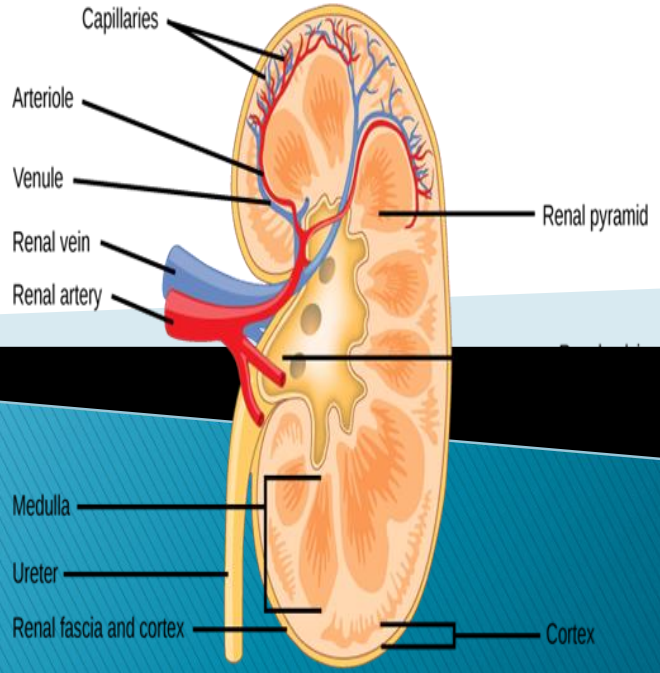
Al- Mustaqbal College University
kidney dialysis
Anatomy
2nd stage

BY:-
Dr.Roaa Nashat AL-Saffar

Renal vasculature

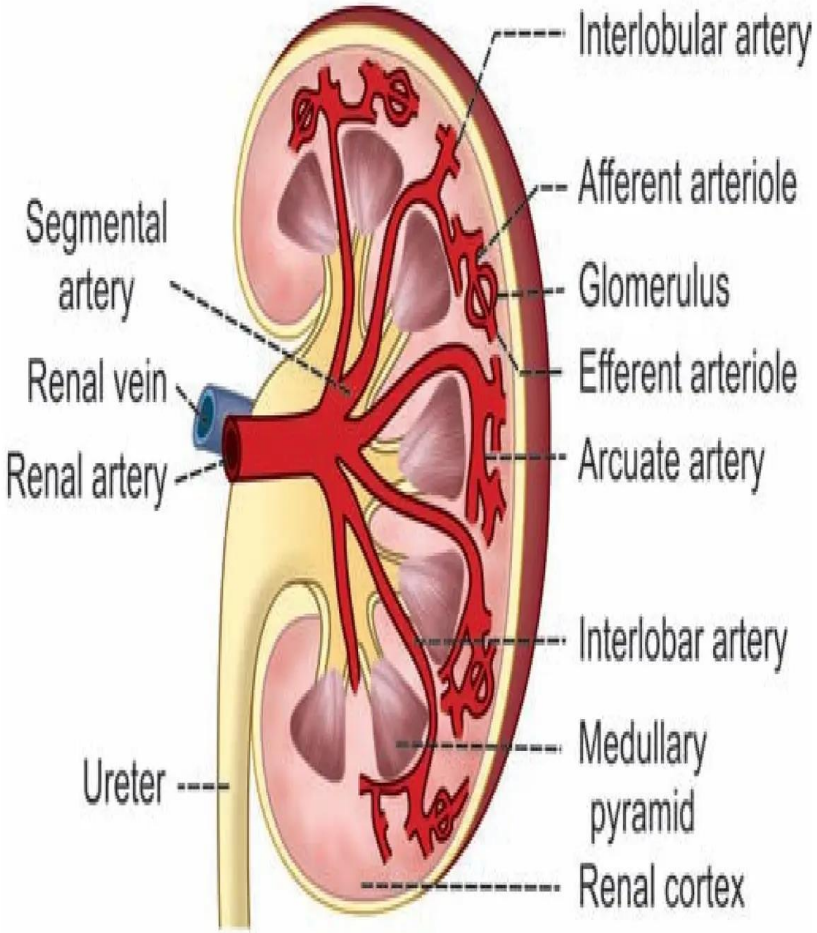


RENAL CIRCULATION

- Blood vessels of kidneys are highly specialized to facilitate the functions of nephrons in the formation of urine.
- In the adults, during resting conditions both the kidneys receive 1,300 mL of blood per minute or about 26% of the cardiac output.
- Maximum blood supply to kidneys has got the functional significance.
- Renal arteries supply blood to the kidneys.

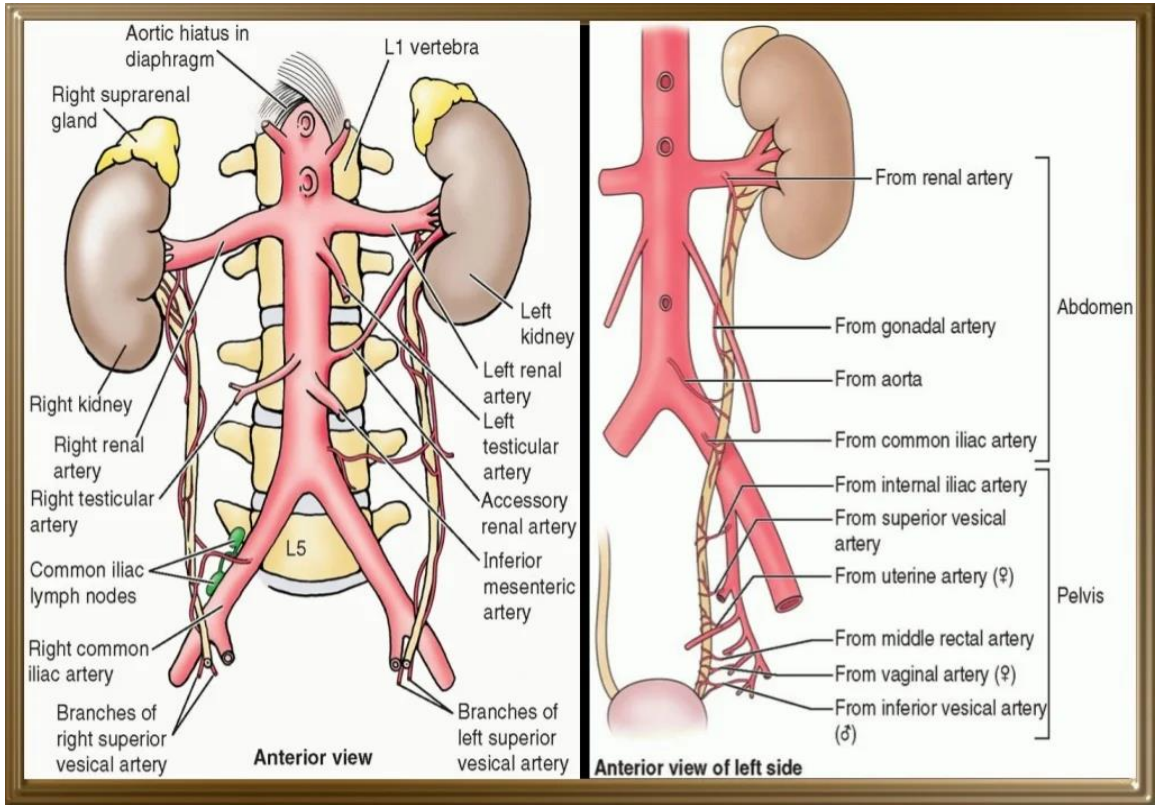
RENAL BLOOD VESSELS

- Renal Artery
- Segmental Artery
- Interlobar Artery
- Arcuate Artery
- Interlobular Artery
- Afferent Arteriole
- Glomerular Capillaries
- Efferent Arteriole



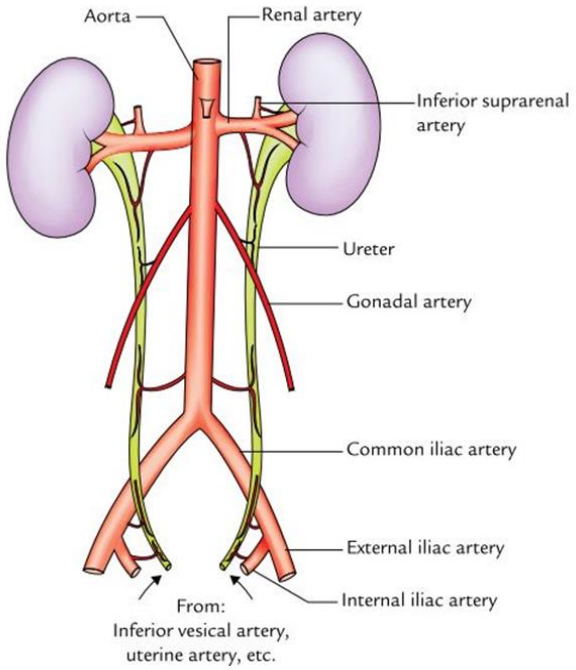
The **renal arteries** are paired arteries that supply the kidneys with blood. Each is directed across the crus of the diaphragm, so as to form nearly a right angle.

The renal arteries carry a large portion of total blood flow to the kidneys. Up to a third of total cardiac output can pass through the renal arteries to be filtered by the kidneys.



Structure

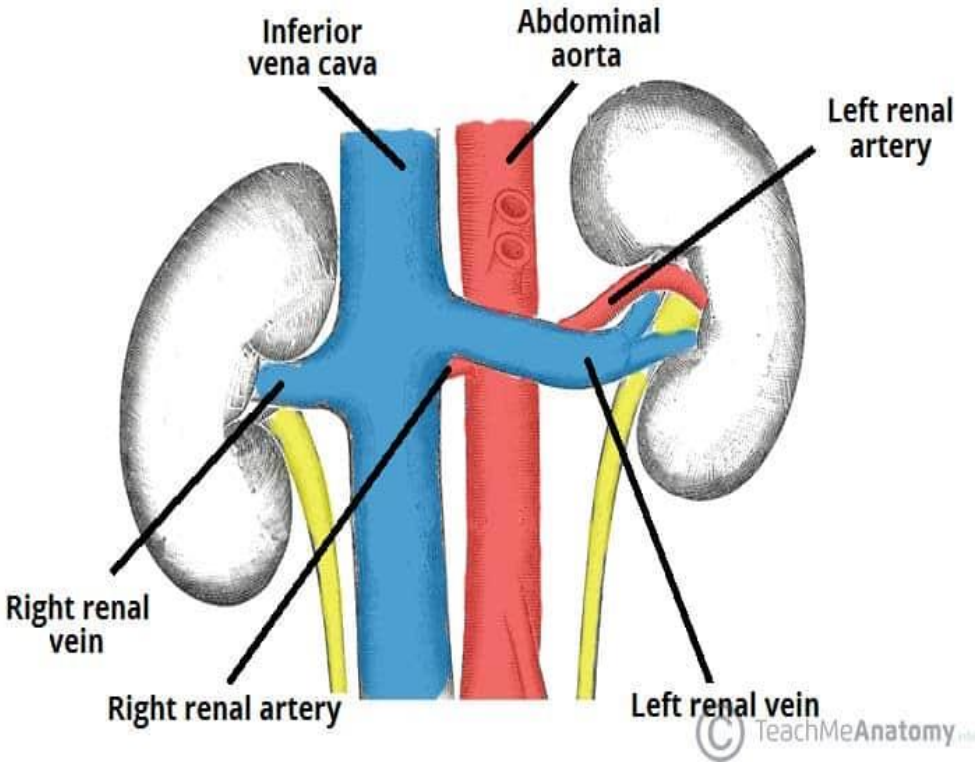
In typical anatomy, the renal arteries arise perpendicularly from the sides of the abdominal aorta, just below the origin of the superior mesenteric artery at the L1-L2 vertebral level. They have a radius of approximately 0.25 cm, 0.26 cm at the root. The measured mean diameter can differ depending on the imaging method used. For example, the diameter was found to be 5.04 ± 0.74 mm using ultrasound but 5.68 ± 1.19 mm using angiography.



Due to the anatomical position of the aorta, the inferior vena cava, and the kidneys, the right renal artery is normally longer than the left renal artery

The right passes behind the inferior vena cava, the right renal vein, the head of the pancreas, and the descending part of the duodenum. It's somewhat lower than the left one.

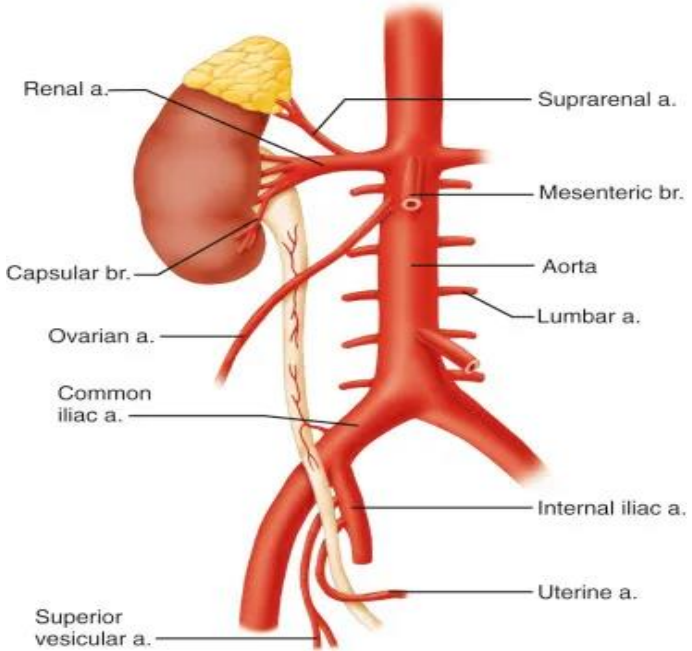
left artery lies behind the left renal vein, the body of the pancreas and the splenic vein, and is crossed by the inferior mesenteric vein.



Branches

Before reaching the hilus of the kidney, each artery divides into four or five branches. The anterior branches (the upper, middle, lower and apical segmental arteries) lie between the renal vein and ureter, the vein being in front, the ureter behind. The posterior branches, which are fewer in number and include the posterior segmental artery, are usually situated behind the ureter

Each vessel gives off some small inferior suprarenal branches to the suprarenal gland, the ureter, and the surrounding cellular tissue and muscles.



Clinical significance

Stenosis

Renal artery stenosis, or narrowing of one or both renal arteries will lead to hypertension as the affected kidneys release renin to increase blood pressure to preserve perfusion to the kidneys. RAS is typically diagnosed with duplex ultrasonography of the renal arteries. It is treated with the use of balloon angioplasty and stents, if necessary.

Atherosclerosis

Atherosclerosis can also affect the renal arteries and can lead to poor perfusion of the kidneys leading to reduced kidney function and, possibly, renal failure

Renal artery aneurysm

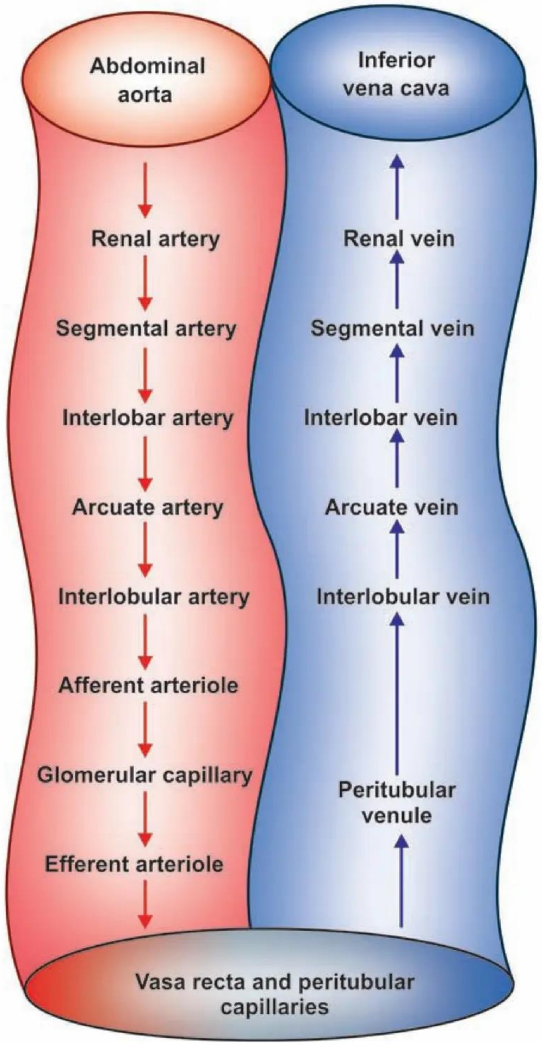
A dilated renal artery measuring twice its normal size indicates a renal artery aneurysm.[

Trauma

A renal artery is damaged in 4% of blunt traumas and 7% of penetrating traumas to the abdomen.[10]

SPECIAL FEATURES OF RENAL CIRCULATION

1. Renal arteries arise directly from the aorta.
2. Second highest blood supply, next to liver
3. The blood is completely filtered at the renal glomeruli (All blood pass throug glomeruli).
4. Renal circulation has a **portal system.**
5. Renal glomerular capillaries form **high pressure bed with a pressure of 60 mm Hg to 70 mm Hg.**
6. Peritubular capillaries form a **low pressure bed** with a pressure of 8 mm Hg to 10 mm Hg. This low pressure helps tubular reabsorption.
7. Autoregulation of renal blood flow is well established.


Abdominal aorta
Renal artery
Segmental artery
Interlobar artery
Arcuate artery
Interlobular artery
Afferent arteriole
Glomerular capillary
Efferent arteriole
Vasa recta and peritubular capillaries
Peritubular venule
Interlobular vein
Arcuate vein
Interlobar vein
Segmental vein
Renal vein
Inferior vena cava