Gross Anatomy of Kidney - II

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Recap

- In the previous class we discussed
  - location,
  - extent,
  - parts & external features,
  - relations and
  - coverings
  - supports of the kidney

To continue further……

Learning objectives

At the end of today's teaching session all the students should be able to

- Describe the internal macrostructure of the kidney
- Define the lobe and lobule of the kidney.
- Name the artery the supplies the kidneys.
- Name the vascular segments of the kidney.
- Write a short note on renal circulation.
- Name the lymph nodes which drain the lymphatics from kidney
- Write a short note on nerve supply of kidneys.

Gross Internal features in Coronal section

- 2 parts –
  - Renal Substance –
    - Outer Cortex – pale looking
    - Inner Medulla – darker, striated
  - Renal Sinus –
    - Cavity within the kidney
    - Communicates with hilum
    - Lined by true capsule

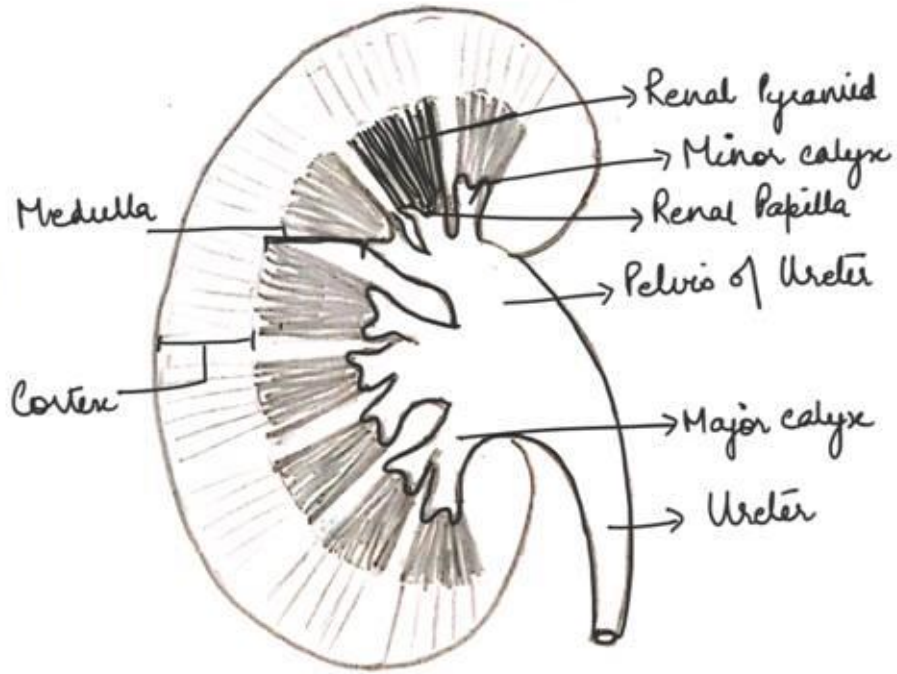
Renal Sinus Contains:

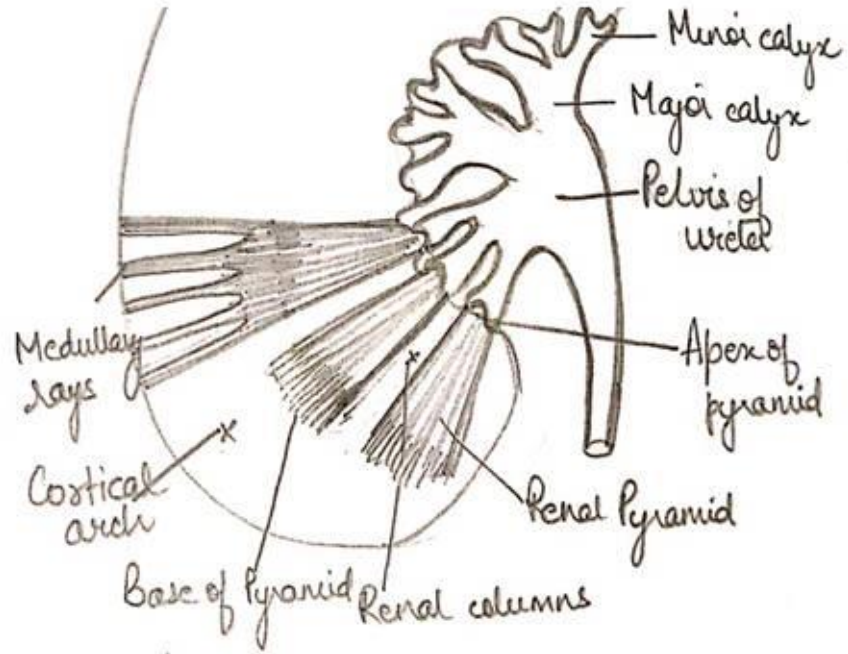
Pelvicalyceal system, renal vessels, nerves & lymphatics, perinepric fat

Renal cortex

Granular outer cortex divisible into

- **Cortical Arches**
  - arch over the base of pyramid
  - consists of medullary rays & convoluted part
  - has outer & inner zone (inner zone - juxtamedullary cortex)
- **Renal columns**
  - cortex between renal pyramids





Cortex contd.....

Medullary ray --

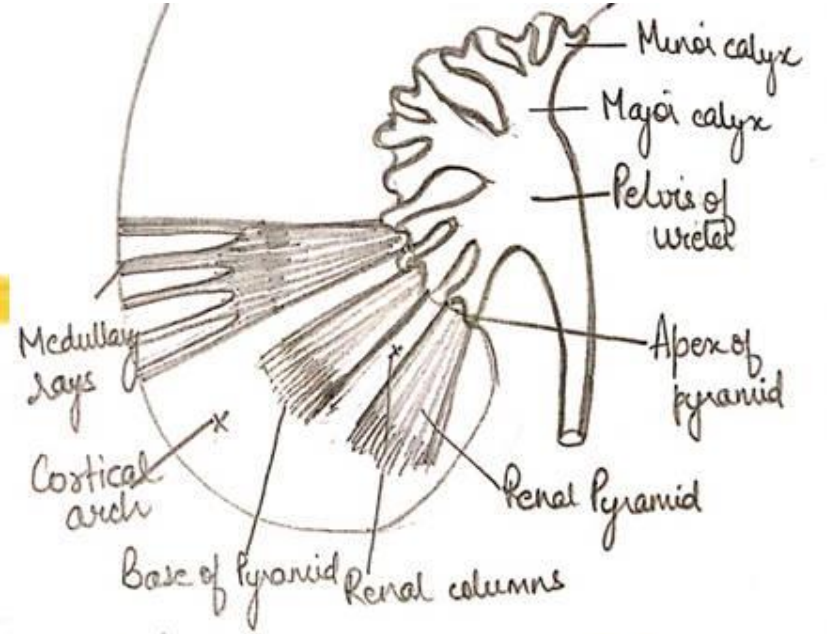
- consists of apex and base
- continuous with medullary pyramids
- occupied by collecting tubules

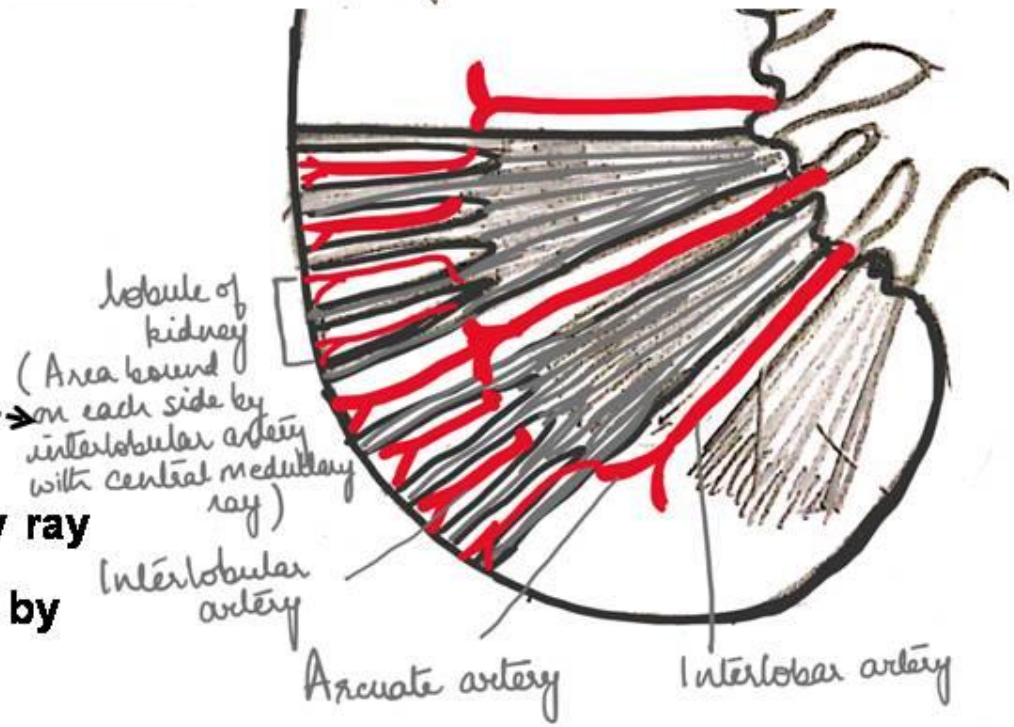
Convoluted part --

- between medullary rays
- occupied by renal corpuscles

What is a lobule of the kidney ?

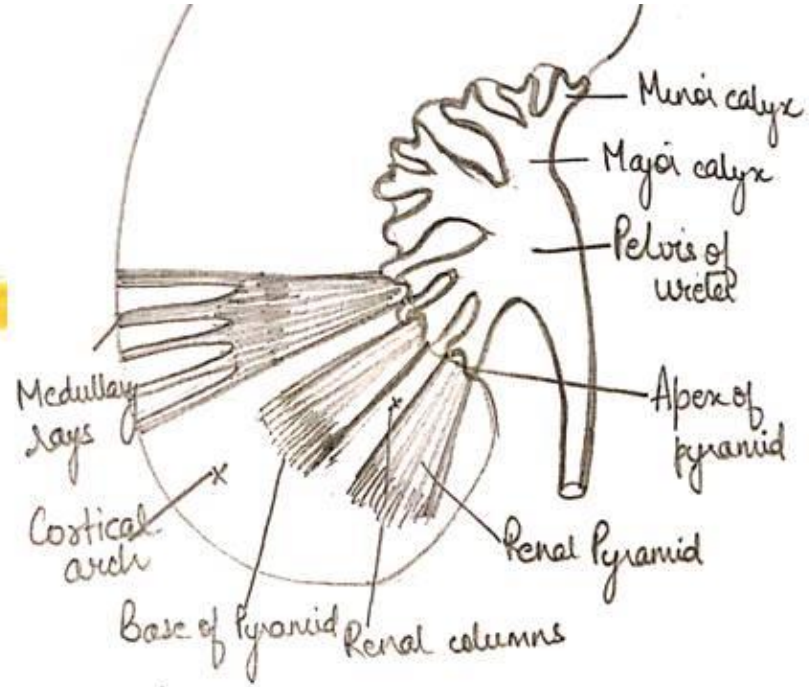
Area of cortical arch with medullary ray in central axis, bound on each side by interlobular blood vessel

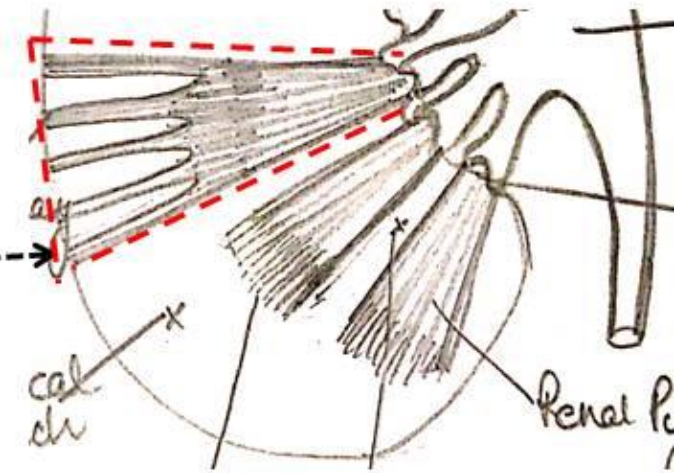




Renal Medulla

- Striated in appearance –
  - due to presence of loops of henle, collecting tubules, arteriolae recti & venae recti
- 8- 18 Conical masses – pyramids
- Each pyramid has a base and apex
- Apex projects into sinus – renal papilla
- Papilla is received by minor calyx
- What is lobe of kidney ?
  - 1 pyramid capped with adjoining cortex

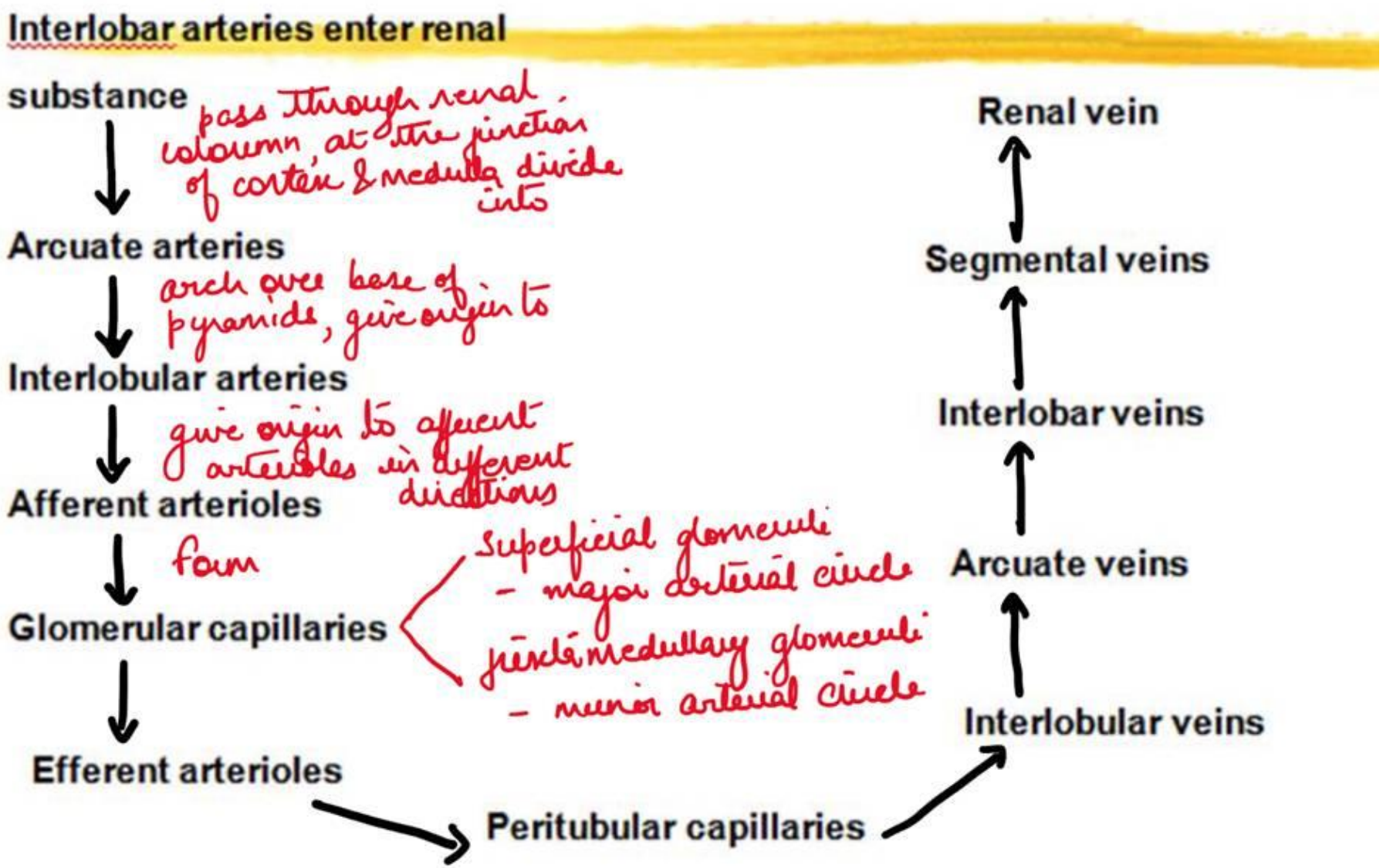




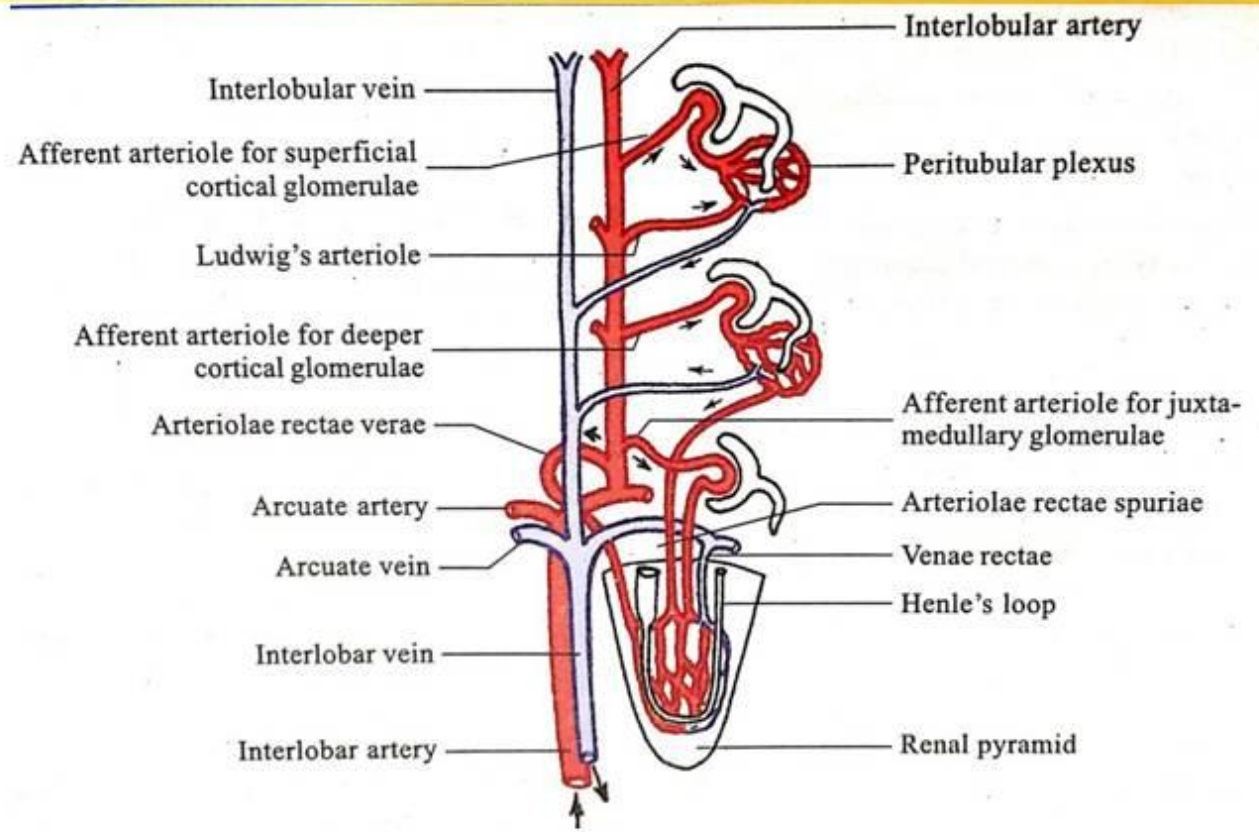
Arterial supply

- supplied by renal artery ------- branch of abdominal aorta
- renal circulation --- 1 litre/ min
- right renal artery is longer than left
- renal artery divides into anterior posterior trunks in renal sinus
- Anterior trunk – gives off 4 segmental arteries
- posterior trunk – continues as posterior segmental artery
- segmental arteries divide into lobar and interlobar arteries that enter renal substance

Circulation through kidney



Internal vascular pattern of kidneys

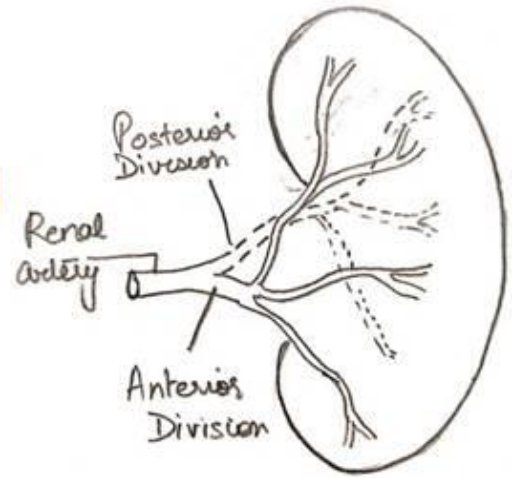


Superficial cortical glomeruli ------ major arterial circle

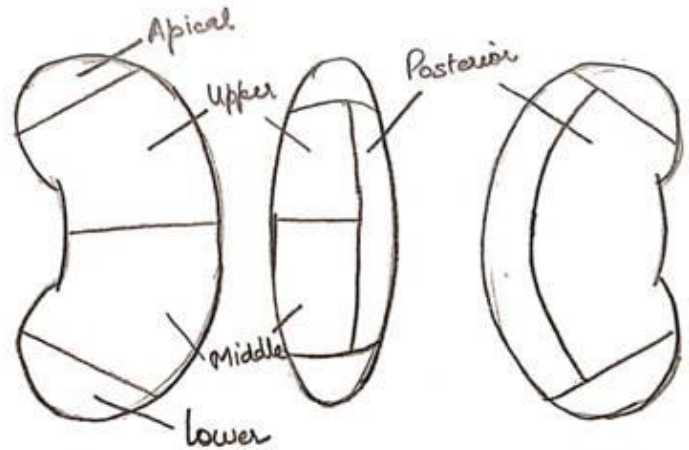
Juxtamedullary glomeruli ------- minor arterial circle

Renal segments
(Brodel's Line)

- Each kidney – 5 independent arterial segments
- no collateral circulation between these segments
- 4 on anterior surface –
  - apical
  - upper anterior
  - middle anterior
  - lower
- 1 on posterior surface
  - posterior segment



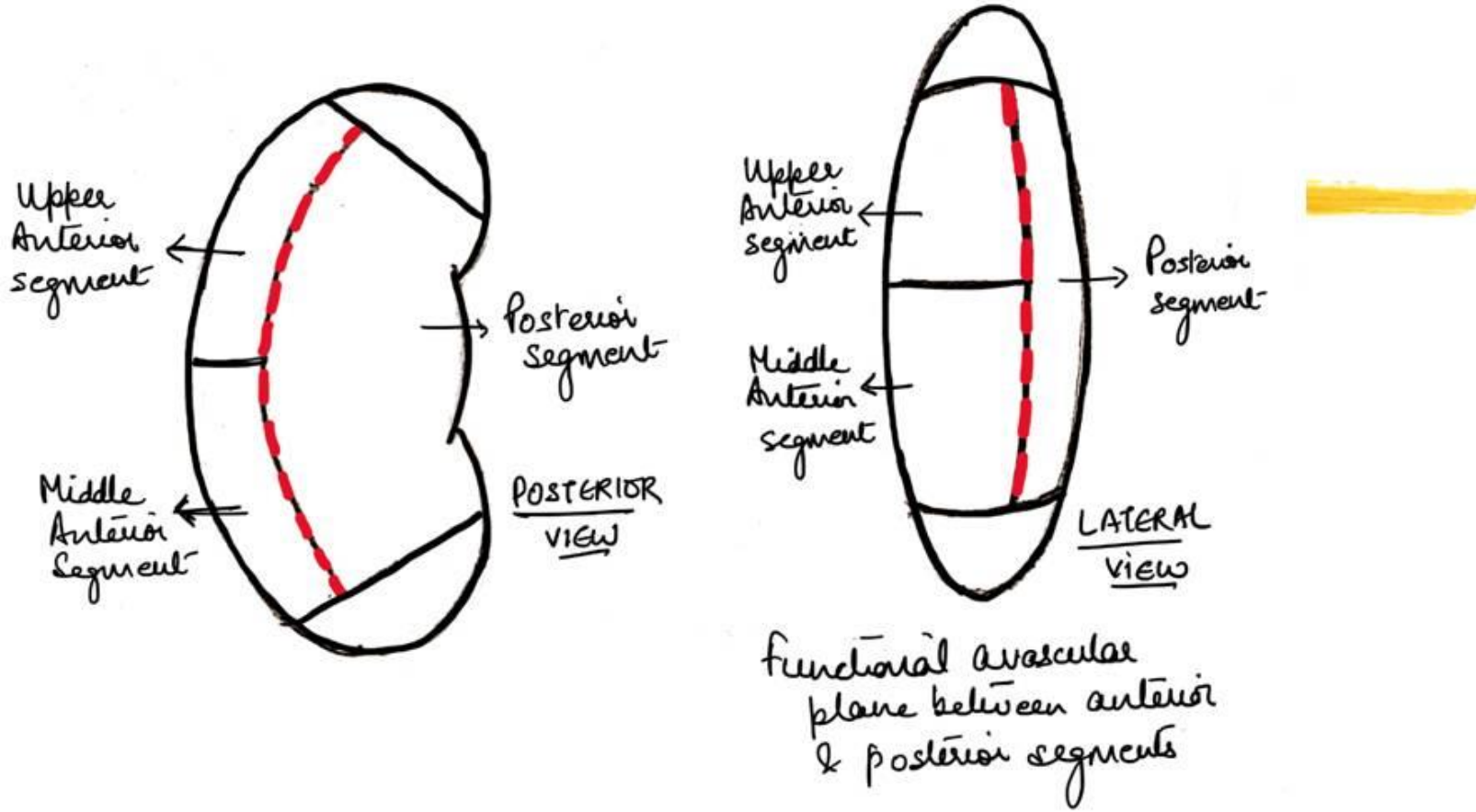
Branches of Renal artery



Segments of left kidney

Brodel's avascular line

- In the living a pale bloodless line is observed along lateral border
- across this line NO ANASTOMOSIS between anterior & posterior divisions of renal artery
- IMPORTANCE:
  - interior of kidney can be explored, stones can be removed from calyces (will less bleeding)
  - This line is not strictly avascular because tributaries of renal vein communicate with each other across this line



junction between anterior & posterior divisions of renal artery along a line on posterior surface – between medial 2/3rd and lateral 1/3rd

Venous Drainage

- drain into IVC through Renal veins
- Left renal vein is longer than right
- Left renal veins drains blood from
  - Left kidney & also
  - Left gonad
  - Left suprarenal
- Right gonadal vein & right suprarenal vein are direct tributaries of IVC

Lymphatic Drainage

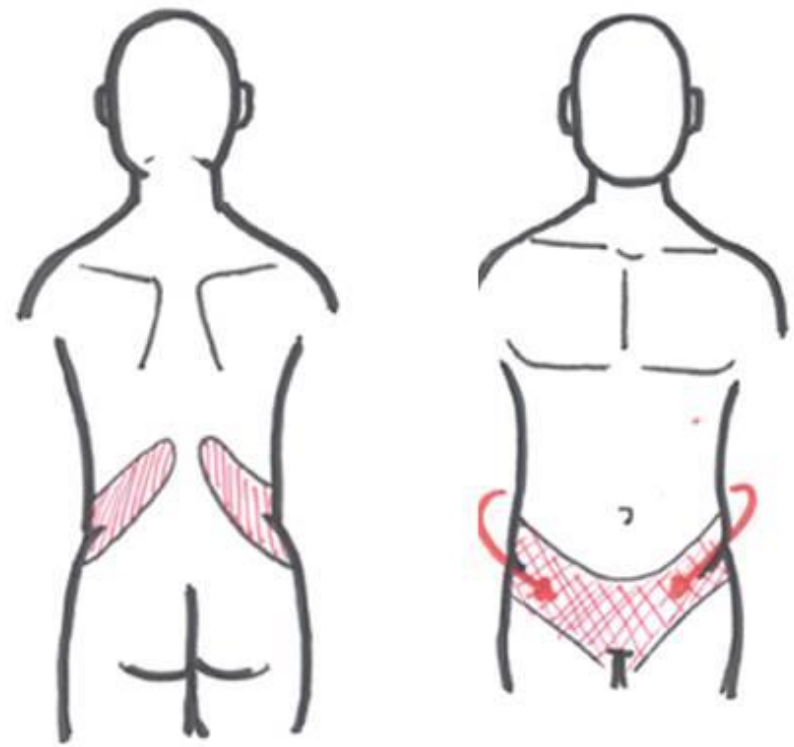
- lymphatics follow back the renal arteries and drain into para aortic group of lymph nodes

Nerve Supply

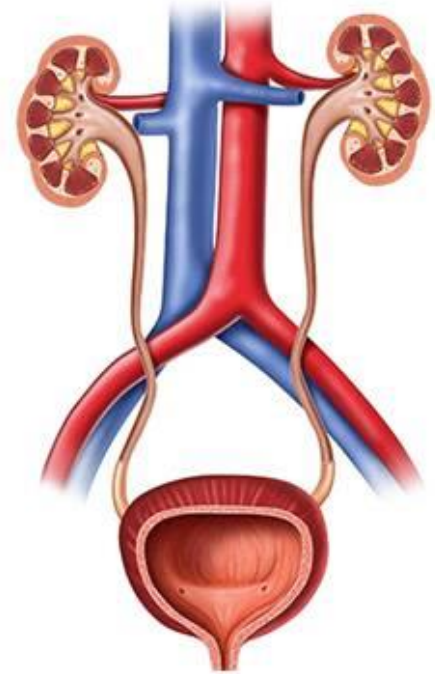
- sympathetic fibres derived from renal plexus
- pre-ganglionic fibres --- T10 – L3 spinal cord segments

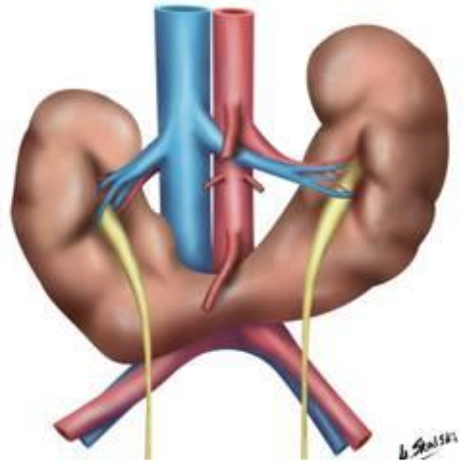
Referred pain in RENAL COLIC

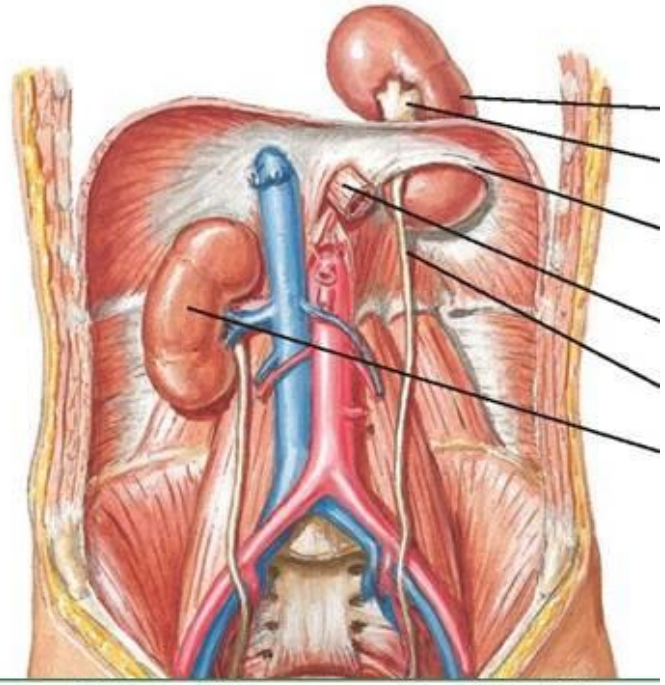
pain radiates from---Loin to Infraumbilical part of abdominal wall including groin---- along the distribution of T10- L3 spinal nerves

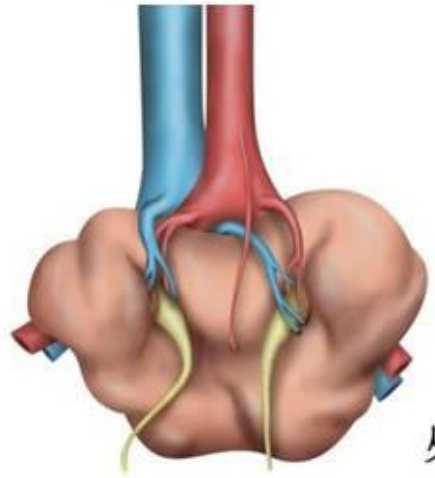


Anomalies of Development



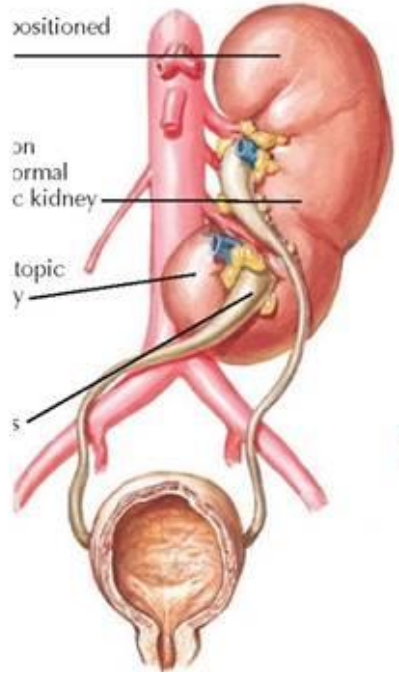


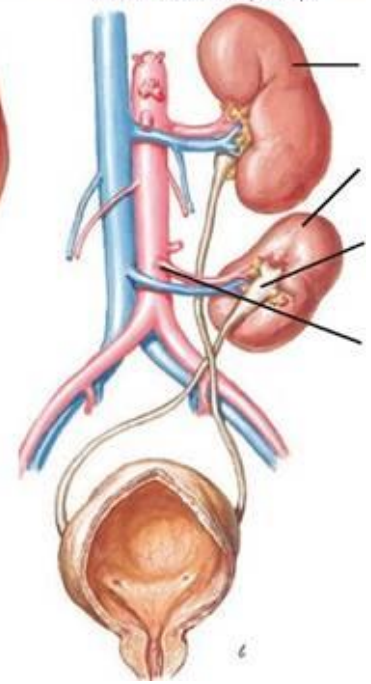




With fusion (90%)

Without fusion (10%)





Applied Anatomy

- Anatomical basis of Loin to Groin pain of renal colic

- Anatomical basis for arterial anastomosis of all arteries during Renal transplantation – as branches of renal arteries are end arteries

- Anatomical basis for exploration of interior of kidney through the avascular plane