

THE LIVER AND BILIARY SYSTEM

Learning Objectives

Upon completion of this session, the student will be able to:

1. Recognize parts of the liver and describe the relationships of its portal venous, hepatic arterial and hepatic venous circulation.
2. Identify the structures passing into and out of the porta hepatis.
3. Describe the anatomy of the biliary system.
4. Explain the peritoneal relationships of the liver and gallbladder.
5. Clarify the discrepancy between the external lobulations of the liver and the internal segmentation of the liver based on the branching of the intrahepatic arteries, veins, and ducts.
6. Identify the normal appearance of the liver, pancreas, gall bladder and biliary system in ultrasound and other imaging modalities. Outline the diagnostic features of gallstones, liver and pancreatic space occupying lesions.

Required Materials

- Cadaver/ Model of Abdomen/ Abdominal Cavity and Liver
- Handouts/ Atlases of Human Anatomy
- Visual and Electronic Media
- Images

Instructions:

- There are 3 stations of activities in this practical.
- When you have completed a particular task you should put a tick in the box before to it, the group's supervisor can question you about it and expect a correct answer.
- Keep these sheets for future reference and revision.
- Make sure that you answer the questions at the end of the activities.

STATION 16.1

THE LIVER

- ☐ Identify that the **liver** is the largest gland in the body lies in the right upper quadrant of the abdomen.
- ☐ Locate the **falciform ligament**, observable on the front of the liver, divides the liver into a left and a much larger right lobe.
- ☐ Note that the liver has a convex **diaphragmatic surface** (anterior, superior, and some posterior), which is covered with visceral peritoneum, except posteriorly in the **bare area of the liver**.
- ☐ Note that the liver has a flat or concave **visceral surface** (postero-inferior). Note that from the visceral surface, the two additional lobes are located between the right and left lobes, which are the **caudate** and **quadrate**.
- ☐ In the visceral surface identify the followings:
 - ☐ **Ligamentum venosum** and the round ligament of the liver (**ligamentum teres**).
 - ☐ An important anatomical landmark, the **porta hepatis** (hilum).
 - ☐ **Inferior vena cava**.
 - ☐ Gallbladder fossa.

- ☐ **Colic impression**, formed by the hepatic flexure.
- ☐ **Renal impression** accommodating part of the right kidney.
- ☐ **Suprarenal impression** it lodges the right suprarenal gland.
- ☐ **Duodenal impression** for duodenum.
- ☐ **Gastric impression** for stomach
- ☐ The plane that divides the liver functionally into right and left lobes runs from the right side of the gall bladder towards the right side of the inferior vena cava.
- ☐ Locate the structures within the hilum of the liver:
 - ☐ **Hepatic artery** to the left and its right and left branches.
 - ☐ **Common bile duct** lies to the right side of the artery. It is formed from the union of the common hepatic duct and the cystic duct.
 - ☐ **Portal vein** lies posteriorly.
- ☐ Observe the peritoneal covering of the liver and locate the following:
 - ☐ **Upper coronary ligament**: covers the area from the upper border of bare area of liver and the undersurface of diaphragm.
 - ☐ **Lower coronary ligament**: starts from the lower border of bare area of liver and continuous by combining with the right layer of lesser omentum.
 - ☐ **Right triangular ligament**: located at the right limit of the bare area, and is a small fold that passes to the diaphragm, being by the union of the upper and lower layers of the coronary ligament.
 - ☐ **Left triangular ligament**: connects the posterior part of the upper surface of the left lobe of the liver to the diaphragm; its anterior layer is continuous with the left layer of the falciform ligament.

STATION 16.2

THE BILIARY SYSTEM

(Figure 16.2.1)

- ☐ Identify the **gall bladder** lies in its fossa on the visceral surface and is com-

- posed of a fundus, body, neck, and cystic duct.
- ☐ Observe the **fundus of the gall bladder** that approaches the surface behind the anterior end of the ninth right costal cartilage close to the lateral margin of the rectus abdominis muscle.
 - ☐ Identify the **cystic duct** joins with the **common hepatic duct** to form the **common bile duct**.
 - ☐ Identify the **cystic artery**, which is a branch from the **right hepatic artery**.
 - ☐ Observe an important descriptive triangle is formed by the common hepatic duct, cystic duct, and the surface of the liver that usually has the cystic artery running across it. It is known as *Callot's triangle*.

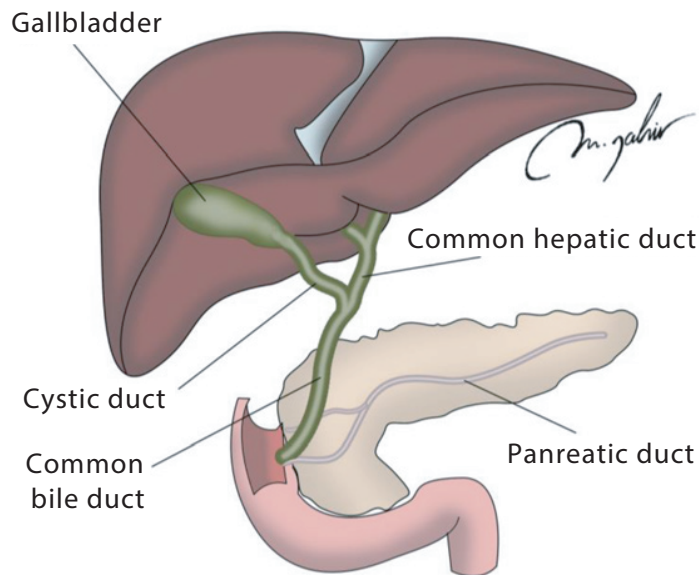


Fig. 16.2.1 Anatomy of the biliary system

STATION 16.3**IMAGING**

(Figure 16.3.1 - 16.3.3)

- ☐ Identify the liver, stomach, pancreas, spleen, kidneys, aorta, crura, inferior vena cava, portal vein and suprarenals in Fig 16.3.1.
- ☐ Identify the liver and GB. Note the acoustic shadow of the large gallstone in Fig.16.3.2.
- ☐ Identify the liver, spleen, aorta, inferior vena cava, stomach and crura in Fig.16.3.3.



Fig. 16.3.1 CT upper abdomen



Fig.16.3.2 Ultrasound of the liver and GB

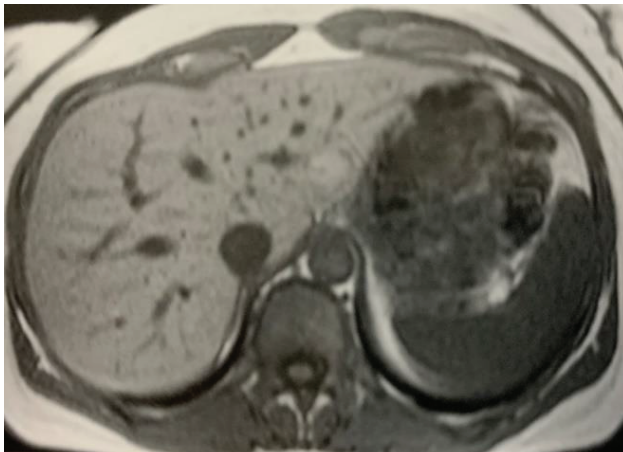


Fig. 16.3.3 MRI liver and spleen. Identity: liver, aorta, crura, inferior vena cava, spleen, stomach

Questions

1. Name the surfaces of the liver?
2. From which peritoneal fold in the fetus are the falciform ligament and lesser omentum formed?
3. What structures are present in the porta hepatic?
4. What is the relationship of the I.V.C. to the liver?
5. Where is the "bare area" of the liver?
6. What are the peritoneal ligaments of the liver?
7. What are the components (parts) of the extra-hepatic biliary system?
8. Name the parts of the gallbladder.
9. What are its main relations?
10. What is the surface marking of the fundus of gall bladder?
11. Where and how is the common bile duct found?
12. Trace the course of the common bile duct to its termination in the duodenum.
13. Where are the most probable anatomical sites for obstruction in the biliar system?

THE PANCREAS, SUPRARENAL AND THYROID GLANDS

Learning Objectives

Upon completion of this session, the student will be able to:

1. Identify and describe the parts of the pancreas and their peritoneal relationships.
2. Describe the vascular supply of the pancreas.
3. Trace the pathway and entry of the bile ducts and pancreatic ducts into the 2nd part of the duodenum.
4. Explain the relationships of the suprarenal glands to adipose and facial coverings, lower ribs and other abdominal organs.
5. Identify the blood supply and venous drainage of the suprarenal glands.
6. Identify the thyroid gland and describe its specific features.
7. Identify the parathyroid glands.
8. Consider the thyroid/parathyroid gland relationship in terms of vascular supply and surgical intervention.
9. Identify and describe the contents of the carotid sheath and their relationships with surrounding structures.
10. Locate the pituitary gland and pineal gland and describe their specific features.
11. Identify the endocrine organs

Required Materials

- Cadaver/ Abdominal Cavity/ Brain/ Sagittal Section of the Brain
- Handouts/ Atlases of Human Anatomy
- Visual and Electronic Media
- Images.

Instructions

- There are 5 stations of activities in this practical.
- When you have completed a particular task you should put a tick in the box before to it, the group's supervisor can question you about it and expect a correct answer.
- Keep these sheets for future reference and revision.
- Make sure that you answer the questions at the end of the activities.

STATION 17.1

PANCREAS

- ☐ Noticeable that the main source of digestive enzymes in the body is the pancreas.
- ☐ Locate the **pancreas** mostly posterior to the stomach. It extends across the **posterior abdominal wall** from the duodenum to the spleen.
- ☐ Review the shape and parts of the pancreas: **head, uncinete process, neck, body** and **tail**.
- ☐ Review the peritoneal arrangement of the pancreas and its relation to the **lesser sac** (the posterior wall of the lesser sac is formed by the peritoneum that covers the **diaphragm, pancreas, left kidney** and **suprarenal gland**, and **duodenum**).
- ☐ Identify the principal structures related to the pancreas:
 - ☐ **Diaphragm**.
 - ☐ **Duodenum**.
 - ☐ **Spleen**.
 - ☐ **Abdominal aorta**.
 - ☐ **Inferior vena cava**.
- ☐ Identify the **main** and **accessory pancreatic ducts**, and their termination in the duodenum, including related **sphincter** of **pancreatic duct**.
- ☐ Review the arterial supply of the pancreas:

- ☐ *Splenic artery* supplies **neck**, **body** and **tail**.
- ☐ *Superior and inferior pancreaticoduodenal arteries* supply head.
- ☐ Review that the venous return into the:
 - ☐ *Splenic vein*.
 - ☐ *Superior pancreaticoduodenal vein* into the *portal vein*
 - ☐ *Inferior pancreaticoduodenal vein* into the *superior mesenteric vein*.
- ☐ Review the lymphatic drainage of the pancreas:
 - ☐ *Head of the pancreas* drains into *pancreaticoduodenal* lymph nodes, *pre-pyloric* and *postpyloric* lymph nodes.
 - ☐ *Pancreatic body* and *tail* drain into mesocolic lymph nodes (around the middle colic artery) and into lymph nodes along the hepatic and splenic arteries.
 - ☐ Last drainage follows the *celiac*, *superior mesenteric*, and *para-aortic* and *aorticaval* lymph nodes.
- ☐ Note that the pancreas receives *parasympathetic* nerve fibers from the posterior vagal trunk via its celiac branch. While, *sympathetic* supply arises from T6-T10 via the thoracic splanchnic nerves and the celiac plexus.

STATION 17.2

SUPRARENAL (ADRENAL) GLANDS

- ☐ Note that the **adrenal glands** (suprarenal glands, colloquially, kidney hats), which are endocrine glands that locate at the upper of the kidneys; the right adrenal gland is triangular in shaped, while the left adrenal gland is semilunar in shaped.
- ☐ Notice that the glands are surrounded by an adipose capsule and renal fascia.
- ☐ Review the blood supply of the adrenal glands, three arteries that supply each adrenal gland:
 - ☐ **Superior suprarenal artery**: from the inferior phrenic artery.

- ☐ **Middle suprarenal artery:** from the abdominal aorta.
- ☐ **Inferior suprarenal artery:** from the renal artery.
- ☐ Venous drainage of the adrenal glands is done via the suprarenal veins:
 - ☐ **Right suprarenal vein:** drains into the inferior vena cava.
 - ☐ **Left suprarenal vein:** drains into the left renal vein or the left inferior phrenic vein.
- ☐ Note that the adrenal glands consist of an outer connective tissue **capsule**, a **cortex** and a **medulla**. Veins and lymphatics leave each gland via the **hilum**, but arteries and nerves enter the glands at numerous sites.

STATION 17.3

THYROID GLAND

- ☐ Identify the **thyroid gland**, is an endocrine gland in the neck, and consists of two **lobes** connected by an **isthmus**. It is found at the front of the neck, below the Adam's apple.
- ☐ Note that the thyroid has an anterolateral surface covered by the **infrahyoid muscles** and the **sternocleidomastoid muscle** and a medial surface facing the trachea and esophagus.
- ☐ Identify the following structures of the thyroid glands:
 - ☐ Right and left lobes joined by a central isthmus. The upper limit of the lobes reaches to the **oblique line on the lamina of the thyroid cartilage** and inferiorly to the level of the **sixth tracheal ring**.
 - ☐ Isthmus overlies the second, third, and fourth tracheal rings.
 - ☐ Locate on the posterior aspect of the gland are situated **four parathyroid glands**. These are usually difficult to see because they are small and have a color similar to that of the gland.
 - ☐ Identify the arterial supply of the gland:
 - ☐ **Superior thyroid artery** of the **external carotid artery**.

- ☐ *Inferior thyroid artery* of the first part of the *subclavian artery*.
- ☐ The gland has three veins: the superior, middle, and inferior thyroid veins. The superior and middle empty in the internal jugular vein while the inferior will empty in the left brachiocephalic as it crosses from left to right.
- ☐ Lymphatic drainage of the thyroid gland flows multidirectionally to the: *prelaryngeal*, *pretracheal*, and *paratracheal* nodes along the *recurrent laryngeal* nerve and then to mediastinal lymph nodes.
- ☐ Identify the two important nerves which are related to the gland and both supply the laryngeal muscles:
 - ☐ *Superior laryngeal* nerve.
 - ☐ *Recurrent laryngeal* nerve.

STATION 17.4

PITUITARY GLAND AND PINEAL GLAND

- ☐ Identify the *pituitary gland*, which is a pea-sized gland that lies in a protecting bony enclosure called the sella turcica.
- ☐ It is composed of three lobes:
 - ☐ *Anterior*.
 - ☐ *Intermediate*.
 - ☐ *Posterior*.
- ☐ Identify the *pituitary stalk* (infundibular stalk or infundibulum) is the connection between the hypothalamus and the posterior pituitary.
- ☐ Identify the *pineal gland* (also called the *pineal body*, *epiphysis cerebri*) is a small endocrine gland. It is located near to the center of the brain between the two hemispheres.

STATION 17.5

IMAGING

(Figure 17.5.1 - 17.5.3)

- ☐ Identify the pituitary fossa in Fig.17.5.1.
- ☐ Identify the thyroid lobes, isthmus and the trachea in Fig.17.5.2.
- ☐ Identify the adrenal glands in Fig.16.3.1.
- ☐ Identify the pancrea, liver, aorta and crura in Fig.17.5.3.



Fig. 17.5.1 CT skull showing the pituitary fossa

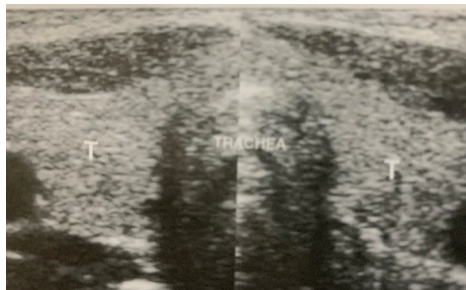


Fig. 17.5.2 Thyroid US. Identify: trachea, thyroid lobe and isthmus, strap muscles

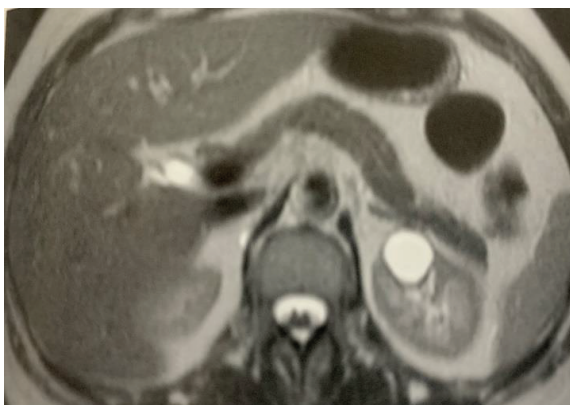


Fig. 17.5.3 CT MRI Pancreas and liver, note simple cyst in left kidney Identify: aorta, crura, kidneys, liver, spleen, head, body and tail of pancreas

Questions

1. What is the relation of the pancreas to structures on the posterior abdominal wall?
2. Where does the tail of pancreas lie? In which peritoneal fold it found?
3. What is the blood supply to the pancreas?
4. Where is the adrenal gland located?
5. What is the function of the adrenal gland?
6. What is the lymphatic drainage of the adrenal gland?
7. Where is the thyroid gland located?
8. What is the blood supply of the thyroid gland?
9. What is the lymphatic drainage of the thyroid gland?

RENAL SYSTEM UPPER AND LOWER URINARY TRACTS

Learning Objectives

Upon completion of this session, the student will be able to:

1. Identify the posterior abdominal wall muscles, the nerves and vascular supply, and their significant function.
2. Describe the vertebral level for all branches of the abdominal aorta and the inferior vena cava.
3. Describe the formation of the lumbar plexus and its relationship to the posterior abdominal wall muscles.
4. Explain the relationships of the kidneys and suprarenal glands to adipose and facial coverings, lower ribs and other abdominal organs.
5. Describe the anatomy of the kidney.
6. Describe the blood supply and venous drainage of the kidneys.
7. Identify the ureter and notice its formation, passway, constrictions, and terminations.
8. Observe the urinary bladder in either its expanded or contracted position, and determine the extent of its peritoneal covering.
9. Recognize the internal orifices of the bladder and differentiate the trigone region from the rest of the bladder lining.
10. Define the relationships of the bladder to other pelvic organs in both sexes.
11. Identify the urethra and differentiate between male urethra and female urethra.
12. Identify the renal cortex, medulla and pelvis in ultrasound images.
13. Identify the major and minor calices, renal pelvis, ureter, bladder and urethra in IVU images.

14. Describe the relationship between the kidneys, diaphragmatic crura, adrenals and blood vessels in axial CT images passing through the kidneys

Required Materials

- Cadaver/ Abdominal Cavity/ Transverse Section of the Kidney/ Demonstration for the Nephron of the Kidney/ Sagittal Section of Male & Female Pelvis
- Handouts/ Atlases of Human Anatomy
- Visual and Electronic Media
- Images.

Instructions

- There are 4 stations of activities in this practical.
- When you have completed a particular task you should put a tick in the box before to it, the group's supervisor can question you about it and expect a correct answer.
- Keep these sheets for future reference and revision.
- Make sure that you answer the questions at the end of the activities.

STATION 18.1

KIDNEY BED AND POSTERIOR ABDOMINAL WALL:

(Figure 18.1.1)

KIDNEY BED

- ☐ Locate the structures forming kidney bed:
- ☐ *Psoas major.*
 - ☐ *Quadratus lumborum.*
 - ☐ *Transverses abdominis.*
 - ☐ *Diaphragm.*

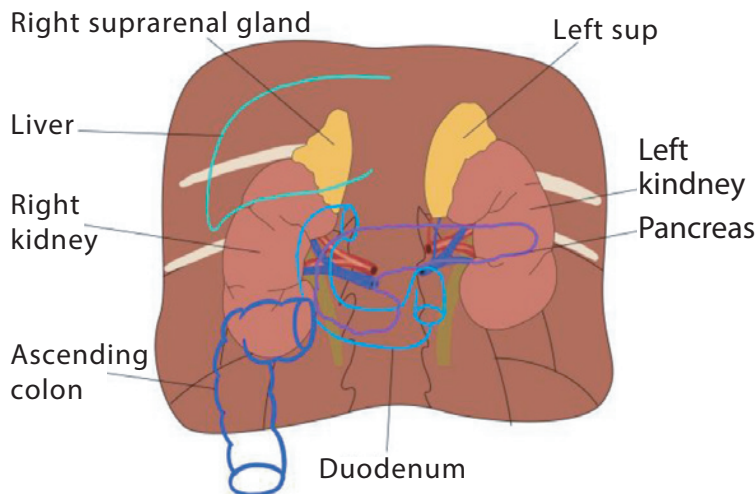


Fig. 18.1.1 Kidney bed

Lumbar plexus

- ☐ Identify the branches of the lumbar plexus which appear in the posterior abdominal wall and they emerge either medial or lateral to **psaos major** or through its anterior surface:
 - ☐ **Medial:** **obturator nerve** (L2, 3,4), **lumbo-sacral trunk** (L4, 5)
 - ☐ **Lateral:** **ilio-inguinal**, **ilio-hypogastric** (L1), **lateral cutaneous nerve of thigh** (L2,3), **femoral nerve** (L2,3,4)
 - ☐ **Anterior:** genito-femoral nerve (L1, 2)
- ☐ Note that **subcostal** nerve, **ilio-inguinal** and **ilio-hypogastric** nerves lie behind kidney in the "**kidney bed**".

ABDOMINAL AORTA

- ☐ Note that the abdominal aorta has two groups of branches
 - ☐ Single Branches
 - ☐ **Coeliac artery**
 - ☐ **Left gastric.**

- ☐ *Splenic.*
 - ☐ *Short gastric arteries.*
 - ☐ *Splenic arteries.*
 - ☐ *Left gastroepiploic.*
- ☐ *Common hepatic.*
 - ☐ *Cystic.*
 - ☐ *Right gastric.*
 - ☐ *Gastroduodenal.*
 - ☐ *Right gastroepiploic.*
 - ☐ *Superior pancreaticoduodenal.*
 - ☐ *Right hepatic.*
 - ☐ *Left hepatic.*
- ☐ **Superior mesenteric artery**
 - ☐ Jejunal and ileal arteries.
 - ☐ Inferior pancreaticoduodenal.
 - ☐ Middle colic.
 - ☐ Right colic.
 - ☐ Ileocolic.
 - ☐ *Anterior cecal.*
 - ☐ *Posterior cecal (appendicular).*
 - ☐ *Ileal.*
 - ☐ *Colic.*
- ☐ **Inferior mesenteric artery**
 - ☐ *Left colic.*
 - ☐ *Sigmoid arteries.*
 - ☐ *Superior rectal.*

- ☐ **Median sacral artery**
- ☐ Paired branches
 - ☐ **Phrenic** arteries.
 - ☐ **Middle suprarenal** arteries.
 - ☐ **Renal** arteries.
 - ☐ **Gonadal** arteries.
 - ☐ **Lumbar** arteries.
 - ☐ **Common iliac** arteries:
 - ☐ **External iliac.**
 - ☐ **Internal iliac.**

STATION 18.2

KIDNEY: EXTERNAL AND INTERNAL FEATURES

- ☐ Locate the **kidneys**, which are a pair of organs located in the right and left side of the abdomen. The kidneys remove waste products from the blood and produce urine
- ☐ Identify the following in each kidney:
 - ☐ Upper and lower **poles**.
 - ☐ Anterior and posterior **surfaces**.
 - ☐ Medial and lateral **borders**.
 - ☐ **Hilum** that is located medially.
 - ☐ The right kidney sits a little bit lower than the left one because it is being pushed by the right lobe of the liver.
 - ☐ Each kidney has a **suprarenal gland** on its upper pole. The right suprarenal gland is **pyramidal** in shape while the left one is **crenate** in shape.
 - ☐ The kidney and its suprarenal gland are enveloped in a fatty capsule called the **perirenal fat or fascia of Gerota**. However each one has a separate compartment inside this fascial envelope.

- ☐ Observe that posteriorly the left kidney is related to the **tenth, eleventh and twelfth ribs** covered by the **diaphragm** and the right one related to the **eleventh and twelfth ribs**, both kidneys sitting on the **psoas major** muscle medially and the **quadratus lumborum** laterally.
- ☐ Observe that anteriorly the right kidney is related to the **quadrate lobe** of the liver, **transverse colon** and **duodenum**, while the left one is related to the **lesser sac**, **pancreas** and the **spleen**.
- ☐ Notice that the **hilum of the kidney** has the **renal vein, artery**, and **pelvis** in order from anterior to posterior but the branches of the artery may sometimes enter the kidney anterior to the vein.
- ☐ Observe in the isolated specimen whether the kidney is right or left: the hilum faces medial, the renal pelvis is posterior, and the ureter points down to the lower pole.
- ☐ In a sagittal section of the kidney identify the following:
 - ☐ **Renal sinus** (contains calyces, pelvis, blood vessels, and fat).
 - ☐ **Outer zone**: cortex that appears granular due to **glomeruli**.
 - ☐ **Inner zone**: medulla that appears striated due to presence of **renal tubules**.
 - ☐ **Renal columns**.
 - ☐ **Renal pyramids**
 - ☐ **Renal papilla**.
 - ☐ **Major and minor calyces**.
- ☐ Using the plastic model trace the branches of a **Segmental branch** of renal artery including the following arteries:
 - ☐ **Interlobar**.
 - ☐ **Interlobular**.
 - ☐ **Arcuate**.

- ☐ Intralobular.
- ☐ Afferent and efferent glomerular arterioles.
- ☐ Using the plastic model identifies the parenchyma of the kidney which is formed of the following:
 - ☐ Nephrons.
 - ☐ Collecting tubules.
- ☐ Notice that the nephron is formed of:
 - ☐ Malpighian renal corpuscle which has the following parts:
 - ☐ Bowmans capsule.
 - ☐ Glomerulus of blood capillaries.
 - ☐ Afferent and efferent arterioles.
 - ☐ Proximal and distal convoluted tubules.
 - ☐ Loop of Henle.

STATION 18.3

URETER: URINARY BLADDER AND URETHRA

URETER

- ☐ Locate the ureter as it continues distally from the renal pelvis on the posterior abdominal wall, noting its relation to the psoas major and to the great vessels.
- ☐ Note that the ureter lies in 2 regions: posterior abdominal wall and pelvis.
- ☐ Locate where the ureter crosses the pelvic brim at the bifurcation of the common iliac artery.
- ☐ Note that ureter has three narrowing parts on its way to the urinary bladder and these narrowing parts are common parts for the localization of urinary stones.
- ☐ Identify the first narrowed part is the pelvi-ureteric junction, the second is the crossing point of ureter to the iliac vessels and the third one is the point where the ureter enters to the urinary bladder.

- ☐ Note its relation to **ovary** in female pelvis.
- ☐ Note its relation to **vas deferens** in male pelvis.
- ☐ Locate the ureter as it enters the bladder (**intramural part**)

BLADDER

- ☐ Locate the general position of the bladder in the pelvis including relation to **pubic bones** and **symphysis pubis**.
- ☐ Note its shape is globular in the living, pyramidal in the cadaver and locate the following:
 - ☐ **Superior, inferior** and **lateral surfaces**
 - ☐ **Apex, base, neck** and **fundus**
- ☐ Define relation of bladder to **peritoneum**. It covers only upper surface (fundus) and upper part of base. And note the following:
 - ☐ **Recto-vesical pouch**.
 - ☐ **Utero-vesical pouch**.
- ☐ Note the close relations of bladder:
 - ☐ **Female: uterus** and **vagina**.
 - ☐ **Male: seminal vesicles, vas deferens, ejaculatory ducts** and **prostate**.
- ☐ Locate point of entrance of ureters into base of bladder
- ☐ Examine internal features of bladder:
 - ☐ Smooth **trigone** (triangular in shape) with entrance of ureters at supero-lateral angles and **internal urethral orifice** at inferior angle.
- ☐ Notice that immediately surrounding urethral orifice is bladder neck.
- ☐ Notice that the trigone area is fixed and does not expand as bladder fill rough (trabeculated) appearance of remainder of interior, particularly in the empty contracted bladder, due to underlying bundles of **detrussor muscle**.

URETHRA

- ☐ Locate the 3 parts of the urethra in the male and compare their lengths:
 - ☐ **Prostatic:** traverses **prostate**.
 - ☐ **Membranous:** traverses **urogenital diaphragm**.

- ☐ Penile: in **corpus spongiosum**.
- ☐ Locate membranous urethra passing through urogenital diaphragm. It is surrounded by striated **sphincter urethrae** muscle and the chief control of **urinary continence**. It is supplied by branches of the **pudendal nerve** (S2,3,4).
- ☐ Locate **external urethral orifice** and **navicular fossa** in male penile urethra.
- ☐ Locate female urethra and compare its length with that in male.
- ☐ Locate female **external urethral orifice** in **vaginal vestibule**.

STATION 18.4

IMAGING

(Figure 18.4.1 - 18.4.6)

- ☐ Identify the liver, right kidney and diaphragm shown in ultrasound image in Fig.18.4.1.
- ☐ Identify the vessels shown in Fig.15.2.2.
- ☐ Identify the ureters and name the pelvicalyceal structures in Fig.18.4.2.
- ☐ Identify the kidneys and relations shown in the coronal CT in Fig.18.4.3 and 18.4.5.
- ☐ Identify the vessels shown in Fig.18.4.5.
- ☐ Identify the urinary bladder and ureters shown in Fig.18.4.6.



Fig.18.4.1 U/S RT kidney and liver. Identify: diaphragm, liver, right kidney, psoas muscle

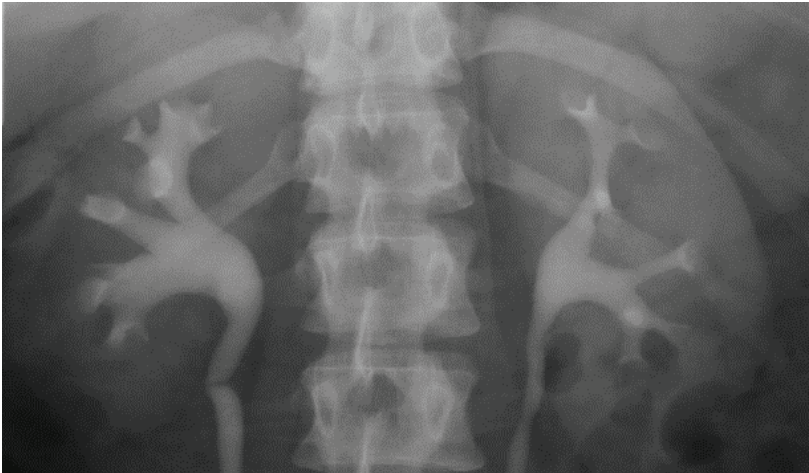


Fig. 18.4.2 Intravenous urography showing functional kidneys



Fig. 18.4.3 Coronal CT showing both kidneys, liver, spleen and psoas muscles



Fig. 18.4.4 Axial CT of kidneys



Fig. 18.4.5 MRA kidney and spleen arteries. Identify: aorta, renal, hepatic and splenic arteries.

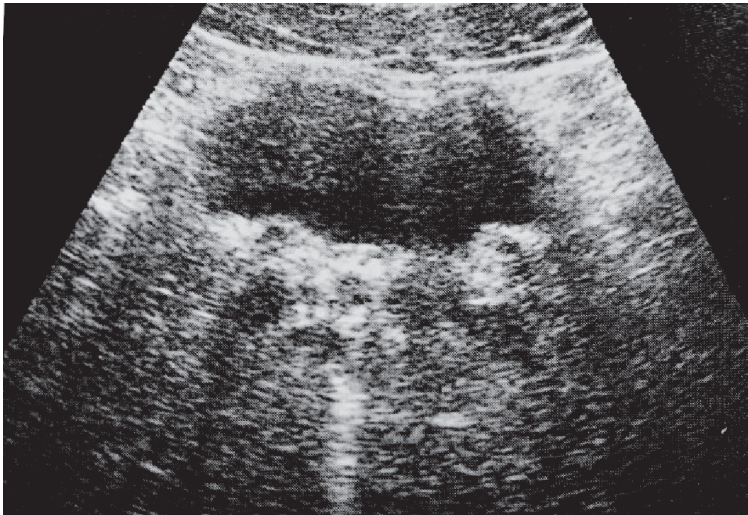


Fig. 18.4.6 US urinary bladder. Identify: urinary bladder, ureters, rectal gas

Questions:

1. What are the localizations of right and left kidney?
2. What are the branches of renal artery in kidney?
3. What are the adjacent structures of the anterior and posterior surfaces of kidneys?
4. What are the structures found in the renal medulla and renal cortex?
5. Which vertebrae are lying parallel to the ureter till the ureter (abdominal part) passes to the pelvic inlet?
6. What are the important structures that are crossed by ureter?
7. What are the close relations of male and female urinary bladder?
8. What are the differences between male and female urethra?
9. Name the abnormalities seen in image 18.4.5

REPRODUCTIVE SYSTEM: PELVIS FRAMEWORK

Learning Objectives

Upon completion of this session, the student will be able to:

1. Demonstrate the bony framework of the pelvis.
2. Identify the two sciatic foramina and list the muscles, nerves, and vessels that pass through each.
3. Explain the origins of the piriformis and obturator internus muscles.
4. Identify the pelvic diaphragm and classify its components.
5. Trace the branches of the internal iliac vessels in both male and female; identify the branches by their relationships to pelvic organs.
6. Explain the formation of the sacral plexus, its relationship to the piriformis muscle and gluteal vessels.
7. Identify the bony parts of the pelvis framework in radiographs

Required Materials

- Cadaver/ Pelvis Framework/ Pelvic Cavity
- Handouts/ Atlases of Human Anatomy
- Visual and Electronic Media
- Images

Instructions

- There are 6 stations of activities in this practical.
- When you have completed a particular task you should put a tick in the box before to it, the group's supervisor can question you about it and expect a correct answer.
- Keep these sheets for future reference and revision.
- Make sure that you answer the questions at the end of the activities.

STATION 19.1

BONY FRAMEWORK OF PELVIS

- ☐ Note that the bony pelvis is formed by the union of the two hip bones anteriorly at the symphysis pubis and posteriorly each hip articulates with the sacrum to form the pelvic girdle.
- ☐ Note that each hip bone consists of the three fused pelvic bones *ilium*, *ischium* and *pubis*.
- ☐ Locate the *acetabulum*, which is area where the three parts of hip bone fused.
- ☐ Within the *ilium* which lies superiorly identify the following:
 - ☐ Upper border of the ilium (*iliac crest*), which extends from the anterior superior iliac spine to the posterior superior iliac spine.
 - ☐ Anterior border extent from the *anterior superior iliac spine* to the *anterior inferior iliac spine*.
 - ☐ Posterior border of the ilium between the *posterior superior* and *posterior inferior iliac spines*.
 - ☐ *Gluteal lines* from where the gluteal muscles take their origin.
 - ☐ *Iliac fossa* from where the iliacus muscle originates.

- ☐ Within the **ischium** which lies postero-inferiorly. Identify the following:
 - ☐ **Ischial body**, the upper thick portion which joins with **pubis** and **ilium** at the **acetabulum**.
 - ☐ **Inferior ramus** of the ischium joins the inferior ramus of the pubis (pubic arch) to enclose the **obturator foramen**.
 - ☐ Spine of the ischium projects medially to divide the **greater** from the **lesser sciatic notch**.
 - ☐ **Ischial tuberosity** is rough prominence, divides by ridges into areas to give attachment to many muscles of the back of the thigh.
 - ☐ **Obturator foramen** is ringed by the sharp margins of the pubis and ischium.
- ☐ Within the **pubis** which lies antero-inferiorly identify the following:
 - ☐ **Body of the pubis** with superior ramus which join the ilium, ischium at the acetabulum and inferior ramus which fuses with the ischium below the obturator foramen.
 - ☐ **Pubic crest** and the **pubic tubercle**.
- ☐ Identify the **sacrum** bone; it's triangular in shape, and locate the following:
 - ☐ Its base lies in the upper border.
 - ☐ **Ala of the sacrum**.
 - ☐ **Sacral promontory**.
 - ☐ **Anterior surface**, possess on each side four foramina to transmit the **anterior rami** of **sacral nerves**.
 - ☐ **Sacral canal** that terminates at the caudal opening **sacral hiatus**.
 - ☐ **Posterior surface**, possess on each side four foramina to transmit the **posterior rami** of the **sacral nerves** between the median crest.
- ☐ Locate the structure passes through the **sacral canal**:
 - ☐ **Dural sac**.

- ☐ Sacral and coccygeal nerves.
- ☐ Filum terminate.
- ☐ Identify the **coccyx**, which consist of four vertebrae fused together from a small triangular bone.

STATION 19.2

DIFFERENCES BETWEEN THE MALE AND FEMALE PELVIS

(Figure 19.2.1)

- ☐ Differentiate between female and male pelvic framework, and recognize the following:
 - ☐ The female pelvis is more broad and flattened, whereas the male pelvis is taller and narrow (because the iliac crests are higher).
 - ☐ In the female the pubic arch forms an obtuse angle (>90 degrees), whereas in the male pelvis the pubic arch forms a much more acute angle (v-shaped) (<90 degrees).
 - ☐ The female pelvic inlet is more circular and wider, whereas the male pelvic inlet is narrower and heart shape.
 - ☐ Female pelvis has a sacrum that is wider, shorter, and less curved, whereas male pelvis has a longer and narrower sacrum.
 - ☐ Female pelvis' coccyx is flexible and straight, whereas the male pelvis' coccyx is projected inwards and immovable.
 - ☐ In the female pelvis the obturator foramen is oval, whereas in the male pelvis is round.
- ☐ Perceive the types of female pelvis:
 - ☐ **Gynaecoid Pelvis**: (is the proper female pelvic shape): has round pelvic inlet (allow normal child birth), shallow pelvic cavity, and short ischial spines.
 - ☐ **Anthropoid Pelvis**: has oval shaped inlet, large anterioposterior diameter with relatively smaller transverse diameter and blunt ischial spine.

- ☐ **Platypelloid Pelvis:** has kidney shaped inlet and blunt ischial spine.
- ☐ **Android Pelvis** (possible in tall women): has triangular or heart-shaped inlet, narrower transverse outlet diameter and prominent ischial spines.

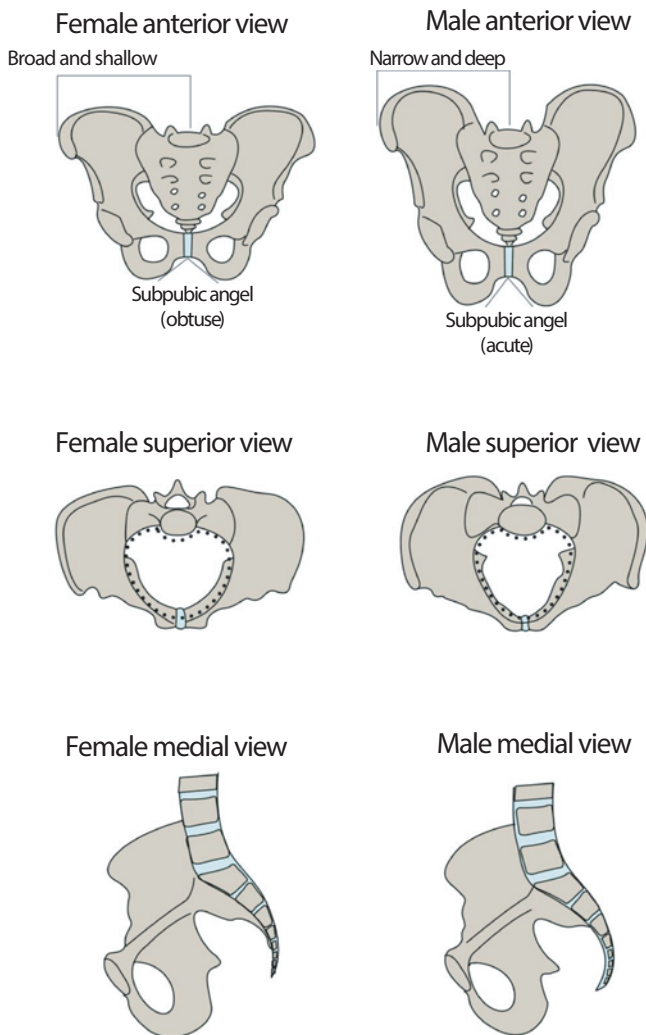


Fig. 19.2.1 Differences between female and male pelvis

STATION 19.3

PELVIC JOINTS AND LIGAMENTS

- ☐ Locate the **sacroiliac joints**: which are strong synovial joints between the sacrum and iliac bones, and identify the following ligaments:
 - ☐ Anterior sacroiliac.
 - ☐ Posterior sacroiliac.
 - ☐ Interosseous sacroiliac.
- ☐ Locate the **symphysis pubis**: is cartilaginous joint between the two pubic bones no movement is possible.
- ☐ Locate the **sacro-coccygeal joint**: is cartilaginous joint. A great deal of movement is possible at this joint.
- ☐ Locate the **sacro-tuberous ligament** extends from the sacrum and coccyx and the posterior inferior iliac spine to the ischial tuberosity.
- ☐ Locate the **sacro-spinous ligament** triangular in shape; it's attached to the sacrum and coccyx and to the ischial spine.
- ☐ Locate the **obturator membrane** fibrous sheet closes the obturator foramen leaving a small obturator canal for passage of obturator nerve and vessels.

STATION 19.4

PELVIC MUSCLES

- ☐ Locate the **piriformis muscle**.
 - ☐ **Origin**: the front of the sacrum.
 - ☐ **Insertion**: through the greater sciatic foramen to the greater trochanter of the femur.
- ☐ Locate the **obturator internus muscle**.
 - ☐ **Origin**: pelvic surface of the obturator membrane.

- ☐ **Insertion:** through the lesser sciatic foramen to the greater trochanter of the femur.
- ☐ Locate the **levator ani muscle**, which form the inferior pelvic wall or pelvic floor or pelvic diaphragm with **coccygeus muscle**.
- ☐ **Origin:** back of the body of the pubis, obturator internus fascia and spine of the ischium.
- ☐ **Insertion:** median raphe extends from the prostate or vagina then to the perineal body surround the anal canal and anococcygeal body to the tip of the coccyx.
- ☐ Direction of the fibres:
 - ☐ Anterior fibres; **levator prostate** or **sphincter vaginae muscle**.
 - ☐ Intermediate fibres; the **puborectalis muscle**.
 - ☐ Posterior fibres; **iliococcygeus muscle**.
- ☐ Locate the **coccygeus muscle**:
 - ☐ **Origin:** ischial spine.
 - ☐ **Insertion:** lower end of the sacrum and coccyx.

STATION 19.5

SACRAL PLEXUS AND INTERNAL ILIAC ARTERY

- ☐ Locate the **sacral plexus** which is formed by the **lumbosacral trunk** and the ventral rami of the upper three and upper part of the **fourth sacral nerves**.
- ☐ Note that the plexus lies in front of the **piriformis** muscle
- ☐ The branches of the plexus are:
 - ☐ Muscular twigs to the:
 - ☐ **Piriformis** (S1, 2).
 - ☐ **Levator ani** (S4).
 - ☐ **Coccygeus** (S4).
 - ☐ **Pelvic splanchnic** (S2 - S4).

- ☐ Superior gluteal (L4, L5, S1).
- ☐ Inferior gluteal (L5, S1, S2).
- ☐ Perforating cutaneous (S2, S3).
- ☐ Nerve to quadratus femoris (L4, L5, S1).
- ☐ Nerve to obturator internus (L5, S1, S2).
- ☐ Posterior cutaneous of the thigh (S1, S2, S3).
- ☐ Pudendal (S2, S3, S4).
- ☐ Sciatic (L4, L5, S1, S2, S3).
- ☐ Identify the internal iliac artery, which supplies the walls and viscera of the pelvis, the buttock, the reproductive organs, and the medial compartment of the thigh. The vesicular branches of the internal iliac arteries supply the bladder. Identify the following branches:
 - ☐ Iliolumbar artery.
 - ☐ Lateral sacral artery.
 - ☐ Superior gluteal artery.
 - ☐ Obturator artery (occasionally from inferior epigastric artery):
 - ☐ Inferior gluteal artery.
 - ☐ Umbilical artery.
 - ☐ Uterine artery (female).
 - ☐ Vaginal artery (female) The artery usually takes the place of the inferior vesical artery that present in the male.
 - ☐ Middle rectal artery.
 - ☐ Internal pudendal artery.

STATION 19.6

IMAGING (Figs. 19.6.1-19.6.4)

- ☐ Identify the bony parts of the pelvis in a AP and lateral radiographs in Figs. 19.6.1, 19.6.2, 19.6.3.
- ☐ Identify the blood vessels seen in angiograms.



Fig. 19.6.1 AP radiograph of pelvis. Note hip joint, iliac fossa, sacrum

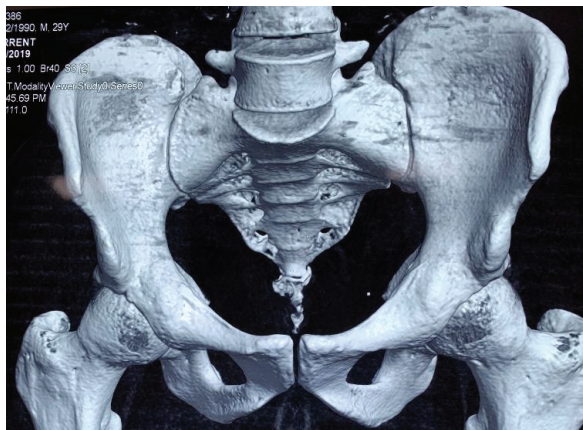


Fig. 19.6.2 3D CT pelvis. Identify: public symphysis, sacroiliac joint, sacrum and coccyx, structures in the upper end of femur.

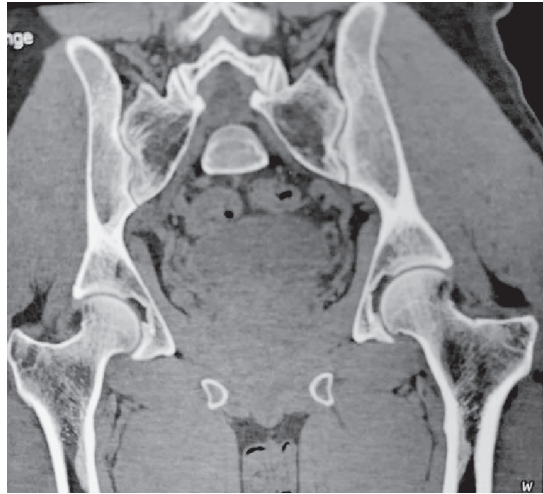


Fig. 19.6.3 CT coronal of pelvis showing hip and sacroiliac joints

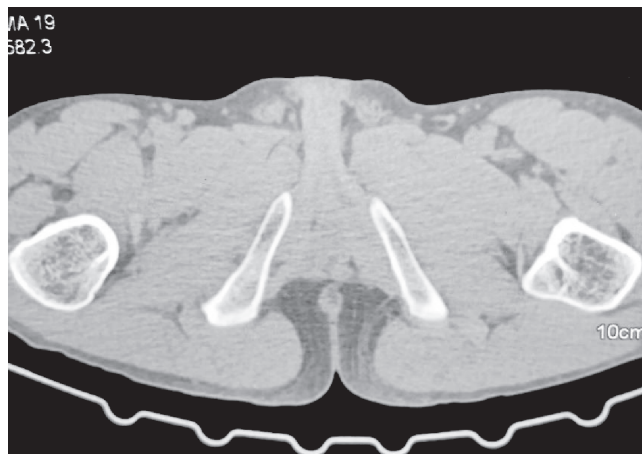


Fig. 19.6.4 Axial CT of pelvic muscles. Identify: gluteus maximus, obturator externus, muscles of anterior compartment of thigh, boundaries of the femoral triangle

Questions

1. Describe the boundaries of the pelvis.
2. What are the parts of the hip bone?
3. What is the pelvic floor?
4. Mention the parts of the levator ani muscle?
5. Mention the branches of the sacral plexus.
6. Mention the organs that are the supply by the internal iliac artery.

MALE REPRODUCTIVE TRACT

Learning Objectives

Upon completion of this session, the student will be able to

1. Define the position and relationships of all organs of the male reproductive tract.
2. Identify the testis, its coverings, and tubules.
3. Identify the epididymis and its subdivisions.
4. Trace the entire course of the ductus deferens and identify its ampulla, observe its relationship to the ureter.
5. Identify the seminal vesicle and explain the formation and course of the ejaculatory duct.
6. Identify the structures of the male copulatory organ.
7. Identify the prostatic gland and define the features of the prostatic urethral wall.
8. Identify the testes in ultrasound images and diagnose hydrocele, varicocele and masses.
9. Identify and assess the volume of the prostate in ultrasound images.

Required Materials

- Cadaver/ Pelvic Cavity/ Sagittal Section of Male Pelvis
- Handouts/ Atlases of Human Anatomy
- Visual and Electronic Media
- Images.

Instructions

- There are 3 stations of activities in this practical.
- When you have completed a particular task you should put a tick in the box before to it, the group's supervisor can question you about it and expect a correct answer.
- Keep these sheets for future reference and revision.
- Make sure that you answer the questions at the end of the activities.

STATION 20.1

SCROTUM, TESTIS AND SPERMATIC CORD

(Figure 20.1.1)

- ☐ Locate the **testis** within the **scrotum** and notice each testis lies in a corresponding half of scrotum.
- ☐ Review the different layers of the scrotum from outside inwards: **skin**, **dartos fascia** and **muscle**, **external spermatic fascia**, **cremasteric fascia**, **internal spermatic fascia**, and **tunica vaginalis**.
- ☐ Note that the scrotum is supplied by:
 - ☐ **Ilioinguinal** nerve.
 - ☐ **Genital branch of genitofemoral** nerve.
 - ☐ **Perineal branch of the posterior cutaneous nerve of the thigh**.
 - ☐ **Internal pudendal** artery.
 - ☐ **External pudendal** artery.
- ☐ Review the general shape of the testis and locate its borders and surfaces:
 - ☐ **Anterior border**.
 - ☐ **Posterior border**.
 - ☐ **Mediastinum of testis**.

- ☐ Tunica albuginea.
- ☐ Observe that the testis is attached to the scrotum by the spermatic cord.
- ☐ Notice the epididymis that is closely applied to the posterior border of the testis.
- ☐ In a coronal section of testis, notice the:
 - ☐ Highly convoluted tubules (seminiferous tubules), which are the functional units of the testis.
 - ☐ Tubulus recti.
 - ☐ Rete testis.
 - ☐ Efferent ductules.
- ☐ Review the general shape of the **epididymis** and note its different parts, head, body and tail.
- ☐ Follow the tail of the epididymis that is continuous with the **ductus deferens** that represents one of the contents, of the spermatic cord.
- ☐ Review other structures that form the **spermatic cord**:
 - ☐ Ductus deferens.
 - ☐ Artery of the ductus deferens.
 - ☐ Testicular artery.
 - ☐ Pampiniform plexus.
 - ☐ Testicular vein.
 - ☐ Cremaster muscle.
 - ☐ Cremasteric artery.
 - ☐ Genitofemoral nerve.
 - ☐ Lymph vessels.
- ☐ List the different layers that cover the **spermatic cord**: **external spermatic fascia** the outer covering, **cremasteric fascia** (the middle covering that contains loops of cremasteric muscle) and **internal spermatic fascia**.

- ☐ Follow the course of the **ductus deferens (vas deferens)** when passing out from the deep inguinal ring: Epididymic part, inguinal part and pelvic part.
- ☐ Observe that the ductus deferens that is covered by the peritoneum of the side wall of the pelvis.
- ☐ Observe that the ductus deferens crosses the lower end of the ureter.
- ☐ Identify the **seminal vesicle** (gland).
- ☐ Follow the ducts deferens to the base of the urinary bladder where it forms dilation called ampulla, the two **ampullae** are related laterally to the seminal vesicles, anteriorly to the base of the urinary bladder and posteriorly to the rectum.
- ☐ Notice that the ducts deferens narrows again and joins with the duct of the seminal vesicle to form the ejaculatory duct, which opens in to the prostate.
- ☐ Identify the external and internal iliac lymph nodes.
- ☐ Identify the **pre-aortic lymph nodes**.

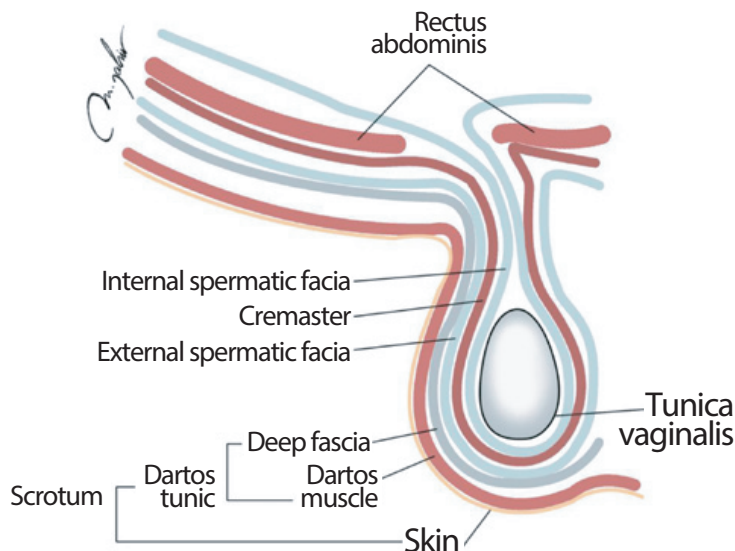


Fig. 20.1.1 Layers of the scrotum

STATION 20.2

PENIS

- ☐ Note that the **penis** is formed of two main parts:
 - ☐ **Root of the penis**, which lies in the superficial perineal pouch.
 - ☐ **Body of the penis**, which is the free part to the penis.
- ☐ Recognize the **glans penis**, which is the dilated terminal part of the penis.
- ☐ Notice the **external urethral orifice**, which lies in the tip of the glans penis.
- ☐ Note that the projecting margin of the base of the glans penis called the corona glandis.
- ☐ Note the **neck of the penis**, which is the constriction at the junction of the base of the glans penis and body.
- ☐ Note that the skin covering the glans penis is called the **prepuce** (foreskin). **Circumcision** is a surgical removes the greater part of the prepuce.
- ☐ Identify the frenulum of the prepuce, which a thin median skin folds which connect the ventral of the glans penis with the prepuce.
- ☐ Recognize the superficial fascia of the penis, which is devoid of fat, like that of the anterior abdominal wall and perineum, it is differentiated into superficial areolar layer and deep membranes layer.
- ☐ Note the deep membranous layer of superficial fascia called fascia penis.
- ☐ Identify the superficial dorsal vein which lies in the fascia while the deep dorsal vein, dorsal arteries and dorsal nerves of the penis run deep to it.
- ☐ In cross section of the penis, identify the following:
 - ☐ **Two corpora cavernosa** that lies dorsal to the **corpus (bulbus) spongiosum**.
 - ☐ Notice the thick capsule, which covers the corpora cavernosa (tunica albuginea).
 - ☐ Note that the **deep dorsal artery of the penis** runs in a longitudinal tortuous course in the center of the corpus cavernosum on each side.
 - ☐ Also notice the thin capsule, which covers the corpus spongiosum (this is why it remains soft during erection of the penis).

- ☐ Identify the urethra (penile), which traverses the whole length of the corpus spongiosum and the urethral arteries along the urethra on each side.
- ☐ Identify the *superficial and deep inguinal lymph nodes*.

STATION 20.3

PROSTATE, URETHRA AND OTHER ACCESSORY GLANDS

- ☐ Identify the *prostatic gland* inferior to the bladder.
- ☐ Note the shape of the gland, which is roughly like an inverted pyramid with the apex downwards and the base upwards.
- ☐ Identify the following parts of the prostate:
 - ☐ Right / left lobe.
 - ☐ Isthmus (anterior lobe) of prostate.
 - ☐ Middle lobe of prostate.
 - ☐ Prostatic capsule.
 - ☐ Prostatic ducts.
- ☐ Identify the prostatic venous plexus and sacral lymph nodes.
- ☐ Identify *bulbo-urethral (Cowper) glands* and *seminal vesicle gland*.
- ☐ Identify the parts of male urethra:
 - ☐ Prostatic urethra.
 - ☐ Membranous urethra.
 - ☐ Spongy urethra.

STATION 20.4

IMAGING (Figs. 20.4.1-20.4.2)

- ☐ Note the shape and echotexture of the testis in ultrasound (Fig.20.4.1)
- ☐ Note the appearance of hydrocele (Fig.20.4.2).

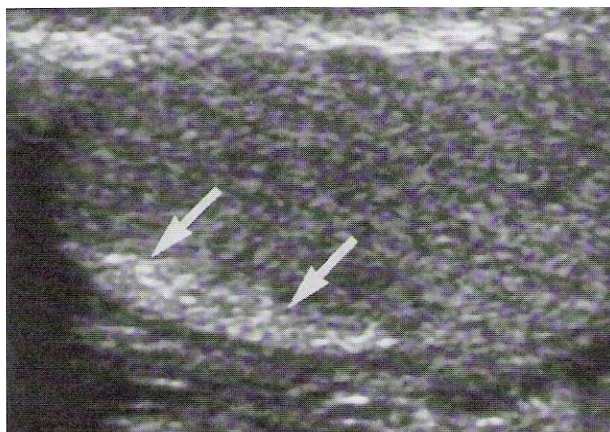


Fig. 20.4.1 US normal testis, arrows show hilum

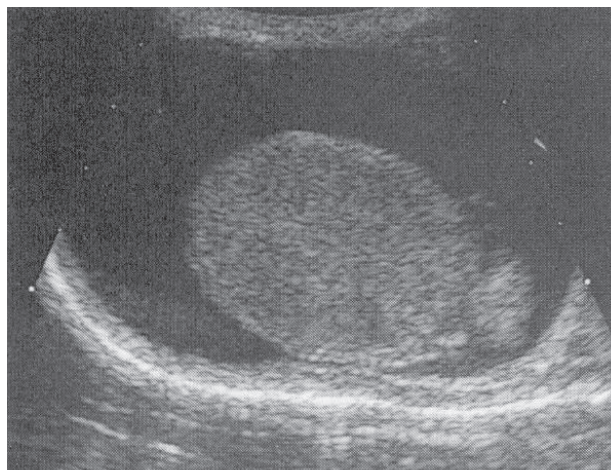


Fig. 20.4.2 US of a hydrocele

Questions

1. What's the importance of localization of testes out of body? Please discuss this different localization.
 2. What are the anatomic structures related with the production and the conduction of sperms?
 3. What's the mechanism of erection of penis and ejaculation? Please discuss the mechanism by forming a relation with its anatomy.
 4. What are the coverings of the testis?
 5. What do we mean by hydrocele?
 6. Mention the contents of the spermatic cord?
 7. What is the arterial supply of the testis, scrotum and penis?
 8. What do we mean by cremastic reflex?
-

FEMALE REPRODUCTIVE TRACT

Learning Objectives

Upon completion of this session, the student will be able to:

1. Define the position and relationships of all organs of the female reproductive tract.
2. Identify the uterus and its subdivisions and describe the continuity of its lumen with that of the vagina and the uterine tubes.
3. Differentiate between the internal and external os of the cervix of the uterus.
4. Trace the continuity of the abdominal peritoneum with that of the pelvis, and identify the peritoneal pouches of the pelvis.
5. Identify the broad ligament and distinguish its parts.
6. Identify the uterine tube and its subdivisions.
7. Identify the ovary and ovarian ligaments and discuss its functional significance.
8. Identify the vagina, and note the angle formed at its junction with the uterus.
9. Identify the uterus, vagina and adnexae in ultrasound images.
10. Identify the uterus and tubes, and diagnose patent and obstructed tube in a hysteron-salpinogram.

Required Materials

- Cadaver/ Pelvic Cavity/ Sagittal Section of Female Pelvis
- Handouts/ Atlases of Human Anatomy
- Visual and Electronic Media
- Images.

Instructions

- There are 2 stations of activities in this practical.
- When you have completed a particular task you should put a tick in the box before to it, the group's supervisor can question you about it and expect a correct answer.
- Keep these sheets for future reference and revision.
- Make sure that you answer the questions at the end of the activities.

STATION 21.1

EXTERNAL GENITAL ORGANS

- ☐ Identify the **vulva** (pudendum), which is the female external genital organ and its different parts are:
 - ☐ **Mons pubis**: it is a collection of fat overlying the pubis (After puberty it becomes covered with hair.
 - ☐ **Labia majora**: this is a pair of skin folds enclosing some fat; they are covered by hair after puberty.
 - ☐ **Labia minora**: is a pair of skin fold between the labia majora.
 - ☐ **Clitoris**: this is the homologue of the penis (in male), but is not traversed by the urethra it lies above and in front of the urethral orifice.
 - ☐ Vestibule: this is the interval between the two labia minora.
- ☐ Locate each of the:
 - ☐ **Anterior labial commissure**.
 - ☐ **Posterior labial commissure**.
 - ☐ **Pudental cleft**.
- ☐ Observe the **urethral orifice** anteriorly.
- ☐ Observe the **vaginal orifice** posteriorly.
- ☐ Notice that the margins of the urethral orifice are prominent and can be felt

by the fingertip through the **vestibule**.

- ☐ Notice that the vaginal orifice is partly closed by the hymen in virgins. (The hymen is a thin membrane at variable shapes and extent.
- ☐ Identify the **greater** and **lesser vestibular glands** and their orifice.
- ☐ Identify the following:
 - ☐ **Ilioinguinal** nerve.
 - ☐ **Genital branch of genitofemoral** nerve.
 - ☐ **Perineal branch of the posterior cutaneous nerve of the thigh**.
 - ☐ **Internal pudendal** artery.
 - ☐ **External pudendal** artery.
 - ☐ **Superficial** and **deep inguinal lymph nodes**.

STATION 21.2

INTERNAL GENITAL ORGANS

Uterus

- ☐ Locate the uterus between the rectum posteriorly and the urinary bladder anteriorly.
- ☐ Notice that the uterus has a normal forward inclination.
- ☐ Identify the different parts of the uterus: the **fundus**, the **body**, the **cervix** and the **isthmus**.
- ☐ The fundus is the free anterosuperior edge. It is convex in all directions and covered by peritoneum.
- ☐ Identify the angle of **anteversion** and **anteflexion** of uterus.
- ☐ The body of uterus is located over the empty urinary bladder and it turns inferiorly. The angle between the body of uterus with vagina is called as **anteversion angle**.

- ☐ The angle between the body of uterus with the cervix of uterus is termed as **anteflexion angle**.
- ☐ The body is the middle part. Observe the peritoneum that covers both surfaces of the body.
- ☐ The isthmus is the constriction between the body and the cervix.
- ☐ Identify the parts of the cervix of uterus: **supravaginal part of cervix** and **vaginal part of cervix**.
- ☐ Identify the peritoneal ligament of uterus: **broad ligament of uterus**.
- ☐ Identify the structures in the broad ligament of uterus: **ovarian vessels, uterine vessels, uterine tubes, uterus, proper ovarian ligament, round ligament of uterus, the pelvic part of ureter, lymph and nerve plexuses**.
- ☐ Note the other ligaments of uterus as supporting bands to keep its position: **round ligament (ligamentum teres), cardinal ligament (transverse cervical ligament, Mackenrodt ligament), pubocervical ligament, and sacrouterine ligament**.
- ☐ Observe the peritoneum reflection and identify:
 - ☐ The **utero-vesical pouch**: it is formed by reflection of the peritoneum at the junction of the body with the cervix on to the upper surface of the urinary bladder.
 - ☐ The **recto-uterine pouch** (Douglas pouch): it is the deepest pouch and it is a site of accumulation of fluid, it is formed by reflection of peritoneum from the front of the rectum to the upper part of the posterior wall of the vagina.
- ☐ Notice that the wall of the uterus forms of three layers:
 - ☐ **Endometrium**.
 - ☐ **Myometrium**.
 - ☐ **Perimetrium**.
- ☐ Identify the uterine arteries and the uterine venous plexus.

- ☐ Identify the external, internal iliac and the sacral lymph nodes.

Uterine Tubes

- ☐ Identify the uterine tube with its different parts:
 - ☐ **Infundibulum**: a funnel – shaped depression. The fimbriae project out from the margins of the infundibulum.
 - ☐ **Ampulla**: this is the widest part of the tube. (Notice that it is the site of fertilization).
 - ☐ **Isthmus**: This is a narrow and slight part of the tube.
 - ☐ **Intramural part**: this is the part that is embedded in the uterine wall and it is the narrowest part.

Ovary

- ☐ Locate the position of the ovary in the posterolateral wall of the pelvis.
- ☐ Notice the ligaments of the ovary:
 - ☐ The ovaries are suspended from the posterior leaf of the broad ligament by the **mesovarium**.
 - ☐ Identify the proper **ligament of ovary**
 - ☐ They also have a **suspensory ligament** from the side wall of the pelvis through which travels its vessels and nerves.
 - ☐ The **round ligament** goes to the corner of the uterus and from there through the inguinal canal to the labium majus as the round ligament of the uterus.
- ☐ Identify the following:
 - ☐ **Cortex** of ovary.
 - ☐ **Medulla** of ovary.
 - ☐ **Ovarian follicle**.
- ☐ Identify the **ovarian vessels**.

Vagina

- ☐ Locate the vagina between the base of the bladder and urethra anteriorly and the rectum and anal canal posteriorly.
- ☐ Locate the lower part of the vagina in the **urogenital triangle** of the **perineum** and its upper part within the pelvis.
- ☐ Identify the fornix of vagina:
 - ☐ Anterior part.
 - ☐ Posterior part.
 - ☐ Lateral part.
- ☐ Notice that the vaginal examination is done by inserting the index finger or both index and middle fingers through the vagina and we can examine:
 - ☐ The wall of the vagina.
 - ☐ The base of the urinary bladder and female urethra.
 - ☐ **Levator ani, ischial spine** and **ischial tuberosity**.
 - ☐ **Douglas pouch, rectum** and **anal canal**.
- ☐ Identify the **vaginal branch** of the **internal iliac** artery and the **internal pudendal** artery.
- ☐ Identify the **pudendal** nerve and the **inferior hypogastric plexus**.

STATION 21.3

IMAGING (Figs. 21.3.1)

- ☐ Identify the vagina, uterus and urinary bladder in Fig.21.3.1.

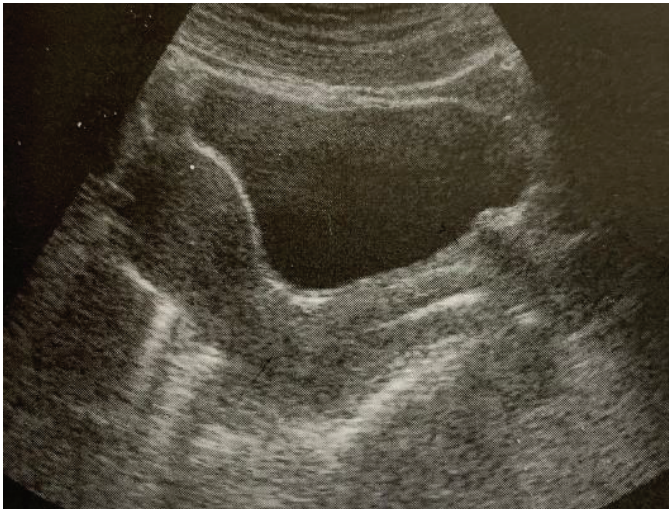


Fig. 21.3.1 US of uterus and vagina

Questions

1. Description of normal position of uterus.
2. What are the structures that are felt in a vaginal examination?
3. When does ectopic pregnancy occur and where are the common sites?
4. What is the arterial supply, venous and lymphatic drainage of the different parts of the female genital system?

PERINEUM

Learning Objectives

Upon completion of this session, the student will be able to:

1. Define the skeletal and ligamentous boundaries of the perineum, and identify the anal and urogenital triangles.
2. Define the position and boundaries of the ischiorectal fossa.
3. Define the structure, contents, and course of the pudendal canal.
4. Trace the branches of the internal pudendal vessels and the pudendal nerve.
5. Differentiate between the internal and external anal sphincters in both structure and function.
6. Distinguish between male and female urethrae.
7. Identify the components of the external genital organs and provide the homologues in each of both sexes.
8. Trace the blood and nerve supply of the external genital organs.
9. Identify the lymphatic drainage of the perineum.

Required Materials

- Cadaver/ Pelvic Cavity/ Bony Skeleton of the Pelvis
- Handouts/ Atlases of Human Anatomy
- Visual and Electronic Media
- Images.

Instructions

- There are 4 stations of activities in this practical.
- When you have completed a particular task you should put a tick in the box before to it, the group's supervisor can question you about it and expect a correct answer.
- Keep these sheets for future reference and revision.
- Make sure that you answer the questions at the end of the activities.

STATION 22.1

THE ANATOMICAL POSITION OF THE PERINEUM

- ☐ Note that the pelvic cavity is divided by the **pelvic diaphragm** into the main pelvic cavity above and the perineum below.
- ☐ Identify the muscles that form the pelvic diaphragm: **levator ani** and **coccygeus**.
- ☐ Note that the perineum is a narrow region between the proximal parts of the thigh. However, when the lower limbs are abducted, the perineum is a diamond shaped area extending from the mons pubis anteriorly, medial surface of the thigh laterally and the gluteal folds and upper end of the intergluteal cleft posteriorly.
- ☐ Identify the structures which form the boundaries of the perineum:
 - ☐ **Pubic symphysis** anteriorly.
 - ☐ **Inferior pubic rami** and **ischial rami** anterolaterally.
 - ☐ **Ischial tuberosities** laterally.
 - ☐ **Sacrotuberous ligaments** posterolaterally.
 - ☐ **Inferiormost part of sacrum** and **coccyx** posteriorly.
- ☐ Note that the transverse line joining the anterior ends of the **ischial tuberosities** divides the perineum into two triangles:
 - ☐ **Urogenital** anteriorly.
 - ☐ **Anal** posteriorly.

STATION 22.2

ANAL TRIANGLE

Identify the contents of the anal triangle:

- ☐ Lower opening of the anal canal, lies in the midline.
- ☐ Ischiorectal fossa, on each side.
- ☐ Review the relations of anal canal:
 - ☐ Anococcygeal body posteriorly.
 - ☐ Fat-filled ischiorectal fossa laterally.

In male anteriorly:

- ☐ Perineal body, the urogenital diaphragm, the membranous part of the urethra, and bulb of the penis.

In female anteriorly:

- ☐ Perineal body, the urogenital diaphragm and the lower part of the vagina.
- ☐ Locate the external sphincter which can be divided into three parts:
 - ☐ Subcutaneous part: which encircles the lower end of the anal canal and has bony attachment.
 - ☐ Superficial part: is attached to the coccyx behind and perineal body in front.
 - ☐ Deep part: which encircles the upper end of the anal canal and has no bony attachment.
- ☐ Locate the position of ischiorectal fossa (wedge-shaped) on each side of the anal canal and notice its boundaries:
 - ☐ The base of the wedge is superficial and formed by skin.
 - ☐ The medial wall formed by the sloping levator ani muscle and anal canal.
 - ☐ The lateral wall is formed by the lower part of the obturator internus muscle covered with pelvic fascia.

STATION 22.3

MALE UROGENITAL TRIANGLE

- ☐ Notice the superficial fascia of the urogenital triangle can be divided into fatty and membranous layers.
- ☐ Notice the urogenital triangle is divided by the **preineal membrane** into:
 - ☐ **Superficial perineal pouch.**
 - ☐ **Deep perineal pouch.**
- ☐ Identify the contents of superficial perineal pouch:
 - ☐ **Root of penis** (blub & right/ left crus).
 - ☐ **Superficial perineal muscles: bulbospongiosus, ischiocavernosus and superficial transverse perineal muscles.**
- ☐ Identify the contents of deep perineal pouch:
 - ☐ **Membranous part of the urethra** – sphincter urethra – bulbourethral gland – **deep transverse perineal muscles** – **internal pudendal vessels** and **dorsal nerve of penis.**

STATION 22.4

FEMALE UROGENITAL TRIANGLE

(Figure 22.4.1)

- ☐ Note that urogenital diaphragm is a musculofascial diaphragm situated in the anterior part of the perineum and filling in the gap of pubic arch. Formed by sphincter urethra and deep transverse perineal muscles.
- ☐ Review the contents of the superficial perineal pouch:
 - ☐ **Root of clitoris** (blub and right/ left crus).
 - ☐ **Superficial perineal muscles: bulbospongiosus, ischiocavernosus and superficial transverse perineal muscles.**
- ☐ Review of contents of the deep perineal pouch:

- Part of the urethra – part of the vagina – sphincter urethrae - deep transverse perineal muscles – Internal pudendal vessels – dorsal nerve of the clitoris.

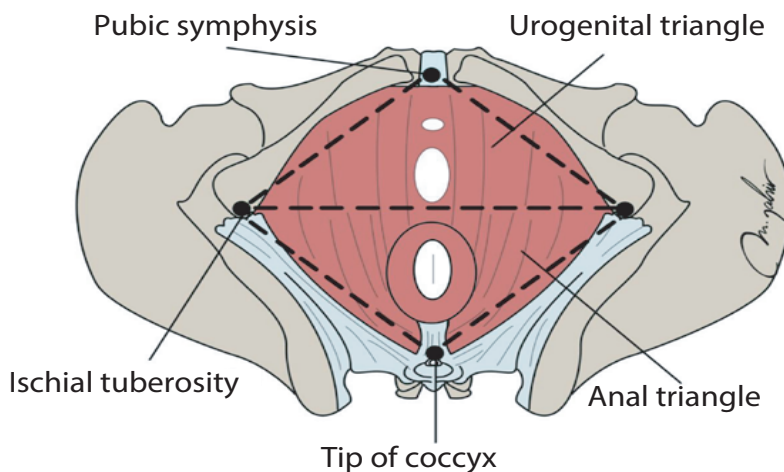


Fig. 22.4.1 Anal and urogenital triangles

Questions

1. Please discuss the anatomy and the clinical importance of perineal body.
2. Which structure can be palpated on rectal examination?
3. What're the differences of urogenital diaphragm according to the gender?

