 Answered
5 Answered
6 Answered
7 Answered
8 Answered
9 Answered
10 Answered
11 Answered
12 Answered

Clear Exam
Anatomy: Abdomen

Question 7 of 125

The third part of the duodenum lies at which of the following vertebral levels:

a) T12
b) L1
c) L2
d) L3 ✅
e) L4

Answer

The inferior (third) part is the longest section, crossing the inferior vena cava, the aorta and the vertebral column at the level of vertebra L3 and lying inferior to the pancreas.

Notes

The small intestine is the longest part of the gastrointestinal tract and extends from the pyloric orifice of the stomach to the ileocaecal fold, comprising the duodenum, jejunum and ileum. The first part of the small intestine is the duodenum.

The duodenum is a C-shaped structure, adjacent to the head of the pancreas, and above the level of the umbilicus. It is retroperitoneal except for its proximal part which is connected to the liver by the hepatoduodenal ligament of the lesser omentum.

Parts of the duodenum

- The superior (first) part extends from the pyloric orifice of the stomach to the neck of the gallbladder. It lies just to the right of the body of vertebra L1, and passes anterior to the inferior vena cava and superior to the head of the pancreas.
- The descending (second) part is just to the right of the midline, extending from the neck of the gallbladder to the lower border of vertebra L3 and lying lateral to the head of the pancreas. This part contains the major duodenal papilla which is the common entrance for the bile and pancreatic ducts.
- The inferior (third) part is the longest section, crossing the inferior vena cava, the aorta and the vertebral column at the level of vertebra L3 and lying inferior to the pancreas.
- The ascending (fourth) part passes upwards on, or to the left of the aorta to approximately the upper border of vertebra L2 and terminates at the duodenojejunal flexure.

Blood supply

The arterial supply of the duodenum is primarily from the pancreaticoduodenal arteries, branches of the superior mesenteric artery and the gastroduodenal artery (branch of the common hepatic artery from the coeliac trunk).

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Anatomy: Abdomen

Question 80 of 125

Which of the following best describes the attachment of the base of the appendix:

a) Lateral wall of caecum inferior to ileocaecal valve
b) Medial wall of ascending colon, superior to ileocaecal valve
c) Antimesenteric border of ileum just proximal to ileocaecal valve
d) Posteromedial wall of caecum inferior to ileocaecal valve
e) Medial wall of caecum superior to ileocaecal valve

< Previous  Next >  See Answer  Something wrong?  Clear Exam
Anatomy: Abdomen

Which of the following best describes the attachment of the base of the appendix?

a) Lateral wall of cecum inferior to ileocecal valve ❌
b) Medial wall of ascending colon, superior to ileocecal valve ❌
c) Antevertoric border of ileum (not anterior) to ileocecal valve ❌
d) Posterior wall of cecum inferior to ileocecal valve ✔
e) Medial wall of cecum superior to ileocecal valve ❌

Answer

The appendix is attached to the posterior mesocolic wall of the cecum, just inferior to the ileoceleal opening and lies in the right iliac fossa. The cecum is continuous with the ascending colon at the entrance of the ileum and is usually in contact with the anterior abdominal wall. It may cross the pelvic brim to lie in the true pelvis.

Notes

The large intestine extends from the distal end of the ileum to the anus and contains the cecum, appendix, colon, rectum, and anal canal.

Cecum

The cecum is the first part of the large intestine. It is inferior to the ileocecal opening and lies in the right iliac fossa. The cecum is continuous with the ascending colon at the entrance of the ileum and is usually in contact with the anterior abdominal wall. It may cross the pelvic brim to lie in the true pelvis.

Appendix

The appendix is attached to the posterior mesocolic wall of the cecum, just inferior to the ileoceleal opening. The appendix is a narrow, blind-ended tube. It has large aggregations of lymphoid tissue in its walls and is suspended from the terminal ileum by the mesoappendix.

The point of attachment to the cecum is consistent with the highly visible free taeniae leading directly to the base of the appendix but the rest of its location is highly variable. It may be:

- 1. posterior to the cecum or the lower ascending colon, or both, in a retrocecal or retrorectal position
- 2. separated over the pelvic brim in a pelvic or descending peritoneal position
- 3. below the cecum in a subcecal position
- 4. anterior to the terminal ileum, possibly contacting with the body wall in a pre-rectal position or posterior to the terminal ileum in a pre-pelvic position.

The most common position is retrocecal, followed by pelvic. The retrocecal appendix is related anteriorly to the cecum and posteriorly to the transverse colon, a mesoappendix may be present in retrocecal appendicitis. Irritation of the psoas muscle (hip flexor) gives rise to pain when the patient’s right thigh is extended from an flexed position as the muscle is stretched.

The surface projection of the base of the appendix is at the junction of the lateral and middle one third of a line from the anterior superior iliac spine to the umbilicus (McBurney’s point). Points with appendicitis may also describe pain at this location.

Resources

- FRCEM Success
- Royal College of Emergency Medicine
- Advanced Life Support Group
- Advanced Trauma Life Support
- Resuscitation Council (UK)
- Trauma Life Support
- Trauma Life Management
- Basic Life Support
- Advanced Life Support Group

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Anatomy: Abdomen

Question 81 of 125

The jejunum predominantly occupies which region of the abdomen:

a. Left upper quadrant
b. Right upper quadrant
c. Left lower quadrant
d. Right lower quadrant
e. Suprapubic region

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The jejunum predominantly occupies which region of the abdomen:

- Left upper quadrant ✓
- Right upper quadrant
- Left lower quadrant
- Right lower quadrant
- Suprapubic region

Answer
The jejunum is mostly in the left upper quadrant of the abdomen.

Notes
The small intestine is the longest part of the gastrointestinal tract and extends from the pyloric orifice of the stomach to the ileocecal valve, forming the duodenum, jejunum, and ileum.

The jejunum and ileum make up the last two sections of the small intestine.

The jejunum and ileum are in a mesentery, attached to the posterior abdominal wall by the mesentery.

Jejunum
The jejunum represents the proximal two-thirds. It is mostly in the left upper quadrant of the abdomen and is larger in diameter and has a thicker wall than the ileum.

Ileum
The ileum makes up the distal three-fifths and is mostly in the right lower quadrant. The ileum terminates in the ileocecal junction, which forms the ileocecal valve, which prevents reflux from the cecum to the ileum and regulates the passage of contents from the ileum to the cecum.

Blood supply
The arterial supply to the jejunum and ileum is derived from the superior mesenteric artery.

Innervation
The sympathetic nerve supply is derived from the T9 - T10 spinal cord segments. Pain from the small intestine and ileum is referred to the peri-umbilical region.

Meckel's diverticulum
A Meckel's diverticulum is the remnant of the proximal part of the yolk stalk (umbilical duct) that extends into the umbilical cord in the embryo and lies on the antimesenteric border of the ileum, approximately 2 feet proximal to the ileocecal junction. It appears as an uniliated tubular outpouching of bowel, about 2 inches long, occurring in about 2% of the population, and may contain ectopic tissue (gastric and pancreatic). Complications include hemorrhage, intussusception, diverticulitis, ulceration, and obstruction, and symptoms may mimic those of acute appendicitis.

Resources
- Royal College of Emergency Medicine
- Well Association for Emergency Medicine
- Advanced Trauma Life Support
- Association Council (UK)
- Ninth Edn. 1998
- Trauma.org

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Anatomy: Abdomen

Which of the following is the functional unit of the liver:

a. Hepatocyte
b. Lobule
c. Portal triad
d. Lobe
e. Acinus

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Question Navigator

1. Answered
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6. Answered
7. Answered
8. Answered
9. Answered
10. Answered
11. Answered
12. Answered

Clear Exam
Anatomy: Abdomen

- Liver
- Gallbladder
- Pancreas
- Spleen
- Stomach
- Duodenum
- Intestines
- Kidneys
- Bladder

Abdominal Organs

Liver: Located on the right side of the body, just under the diaphragm, the liver is the largest organ in the body.

Gallbladder: A small, pear-shaped organ located under the liver, responsible for storing bile.

Pancreas: Situated behind the stomach, the pancreas helps regulate blood sugar levels and produce digestive enzymes.

Spleen: Found on the left side of the abdomen, the spleen filters blood and plays a role in the immune system.

Stomach: A part of the digestive system, the stomach helps break down food and mix it with digestive juices.

Duodenum: The first part of the small intestine, the duodenum is where nutrients are absorbed.

Intestines: The large and small intestines are responsible for absorbing nutrients and eliminating waste.

Kidneys: Located on either side of the spine, the kidneys filter waste products from the blood.

Bladder: A muscular sac located at the pelvic floor, the bladder stores urine until it is released.

Abdominal Nerves

The abdominal nerves are part of the autonomic nervous system, responsible for involuntary functions like digestion.

Abdominal Veins

The abdominal veins are part of the circulatory system, aiding in the transport of blood throughout the body.

Abdominal Arteries

The abdominal arteries supply oxygenated blood to the organs and tissues in the abdominal cavity.

Abdominal Muscles

The abdominal muscles provide support and protection for the abdominal organs.

Abdominal Fat

Abdominal fat is a type of fat that surrounds organs in the abdominal cavity and plays a role in energy storage.

History

This is a brief summary of the anatomical structures and functions of the abdomen.

Diagnosis

Diagnosis involves using imaging techniques like CT scans, MRIs, and ultrasounds to determine the condition of the organs.

Interventional Procedures

Interventional procedures may include endoscopic procedures or laparoscopic surgery to treat abdominal conditions.

Corrective Surgery

Corrective surgery may be performed to treat conditions like hernias or gastrointestinal disorders.

Recovery

Recovery from abdominal procedures typically involves rest and proper nutrition to aid in the healing process.

Final Thoughts

Understanding the anatomy and functions of the abdomen is crucial for diagnosing and treating various conditions.
Anatomy: Abdomen

Question 83 of 125

The common bile duct is formed from which of the following structures:

- a. The right and left hepatic duct
- b. The common hepatic duct and the pancreatic duct
- c. The common hepatic duct and the cystic duct
- d. The cystic duct and the pancreatic duct
- e. The hepatic ducts and hepatic artery proper

< Previous  Next >  See Answer  Something wrong? Clear Exam
Anatomy: Abdomen

**Question 8 of 125**

The common bile duct is formed from which of the following structures:

- a) The right and left hepatic duct (Correct)
- b) The common hepatic duct and the pancreatic duct
- c) The common hepatic duct and the cystic duct
- d) The cystic duct and the pancreatic duct
- e) The hepatic ducts and hepatic artery proper

**Answer**

The common hepatic duct and the cystic duct combine to form the common bile duct.

**Notes**

**Biliary tree**

The biliary tree begins in the liver parenchyma with the formation of the left and right hepatic duct which drain bile from the liver where it has been synthesised. These two ducts need to form the common hepatic duct which runs near the liver, with the hepatic artery proper and portal vein in the free margin of the lesser omentum.

As the common hepatic duct descends, it is joined by the cystic duct, which is a continuation of the neck of the gallbladder. The common hepatic duct and the cystic duct combine to form the common bile duct. At this point the bile duct lies to the right of the hepatic artery proper and usually to the right of, and anterior to, the portal vein in the free margin of the lesser omentum.

As the common bile duct descends, it passes posterior to the first part of the duodenum before joining with the pancreatic duct from the pancreas, forming the hepatopancreatic ampulla (ampulla of Vater) at the major duodenal papilla, located in the second part of the duodenum. Surrounding the ampulla is the sphincter of Oddi, a collection of smooth muscle which can open to allow bile and pancreatic fluid to empty into the duodenum.

**Common bile duct relations**

The common bile duct can be divided into three main regions, based on its relation to the duodenum:

- The first supraduodenal region is the upper one-third which lies in the free margin of the lesser omentum with the hepatic artery and portal vein. The common bile duct lies anterior to the portal vein and to the right of the hepatic artery proper.
- The second intraduodenal region is the middle one-third which lies posterior to the first part of the duodenum. The gastroduodenal artery lies on its left aspect and the portal vein on its posterior aspect.
- The third infraduodenal region is the lower one-third which lies in a groove on the posterior surface of the head of the pancreas, to the left of the second part of the duodenum and anterior to the right renal vein and inferior vena cava.

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Resources

- The Royal College of Emergency Medicine
- Web Association for Emergency Medicine
- Advanced Trauma Life Support
- Resuscitation Council (UK)
- TraumaUK
- Resuscitation

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Anatomy: Abdomen

Question 84 of 125

Which of the following structures is not related to the visceral surface of the liver:

- a Right kidney
- b Superior part of the duodenum
- c Oesophagus
- d Lesser omentum
- e Spleen

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12 Answered

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- Trauma.org
- Radiopaedia

Advanced Life Support Group
- Emergency Medicine Journal
- Lifeinthefastlane
- Instant Anatomy
- Patient.co.uk
Anatomy: Abdomen

Question 85 of 125

The inguinal ligament is formed from which of the following:

a) The lower free border of the external oblique aponeurosis
b) The lower free border of the internal oblique aponeurosis
c) The lower free border of the transversus abdominis aponeurosis
d) The lower free border of the rectus abdominis aponeurosis
e) The lower free border of the thoracolumbar fascia

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Anatomy: Abdomen

Quoted from LJS:
- The inguinal ligament is formed from which of the following?
  a) The lower free border of the external oblique aponeurosis
  b) Tensor fasciae latae
  c) Rectus abdominis
  d) Transversus abdominis

Answer
- The lower free border of the external oblique aponeurosis

Notes
- There are four recti muscles in the abdominal wall: three flat muscles whose fibers run parallel to the spine and one larger diagonal muscle across the front of the body. The rectus abdominis is derived from the costal margins of the lower eight ribs and inserts into the pubis; the rectus is the most anterior abdominal muscle and is important in core stability.

External oblique
- The external oblique is the most superficial and is a thick, broad, flat muscle that runs diagonally across the front of the body. It helps to protect the abdomen and helps with movement, such as bending forward or pushing against an object. The muscle fibers are oriented horizontally, and this helps to support the abdominal wall and protect the organs inside.

Internal oblique
- The internal oblique muscle lies deep to the external oblique. Its fibers are oriented horizontally, and it helps to protect the abdominal organs.

Transversus abdominis
- The transversus abdominis is located deep to the internal oblique muscle. Its fibers are oriented horizontally, and it helps to protect the organs inside the abdominal cavity.

External oblique origin:
- The external oblique muscle originates on the lower parts of the ribs and the iliac crest.

External oblique insertion:
- The external oblique inserts on the inguinal ligament and the pubis.

Internal oblique origin:
- The internal oblique muscle originates on the lower parts of the ribs and the iliac crest.

Internal oblique insertion:
- The internal oblique inserts on the pubis.

Transversus abdominis origin:
- The transversus abdominis muscle originates on the iliac crest and the posterior wall of the abdomen.

Transversus abdominis insertion:
- The transversus abdominis inserts on the lumbar spine and the pubis.

Rectus abdominis origin:
- The rectus abdominis originates on the xiphoid process and the anterior superior iliac spine.

Rectus abdominis insertion:
- The rectus abdominis inserts on the pubis.

Function
- The abdominal wall muscles work in concert to provide support and stability to the trunk. The muscles of the abdominal wall are involved in activities such as bending forward, lifting objects, and coughing.

Resources
- Each of the following is correct. Please select all that apply.
  a) The pubic symphysis
  b) The ilium
  c) The ischium
  d) The sacrum

Question Navigator
1. Answered
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13. Answered
14. Answered
15. Answered
16. Answered
17. Answered
Anatomy: Abdomen

Question 86 of 125

Regarding the large intestine, which of the following parts is not described correctly:

- a. Caecum – Intraperitoneal
- b. Ascending colon – Retroperitoneal
- c. Transverse colon – Intraperitoneal
- d. Descending colon – Retroperitoneal
- e. Sigmoid colon – Retroperitoneal

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Anatomy: Abdomen

Answer:

The ascending colon is the most superior part of the large intestine. It is located on the right side of the abdomen, just above the liver. The transverse colon is the horizontal portion of the large intestine that connects the ascending and descending colons. The descending colon is the portion of the large intestine that descends inferiorly from the transverse colon. The sigmoid colon is the narrowest portion of the large intestine and is located in the pelvis.

Notes:

The large intestine continues the structure of the small intestine in the area, and comprises the cecum, appendix, colon, rectum, and anal canal.

Questions:

Question Navigator

1. Ascending colon — Intervertebral
2. Descending colon — Intervertebral
3. Transverse colon — Intervertebral
4. Sigmoid colon — Intervertebral
5. Appendix — Intervertebral


Resources:

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- ERCB "AED" (current)
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ERCB is a dynamic organization with the mandate to promote the advancement of emergency care in Alberta. ERCB is a non-profit organization that serves as the leading voice for emergency care in Alberta. ERCB is dedicated to providing high-quality emergency care to Albertans and improving the safety and well-being of all Albertans. ERCB is committed to fostering a culture of continuous learning and improvement in emergency care in Alberta.

The ERCB is governed by a Board of Directors, which is responsible for setting the strategic direction and overseeing the operations of the organization. The Board is composed of representatives from various stakeholder groups, including healthcare providers, emergency management personnel, and government officials. ERCB is a member of the Canadian Association of Emergency Nurses (CAEN), the Canadian Association of Emergency Physicians (CAEP), and the Canadian Association of Critical Care Nurses (CACCN).

The ERCB offers a range of educational programs and resources, including certification programs, workshops, and webinars. ERCB is committed to providing high-quality emergency care to Albertans and improving the safety and well-being of all Albertans. ERCB is dedicated to fostering a culture of continuous learning and improvement in emergency care in Alberta.

Contact Information:

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Anatomy: Abdomen

A 45 year old overweight female, with known gallstones presents to ED complaining of severe right upper quadrant pain. Imaging shows that large gallstones have eroded through the posterior wall of the fundus of the gallbladder to enter the intestine. Which of the following parts of the intestine is most likely to first contain gallstones:

- Caecum
- Ascending colon
- Transverse colon
- Descending colon
- Sigmoid colon

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- Advanced Life Support Group
- Emergency Medicine Journal
- Lifeinthefastlane
- Instant Anatomy
- Patient.co.uk

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Anatomy: Abdomen

A 45-year-old overweight female, with known gallstones presents to ED complaining of severe right upper quadrant pain. Imaging shows that large gallstones have eroded through the posterior wall of the fundus of the gallbladder to enter the intestine. Which of the following parts of the intestine is most likely to first contain gallstones?

- Cecum
- Ascending colon
- Transverse colon
- Descending colon
- Sigmoid colon

Answer

The fundus of the gallbladder lies anterior to and in contact with the transverse colon, thus gallstones eroding through the posterior wall of fundus of the gallbladder will enter the right transverse colon (and then pass naturally through the descending colon and sigmoid colon). Gallstones lodged in the body of the gallbladder may erode through the posterior wall of the body to enter the duodenum (and may then become lodged at the ileocecal junction causing intestinal obstruction).

Notes

The gallbladder is a pear-shaped sac lying on the visceral surface of the right lobe of the liver in a fossa between the right and quadrate lobes. It is an intraperitoneal structure and lies in the right hypochondrium. It is located at the junction of the right ninth costal cartilage and the lateral border of the rectus abdominis muscles, which is the site of maximal tenderness in the acute inflammation of the gallbladder.

Structure

It has:
- a rounded end, the fundus, which may project from the inferior border of the liver
- a major part in the fossa, the body, which may lie against the transverse colon and the superior part of the duodenum
- a narrow part, the neck, which opens to become continuous with the cystic duct.

The neck contains a muscular fold, known as Hartmann’s pouch, which is a common site for gallstones to become lodged.

Relations

The gallbladder lies:
- posterior and inferior to the liver
- posterior to the anterior abdominal wall
- anterior to the transverse colon and the proximal duodenum
- superior to the biliary tree and the duodenum.

Innervation

Inflammation of the gallbladder may present with pain in the right upper quadrant and also the right shoulder; this is due to irritation of the diaphragmatic visceral peritoneum innervated by the phrenic nerve (C3 – C5) that also innervate skin over the shoulder.
Anatomy: Abdomen

Question 88 of 125

Regarding the transversus abdominis muscle, which of the following statements is CORRECT:

- a. It lies deep to the rectus abdominis muscle.
- b. It originates from the medial half of the inguinal ligament and the iliac crest.
- c. It inserts onto the linea alba and the pubic crest.
- d. It is intersected along its length by tendinous intersections.
- e. The lower free border of its aponeurosis forms the inguinal ligament.

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Anatomy: Abdomen

Question 89 of 125

Visceral afferent fibres from the ascending colon and proximal transverse colon travel to which of the following spinal cord segments:

a. T6 – T8
b. T8 – T10
c. T10 – T11
d. L1 – L2
e. L3 – L4
Anatomy: Abdomen

**Question 1:**

Vascular affinity terms from the ascending colon and proximal transverse colon travel to which of the following spinal cord segments?

- T1 - T6
- T7 - T12
- L1 - L2
- L3 - L4

**Answer:**

The vascular anatomy shown here from the ascending colon and transverse colon travel to the following spinal cord segments:

- T1 - T6: Anterior spinal artery
- T7 - T12: Posterior spinal artery
- L1 - L2: Anterior spinal artery

**Notes:**

The large blood vessels extend from the distal colon to the liver and preganglionic nerves to the L1 and L2 spinal cord segmental nerves to innervate to the hepatic region and high.

**Relations**

<table>
<thead>
<tr>
<th>Colons</th>
<th>Anterior relations</th>
<th>Posterior relations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ascending colon</td>
<td>Small intestine, proximal transverse colon, posterior abdominal wall</td>
<td>Rectosigmoid flexure, right iliac fossa</td>
</tr>
<tr>
<td>Transverse colon</td>
<td>Liver, gallbladder, stomach, proximal transverse colon, anterior abdominal wall</td>
<td>Spleen, stomach, left iliac fossa, aorta</td>
</tr>
<tr>
<td>Descending colon</td>
<td>Small intestine, proximal transverse colon, anterior abdominal wall</td>
<td>Renal vessels, descending colon</td>
</tr>
<tr>
<td>SigmoiD colon</td>
<td>Uterus, urinary bladder</td>
<td>Rectosigmoid flexure, anus</td>
</tr>
</tbody>
</table>

**Blood supply:**

The arterial supply to the colon is derived from the superior mesenteric artery (SMA). An anterior view of the SMA is shown. The SMA provides branches to the colon and the rectum. The SMA gives rise to the inferior mesenteric artery (IMA) which supplies the rectum.

The posterior view of the SMA shows the posterior mesenteric vein (PMV) which drains into the SMA. The SMA is the main blood supply to the abdominal organs.

**Transverse colon:**

The transverse colon is the longest part of the small intestine. It connects the small intestine to the cecum. The transverse colon is divided into three parts: the left, middle, and right sections. The left section is located on the left side of the abdomen, the middle section is located in the midline, and the right section is located on the right side of the abdomen.

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    - Medical School Ongoing
    - Medical School Study Aid
Anatomy: Abdomen

The retroduodenal region of the common bile duct:

a. lies left of the gastroduodenal artery.
b. lies posterior to the portal vein.
c. lies posterior to the first part of the duodenum
d. empties directly into the major duodenal papilla.
e. lies posterior to the second part of the duodenum.
Anatomy: Abdomen

Question 25 of 125
The retroperitoneal region of the common bile duct:

- a) lies left of the gastroduodenal artery - Correct
- b) lies posterior to the portal vein.
- c) lies posterior to the first part of the duodenum - Correct
- d) opens directly into the major duodenal papilla.
- e) lies posterior to the second part of the duodenum.

Answer
The retroperitoneal region is the middle one-third of the common bile duct which lies posterior to the first part of the duodenum. The gastroduodenal artery lies on its left aspect and the portal vein on its posterior aspect.

Notes
Biliary tree
The biliary tree begins in the liver parenchyma with the formation of the left and right hepatic ducts which drain bile from the liver where it has been synthesized. These two ducts meet to form the common hepatic duct which runs near the liver, with the hepatic artery proper and portal vein in the free margin of the lesser omentum.

As the common hepatic duct descends, it is joined by the cystic duct, which is a continuation of the neck of the gallbladder. The common hepatic duct and the cystic duct combine to form the common bile duct. At this point the bile duct lies to the right of the hepatic artery proper and usually to the right of and anterior to, the portal vein in the free margin of the lesser omentum.

As the common bile duct descends, it passes posterior to the first part of the duodenum before joining with the pancreatic duct from the pancreas, forming the hepatopancreatic ampulla (ampulla of Vater) at the major duodenal papilla, located in the second part of the duodenum. Surrounding the ampulla is the sphincter of Oddi, a collection of smooth muscle which can open to allow bile and pancreatic fluid to empty into the duodenum.

Common bile duct relations
The common bile duct can be divided into three main regions, based on its relation to the duodenum:

- The suprapancreatic region is the upper one-third which lies in the free margin of the lesser omentum with the hepatic artery and portal vein. The common bile duct lies anterior to the portal vein and to the right of the hepatic artery proper.
- The retroperitoneal region is the middle one-third which lies posterior to the first part of the duodenum. The gastroduodenal artery lies on its left aspect and the portal vein on its posterior aspect.
- The infrapancreatic region is the lower one-third which lies in the groove on the posterior surface of the head of the pancreas, to the left of the second part of the duodenum and anterior to the right renal vein and inferior vena cava.
Anatomy: Abdomen

A 35 year old female is brought into hospital following a road traffic accident. Imaging shows retroperitoneal trauma. Which of the following structures is most likely affected:

- a) Stomach
- b) Abdominal aorta
- c) Caecum
- d) Tail of the pancreas
- e) Gallbladder
Anatomy: Abdomen

A 35-year-old female is brought into hospital following a road traffic accident. Imaging shows retroperitoneal trauma. Which of the following structures is most likely affected?

- a) Stomach
- b) Abdominal aorta
- c) Jejunum
- d) Tail of the pancreas
- e) Gallbladder

Answer

The abdominal aorta is the only retroperitoneal structure listed.

Notes

The peritoneum is a continuous double-layered serous membrane.

The parietal peritoneum lines the walls of the abdominal cavity and the visceral peritoneum lines the viscer.

Between the parietal and visceral layers of peritoneum is a potential space, the peritoneal cavity.

Abdominal viscera are either suspended in the peritoneal cavity by folds of peritoneum called mesenteries (entrap visceral visco) or are outside the peritoneal cavity bound to the posterior abdominal wall (retroperitoneal visco). Retroperitoneal organs are only covered in peritoneum on their anterior surface.

Innervation

The parietal peritoneum associated with the abdominal wall is innervated by somatic afferents carried in branches of the associated spinal nerves and is therefore sensitive to pressure, pain and temperature, and gives rise to well-localised pain. The diaphragmatic peritoneum is supplied by the phrenic nerve (C3 – C5) and the remainder of the parietal peritoneum is supplied segmentally by intercostal and lumbar nerves.

The visceral peritoneum is innervated by visceral afferents that accompany autonomic nerves back to the CNS and therefor activation gives rise to referred and poorly localised sensations of discomfort and to visceral motor activity.

Retropertitoneal viscera

A useful mnemonic to help remember which abdominal organs are retroperitoneal is SAD PUCKER:

- Superior vena cava
- Aorta and Inferior vena cava
- Duodenum (2nd and 3rd part)
- Pancreas (except for the tail)
- Ureters (proximal) and Bladder
- Colon (ascending and descending)
- Kidneys
- [Oesophagus]
- Rectum (lower two-thirds)

Resources

- The Royal College of Emergency Medicine
- The Faculty of Intensive Care Medicine
- Advanced Trauma Life Support®
- Resuscitation Council UK
- Faculty of Anaesthetics
- Trauma TV
- Traumapedia

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- Emergency Medicine Journal
- Cardiac Care
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- FRCEMSuk

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Anatomy: Abdomen

Question 92 of 125

The quadrate and caudate lobes of the liver are separated by which of the following structures:

a. Ligamentum venosum
b. Ligamentum teres
c. Gallbladder
d. Inferior vena cava
e. Porta hepatitis

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12. Answered

Clear Exam
Anatomy: Abdomen

Question 93 of 125

A 19 year old male is brought to ED having sustained a handlebar injury with blunt trauma to his upper abdomen whilst riding his scooter. Which of the following is the most commonly injured organ:

- a) Pancreas
- b) Transverse colon
- c) Spleen
- d) Duodenum
- e) Kidney

< Previous  Next >  See Answer
Anatomy: Abdomen

A 19-year-old male is brought to ED having sustained a handlebar injury with blunt trauma to his upper abdomen whilst riding his scooter. Which of the following is the most commonly injured organ?

- Pancreas
- Transverse colon
- Spleen
- Gallbladder
- Kidney

Answer

The liver and spleen are the most commonly injured organs with this clinical picture.

Notes

1. The transverse colon lies against the diaphragm, in the area of ribs 7 – 11. It lies in the left hypochondrium of the abdomen. The spleen should normally be palpated on clinical examination

2. The spleen is an organ of the reticuloendothelial system and acts:
   - to filter blood to remove old and defective blood cells
   - to act as a reservoir
   - to produce white blood cells
   - to produce an immune response

Relations

The spleen lies posterior to the stomach, superior to the left colic flexure and laterally to the left kidney and tail of the pancreas.

Surface markings

The splenic ligaments are the left side and back in the area of ribs 9 – 11. The spleen follows the contour of rib 10 and extends from the superior pole of the left kidney to just posterior to the midaxillary line.

Splenic, mastication

This most commonly occurs due to localized trauma to the left upper quadrant. It may be associated with left lowerrib fractures. Because the spleen has an extremely thin capsule it is susceptible to injury even when there is no damage to surrounding structures and because the spleen is highly vascular when ruptured, it bleeds profusely into the peritoneal cavity.
Anatomy: Abdomen

Question 94 of 125

The hepatic portal vein is formed from the union of which of the following veins:

a) Superior mesenteric and inferior mesenteric veins
b) Superior mesenteric and hepatic veins
c) Right and left hepatic veins
d) Superior mesenteric and splenic veins
e) Superior mesenteric and gastric veins

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9 Answered
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11 Answered
12 Answered

Clear Exam
Anatomy: Abdomen

Quarter 4 Q 25

The hepatic portal vein is formed from the union of which of the following veins?

- a) Superior mesenteric and inferior mesenteric veins
- b) Superior mesenteric and hepatic veins
- c) Right and left hepatic veins
- d) Superior mesenteric and splenic veins
- e) Superior mesenteric and gastric veins

Answer:

The portal vein is formed from the union of the superior mesenteric and splenic veins posterior to the neck of the pancreas at the level of vertebra L2.

Notes:

The portal vein is the final common pathway for the transport of venous blood from the spleen, pancreas, gallbladder and abdominal part of the gastrointestinal tract.

It is formed from the union of the superior mesenteric and splenic veins posterior to the neck of the pancreas at the level of vertebra L2.

Portal systemic anastomoses:

The hepatic portal system drains desanguinated nutrient-rich blood from the visceral organs of the abdomen to the liver. Normally, 100% of portal venous blood flow is recovered from the hepatic veins. In patients with elevated portal venous pressure e.g. from cirrhosis, there is significantly less blood flow to the liver and the rest of the blood enters collateral channels which drain into the systemic circulation at specific points.

Portal systemic anastomoses occur at specific points of the liver, the largest of these being:

- The gastroesophageal junction around the cardio of the stomach where the left gastric vein and its tributaries from gastroesophageal anastomosis with tributaries of the splenic veins of the caval system
- The area where the superior mesenteric vein of the portal system anastomoses with the middle and inferior mesenteric veins of the systemic venous system
- The anterior abdominal wall around the umbilicus where the portal venous and systemic veins anastomose with systemic veins on the anterior abdominal wall.

When pressure in the portal vein is elevated, venous engorgement (varices) tends to occur at and around these sites producing:

- varices at the gastroesophageal junction
- varices at the mesenteric junction
- caput medusae at the umbilicus

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- Emergency Medicine Journal
- Advanced Life Support
- Patient.uk

Resources

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Anatomy: Abdomen

Question 95 of 125

Regarding the appendix, which of the following statements is CORRECT:

a. The psoas sign may be positive in retrocaecal appendicitis.
b. The appendix has a highly variable attachment site to the caecum.
c. The appendix is a retroperitoneal structure.
d. The surface projection of the base of the appendix is called Murphy’s point.
e. The subcaecal position is the most common position of the appendix.
Anatomy: Abdomen

Question 15 of 32

Regarding the appendix, which of the following statements is CORRECT?

a) The posa sign may be positive in retrocecal appendicitis.

b) The appendix has a highly variable attachment site to the cecum.

c) The appendix is a vermiform structure.

d) The surface projection of the base of the appendix is called Murphy’s point.

e) The subcecal position is the most common position of the appendix.

Answer

The most common position is retrocecal, followed by pelvic. The retrocecal appendix is related anteriorly to the cecum and posteriorly to the psoas major and iliacus muscle. The posa sign may be positive in retrocecal appendicitis. Irritation of the posa major (left flexure) gives rise in pain when the patient’s right thigh is extended from a flexed position as the muscle is stretched.

Notes

The large intestine extends from the distal end of the large to the anus, and comprises the cecum, appendix, colon, rectum and anal canal.

Cecum

The interlooped cecum is the first part of the large intestine. It is inferior to the ileocecal opening and lies in the right iliac fossa. The cecum is continuous with the ascending colon at the entrance of the ileocecal valve, and in contact on the anterior abdominal wall. It may cross the pelvic brim to lie in the true pelvis.

Appendix

The appendix is attached to the posteromedial wall of the cecum, just inferior to the ileocecal valve. The appendix is a vermiform, blind ended tube. It has a large aggregation of lymphatic tissue in its walls and is surrounded by the vermiform process.

Its point of attachment to the cecum is considered with the highly visible free mesoappendix leading directly to the base of the appendix but not the root of this latter is highly visible. It may lie:

1. posterior to the cecum on the lower ascending colon, or both, in a retrocecal or retrocecal position
2. suspended over the pelvic brim by a pelvic or descending position
3. below the cecum in a subcecal position
4. anterior to the terminal ileum, possibly connected with the ileoceleal valve in a previleal position or posterior to the terminal ileum in a postileal position.

The most common position is retrocecal, followed by pelvic. The retrocecal appendix is related anteriorly to the cecum and posteriorly to the psoas major and iliacus muscle. The posa sign may be positive in retrocecal appendicitis. Irritation of the posa major (left flexure) gives rise in pain when the patient’s right thigh is extended from a flexed position as the muscle is stretched.

The surface projection of the base of the appendix is at the junction of the ileum and middle one-third of a line from the anterior superior iliac spine to the umbilicus (right iliac fossa). People with appendix signs may describe pain at this location.
Anatomy: Abdomen

Question 96 of 125

The oesophagus passes through the diaphragm at which vertebral level:

a. T8  
b. T9  
c. T10  
d. T11  
e. T12

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11. Answered  
12. Answered  

Clear Exam
Anatomy: Abdomen

Question 96 of 125

The oesophagus passes through the diaphragm at which vertebral level:

a) T8
b) T9

T10

d) T11

e) T12

Answer

The abdominal oesophagus emerges through the oesophageal hiatus in the diaphragm at vertebral level T10.

Notes

The abdominal oesophagus represents the short distal part (about 2 cm) of the oesophagus located in the abdominal cavity. Emerging through the right crus of the diaphragm at the level of vertebra T10, it passes from the oesophageal hiatus to the cardiac orifice of the stomach just left of the midline at the level of vertebra T11.

The lower oesophageal sphincter is a physiological sphincter located at the gastro-oesophageal junction.

Anatomical factors that help guard against gastric reflux include:

- The diaphragmatic pinchcock effect where at the oesophageal hiatus, right crural fibres exert pressure on the oesophageal wall and serve as an extrinsic sphincter
- The lower oesophageal sphincter which is a high-pressure zone of smooth muscle in the oesophageal wall maintained in a state of tonic contraction (except during swallowing, belching or vomiting)
- Intra-abdominal pressure which maintains the oesophagus in a state of collapse when empty
- The angle of His formed at the junction of the oesophagus and the gastric fundus, which together with the posterolateral position of the gastric fundus, minimises contact of gastric content with the gastro-oesophageal junction
- The gastric mucosal rossette-like folds formed at the gastro-oesophageal junction which compress against each other with increased intra-abdominal pressure to prevent reflux

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Anatomy: Abdomen

The portal triad comprises all of the following structures EXCEPT for:

- a. Branches of the hepatic vein
- b. Branches of the portal vein
- c. Branches of the hepatic artery
- d. Bile ducts
- e. Vagal parasympathetic nerve fibres

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Anatomy: Abdoveen

Answer:

1. **Inferior Vena Cava**
2. **Superior Vena Cava**
3. **Liver**
4. **Diaphragm**

**Nerves:**

1. **Celiac plexus**
2. **Mesenteric plexus**
3. **Hepatic plexus**
4. **Splenic plexus**

**Sympathetic trunk:**

1. **Thoracic segments**
2. **Cervical segments**
3. **Sacral segments**

**Intestinal arteries:**

1. **Common hepatic artery**
2. **Gastric arteries**
3. **Splenic artery**
4. ** Hepatic arteries**

**Aralenal arteries:**

1. **Gastric arteries**
2. **Celiac artery**
3. **Common hepatic artery**
4. **Gastric arteries**

**Inferior mesenteric artery:**

1. **Ileocolic artery**
2. **Mesenteric artery**
3. **Sigmoid artery**
4. **Specific segmental arteries**

**Diaphragm:**

1. **Right crural portion**
2. **Left crus**
3. **Lateral arcuate ligament**
4. **Lateral arcuate ligament”

**Liver:**

- Hepatocellular carcinoma
- Metastatic liver disease
- Liver transplantation
- Hepatobiliary tract disease
- Hepatitis

**Lymph nodes:**

- Hepatic lymph nodes
- Splenic lymph nodes
- Mesenteric lymph nodes
- Celiac lymph nodes

**Liver function:**

- Hepatocellular function
- Biliary function
- Metabolic function
- Hematopoietic function

**Liver failure:**

- Acute liver failure
- Chronic liver failure

**Liver transplantation:**

- Living donor liver transplantation
- Cadaveric donor liver transplantation

**Liver transplantation complications:**

- Acute rejection
- Chronic rejection
- Infectious complications
- Oncological complications

**Liver cirrhosis:**

- Alcoholic liver disease
- Non-alcoholic fatty liver disease
- Autoimmune hepatitis
- Primary biliary cirrhosis

**Liver cancer:**

- Hepatocellular carcinoma
- Cholangiocarcinoma
- Liver metastases
- Sarcoma

**Gastrointestinal bleeding:**

- Upper gastrointestinal bleeding
- Lower gastrointestinal bleeding

**Gastrointestinal perforation:**

- Peptic ulcer disease
- Crohn’s disease
- Diverticulitis
- Cancer

**Gastrointestinal obstruction:**

- Intestinal obstruction
- Esophageal obstruction
- Gastric outlet obstruction

**Gastrointestinal fistulas:**

- Enterocutaneous fistula
- Enterostomal fistula
- Enterovesical fistula

**Gastrointestinal hemorrhage:**

- Upper gastrointestinal hemorrhage
- Lower gastrointestinal hemorrhage

**Gastrointestinal tract:**

- Esophagus
- Stomach
- Small intestine
- Large intestine

**Gastrointestinal tract disorders:**

- GI motility disorders
- GI inflammatory disorders
- GI neoplastic disorders
- GI functional disorders

**Gastrointestinal tract surgery:**

- Laparoscopic surgery
- Open surgery
- Endoscopic procedures
- Interventional procedures

**Gastrointestinal tract cancers:**

- Esophageal cancer
- Stomach cancer
- Small bowel cancer
- Large bowel cancer

**Gastrointestinal tract imaging:**

- Ultrasound
- CT scan
- MRI
- Endoscopy

**Gastrointestinal tract research:**

- Basic science research
- Clinical research
- Translational research
- Public health research

**Gastrointestinal tract therapy:**

- Medical therapy
- Surgery
- Radiation therapy
- Immunotherapy

**Gastrointestinal tract genetics:**

- Genetic basis of GI disorders
- Genetic screening
- Genetic counseling
- Genetic therapy
Anatomy: Abdomen

Question 98 of 125

The superficial inguinal ring is located at which of the following sites:

- a. Just superior to the midpoint of the inguinal ligament
- b. Superior to a point midway between the anterior superior iliac spine and the pubic symphysis
- c. Superior to a point midway between the anterior superior iliac spine and the pubic tubercle
- d. Just superior to the pubic tubercle
- e. Immediately lateral to the inferior epigastric vessels

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Anatomy: Abdomen

Question 99 of 125

The abdominal aorta lies posterior to which of the following parts of the duodenum:

- a) First part
- b) Second part
- c) First and second parts
- d) Second and third parts
- e) Third and fourth parts

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Anatomy: Abdomen

Question 99 of 125

The abdominal aorta lies posterior to which of the following parts of the duodenum:

- a) First part
- b) Second part
- c) First and second parts
- d) Second and third parts
- e) Third and fourth parts

Answer

The inferior (third) part is the longest section, crossing the inferior vena cava, the aorta and the vertebral column at the level of vertebra L3 and lying inferior to the pancreas. The ascending (fourth) part passes upwards on, or to the left of the aorta to approximately the upper border of vertebra L2 and terminates at the duodenaljejunal flexure.

Notes

The small intestine is the longest part of the gastrointestinal tract and extends from the pyloric orifice of the stomach to the ileocecal fold, comprising the duodenum, jejunum and ileum. The first part of the small intestine is the duodenum.

The duodenum is a C-shaped structure, adjacent to the head of the pancreas, and above the level of the umbilicus. It is retroperitoneal except for its proximal part which is connected to the liver by the hepatoduodenal ligament of the lesser omentum.

Parts of the duodenum

- The superior (first) part extends from the pyloric orifice of the stomach to the neck of the gallbladder, lies just to the right of the body of vertebra L1, and passes anterior to the inferior vena cava and superior to the head of the pancreas.
- The descending (second) part is just to the right of the midline, extending from the neck of the gallbladder to the lower border of vertebra L3 and lying lateral to the head of the pancreas. This part contains the major duodenal papilla which is the common entrance for the bile and pancreatic ducts.
- The inferior (third) part is the longest section, crossing the inferior vena cava, the aorta and the vertebral column at the level of vertebra L3 and lying inferior to the pancreas.
- The ascending (fourth) part passes upwards on, or to the left of the aorta to approximately the upper border of vertebra L2 and terminates at the duodenaljejunal flexure.

Blood supply

The arterial supply of the duodenum is primarily from the pancreaticoduodenal arteries, branches of the superior mesenteric artery and the gastroduodenal artery [branch of the common hepatic artery from the coeliac trunk].
Anatomy: Abdomen

Question 100 of 125

Regarding the external oblique muscle, which of the following statements is INCORRECT:

a. It is the largest and most superficial of the anterior abdominal muscles.
b. Its aponeurosis forms the linea alba at the midline.
c. It originates from the xiphoid process.
d. It inserts into the lateral lip of the iliac crest.
e. The lower free border of the external oblique aponeurosis forms the inguinal ligament.

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Anatomy: Abdomen

Question 1: 105

Regarding the external oblique musculature, which of the following statements is CORRECT?

1. It is the largest and most superficial of the anterior abdominal muscles
2. It is innervated by the lumbar plexus
3. It is the deepest of the abdominal muscles
4. It is innervated by the thoracolumbar plexus

Options:
A. 1
B. 2
C. 3
D. 4

Correct Answer: A

Answer: The external oblique is the largest and most superficial of the anterior abdominal muscles. It is involved in movements like flexion and internal rotation of the thigh. Its innervation comes from both the lumbar and thoracolumbar plexus. The deeper muscles include the internal oblique and transversus abdominis.

Notes: There are no specific landmarks to identify the external oblique muscle. It can be felt as a band of muscle fibers that run horizontally and are最容易被感知的 anterior abdominal muscle. Its innervation comes from the lumbar plexus (L1-L4 nerves) and thoracolumbar plexus (T12-L4 nerves).

External oblique

The external oblique muscle is the largest and most superficial of the anterior abdominal muscles. It is involved in movements like flexion and internal rotation of the thigh. Its innervation comes from both the lumbar and thoracolumbar plexus. The deeper muscles include the internal oblique and transversus abdominis.

Internal oblique

The internal oblique muscle is deep to the external oblique muscle. It innervates to a paraspinal location, originating from the thoracolumbar fascia. Its innervation is from the lumbar plexus, specifically the T12-L4 nerves. It is involved in movements like flexion and internal rotation of the thigh.

Transversus abdominis

The transversus abdominis is the innermost of the three abdominal muscle layers. It originates from the thoracolumbar fascia, the transverse processes of the lumbar vertebrae, and the iliac crest. It is innervated by the lumbar plexus, specifically the T12-L4 nerves. It is involved in movements like flexion and internal rotation of the thigh.

Rectus abdominis

The rectus abdominis is a long, strap-like muscle that extends from the xiphoid process to the pubic symphysis. It originates from the pubic crest, pubic bone, and pubic symphysis and inserts on the anterior superior iliac spine. It is innervated by the lumbar plexus, specifically the T4-L2 nerves. It is involved in movements like flexion and internal rotation of the thigh.

Function

The external oblique muscle is a powerful flexor of the thigh. The internal oblique muscle is involved in movements like flexion and internal rotation of the thigh. The transversus abdominis muscle is involved in movements like flexion and internal rotation of the thigh. The rectus abdominis muscle is involved in movements like flexion and internal rotation of the thigh.

In addition, contraction of these muscles helps stabilize the trunk, protecting the back and abdomen during activities that involve excessive twisting or bending. For example, this muscle is activated during arm exercises to maintain balance or support during movements that involve twisting or bending.
Anatomy: Abdomen

Question 101 of 125

Which of the following abdominal regions does the caecum occupy:

a  Right iliac fossa
b  Left iliac fossa
c  Suprapubic region
d  Right flank
e  Umbilicus

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7  Answered
8  Answered
9  Answered
10 Answered
11 Answered
12 Answered

Clear Exam
Anatomy: Abdomen

Which of the following abdominal regions does the cecum occupy:

- Right flexure
- Left flexure
- Suprapubic region
- Right flank
- Umbilicus

Answer

The intermesenteric cecum is the first part of the large intestine. It is inferior to the ileocecal opening and lies in the right flexure.

Notes

The large intestine extends from the distal end of the ileum to the anus, and comprises the cecum, appendix, colon, rectum and anal canal.

The Large Intestine

"Diagram of the large intestine, showing the colon, rectum and appendix."

Cecum

The intermesenteric cecum is the first part of the large intestine. It is inferior to the ileocecal opening and lies in the right flexure. The cecum is continuous with the ascending colon at the entrance of the ileum and usually in contact with the anterior abdominal wall if it lies across the pelvic brim to lie in the true pelvis.

Appendix

The appendix is attached to the cecum at the ileocecal valve by the mesoappendix, and is a common site for the development of inflammatory conditions such as appendicitis.

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1. Answered
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12. Answered

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Anatomy: Abdomen

Question 102 of 125

The abdominal wall is divided into a simple four quadrant pattern by the vertical median plane intersecting with which of the following transverse planes:

- **Transumbilical plane passing through the umbilicus**
- **Intertubercular plane connecting the tubercles of the iliac crests**
- **Transpyloric plane lying halfway between the jugular notch and the pubic symphysis**
- **Subcostal plane lying immediately inferior to the costal margins**
- **Interspinous plane connecting the anterior superior iliac spines**

[Buttons: Previous, Next, See Answer, Something wrong?]
Anatomy: Abdomen

Question 126 of 125

The abdominal wall is divided into a simple four quadrant pattern by the vertical median plane intersecting with which of the following transverse planes:

a) Transumbilical plane passing through the umbilicus ✓
b) Interumbilical plane connecting the tubercles of the iliac crests
c) Transpyloric plane lying halfway between the juchal notch and the pubic symphysis
d) Subcostal plane lying immediately inferior to the costal margins
e) Intercostal plane connecting the anterior superior iliac spines

Answer

The abdominal wall may be divided into a simple four-quadrant topographical pattern by a horizontal line passing through the umbilicus and the intervertebral disc between vertebrae L3 and L4 (transumbilical plane) intersecting with the vertical median plane.

Notes

Four-quadrant pattern

The abdominal wall may be divided into a simple four-quadrant topographical pattern by a horizontal line passing through the umbilicus and the intervertebral disc between vertebrae L3 and L4 (transumbilical plane) intersecting with the vertical median plane: this forms the right upper, the left upper, the right lower and the left lower quadrants.

Nine-region pattern

The nine-region topographical description is based on two horizontal and two vertical planes.

The two vertical planes pass on each side from the midpoint of the clavicle to the midpoint of the inguinal ligament.

The inferior horizontal plane (the intertubercular plane) connects the tubercles of the iliac crests and passes posteriorly through the body of vertebra L5.

The superior horizontal plane may be taken as the subcostal or the transpyloric plane:

- The subcostal plane lies immediately inferior to the costal margins at the lower border of the tenth costal cartilage and passes posteriorly through the body of vertebra L3.
- The transpyloric plane lies halfway between the juchal notch and the pubic symphysis, intersecting with the costal margin at the ends of the ninth costal cartilage and passing posteriorly through the body of vertebra L1.

The nine regions are designated (read as if reading a book):

- the right hypochondriac region
- the epigastric region
- the left hypochondriac region
- the right lumbar region (or flank)
- the umbilical region
- the left lumbar region (or flank)
- the right iliac region
- the pubic (or hypogastric) region
- the left iliac region

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Anatomy: Abdomen

Question 103 of 125

The mesentery connects which of the following structures to the posterior abdominal wall:

a. Transverse colon
b. Stomach
c. Jejunum and ileum
d. Duodenum
e. Liver

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Anatomy: Abdomen

Lower part of the abdomen

The musculature consists of the following structures in the posterior abdominal wall:

- Transversus abdominis
- External oblique
- Internal oblique
- Rectus abdominis

Answer

Transversus abdominis

The transversus abdominis is a broad, flat sheet of muscle that runs across the front of the abdomen. It is covered by the external oblique and internal oblique muscles. The transversus abdominis helps support the back and stabilizes the spine during activities like lifting or standing. It also plays a role in core stability and balance.

External oblique

The external oblique is a thick, fan-shaped muscle that runs diagonally across the sides of the abdomen. It helps in movements like bending forward at the waist and moving the ribs in and out during breathing. The external oblique also plays a role in supporting the abdominal organs and protecting the internal organs from external forces.

Internal oblique

The internal oblique is a thick, fan-shaped muscle that runs diagonally across the sides of the abdomen. It helps in movements like bending forward at the waist and moving the ribs in and out during breathing. The internal oblique also plays a role in supporting the abdominal organs and protecting the internal organs from external forces.

Rectus abdominis

The rectus abdominis is a long, strap-like muscle that runs vertically down the center of the abdomen. It helps in movements like bending forward at the waist and moving the ribs in and out during breathing. The rectus abdominis is also involved in activities like pulling your belly button in and holding your abdominal organs in place during activities like lifting or coughing.

Notes

Structures

- Transversus abdominis
- External oblique
- Internal oblique
- Rectus abdominis

Abdominal wall

The abdominal wall is made up of the following structures:

- Transversus abdominis
- External oblique
- Internal oblique
- Rectus abdominis

Transversus abdominis

The transversus abdominis is a broad, flat sheet of muscle that runs across the front of the abdomen. It is covered by the external oblique and internal oblique muscles. The transversus abdominis helps support the back and stabilizes the spine during activities like lifting or standing. It also plays a role in core stability and balance.

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Connections of the posterior wall

The abdominal wall is divided into the anterior, posterior, and lateral walls. The posterior wall of the abdomen is made up of the following muscles:

- Transversus abdominis
- External oblique
- Internal oblique
- Rectus abdominis

The transversus abdominis is a broad, flat sheet of muscle that runs across the front of the abdomen. It is covered by the external oblique and internal oblique muscles. The transversus abdominis helps support the back and stabilizes the spine during activities like lifting or standing. It also plays a role in core stability and balance.

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Muscles

Muscles are the body’s primary source of movement. They are composed of muscle fibers that contract to produce movement. There are different types of muscles depending on their function:

- Skeletal muscles: attached to the bones of the body
- Smooth muscles: found in the walls of organs like the stomach and intestines
- Cardiac muscles: found in the heart

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The transversus abdominis is a broad, flat sheet of muscle that runs across the front of the abdomen. It is covered by the external oblique and internal oblique muscles. The transversus abdominis helps support the back and stabilizes the spine during activities like lifting or standing. It also plays a role in core stability and balance.

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Anatomy: Abdomen

McBurney’s point, the surface projection of the base of the appendix is located at which of the following sites:

a. At the junction of the lateral and middle one-thirds of a line extending from the anterior superior iliac spine to the umbilicus.

b. At the midpoint of a line extending from the anterior superior iliac spine to the umbilicus.

c. At the junction of the medial and middle one-thirds of a line extending from the anterior superior iliac spine to the umbilicus.

d. At the midpoint of a line extending from the anterior superior iliac spine to the pubic symphysis.

e. At the midpoint of a line extending from the anterior superior iliac spine to the pubic tubercle.

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Anatomy: Abdomen

Question 1 of 25

McBurney’s point: the surface projection of the base of the appendix is located at one of the following sites:

A. At the junction of the lateral and middle one-third of a line extending from the anterior superior iliac spine to the umbilicus.
B. At the site of origin of a line extending from the anterior superior iliac spine to the umbilicus.
C. At the junction of the medial and middle one-third of a line extending from the anterior superior iliac spine to the pubis.
D. At the point of a line extending from the anterior superior iliac spine to the pubic symphysis.
E. At the midpoint of a line extending from the anterior superior iliac spine to the pubic tubercle.

Answer

The surface projection of the base of the appendix is at the junction of the lateral and middle one-third of a line from the anterior superior iliac spine to the umbilicus (McBurney’s point). People with appendicitis may develop pain at this location.

Notes

The large intestine extends from the distal end of the ileum to the anus, and comprises the caecum, appendix, colon, rectum and anal canal.

Cancer

The interperitoneal cancer is the first part of the large intestine. It is inferior to the mesoappendix opening and is to the right side of the body. The cupus is continuous with the ascending colon at the gas trointestinal level. It has large aggregations of lymphatic tissue in its walls and is supplied from the terminal ileum by the mesenteric artery.

Appendix

The appendix is attached to the posterior medial wall of the caecum, just inferior to the rest of the caecum. The appendix is a narrow, hollow, blind-ended tube. It is large aggregations of lymphatic tissue in its walls and is supplied from the terminal ileum by the mesenteric artery.

Its point of attachment to the caecum is consistent with the movable free boundary that may attach to the base of the appendix but not the rest of the location. It is variable. It may be:

- 1. posterior to the caecum or the lower ascending colon, or both, in a retrocecal or retroperitoneal position
- 2. inferior to the peritoneum in a peritoneal or retroperitoneal position
- 3. 1/3 below the caecum in a subcecal position
- 4. anterior to the terminal ileum, possibly contacting with the body wall in a pre-ileal position or posterior to the terminal ileum in a post-ileal position.

The most common position is retrocecal, followed by ileal. The retrocecal appendix is related anteriorly to the caecum and posteriorly to the peritoneum and the bowel. The peritoneum may be posterior to the retrocecal appendices. Interruption of the peritoneal line gives rise to pain when the patient’s right thigh is extended so the patient's leg is bent.
Anatomy: Abdomen

Question 105 of 125

The lymphatic supply of the liver primarily drains into:

a. Superior mesenteric lymph nodes
b. Inferior mesenteric lymph nodes
c. Coeliac lymph nodes
d. Lumbar lymph nodes
e. Lateral aortic lymph nodes

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Anatomy: Abdomen

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The supraduodenal region of the common bile duct:

- a. lies superior to the cystic duct.
- b. lies in the free margin of the greater omentum.
- c. lies to the left of the hepatic artery proper.
- d. lies anterior to the portal vein.
- e. empties into the major duodenal papilla.

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**Anatomy: Abdomen**

**Question 5 of 12**

The supradiaphragmatic region of the common bile duct:

- a) lies superior to the cysntic duct. ✗
- b) lies in the free margin of the greater omentum. ✗
- c) lies to the right of the hepatic artery proper. ✗
- d) lies anterior to the portal vein. ✓
- e) empties into the major duodenal papilla.

**Answer**

The common bile duct is formed by the union of the common hepatic duct and the cystic duct. The supradiaphragmatic region is the upper one-third of the common bile duct which lies in the free margin of the lesser omentum with the hepatic artery and portal vein.

**Notes**

**Biliary tree**

The biliary tree begins in the liver parenchyma with the formation of the left and right hepatic duct which drain bile from the liver where it has been synthesized. These two ducts meet to form the common hepatic duct which runs near the liver, with the hepatic artery proper and portal vein in the free margin of the lesser omentum.

As the common hepatic duct descends, it is joined by the cystic duct, which is a continuation of the neck of the gallbladder. The common hepatic duct and the cystic duct combine to form the common bile duct.

At this point the bile duct lies to the right of the hepatic artery proper and usually to the right of, and anterior to, the portal vein in the free margin of the lesser omentum.

As the common bile duct descends, it passes posterior to the first part of the duodenum before joining with the pancreatic duct from the pancreas, forming the hepatopancreatic ampulla (ampulla of Vater) at the major duodenal papilla located in the second part of the duodenum. Surrounding the ampulla is the sphincter of Oddi, a collection of smooth muscle which can open to allow bile and pancreatic fluid to empty into the duodenum.

**Common bile duct relations**

The common bile duct can be divided into three main regions, based on its relation to the duodenum:

- The supradiaphragmatic region is the upper one-third which lies in the free margin of the lesser omentum with the hepatic artery and portal vein. The common bile duct lies anterior to the portal vein and to the right of the hepatic artery proper.
- The retrodiaphragmatic region is the middle one-third which lies posterior to the first part of the duodenum. The gastroduodenal artery lies on its left aspect and the portal vein lies on its posterior aspect.
- The infra-diaphragmatic region is the lower one-third which lies in the posterior surface of the head of the pancreas, to the left of the second part of the duodenum and anterior to the right renal vein and inferior vena cava.
Anatomy: Abdomen

Question 107 of 125

A 45 year old overweight patient presents to ED complaining of fever and severe right upper quadrant pain. The pain radiates to her right shoulder tip. Murphy’s sign is positive and you diagnose acute cholecystitis. Which of the following nerves is responsible for the pain referred to the shoulder tip:

- Vagus nerve
- Phrenic nerve
- Greater thoracic splanchnic nerve
- Intercostal nerves
- Lesser thoracic splanchnic nerve

< Previous Next > See Answer
Anatomy: Abdomen

A 46-year-old overnight patient presents to ED complaining of fever and severe right upper quadrant pain. The pain radiates to her right shoulder tip. Murphy’s sign is positive and you diagnose acute cholecystitis. Which of the following nerves is responsible for the pain referred to the shoulder tip:

a) Vagus nerve  X  
b) Phrenic nerve  ☑  
c) Greater splanchnic nerve  ☑  
d) Intercostal nerves  ☑  
e) Lesser splanchnic nerve  ☑  

Answer

Inflammation of the gallbladder may present with pain in the right upper quadrant and also the right shoulder. This is due to irritation of the diaphragmatic visceral peritoneum (innervated by the phrenic nerve ICN 3–9) that also innervates skin over the shoulder.

Notes

The gallbladder is a pear-shaped sac lying on the visceral surface of the right lobe of the liver in fossa between the right and quadrate lobes. It is an indiaphragm bag structure and lies in the right hypochondrium. It is located at the junction of the right ninth costal cartilage and the lateral border of the rectus abdominis muscle which is the site of maximal tenderness in acute inflammation of the gallbladder.

Structure

It has:

- a rounded end, the fundus, which may project from the inferior border of the liver
- a small part in the fossa, the body, which may lie against the transverse colon and the superior part of the duodenum
- and a narrow part, the neck, which tapers to become continuous with the cystic duct.

The neck contains a mucous fold, known as Hartmann’s pouch, which is a common site for gallstones to become lodged.

Relations

The gallbladder lies:

- posterior and inferior to the liver
- posterior to the anterior abdominal wall
- anterior to the transverse colon and the proximal duodenum
- superior to the liver and the diaphragm.

Innervation

Inflammation of the gallbladder may present with pain in the right upper quadrant and also the right shoulder. This is due to irritation of the diaphragmatic visceral peritoneum (innervated by the phrenic nerve ICN 3–9) that also innervates skin over the shoulder.

< Previous  Next >
Anatomy: Abdomen

The rectus sheath encloses all of the following structures except the:

a. Transversus abdominis muscle
b. Pyramidalis muscle
c. Lower thoracic intercostal nerves
d. Superior epigastric artery
e. Inferior epigastric artery
Anatomy: Abdomen

Question 508 of 125

The rectus sheath encloses all of the following structures except the:

a) Transversus abdominis muscle  
 b) Pyramidalis muscle  
 c) Lower thoracic intercostal nerves  
 d) Superior epigastric artery  
 e) Inferior epigastric artery

Answer

The rectus sheath encloses the rectus abdominis and pyramidalis muscles, the superior and inferior epigastric vessels, the termination of intercostal nerves T7 – T11 and the 12th thoracic nerve and the accompanying vessels.

Notes

The rectus sheath is formed by the aponeuroses of the three flat anterior abdominal wall muscles.

The anterior wall of the sheath is formed by the aponeurosis of the external oblique and half of the aponeurosis of the internal oblique (which splits at the lateral margin of the rectus abdominis).

The posterior wall of the sheath is formed by the other half of the aponeurosis of the internal oblique and by the aponeurosis of the transversus abdominis.

![Diagram of Anatomy: Abdomen](By Henry Vandyke Carter [Public domain], via Wikimedia Commons)

The rectus sheath completely encloses the upper three-quarters of the rectus abdominis in the above formation but only covers the anterior surface of the lower one-quarter of the muscle. At this point (midway between the umbilicus and the pubic symphysis), the anterior wall is formed by the aponeuroses of all three muscles, there is no posterior wall to the rectus sheath and the rectus abdominis muscle is in direct contact with the transversalis fascia. Marking this point of transition is the arcuate line.

![Diagram of Anatomy: Abdomen](Modified by FRCEM Success. Original by Henry Vandyke Carter [Public domain], via Wikimedia Commons)

The rectus sheath also encloses the pyramidalis muscle, the superior and inferior epigastric vessels, the termination of intercostal nerves T7 – T11 and the 12th thoracic nerve and the accompanying vessels.

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Resources

- The Royal College of Emergency Medicine
- Irish Association for Emergency Medicine
- Advanced Trauma Life Support
- Resuscitation Council UK
- YorkMedsAnatomy
- Traims
- Radiopaedia

- Advanced Life Support Group
- Emergency Medicine Journal
- EmergingHealthlive
- Instant Anatomy
- Patient.co.uk
Anatomy: Abdomen

Control of bile and pancreatic fluid entering the duodenum is regulated by the:

- a. Ampulla of Vater
- b. Major duodenal papilla
- c. External biliary sphincter
- d. Internal biliary sphincter
- e. Sphincter of Oddi

Q: 109 of 125
Anatomy: Abdomen

Question 119 of 125

Control of bile and pancreatic fluid entering the duodenum is regulated by:

a) Ampulla of Vater ✗
b) Major duodenal papilla
c) External biliary sphincter
d) Internal biliary sphincter
e) Sphincter of Oddi ✓

Answer

As the common bile duct descends, it passes posterior to the first part of the duodenum before joining with the pancreatic duct from the pancreas, forming the hepatopancreatic ampulla (ampulla of Vater) at the major duodenal papilla, located in the second part of the duodenum. Surrounding the ampulla is the sphincter of Oddi, a collection of smooth muscle which can open to allow bile and pancreatic fluid to empty into the duodenum.

Notes

Biliary tree

The biliary tree begins in the liver parenchyma with the formation of the left and right hepatic duct which drain bile from the liver where it has been synthesized. These two ducts meet to form the common hepatic duct which runs near the liver, with the hepatic artery proper and portal vein in the free margin of the lesser omentum.

As the common hepatic duct descends, it is joined by the cystic duct, which is a continuation of the neck of the gallbladder. The common hepatic duct and the cystic duct combine to form the common bile duct. At this point the bile duct lies to the right of the hepatic artery proper and usually to the right of, and anterior to, the portal vein in the free margin of the lesser omentum.

As the common bile duct descends, it passes posterior to the first part of the duodenum before joining with the pancreatic duct from the pancreas, forming the hepatopancreatic ampulla (ampulla of Vater) at the major duodenal papilla, located in the second part of the duodenum. Surrounding the ampulla is the sphincter of Oddi, a collection of smooth muscle which can open to allow bile and pancreatic fluid to empty into the duodenum.

Common bile duct relations

The common bile duct can be divided into three main regions, based on its relation to the duodenum:

- The first supraduodenal region is the upper one third which lies in the free margin of the lesser omentum with the hepatic artery and portal vein. The common bile duct lies anterior to the portal vein and to the right of the hepatic artery proper.
- The second retroduodenal region is the middle one third which lies posterior to the first part of the duodenum. The gastroduodenal artery lies on its left aspect and the portal vein on its posterior aspect.
- The third intraduodenal region is the lower one third which lies in a groove on the posterior surface of the head of the pancreas, to the left of the second part of the duodenum and anterior to the right mesocolon and inferior vena cava.

Resources

- The Royal College of Emergency Medicine
- Joint Advisory for Emergency Medicine
- Advanced Trauma Life Support®
- Resuscitation Council (UK)
- Trauma Audit
- Traumapedia

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Anatomy: Abdomen
Question 110 of 125

The arterial supply to the pancreas is mainly derived from which of the following:

a. Gastric artery
b. Splenic artery
c. Hepatic artery
d. Renal artery
e. Inferior mesenteric artery

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Something wrong?

Question Navigator
1 Answered
2 Answered
3 Answered
4 Answered
5 Answered
6 Answered
7 Answered
8 Answered
9 Answered
10 Answered
11 Answered
12 Answered

Clear Exam
Anatomy: Abdomen

Question 113 of 125

The arterial supply to the pancreas is mainly derived from which of the following:

- a) Gastric artery
- b) Splenic artery √
- c) Hepatic artery
- d) Renal artery
- e) Inferior mesenteric artery

The pancreas lies mostly posterior to the stomach. It extends across the posterior abdominal wall from the duodenum on the right, to the spleen on the left. It lies in the epigastrum and left hypochondrium regions. The pancreas is a retroperitoneal organ (except for a small part of its tail) and consists of a head, uncinate process, neck, body and tail.

The head of the pancreas lies within the C-shaped concavity of the duodenum. The uncinate process projects from the lower part of the head and passes posterior to the superior mesenteric vessels. The neck is anterior to the superior mesenteric vessels. Posterior to the neck of the pancreas, the superior mesenteric and splenic veins join to form the portal vein. The body is elongated and extends from the neck to the tail of the pancreas in the transpyloric plane (at the level of vertebra L1) to lie behind the stomach and to the left of the superior mesenteric vessels. The tail passes between layers of the splenorenal ligament (intraperitoneal) and lies medial to the spleen.

The pancreatic duct begins in the tail of the pancreas and passes to the right through the body and to the head where it turns inferiorly and joins the bile duct forming the ampulla of Vater which enters the second part of the duodenum at the major duodenal papilla. The accessory pancreatic duct empties into the duodenum just above the major duodenal papilla at the minor duodenal papilla.

The arterial supply to the pancreas is mainly by pancreatic branches derived from the splenic artery (branch of the coeliac trunk). The head is additionally supplied by branches of the gastroduodenal and superior mesenteric arteries. Venous drainage of the head of the pancreas is via pancreaticoduodenal veins into the superior mesenteric vein and portal vein; venous drainage of the body and tail of the pancreas is via pancreatic veins into the splenic vein.

Lymphatic drainage is to the coeliac group of pre-aortic nodes.

The sympathetic nerve supply is derived from the T6 – T10 spinal cord segments and thus pain is typically referred to the lower thorax and epigastric region.
Anatomy: Abdomen

Question 111 of 125

The fourth part of the duodenum terminates at which of the following vertebral levels:

a. T12  
b. L1  
c. L2  
d. L3  
e. L4  

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Question Navigator

1. Answered  
2. Answered  
3. Answered  
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10. Answered  
11. Answered  
12. Answered  

Clear Exam
Anatomy: Abdomen

Question 11 of 129

The fourth part of the duodenum terminates at which of the following vertebral levels:

- a) T12
- b) L1
- c) L3
- d) L3
- e) L4

Answer

The ascending (fourth) part passes upwards on, or to the left of the aorta to approximately the upper border of vertebra L2 and terminates at the duodenojejunal flexure.

Notes

The small intestine is the largest part of the gastrointestinal tract and extends from the pyloric orifice of the stomach to the ileocecal fold, comprising the duodenum, jejunum and ileum. The first part of the small intestine is the duodenum.

The duodenum is a C-shaped structure, adjacent to the head of the pancreas, and above the level of the umbilicus. It is retroperitoneal except for its proximal part which is connected to the liver by the hepatoduodenal ligament of the lesser omentum.

Parts of the duodenum

- The superior (first) part extends from the pyloric orifice of the stomach to the neck of the gallbladder, lies just to the right of the body of vertebra L1, and passes anterior to the inferior vena cava and superior to the head of the pancreas.
- The descending (second) part is just to the right of the midline, extending from the neck of the gallbladder to the lower border of vertebra L3 and lying lateral to the head of the pancreas. This part contains the major duodenal papilla which is the common entrance for the bile and pancreatic ducts.
- The inferior (third) part is the longest section, crossing the inferior vena cava, the aorta and the vertebral column at the level of vertebra L3 and lying inferior to the pancreas.
- The ascending (fourth) part passes upwards on, or to the left of the aorta to approximately the upper border of vertebra L2 and terminates at the duodenojejunal flexure.
Anatomy: Abdomen

Irritation of the central part of the diaphragmatic peritoneum is typically referred to:

a  The jaw
b  The shoulder tip
c  The epigastric region
d  The periumbilical region
e  The flanks

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Anatomy: Abdomen

Question 113 of 319

- The jaw
- The shoulder tip
- The epigastric region
- The periumbilical region
- The flanks

Answer

The diaphragmatic peritoneum is supplied by the phrenic nerve (C3 – C5) and thus painful stimuli to the diaphragmatic peritoneum can be referred to the shoulder tip.

Notes

The peritoneum is a continuous double-layered serous membrane.

The parietal peritoneum lines the walls of the abdominal cavity and the visceral peritoneum lines the viscera.

Between the parietal and visceral layers of peritoneum is a potential space, the peritoneal cavity.

Abdominal viscera are either suspended in the peritoneal cavity by folds of peritoneum called mesenteries (ecto-peritoneal viscera) or are outside the peritoneal cavity bound to the posterior abdominal wall (endo-peritoneal viscera). Retroperitoneal organs are only covered in peritoneum on their anterior surface.

Innervation

The parietal peritoneum associated with the abdominal wall is innervated by somatic afferents carried in branches of the associated spinal nerves and is therefore sensitive to pressure, pain and temperature, and gives rise to well-localised pain. The diaphragmatic peritoneum is supplied by the phrenic nerve (C3 – C5) and the remainder of the parietal peritoneum is supplied segmentally by intercostal and lumbar nerves.

The visceral peritoneum is innervated by visceral afferents that accompany autonomic nerves back to the CNS and therefore activation gives rise to referred and poorly localised sensations of discomfort and to visceral motor activity.

Retroperitoneal viscera

A useful mnemonic to help remember which abdominal organs are retroperitoneal is SAD PUCKER:

- Suprarenal glands
- Aorta and Inferior vena cava
- Duodenum (2nd and 3rd parts)
- Pancreas (except for the tail)
- Ureters (proximal) and Bladder
- Colon (ascending and descending)
- Kidneys
- Ilieostomy
- Rectum (lower two-thirds)
Anatomy: Abdomen

The common bile duct drains into the duodenum in which of the following regions:

- First part of the duodenum
- Duodenojejunal flexure
- Second part of the duodenum
- Third part of the duodenum
- Fourth part of the duodenum

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Anatomy: Abdomen

Question 10 of 125

The common bile duct drains into the duodenum in which of the following regions:

- a) First part of the duodenum ✗
- b) Duodenal flexure
- c) Second part of the duodenum ✓
- d) Third part of the duodenum
- e) Fourth part of the duodenum

Answer

As the common bile duct descends, it passes posterior to the first part of the duodenum before joining with the pancreatic duct from the pancreas, forming the hepatopancreatic ampulla (ampulla of Vater) at the major duodenal papilla, located in the second part of the duodenum.

Notes

Biliary tree

The biliary tree begins in the liver parenchyma with the formation of the left and right hepatic ducts which drain bile from the liver where it has been synthesised. These two ducts meet to form the common hepatic duct which runs near the liver, with the hepatic artery proper and portal vein in the free margin of the lesser omentum.

As the common hepatic duct descends, it is joined by the cystic duct, which is a continuation of the neck of the gallbladder. The common hepatic duct and the cystic duct combine to form the common bile duct. At this point the bile duct lies to the right of the hepatic artery proper and usually to the right of and anterior to, the portal vein in the free margin of the lesser omentum.

As the common bile duct descends, it passes posterior to the first part of the duodenum before joining with the pancreatic duct from the pancreas, forming the hepatopancreatic ampulla (ampulla of Vater) at the major duodenal papilla, located in the second part of the duodenum. Surrounding the ampulla is the sphincter of Oddi, a collection of smooth muscle which can open to allow bile and pancreatic fluid to empty into the duodenum.

Common bile duct relations

The common bile duct can be divided into three main regions, based on its relation to the duodenum:

- The first intraduodenal region is the upper one-third which lies in the free margin of the lesser omentum with the hepatic artery and portal vein. The common bile duct lies anterior to the portal vein and to the right of the hepatic artery proper.
- The second intraduodenal region is the middle one-third which lies posterior to the first part of the duodenum. The gastro-duodenal artery lies on its left aspect and the portal vein on its posterior aspect.
- The third intraduodenal region is the lower one-third which lies in a groove on the posterior surface of the head of the pancreas, to the left of the second part of the duodenum and anterior to the right renal veins and inferior vena cava.

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Resources

- The Royal College of Emergency Medicine
- Irish Association for Emergency Medicine
- Advanced Trauma Life Support
- Resuscitation Council (UK)
- TRIALMedicine
- Trauma.org
- Radiopedia
- Advanced Life Support Group
- Emergency Medicine Journal
- Lifeinthefastlane
- Inland Anatomies
- Patient.co.uk

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Anatomy: Abdomen

The infraduodenal region of the common bile duct:

a. runs in a groove posterior to the head of the pancreas.
b. lies posterior to the first part of the duodenum.
c. lies posterior to the inferior vena cava.
d. lies anterior to the left renal vein.
e. empties into the third part of the duodenum.

< Previous  Next >  See Answer  Something wrong?
The infraduodenal region is the lower one-third of the common bile duct which lies in a groove on the posterior surface of the head of the pancreas, to the left of the second part of the duodenum and anterior to the right renal vein and inferior vena cava.

Notes

Biliary tree

The biliary tree begins in the liver parenchyma with the formation of the left and right hepatic duct which drain bile from the liver where it has been synthesized. These two ducts meet to form the common hepatic duct which runs near the liver, with the hepatic artery proper and portal vein in the free margin of the lesser omentum.

As the common hepatic duct descends, it is joined by the cystic duct, which is a continuation of the neck of the gallbladder. The common hepatic duct and the cystic duct combine to form the common bile duct. At this point the bile duct lies to the right of the hepatic artery proper and usually to the right of, and anterior to, the portal vein in the free margin of the lesser omentum.

As the common bile duct descends, it passes posterior to the first part of the duodenum before joining with the pancreatic duct from the pancreas, forming the hepatopancreatic ampulla (ampulla of Vater) at the major duodenal papilla, located in the second part of the duodenum. Surrounding the ampulla is the sphincter of Oddi, a collection of smooth muscle which can open to allow bile and pancreatic fluid to empty into the duodenum.

Common bile duct relations

The common bile duct can be divided into three main regions, based on its relation to the duodenum:

- The supraduodenal region is the upper one-third which lies in the free margin of the lesser omentum with the hepatic artery and portal vein. The common bile duct lies anterior to the portal vein and to the right of the hepatic artery proper.
- The retroduodenal region is the middle one-third which lies posterior to the first part of the duodenum. The gastroduodenal artery lies on its left aspect and the portal vein on its posterior aspect.
- The infraduodenal region is the lower one-third which lies in a groove on the posterior surface of the head of the pancreas, to the left of the second part of the duodenum and anterior to the right renal vein and inferior vena cava.
Anatomy: Abdomen

The greater sac of the peritoneal cavity is divided into two compartments by which of the following structures:

a. Liver
b. Stomach
c. Transverse mesocolon
d. Duodenum
e. Mesentery
Anatomy: Abdomen

The anterior abdominal wall muscles are innervated by:

- **a** The anterior rami of L1 – L3
- **b** The anterior rami of T7 – T12 and L1
- **c** The anterior rami of T12 and L1 – L4
- **d** The phrenic nerve
- **e** The anterior rami of T7 – T10

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Something wrong?

Question Navigator

1. Answered
2. Answered
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7. Answered
8. Answered
9. Answered
10. Answered
11. Answered
12. Answered

Clear Exam
Anatomy: Abdomen

Question 1 of 145

The anterior abdominal wall muscles are innervated by:

- a. the anterior rami L1 - L3
- b. the anterior rami T7 - T12 and L4 - L5
- c. the anterior rami T7 - T12 and L4 - L5 (Correct)
- d. the posterior rami T7 - T12
- e. the anterior rami T7 - T12

Notes

There are five muscles in the anterior abdominal group of abdominal wall muscles. They are flat muscles whose fibres run in an oblique manner and parallel to anterior border being innervated by the anterior rami of T7 - T12 and L4 - L5. They are the transverse abdominis, rectus abdominis, external oblique, internal oblique, and the intrinsic oblique.

External oblique

No external oblique is the largest and most superficial of the anterior abdominal muscles. Running along the side of the abdomen and running along the inguinal ligament. It is innervated by the anterior rami of the 7th to 12th thoracic vertebrae.

Internal oblique

The internal oblique is a muscle lying deep to the external oblique. It runs from the iliac crest to the pubic crest and is innervated by the anterior rami of the 7th to 12th thoracic vertebrae.

Transversus abdominis

The transversus abdominis is the innermost of the flat anterior abdominal muscles. Running deep to the external oblique. It originates from the ilium and inserts into the rectus sheath. It is innervated by the anterior rami of the 7th to 12th thoracic vertebrae. It is innervated by the anterior ramus of the 7th to 12th thoracic vertebrae.

Rectus abdominis

The rectus abdominis is a long muscle that extends the length of the anterior abdominal wall. It is innervated by the anterior rami of the 7th to 12th thoracic vertebrae. It is innervated by the anterior rami of the 7th to 12th thoracic vertebrae.

Exclusion

- a. the posterior rami T7 - T12
- b. the anterior rami T7 - T12
- c. the posterior rami T7 - T12
- d. the anterior rami T7 - T12
- e. the anterior rami T7 - T12

Resources

- a. [Abdominal Wall Anatomy](https://example.com/abdominal-wall-anatomy)
- b. [Abdominal Muscles Innervation](https://example.com/abdominal-muscle-innervation)
- c. [Orthopaedic Knowledge Network](https://example.com/orthopaedic-knowledge-network)
- d. [Pelvic Floor](https://example.com/pelvic-floor)
- e. [Pelvic Support Group](https://example.com/pelvic-support-group)
- f. [Orthopaedic Knowledge Network](https://example.com/orthopaedic-knowledge-network)
- g. [Pelvic Floor](https://example.com/pelvic-floor)
- h. [Pelvic Support Group](https://example.com/pelvic-support-group)
- i. [Abdominal Wall Anatomy](https://example.com/abdominal-wall-anatomy)
- j. [Abdominal Muscles Innervation](https://example.com/abdominal-muscle-innervation)
Anatomy: Abdomen

Question 117 of 125

Visceral afferent fibres from the pancreas travel to which of the following spinal cord levels:

a. T1 - T2
b. T4 - T6
c. T6 - T10
d. T10 - T12
e. T12 - L2

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Anatomy: Abdomen

**Question 372 of 385**

Visceral afferent fibres travel to the thoracic and lower sympathetic nerves. The segmental level of innervation is T1 to T8. They rapidly radiate to the mediastinum to initiate the period of peritoneum covering the peritoneum.

**Notes**

The parietal pleura lies directly anterior to the stomach. It extends across the posterior abdominal wall between the diaphragm on the right, to the spleen on the left. It is one of the largest regions and is highly vascularised. The parietal pleura is an irregular barrier beneath a pleural sac formed by a serous membrane for the right and consists of a thin visceral pleura, used for the diaphragm, and a subcostal visceral pleura, used for the both.

**Relations**

- The head of the pancreas lies within the C-shaped concavity of the duodenum. The head is related anteriorly to the first part of the duodenum, the transverse colon, and to the fourth part of the duodenum. It is also related posteriorly to the mesentery of the superior mesenteric vessels.
- The neck is related anteriorly to the superior mesenteric vessels. Posteriorly, the neck relates to the duodenum. The superior mesenteric arterial and pancreatic veins form the portal vein.
- The body is related anteriorly to the head of the pancreas; posteriorly, the superior mesenteric vessels. The inferior mesenteric artery is located anteriorly to the head of the pancreas.
- The tail is related anteriorly to the spleen; posteriorly, the superior mesenteric vessels.

**Blood supply**

The vascular supply to the pancreas is derived from the superior mesenteric artery, the splenic arteries, and the gastroepiploic arteries. The head and neck of the pancreas receive a variable amount of blood from the superior mesenteric vessels and the portal vessels. The body and tail of the pancreas receive a variable amount of blood from the superior mesenteric vessels and the inferior mesenteric artery.

**Lymphatics**

Lymphatic drainage includes the pancreatic lymph nodes and the posterior nodes, which join the lymphatic ducts into the thoracic duct.

**Innervation**

Visceral afferent fibres travel in the thoracic and lower sympathetic nerves. The somatic level of innervation is T1 to T8. These fibres radiate from the celiac plexus to the posterior peritoneum covering the peritoneum.

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**Question Navigator**

1. Answered
2. Answered
3. Answered
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6. Answered
7. Answered
8. Answered
9. Answered
10. Answered
11. Answered
12. Answered
13. Answered
14. Answered
15. Answered

**Resources**

- The Faculty of Emergency Medicine
- The Faculty of Paediatrics & Child Health
- The Faculty of Midwifery
- The Faculty of Public Health
- The Faculty of Primary Care
- The Faculty of Public Health
- The Faculty of Midwifery
- The Faculty of Paediatrics & Child Health
- The Faculty of Emergency Medicine
- The Faculty of Public Health
- The Faculty of Primary Care
- The Faculty of Midwifery
- The Faculty of Paediatrics & Child Health
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- The Faculty of Paediatrics & Child Health
- The Faculty of Midwifery
- The Faculty of Primary Care
- The Faculty of Midwifery
- The Faculty of Paediatrics & Child Health
- The Faculty of Emergency Medicine
- The Faculty of Paediatrics & Child Health
- The Faculty of Midwifery

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Anatomy: Abdomen

Question 118 of 125

The abdominal oesophagus ends at which of the following vertebral levels:

a. T8
b. T9
c. T10
d. T11
e. T12

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Something wrong?

Question Navigator

1. Answered
2. Answered
3. Answered
4. Answered
5. Answered
6. Answered
7. Answered
8. Answered
9. Answered
10. Answered
11. Answered
12. Answered

Clear Exam
Anatomy: Abdomen
Question 118 of 125

The abdominal oesophagus ends at which of the following vertebral levels:

a) T8 ✗
b) T9
c) T10 ✓
d) T11 ✓
e) T12

Answer
The abdominal oesophagus meets the cardiac orifice of the stomach, ending at the level of vertebra T11.

Notes
The abdominal oesophagus represents the short distal part (about 2 cm) of the oesophagus located in the abdominal cavity. Emerging through the right crus of the diaphragm at the level of vertebra T10, it passes from the oesophageal hiatus to the cardiac orifice of the stomach just left of the midline at the level of vertebra T11.

The lower oesophageal sphincter is a physiological sphincter located at the gastro-oesophageal junction.

Anatomical factors that help guard against gastric reflux include:

- The diaphragmatic pisiform effect where at the oesophageal hiatus, right crural fibres exert pressure on the oesophageal wall and serve as an extrinsic sphincter
- The lower oesophageal sphincter which is a high-pressure zone of smooth muscle in the oesophageal wall maintained in a state of tonic contraction (except during swallowing, belching or vomiting)
- Intra-abdominal pressure which maintains the oesophagus in a state of collapse when empty
- The angle of His formed at the junction of the oesophagus and the gastric fundus, which together with the posterior lateral position of the gastric fundus, minimises contact of gastric content with the gastro-oesophageal junction
- The gastric mucosal rosette-like folds formed at the gastro-oesophageal junction which compress against each other with increased intra-abdominal pressure to prevent reflux

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Anatomy: Abdomen

A 31 year old man is brought to ED following a road traffic accident in which he was wearing his seatbelt. Imaging shows a fracture of the left ninth and tenth rib with intra-abdominal bleeding. Which of the following organs is most likely injured:

a. Liver  
b. Pancreas  
c. Spleen  
d. Left kidney  
e. Left colic flexure

< Previous  Next >  See Answer  Something wrong?

Question Navigator
1. Answered
2. Answered
3. Answered
4. Answered
5. Answered
6. Answered
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Anatomy: Abdomen

Answer

The spleen rests against the diaphragm and ribs 9 – 11 in the left hypochondriac region. The left colic flexure lies inferior to the spleen. The left kidney lies retroperitoneally, approximately at the level of T11 to L3 vertebrae. The liver lies predominately in the right hypochondrium and upper abdomen although a small portion projects into the left hypochondrium below the diaphragm. The body of the pancreas lies in front of the second lumbar vertebra.

Notes

The intercostal splenic ligaments, which support the spleen, are in the area of ribs 9 – 11. It lies in the left hypochondriac region of the abdomen. The spleen cannot normally be palpated on clinical examination.

The spleen is an organ of the reticuloendothelial system and acts:

- to filter blood to remove old and defective blood cells
- as a blood reservoir
- to produce white blood cells
- to produce an immune response

Relations

The spleen lies posterior to the stomach, superior to the left colic flexure and laterally to the left kidney and tail of the pancreas.

Surface markings

The spleen projects onto the left side and back in the area of ribs 9 –11. The spleen follows the contour of ribs 10-11 and extends from the superior pole of the left kidney to just posterior to the ribcage.

Splenic rupture

This most commonly occurs due to localised trauma to the left upper quadrant. It may be associated with left lower rib fractures. Because the spleen is an extremely thin capsule it is susceptible to injury even when there is no damage to surrounding structures and because the spleen is highly vascular, when ruptured, it bleeds profusely into the peritoneal cavity.
Anatomy: Abdomen

Question 120 of 125

The right and left hepatic arteries are derived from which of the following blood vessels:

- a. Directly from the aorta
- b. From the coeliac trunk
- c. From the superior mesenteric artery
- d. From the inferior mesenteric artery
- e. From the gastroepiploic artery

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Anatomy: Abdomen

Question 121 of 125

Which of the following is the most common position of the vermiform appendix:

- a. Pre-ileal
- b. Post-ileal
- c. Subcaecal
- d. Retrocaecal
- e. Pelvic

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Anatomy: Abdomen

Which of the following is the most common position of the vermiform appendix?

a) Pre-ileal  
X b) Psoas-ileal  
X c) Subileal  
X d) Retrococcal  
X e) Pelvic

Answer

The most common position is retrococcal, followed by pelvic.

Notes

The large intestine extends from the distal end of the ilium to the anus, and comprises the caecum, appendix, cecum, rectum, and anal canal.

Caecum

The intraperitoneal caecum is the first part of the large intestine. It is inferior to the ileocaecal opening and lies in the right iliac fossa. The caecum is continuous with the ascending colon at the entrance of the ileocaecal valve, and is usually in contact with the anterior abdominal wall. It may cross the pelvic brim to lie in the true pelvis.

Appendix

The appendix is attached to the posterior medial wall of the caecum, just inferior to the end of the ilium. The appendix is a narrow, hollow, blind-ended tube, has large aggregations of lymphoid tissue in its walls and is suspended from the terminal ileum by the mesoappendix.

Its point of attachment to the caecum is consistent with the highly visible free taeniae lying directly to the base of the appendix but the rest of its location is highly variable. It may be:

1) posterior to the caecum or the lower ascending colon, or both, in a retrocaecal or retrocolic position  
2) superior to the pelvic brim in a pelvic or descending position  
3) below the caecum in a subcaecal position  
4) anterior to the terminal ileum, possibly contacting with the body wall in a para-ileal position or posterior to the terminal ileum in a post-ileal position.

The most common position is retrococcal, followed by pelvic. The retrococcal appendix is lateral anteriorly to the caecum and posteriorly to the psoas major and iliacus muscle. The psoas sign may be positive in retrococcal appendicitis. Irritation of the psoas muscle may give rise to pain when the patient’s right thigh is extended from a flexed position as the muscle is stretched.

The surface projection of the base of the appendix is the junction of the iliacus and middle one third of a line from the anterior superior iliac spine to the umbilicus (McBumney’s point). People with appendicitis may describe pain in this location.
Anatomy: Abdomen

Question 122 of 125

The floor of the inguinal canal is formed primarily by which of the following structures:

a. Transversalis fascia
b. Medial one-half of the inguinal ligament
c. Lateral one-half of the inguinal ligament
d. Psoas major muscle
e. Pectineus muscle
Anatomy: Abdomen

The floor of the abdominal cavity is formed by the peritoneum which lines the abdominal cavity and the posterior abdominal wall.

**Notes**

**Abdominal Cavity**

- The peritoneum of the abdominal cavity is continuous with the peritoneum of the pelvic cavity.

**Abdominal wall**

- The abdominal wall is formed by the underlying muscles and the overlying skin.

**Peritoneum**

- The peritoneum is a double-layered membrane that lines the abdominal cavity and the posterior abdominal wall.

**Contents**

- **Solid organs**
  - Liver
  - Spleen
  - Kidneys
  - Adrenal glands

- **Vessels**
  - Major blood vessels: aorta, vena cava, hepatic artery

- **Nerves**
  - Autonomic nerves: sympathetic, parasympathetic

**Muscles**

- **External oblique**
- **Internal oblique**
- **Rectus abdominis**
- **Transversus abdominis**

**Blood vessels**

- **Aorta**
- **Vena cava**
- **Hepatic artery**

**Nerves**

- **Splanchnic nerves**
- **Autonomic nerves**

**Veins**

- **Superior vena cava**
- ** Inferior vena cava**

**Arteries**

- **Aorta**
- **Hepatic artery**

**Lymph nodes**

- **Celiac nodes**
- **Superior mesenteric nodes**
- ** Inferior mesenteric nodes**

**Nerve plexuses**

- **Splanchnic plexus**
- **Autonomic plexus**

**Pancreas**

- Located in the upper abdomen, posterior to the stomach and anterior to the aorta and superior mesenteric artery.
Anatomy: Abdomen

The linea alba is formed from which of the following:

a. The aponeuroses of the three flat anterior abdominal muscles
b. The free edge of the external oblique aponeurosis
c. The tendinous intersection of the rectus abdominis muscle
d. The thoracolumbar fascia
e. The tendon of the pyramidalis muscle

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Anatomy: Abdomen

Question 12/12

The linea alba is formed from which of the following?

a) The aponeuroses of the three flat anterior abdominal muscles
b) The tendinous arch of the rectus abdominis muscle
c) The transversalis fascia
d) The aponeuroses of the muscles

e) The fascia transversalis

---

Notes

There are no muscles in the anterior abdominal wall. The flat muscle walls arise from the linea alba and fascia transversalis. The linea alba is the site of origin for the right and left rectus muscles.

External oblique

The external oblique attaches to the iliac crest and is covered by the linea alba. It is the most superficial muscle of the anterior abdominal wall.

Internal oblique

The internal oblique muscle lies deep to the external oblique muscle. It is a sheet of muscle that extends from the anterior axillary line to the anterior superior iliac spine.

Transverse abdominis

The transverse abdominis is the deepest muscle of the anterior abdominal wall. It lies deep to the internal oblique muscle.

Rectus abdominis

The rectus abdominis is a long muscle that extends the length of the anterior abdominal wall. It originates from the pubic tubercle and inserts into the anterior superior iliac spine and pubis.

Fascia

The fascia is a thick sheet of connective tissue that covers the abdominal muscles and organs.

Imagery

The linea alba is the fibrous cord that unites the flat muscle walls of the abdomen. It is visible through the skin of the abdomen.

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Anatomy: Abdomen

The arterial supply to the jejunum and ileum is derived predominantly from which of the following:

a. Coeliac trunk
b. Superior mesenteric artery
c. Inferior mesenteric artery
d. Renal artery
e. Lumbar artery

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Anatomy: Abdomen

Question 1A of 037

The arterial supply to the jejunum and ileum is derived predominantly from which of the following:

a) Coeliac trunk ✓
b) Superior mesenteric artery

c) Inferior mesenteric artery
d) Renal artery
e) Lumbar artery

Answer

The jejunum is mostly in the left upper quadrant of the abdomen.

Notes

The small intestine is the longest part of the gastrointestinal tract and extends from the pyloric orifice of the stomach to the ileocecal fold, comprising the duodenum, jejunum and ileum.

The jejunum and ileum make up the last two sections of the small intestine.

The jejunum and ileum are intra-peritoneal, attached to the posterior abdominal wall by the mesentery.

Jejunum

The jejunum represents the proximal two-fifths. It is mostly in the left upper quadrant of the abdomen and is larger in diameter and has a thicker wall than the ileum.

Ileum

The ileum makes up the distal three-fifths and is mostly in the right lower quadrant. The ileum navigates into the large intestine at the ileocecal junction forming the ileocecal valve, which prevents reflux from the cecum to the ileum and regulates the passage of contents from the ileum to the cecum.

Blood supply

The arterial supply to the jejunum and ileum is derived from the superior mesenteric artery.

Innervation

The sympathetic nerve supply is derived from the T9 – T11 spinal cord segments. Pain from the small jejunum and ileum is referred to the peri-umbilical region.

Meckel’s diverticulum

A Meckel’s diverticulum is the remnant of the proximal part of the yolk stalk (oblique duct) that extends into the umbilical cord in the embryos and lies on the antimesenteric border of the ileum, approximately 2 feet proximal to the ileocecal junction. It appears as a blind-ended tubular outpouching of bowel, about 2 inches long, occurring in about 2% of the population, and may contain two types of ectopic tissue (gastric and pancreatic). Complications include hemorrhage, intussusception, diverticulitis, ulceration and obstruction, and symptoms may mimic those of acute appendicitis.

Resources

- The Royal College of Emergency Medicine
- Irish Association for Emergency Medicine
- Advanced Trauma Life Support
- Resuscitation Council (UK)
- Trauma Registry
- TraumaPod
- AdvancedAcuteHelp
- Emergency Medicine Journal
- Outdoor recreate
- Instant Resuscitation
- Trauma.co.uk

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Anatomy: Abdomen

Question 125 of 125

A 72 year old man presents to ED with severe abdominal pain and diarrhoea. Imaging shows occlusion of the inferior mesenteric artery. Which of the following structures is most likely affected:

- Ascending and descending colon
- Ascending and transverse colon
- Caecum and transverse colon
- Descending and sigmoid colon
- Caecum and ileum

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A 72-year-old man presents to ED with severe abdominal pain and diaphoresis. Imaging shows occlusion of the inferior mesenteric artery. Which of the following structures is most likely affected:

- Ascending and descending colon
- Ascending and transverse colon
- Cæcum and transverse colon
- Descending and sigmoid colon
- Cæcum and ileum

Answer

The inferior mesenteric artery supplies the hindgut structures including the distal one-third of the transverse colon (splenic flexure), the descending colon, sigmoid colon and rectum.

Notes

The large intestine extends from the distal end of the ileum to the anus, and comprises the caecum, appendix, colon, rectum and anal canal.

The colon continues from the caecum in the right groin as the ascending colon, which passes upwards through the right flank and into the right hypochondrium.

Just below the right side of the liver, it bends to the left forming the right colic flexure (hepatic flexure), and crosses the abdomen as the transverse colon to the left hypochondrium. The transverse colon is related superiorly to the liver, gallbladder, greater curvature of the stomach and the lateral end of the spleen.

At this point, just below the spleen, it bends downwards forming the left colic flexure (splenic flexure) and continues as the descending colon through the left flank and into the left groin. The splenic flexure is higher and more posterior than the hepatic flexure, and is attached to the diaphragm by the phrenicocolic ligament.

The colon enters the upper part of the pelvic as the sigmoid colon, which begins above the pelvic inlet and extends to the level of vertebra S3 where it is continuous with the rectum. This S-shaped structure is quite mobile except at its proximal and distal end which are attached to the descending colon and rectum respectively. Between those points, it is suspended by the sigmoid mesocolon.

The ascending and descending segments are retroperitoneal and the transverse and sigmoid segments are intraperitoneal.

<table>
<thead>
<tr>
<th>Colon</th>
<th>Anterior relations</th>
<th>Posterior relations</th>
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</thead>
<tbody>
<tr>
<td>Ascending colon</td>
<td>Small intestine, greater omentum, anterior abdominal wall</td>
<td>Iliacus and quadratus lumborum, right kidney</td>
</tr>
<tr>
<td>Transverse colon</td>
<td>Liver, gallbladder, stomach, greater omentum, anterior abdominal wall</td>
<td>Second part of duodenum, head of pancreas, upper end of mesentery, duodenopancreatic flexure, colic of jejunum and ileum</td>
</tr>
<tr>
<td>Descending colon</td>
<td>Small intestine, greater omentum, anterior abdominal wall</td>
<td>Iliacus and quadratus lumborum, left kidney</td>
</tr>
<tr>
<td>Sigmoid colon</td>
<td>Bladder, uterine and upper vagina</td>
<td>Rectum, sacrum, ileum</td>
</tr>
</tbody>
</table>

Blood supply

The arterial supply to the colon is derived from the superior mesenteric artery (caecum, appendix, ascending colon, hepatic flexus, proximal two-thirds of transverse colon) and the inferior mesenteric artery (distal one-third of transverse colon, splenic flexure, descending colon, sigmoid colon).

As the terminal vessels of the superior mesenteric and inferior mesenteric artery approach the colon they split into many colic branches which anastomose with each other. These anastomoses from a continuous arterial channel which extends the length of the colon, the marginal artery.

At the junctional area of the supply of the superior and inferior mesenteric arteries, the anastomoses may not be sufficient, thus the splenic flexure is most susceptible to ischaemia.

Innervation

The visceral pain sensation from the ascending and transverse colon travels through the lesser splanchnic nerve to the T2 – T3 spinal cord segments hence pain is referred to the umbilical and hypogastrian regions.

Pain from the descending and sigmoid colon is carried in the lumbar splanchnic nerves to the L1 and L2 spinal cord segments hence pain is referred to the inguinal region and thigh.