**Urogenital system**

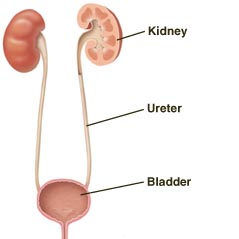
**Why called Urogenital system??**

**1-**The urinary and genital organ developed from a common mesodermal ridge along the caudal wall of abdominal cavity.

**2-**The urinary and the genital organs are anatomically connected and the excretory ducts of both systems initially inter a common cavity, the cloaca.

**Functions of urinary system:**

1. **Regulation of blood volume and Regulation of blood pressure**
2. **Regulation of the pH of the blood:**
3. **Regulation of the ionic composition of blood:**
4. **Production of Red blood cells:**
5. **Synthesis of Vitamin D:**
6. **Excretion of waste products and foreign substances:**

**Urinary system anatomically consists of:**

1. Kidneys.

2. Ureters.

3. Bladder.

4. Urethra.

**The kidneys:**

They are paired excretory organs which secrete the urine they are **red-brown** in color and are **situated against the dorsal wall** of the abdomen. Their shape varies from **bean** shape to **heart** shape (right kidney in horse). Only in bovine the kidney is lobulated. **The hilus:** is the depression through which pass artery, vein nerves, lymph vessels and ureters and leads to the renal sinus which lodges the renal pelvis which is **absent in bovine**. The kidney consists of external cortex and internal medulla. The cortex is reddish-brown in color and granular, while the medulla projects into the renal pelvis or calices with one or more papilla.

The basic features of the kidneys:

1) **2** surfaces: dorsal and ventral surfaces.

2) **2** borders: lateral and medial borders.

3) **2** poles: cranial and caudal poles.

**Fixation:**

The kidneys are held in position by:

**1.** The pressure of adjacent organs, nerve and blood supply.

**2.** The renal fascia.

**3.** Hepatorenal ligament (right side).

**4.** Suspensory ligament of spleen (left side)

**Classification of kidneys:**

I-The kidneys are classified according to the **external surface** are:

**a. Smooth surface:** e.g. in (sheep. Horse, dog. Human)

**b. Lobulated surface:** external surface appearance glandular in shape **e.g. in (bovine).**

**II-** according to the internal surface and degree of fusion **are:**

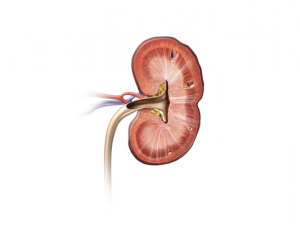
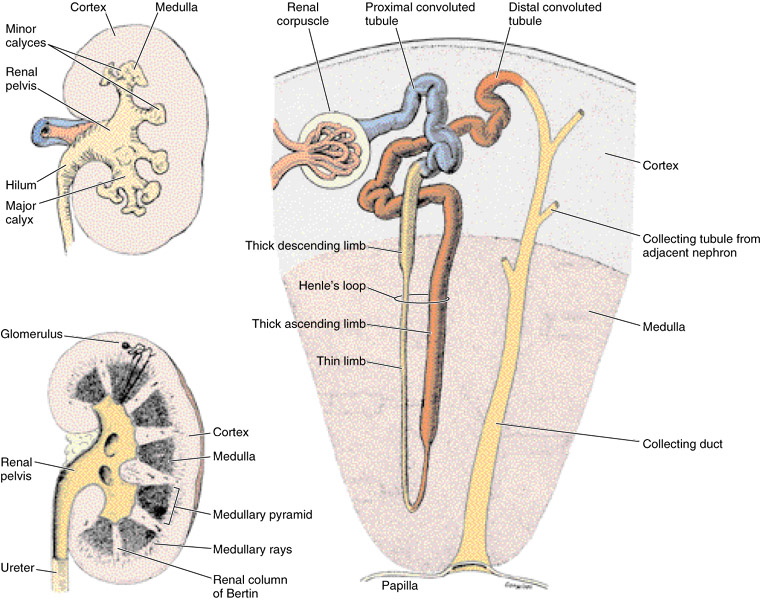
**a- Unilobar kidney:** With smooth surface and a single renal papilla

**e.g.(cat).**

**b-Multilobar kidneys:** With smooth surface and multi papillae

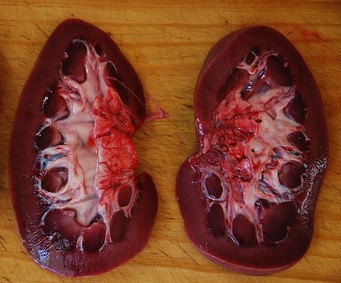
**e.g.(pig)**

**c- Multilobar kidneys:** With lobulated surface and multi-papillae

 **e.g. (bovine)**



**(Unilobar in Cat) (Lobulated in cow)**



**(Multilobar in pig) (Heart shape in horse)**

**The kidney of the horse:**

**Right kidney:**

It is heart shape and located ventral to the dorsal part of the last 2-3 rids. The dorsal surface is convex and related to the diaphragm and the ventral surface concave and related to the liver, pancreas, cecum and right adrenal gland, it has no peritoneal covering. The medial border has renal pelvis while the lateral border is rounded, and the cranial pole is thick, rounded and lies in the renal impression of the liver, while the caudal pole is thin and narrow.

**The left kidney:**

Bean shaped, it is narrow and longer than the right one, situated further caudally and located ventral to the last rib. The greater part of it's covered with peritoneum. The cranial pole is related to the stomach, and the caudal pole is larger than cranial.

**The kidney of ox:**

Are superficially divided into lobes by fissures. The lobes are about **20** in number. The right kidney lies ventral to the last rib, while the left kidney when the rumen is full, it pushes the left kidney caudally and across the median plane, so it situated on the right side, caudal to the right kidney. The kidneys are embedded in a large amount of fat termed adipose capsule. The weight is 600-700 gm.

**Structure:**

The pelvis is **absent** in ox, so the ureter begins at the junction of two wide thin-walled tubule the "major calices". Each major calyx gives off a number of branches and these divided into several funnel-shaped called "minor calices" each of which embraces renal papillae.

**Kidney of sheep and goat:**

Are bean-shaped and smooth, the hilus is deeper in sheep than in goat. There is a renal crest or common papilla formed by the fusion of 12-16 pyramids in sheep and 10 in goat. Renal pelvis is present.

**The kidneys of the dog:**

Bean-shaped, smooth they are retroperitoneal and located in the sublumber region on either side of aorta and caudal vena cava, both kidneys are palpable through the abdominal wall.

**The kidney of the pig:**

Smooth and bean-shaped the pelvis is funnel-shaped and divided into two major calices which give off 8-12 short minor calices each one contain papilla.

**Ureters:**

The ureter is the narrow part of the excretory duct of the kidney, it is conducting the urine from the renal pelvis to the bladder. It begins at the renal pelvis and terminates at the bladder. It is about 6-8 mm in diameter. It consists of:

***1-Abdominal part:***

begins from the hilus of the kidney curves caudally, lateral to the caudal vena cava.

**2. *Pelvic part:***

passes caudally on the lateral wall of the pelvic cavity, it pierces the dorsal wall of the bladder near it's neck. In male it enters the genital fold, while in female it situated in the dorsal part of the broad ligament of the uterus.

**The urinary bladder:**

Is an organ capable of great distention. It can store considerable amount of urine, so it's form and position differ according to the amount of the content. When it is empty and contracted it is founding in pelvic cavity, and it's wall is relatively thick, while when full it extends cranially to the abdominal cavity and the wall is thin.

(It's capacity in horse about **3** liters).

It consists of **apex**, **body** and **neck**.

1-Apex------the cranial free end.

2-Body------the central main part.

3-Neck------the constricted portion which joins the urethra.

4-Dorsal and ventral surfaces: it's ventral surface related to the ventral wall of the pelvic cavity, and the dorsal surface is related in male to the genital fold and rectum, while in female it is related to the body of uterus and the broad ligament and vagina. In young animals there is a mass of scar tissue which is the remnant of the caudal part of the urachus, which is (the tube that connect the primitive bladder with the allantoic sac in the fetus and it is included in the umbilical cord).

The wall of the bladder consists of covering peritoneum, muscular coat and mucosal lining. There is a circular muscle at the neck of the bladder form "***sphincter vesicae***". The ureters join the bladder near the neck, they pass about 2-3 cm between the muscular and mucous coat before piercing the wall, this form "**a valve**", prevents the return of the urine from the bladder to the ureters.

**Ureteral ostium:** which they are left and right openings of each ureter into the bladder, near the neck.

**Fixation of the urinary bladder:**

1. The median ligament (unpaired): it is ventral fold of peritoneum which is fixed the bladder to the ventral wall of the pelvis and abdomen.

2. Lateral ligament (paired): peritoneal folds attached the lateral aspect of the urinary bladder to the lateral walls of the pelvis. Each ligament envelops the round ligament (remnants of the left and right umbilical arteries).

**Urethra:**

It is musculomembranous tube through which the urine is discharge from the bladder. The wall of urethra has the same basic layer as that the urinary bladder. In addition, it contains the striated urethralis muscle which allows some voluntary control of urination. Both male and female urethra associated anatomically with the genital organs.

**Female urethra**:

it begins at the neck of the bladder and extends caudally along the floor of the pelvis and opens by the external urethral ostium in the floor of the genital tract at the junction of the vagina, and vestibule.

**Male urethra:**

It is a long tube extends from the bladder to glans penis; it passes caudally on the floor of the pelvis, and divided into:

1. The pelvic part extend from the neck of the bladder, caudal to the prostate, the tube is dilated.

2. The pre-prostatic part, the short initial segment.

3. The prostatic part, the portion surrounded by the prostate gland.

4. Spongy part.

5. The portion of the urethra within the penis, passé between the two crura of the penis and run along the groove on the ventral surface of the penis and covered by the corpus spongious penis and bulbospongious muscle. It opens in the external urethral orifice on the glans penis.

**Blood supply of the kidney:**

From the renal artery which comes from the aorta, enter the hilus of the kidney and reach the intermediate zone and form anastomatic arches .from the arteries branches pass in to the cortex and medulla. Cortical branches have a radial course between the cortical lobules and give off short lateral branches.

