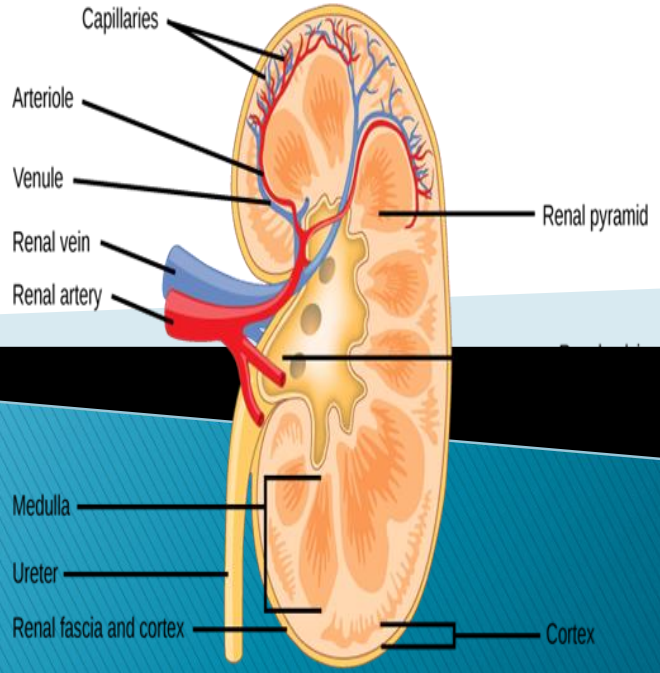
Al- Mustaqbal College University
kidney dialysis
Anatomy
2nd stage

BY:-
Dr.Roaa Nashat AL-Saffar

Renal vasculature



1. Overview of Kidney Blood Supply

The kidneys receive about 20–25% of the resting cardiac output, making their blood supply extremely important for:

- Filtration of blood
- Regulation of blood pressure
- Maintenance of electrolyte and fluid balance

Each kidney is supplied by one renal artery and drained by one renal vein, both entering and leaving at the renal hilum.

2. The Renal Hilum and Sinus

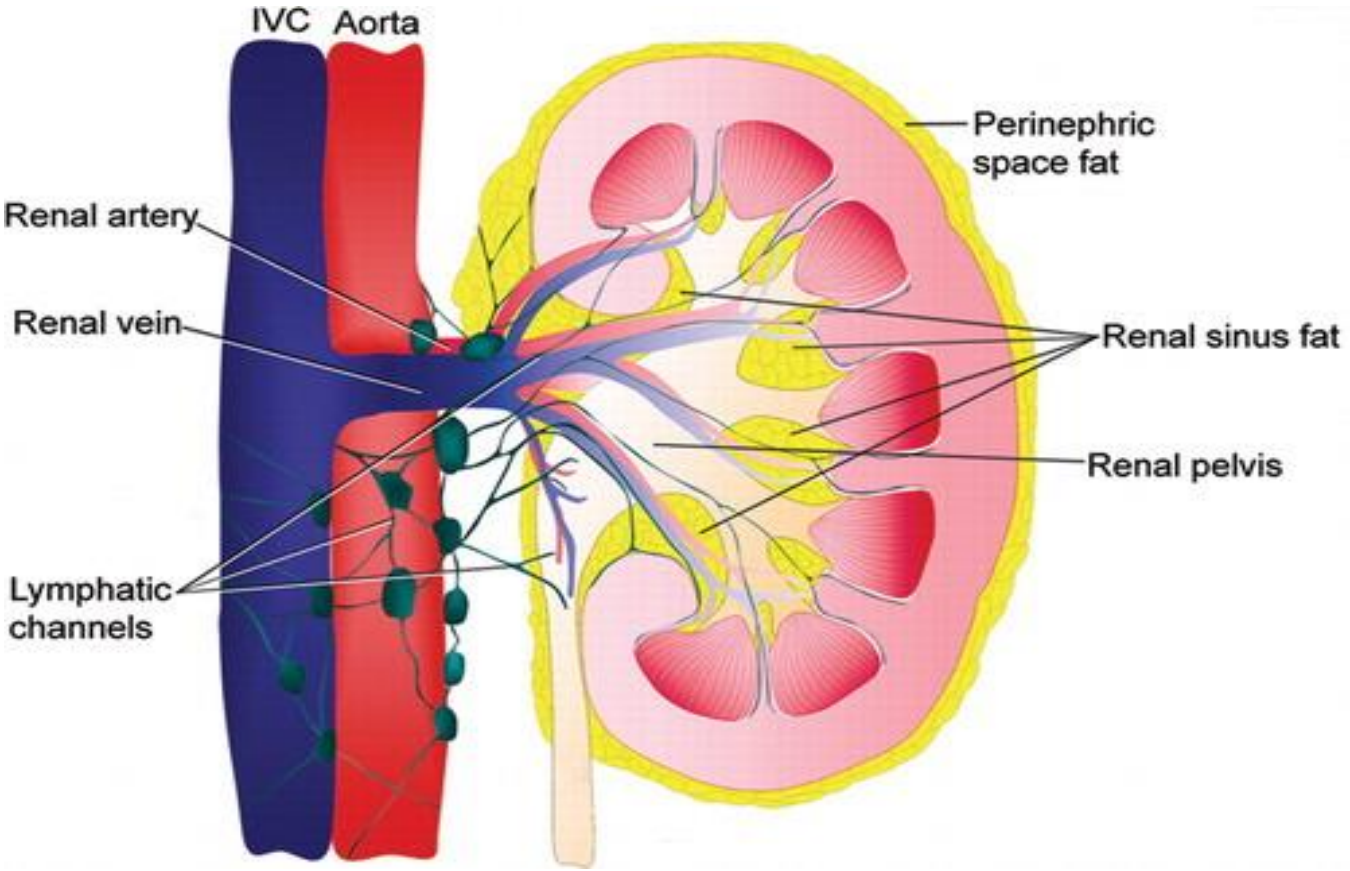
- Hilum: The concave medial border of the kidney where structures enter and leave.
- Renal sinus: A space inside the kidney that contains fat, renal vessels, lymphatics, and part of the renal pelvis.

At the hilum (from anterior to posterior):

Renal vein → Renal artery → Renal pelvis (ureter)

Mnemonic: "VAP"

.


IVC
Aorta
Perinephric space fat
Renal artery
Renal vein
Renal sinus fat
Renal pelvis
Lymphatic channels

RENAL ARTERY

Origin and Course

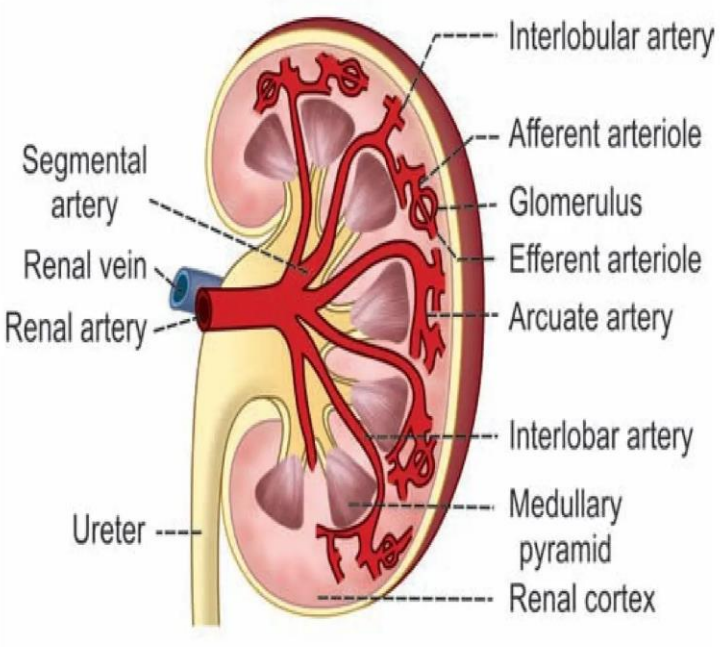
• Each renal artery arises from the lateral aspect of the abdominal aorta at the level of L1–L2 vertebra • It runs horizontally toward the kidney and divides near the hilum

Branches (Inside the Kidney):

1. Segmental arteries → 5 segments: apical, upper, middle, lower, posterior
2. Interlobar arteries → between renal pyramids
3. Arcuate arteries → curve along the corticomedullary junction
4. Interlobular (cortical radiate) arteries → supply renal cortex
5. Afferent arterioles → lead to glomeruli

RENAL BLOOD VESSELS

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



Renal Vein

The renal veins are large blood vessels that carry deoxygenated blood away from the kidneys and drain it into the inferior vena cava (IVC).

They play a vital role in returning filtered blood back to the systemic circulation after waste products have been removed by the kidneys.

2. Anatomy of the Renal Veins

- Each kidney has one renal vein:
- Right renal vein
- Left renal vein

Right Renal Vein

- Shorter than the left (about 2–3 cm long).
- Drains directly into the inferior vena cava.
- Lies posterior to the right renal artery.

Left Renal Vein

- Longer than the right (about 6–7 cm long).
- Passes anterior to the aorta and posterior to the superior mesenteric artery (SMA) — this is called the “nutcracker relationship.”
- Drains into the inferior vena cava on the right side of the vertebral column.

3-**Tributaries** (Veins that drain into the renal vein)

Left renal vein receives:

- Left gonadal vein (testicular or ovarian)
- Left suprarenal (adrenal) vein
- Left inferior phrenic vein (sometimes)

Right renal vein usually receives no major tributaries, as the right gonadal and right adrenal veins drain directly into the IVC.

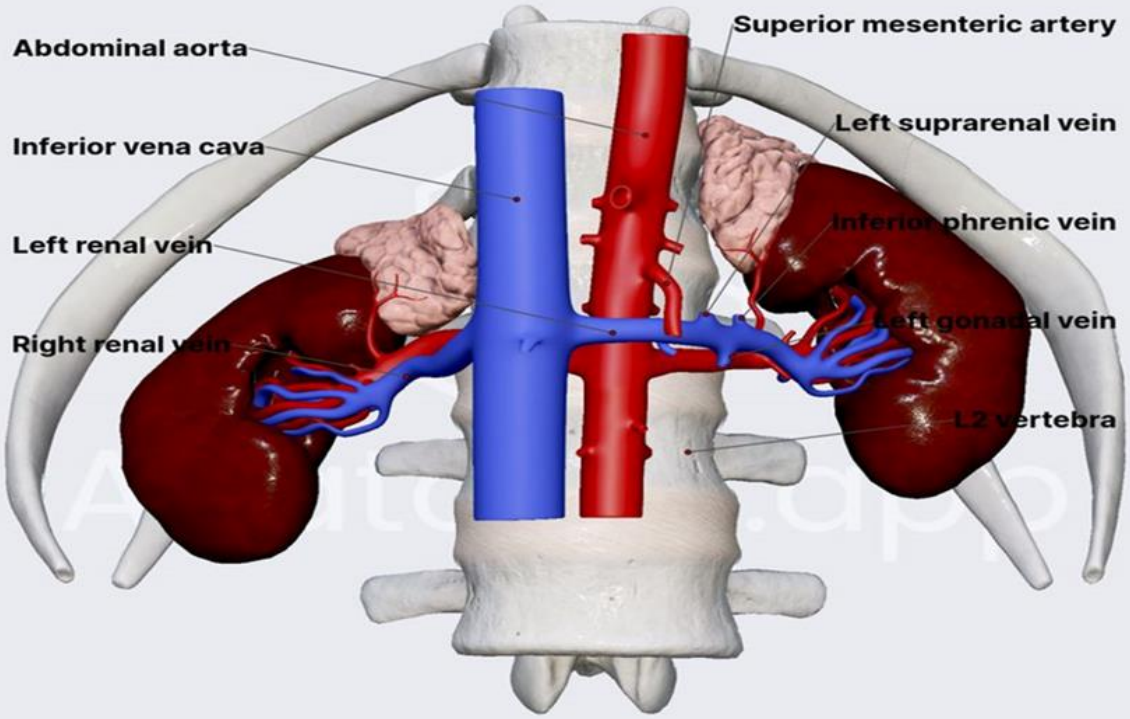
Relations of Renal Vessels

Right Kidney

- Anterior to renal artery: IVC
- Posterior to renal artery: Right crus of diaphragm

Left Kidney

- Anterior to renal vein: Superior mesenteric artery (SMA)
- Posterior to renal vein: Aorta


Abdominal aorta
Inferior vena cava
Left renal vein
Right renal vein
Superior mesenteric artery
Left suprarenal vein
Inferior phrenic vein
Left gonadal vein
L2 vertebra

Microscopic (for histology correlation)

- The renal artery has a thick muscular wall to handle high pressure.
- The renal vein has a thin wall and larger lumen.
- In a slide, the artery appears round and thick, while the vein looks collapsed or irregular.

7. Clinical Correlations

1. **Renal Artery Stenosis**:

- Narrowing of renal artery → decreased blood flow → activates renin-angiotensin system → hypertension.
- Treated with angioplasty or stenting.

2**. Nutcracker Syndrome**:

- Compression of left renal vein between the SMA and aorta.
- Symptoms: flank pain, hematuria, pelvic congestion in females.

3**. Accessory (Supernumerary) Renal Arteries**:

- In 20–30% of people, more than one renal artery exists.