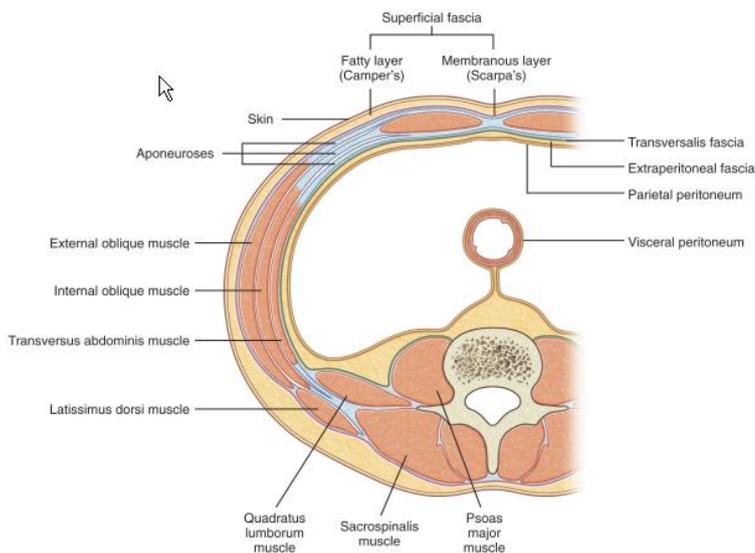
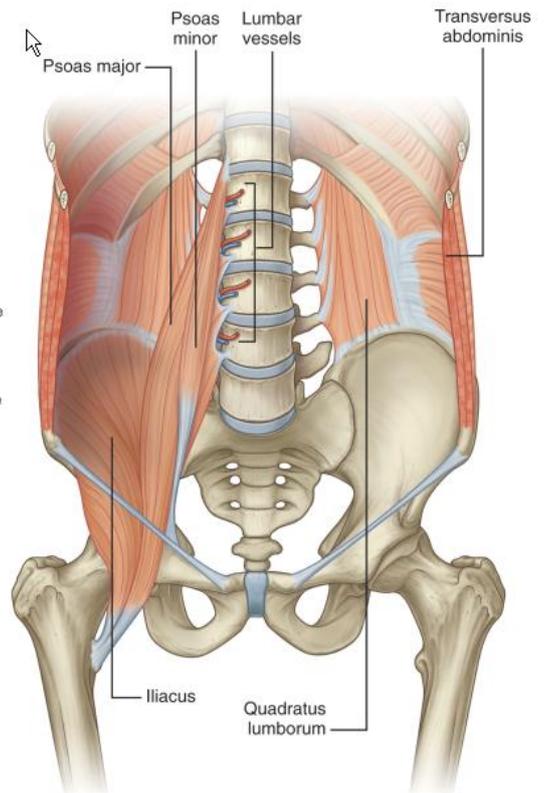
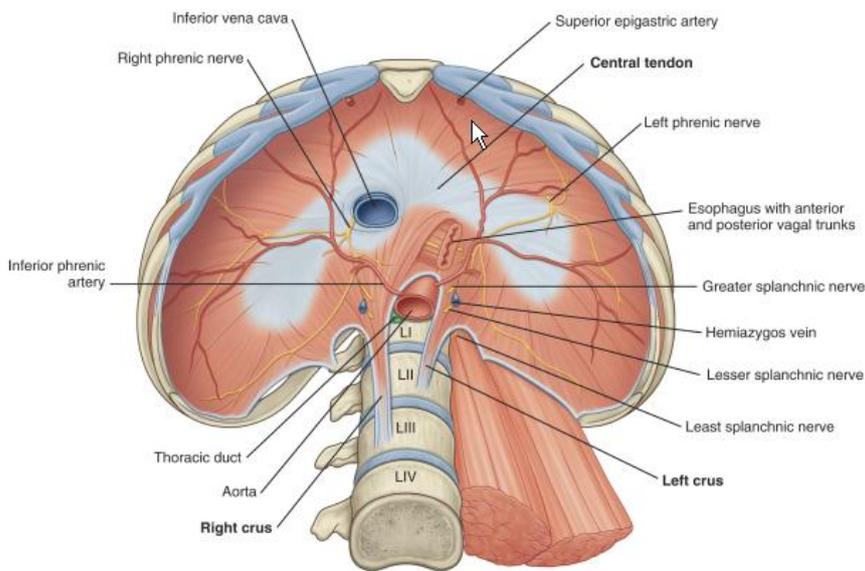


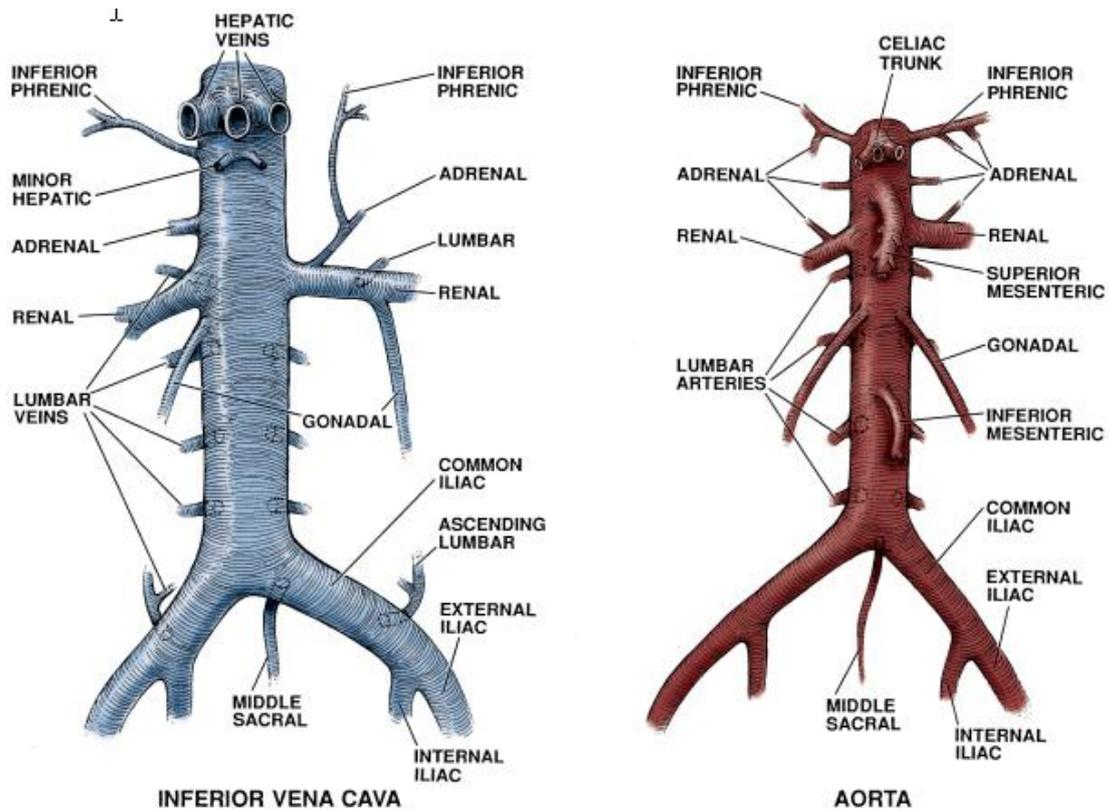
## Upper tract anatomy



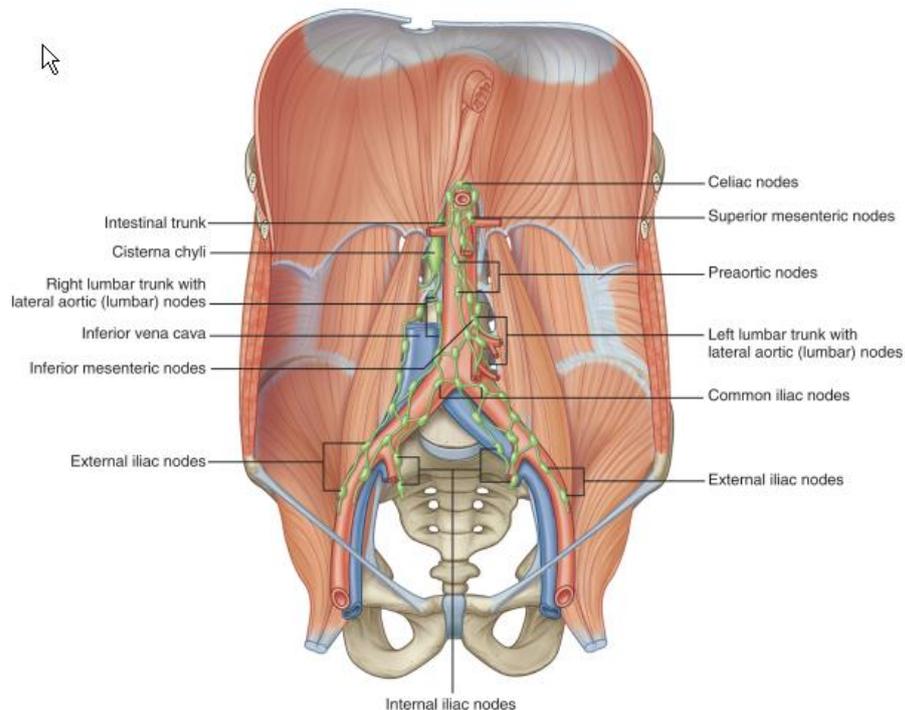
### Lumbodorsal fascia

Arises from spinous processes of lumbar vertebrae. Splits into 3 layers to enclose sacrospinalis and quadratus lumborum mm. Contiguous with transversus abdominis aponeurosis.

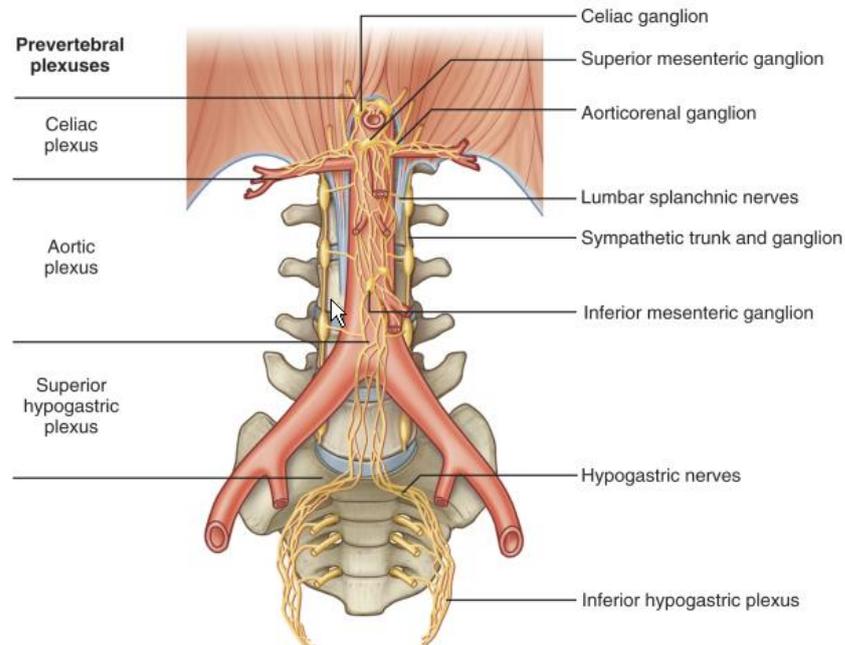
Muscle	Origin	Insertion	Function
Sacrospinalis	Sacrum and lumbar vertebrae	Lower ribs and thoracic vertebrae	Extension of the spine
Quadratus lumborum	5th lumbar vertebra	1st through 4th lumbar vertebrae, 12th rib	Depress and stabilize 12th rib, lateral bending of the trunk
External oblique	Lower eight ribs	Lateral lip of iliac crest, aponeurosis ending in midline raphe	Compress abdominal contents, flexion of the trunk
Internal oblique	Lumbodorsal fascia, iliac crest	Lower four ribs, aponeurosis ending in linea alba	Compress abdominal contents, flexion of the trunk
Transversus abdominis	Lumbodorsal fascia, medial lip of iliac crest	Aponeurosis ending in linea alba	Compress abdominal contents
Psoas	12th thoracic through 5th lumbar vertebrae	Lesser trochanter of femur	Flexion of the hip
Iliacus	Inner aspect of iliac pelvic wing	Lesser trochanter of femur	Flexion of the hip



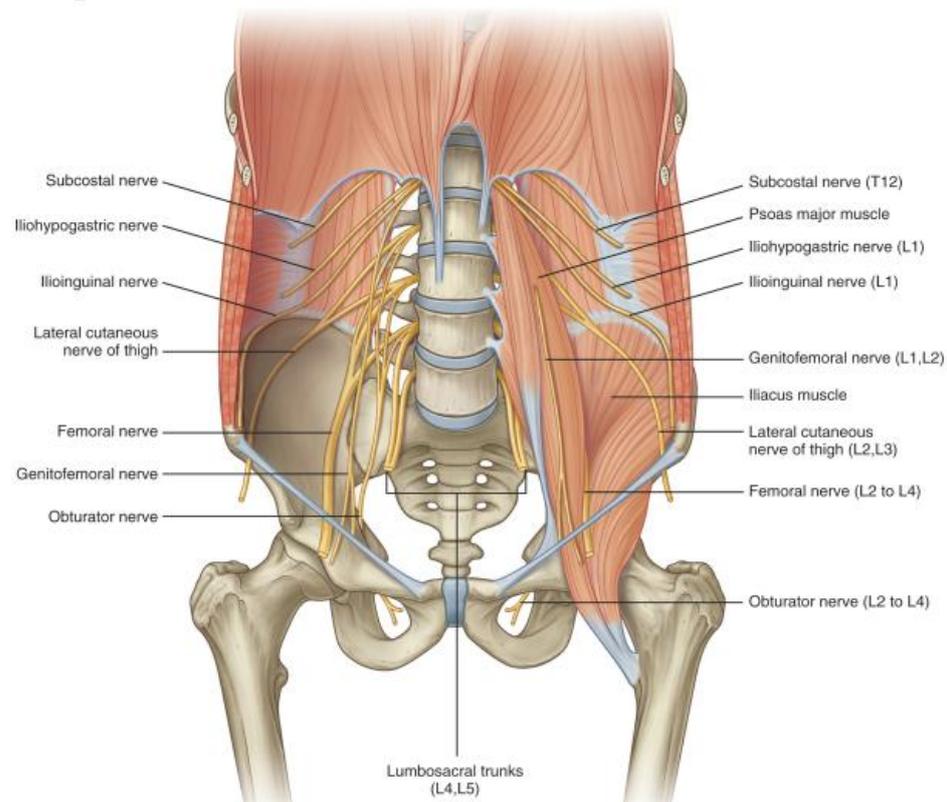
Aorta – 3 anterior, 3 lateral, 4 posterior (vertebral), one caudal (median sacral)  
 3 branches of celiac a. – left gastric, common hepatic and splenic  
 Aortic hiatus T12; bifurcation T4  
 Multiple perforating adrenal arteries, single dominant adrenal vein  
 Renal arteries at level of 2nd lumbar vertebrae



Lymphatic flow predominantly right to left. Right testis tumour landing site = interaortocaval nodes, then right and left. Left testis tumour landing site left paraaortic nodes – **no spread to right nodes**. See appendix notes  
 Cysterna chyli = T12, retrocrucral (thoracic), behind aorta slightly to right



Lumbosacral plexus T12, L1-5, S1-5, C1; motor and somatic sensory innervation of pelvis and lower limb. NB. Femoral nerve in body of psoas



Iliohypogastric and ilioinguinal run between transverses abdominis and internal oblique muscles – TAPP block

Branch	Origin	Spinal Segments	Function: Motor	Function: Sensory
Iliohypogastric	Anterior ramus L1	L1	Internal oblique and transversus abdominis	Posterolateral gluteal skin and skin in pubic region
Ilioinguinal	Anterior ramus L1	L1	Internal oblique and transversus abdominis	Skin in the upper medial thigh, and either the skin over the root of the penis and anterior scrotum or the mons pubis and labium majus
Genitofemoral	Anterior rami L1 and L2	L1, L2	Genital branch—male cremasteric muscle	Genital branch—skin of anterior scrotum or skin of mons pubis and labium majus femoral branch—skin of upper anterior thigh
Lateral cutaneous nerve of thigh	Anterior rami L2 and L3	L2, L3		Skin on anterior and lateral thigh to the knee
Obturator	Anterior rami L2 to L4	L2 to L4	Obturator externus, pectineus, and muscles in medial compartment of thigh	Skin on medial aspect of the thigh
Femoral	Anterior rami L2 to L4	L2 to L4	Iliacus, pectineus, and muscles in anterior compartment of thigh	Skin on anterior thigh and medial surface of leg

## Kidneys

10-12 cm long, 5-7cm wide and 3cm thick

~150g each

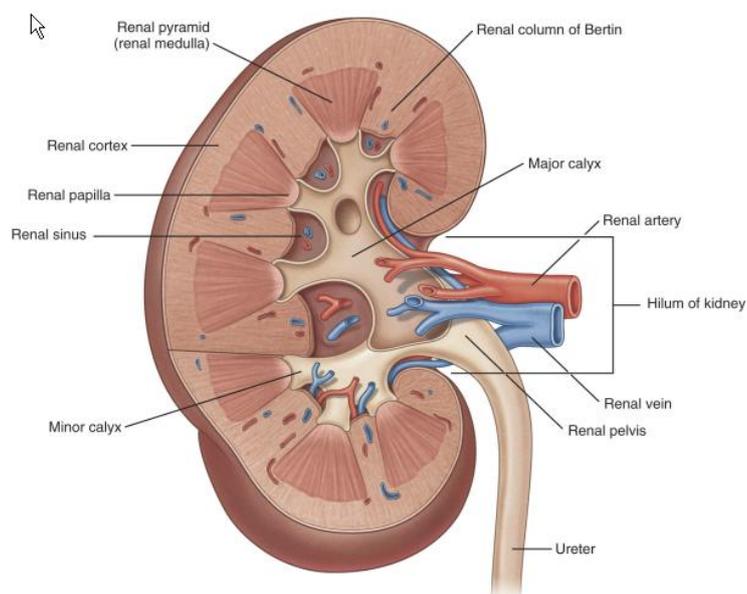
Typically 7-9 papillae/minor calyces – however wide variation

Remember orientation of kidney – upper pole more posterior and medial, medial surface more anterior. Important for PCNL etc.

Gerota's fascia deficient inferiorly

Sympathetic nerve input typically travels through coeliac plexus (see above)

Kidney sectioned from behind – pelvis, vein, artery



## Arterial supply

20% cardiac output; 600ml/min each

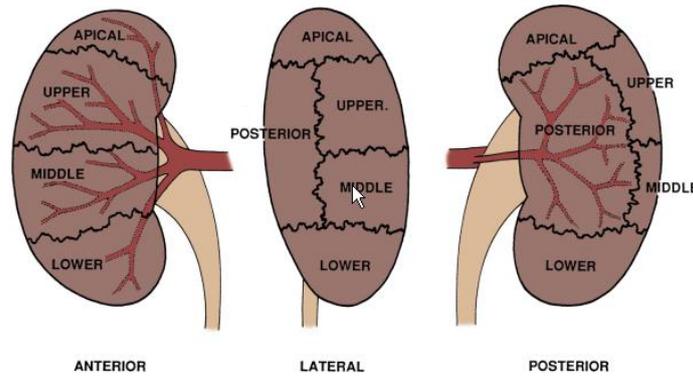
Arise body of L2; splits into segmental branches

First branch posterior; usually 4 anterior branches. End arteries – large ischaemic loss if ligated.

Free anastomoses of renal veins – no defect if ligated.

Progression : segmental – interlobar – arcuate – interlobular – afferent artery

Arterial anomalies in 25 – 40% patients. Most common abnormality supernumerary left renal artery

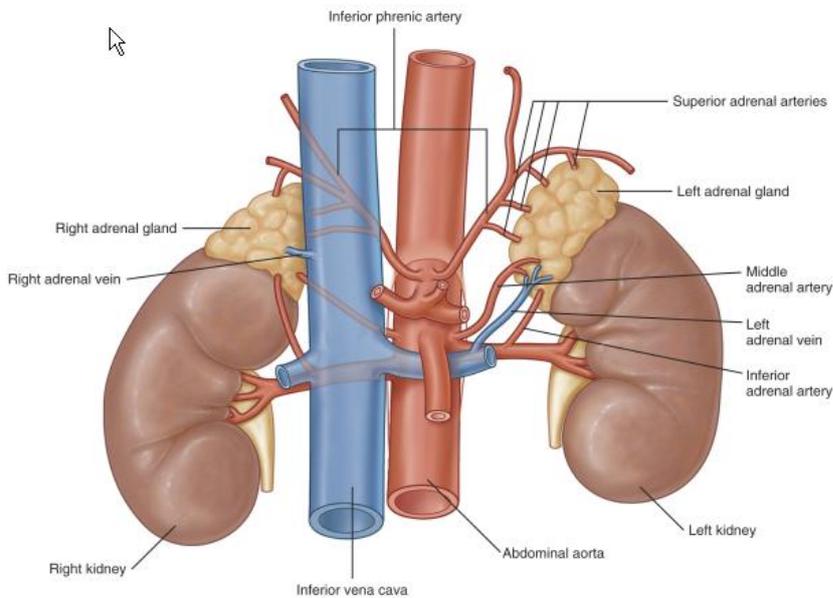


### Adrenals

Embryologically distinct development from kidneys – seen in normal anatomical position with ectopia/agenesis

Medulla – zona reticularis – zona fasciculata – zona glomerularis

Right higher than left



### Ureters

22 – 30cm long

Internal longitudinal and outer circular/oblique mm (opposite of tunica albuginea ‘trunk’)

Segmental arterial supply from renal, gonadal, aorta, common iliac, internal iliac and branches

Tight areas at PUJ, VUJ and over iliac artery

Autonomous pacemaker cells in renal pelvis

Arbitrary division into:

(i) Upper and lower halves (bifurcation of common iliac)

(ii) Upper, mid and lower thirds (mid ureter between upper and lower borders of sacrum)

