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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

Interlobar arteries enter renal

Substance pass through renal columns, at the junction of cortex & medulla divide into

Arcuate arteries

Arched over base of pyramid, give origin to

Interlobular arteries

Give origin to afferent arterioles in different directions

Afferent arterioles

Form

Glomerular capillaries

Efferent arterioles

Superficial glomeruli - major arterial circle

Juxtamedullary glomeruli - minor arterial circle

Peritubular capillaries

Renal vein

Segmental veins

Interlobular veins

Arcuate veins
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
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

Referral 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
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