

Posterior Abdominal wall- I (Muscles & nerves)

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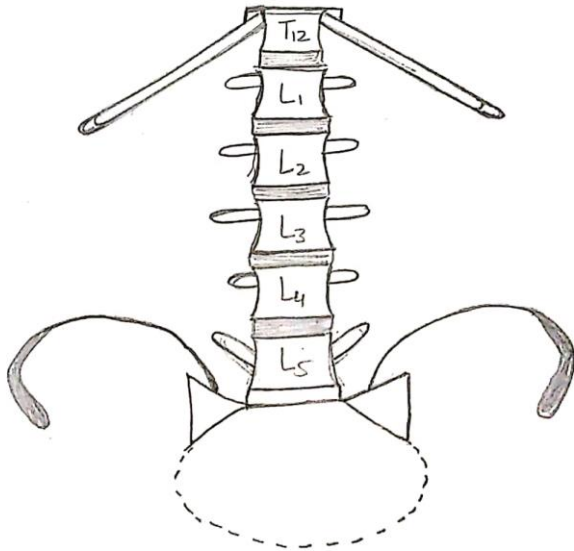
Learning Objectives

By the end of this teaching session you should be able to-

- **Describe the muscles of posterior abdominal wall (origin, insertion, actions, nerve supply)**
- **Enumerate the nerves of the posterior abdominal wall**
- **Describe the lumbar plexus (location , formation , branches)**

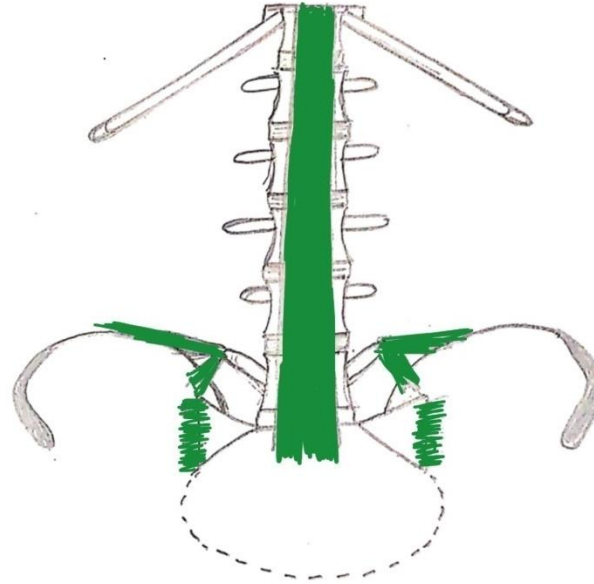
Understanding the anatomical reconstruction Muscles of posterior abdominal wall

Skeletal Background



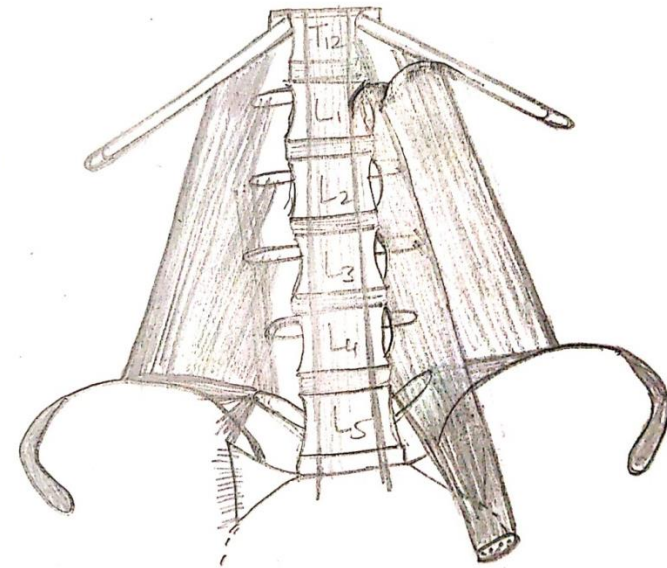
1. T 12 vertebra
2. 12th rib
3. L 1 – L5 vertebrae
4. Iliac crest and iliac fossa

Ligamentous background



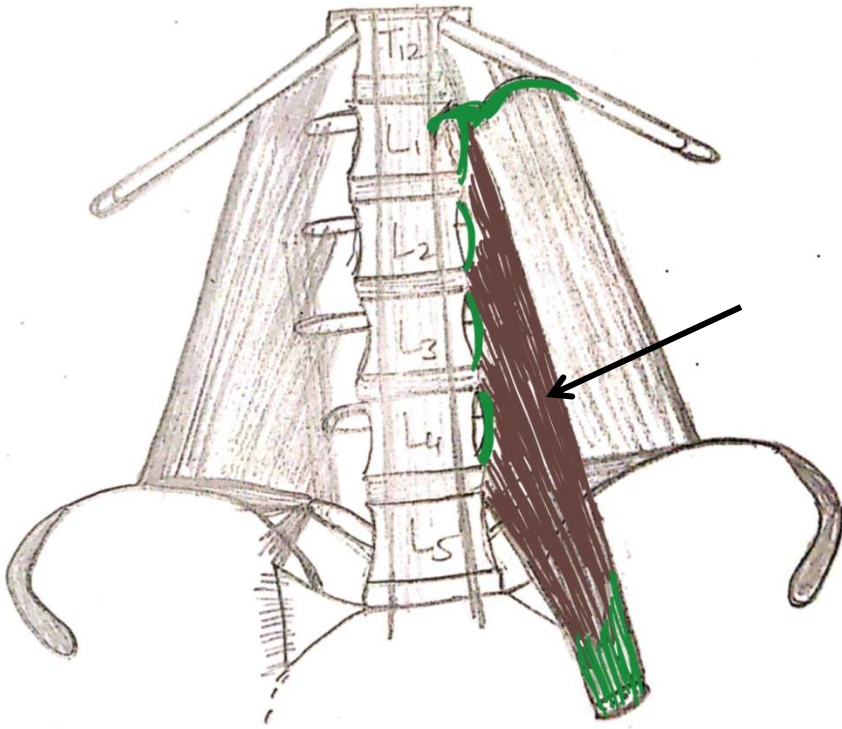
1. Iliolumbar ligament
2. Anterior longitudinal ligament
3. Ventral sacroiliac ligament

Musculofascial Background



1. Psoas major muscle and fascia
2. Quadratus lumborum
3. Iliacus and fascia iliaca
4. Psoas minor

Psoas major



Occupies 3 regions- abdomen, false pelvis & upper thigh

Origin – 14 fleshy strips

Continuous attachment from T12(lower border) to L5 (upper border)

1. discs above 5 lumbar vertebrae
2. adjoining parts of vertebral bodies
3. 4 fibrous arches across the sides of upper 4 lumbar vertebrae

Actions –

- i. Chief flexor of thigh at hip joint
- ii. Bilateral muscles help in flexion of trunk
- iii. Medial rotator of thigh

Insertion

- as Ilio psoas tendon
- at lesser trochanter

Nerve supply – ventral rami of L1 – L4

Psoas fascia

Covers psoas muscle

Attachments:

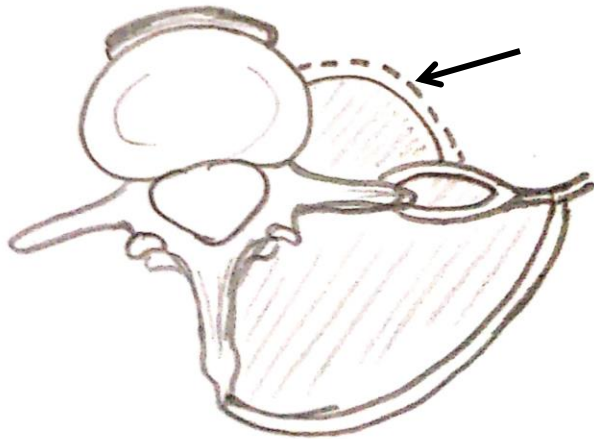
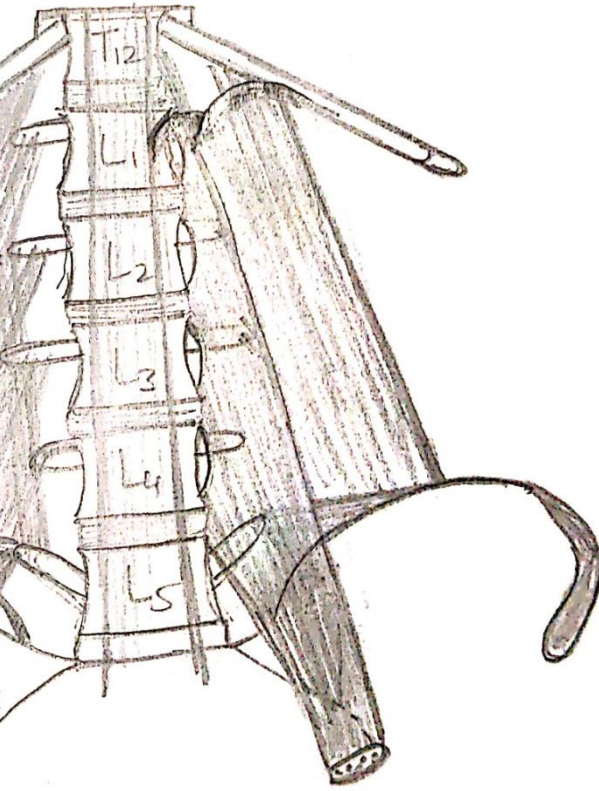
Superiorly - thickened and forms medial arcuate ligament (body of L1 to tip of L1 transverse process)

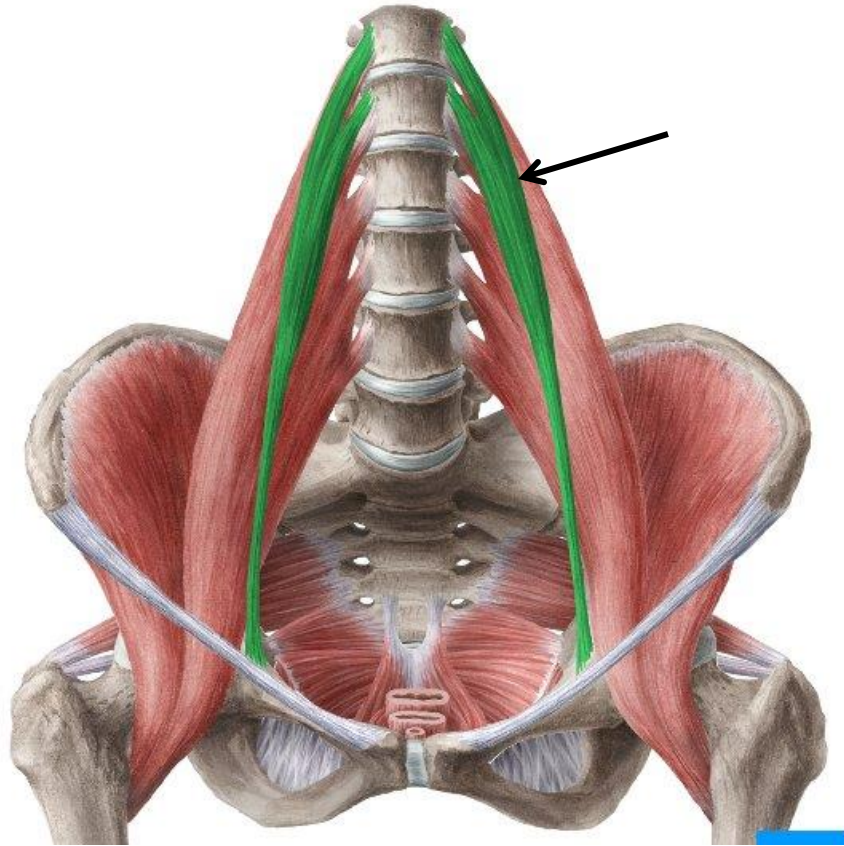
Laterally fused with anterior layer of thoracolumbar fascia

Medially – bodies of lumbar vertebrae & intervertebral discs

Inferiorly – fused with fascia covering iliacus

Forms a sheath around muscle – **psoas sheath**





Psoas minor

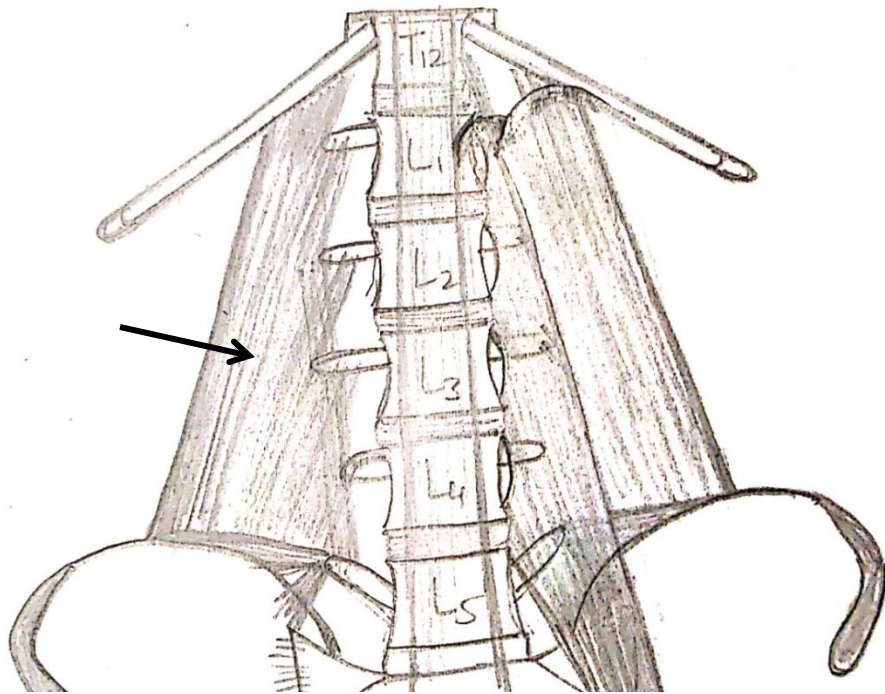
Origin – common origin with psoas major from T12 – L1

Insertion –

- Iliopubic eminence

Nerve supply – ventral rami of L1

Quadratus Lumborum



Most lateral muscle of posterior abdominal wall

Origin –

- Iliolumbar ligament
- Adjacent part of iliac crest
- Lumbar vertebrae transverse process

Insertion –

- Medial part of inferior border of 12th Rib
- slips to transverse process behind slips of origin

Actions –

- Helps to fix 12th rib during inspiration
- Bilateral muscles help in extension of lumbar vertebral column
- Acting singly – lateral flexion

Nerve supply – upper lumbar nerves & subcostal nerve

Iliacus

Below iliac crest

Origin –

- Upper 2/3 rd of iliac fossa

Insertion –

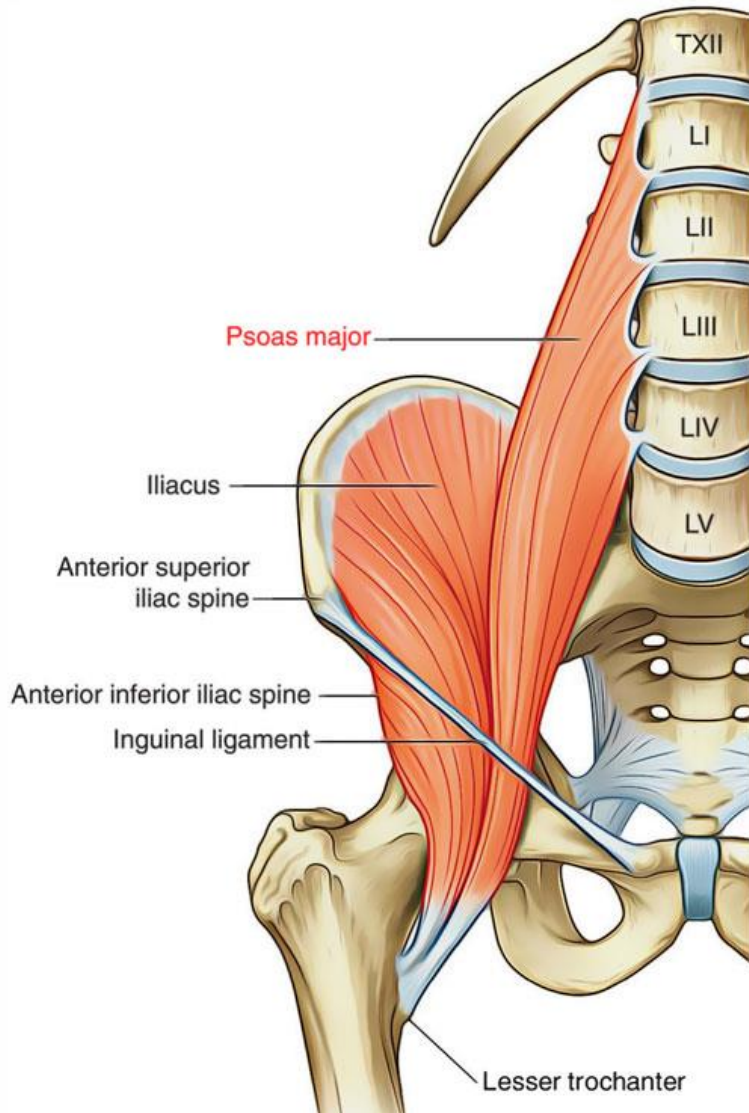
- as iliopsoas tendon to the lesser trochanter

Nerve supply –

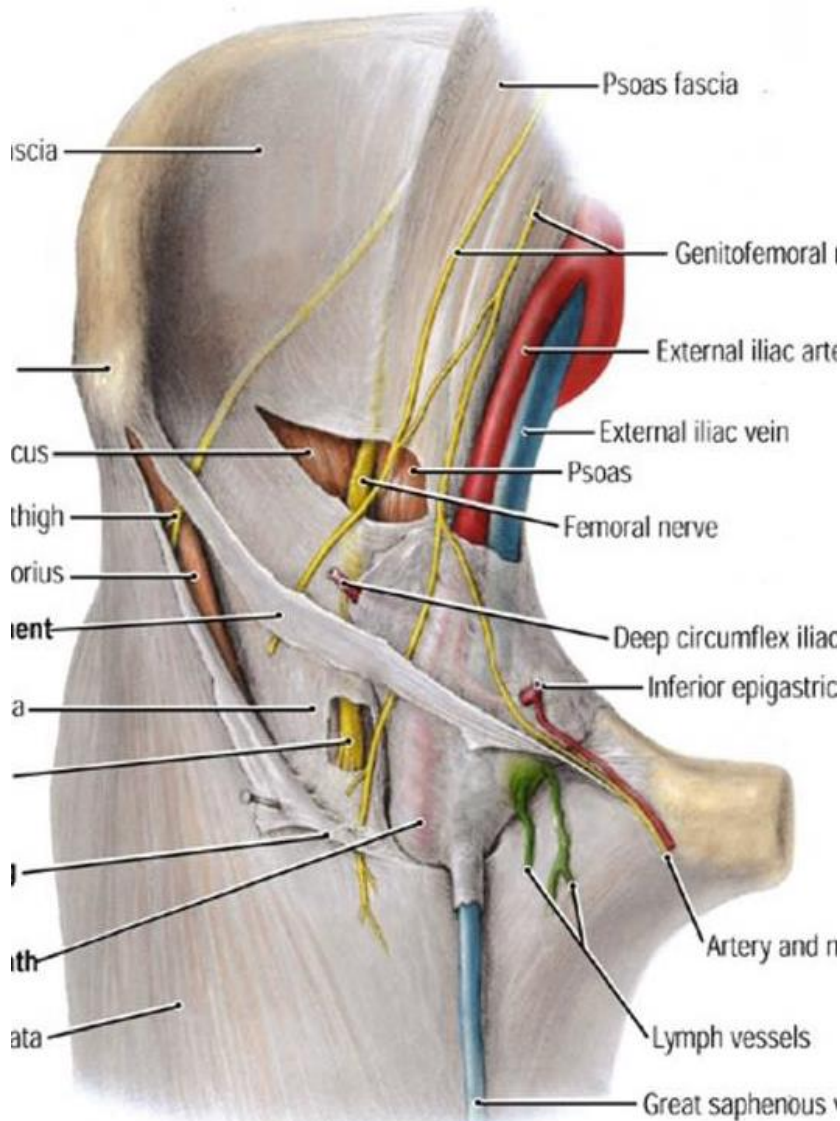
Femoral nerve

Actions:

Flexion of thigh at hip joint



Iliac Fascia



- **Covers the iliacus**

Fascia attachments:

- **Medially – merges with psoas fascia & attached to iliopectineal eminence**
- **Inferiorly – passes deep to inguinal ligament & forms posterior layer of femoral sheath**

Triangle of surgical importance

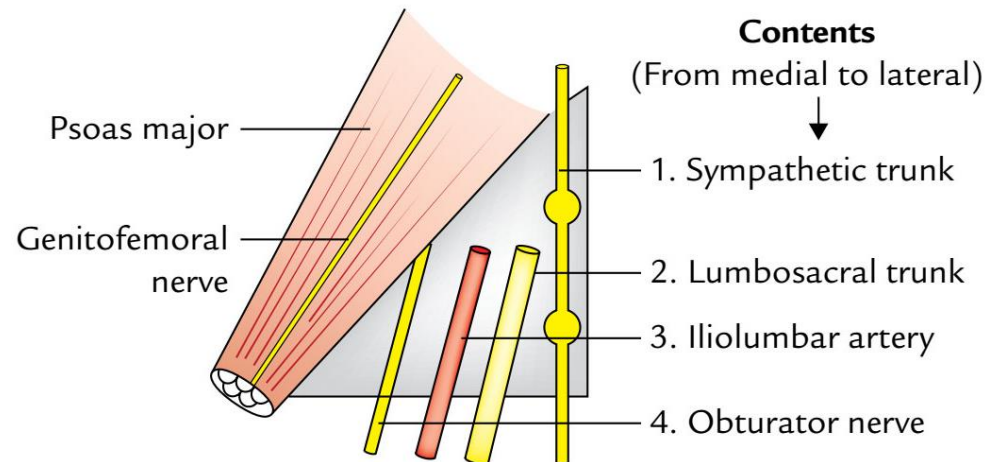
Triangle of Marcille /

Lumbosacral triangle

Lumbosacral triangle

Boundaries:

- **Medially** – body of L5
- **Laterally** – medial border of psoas major
- **Apex** – junction of medial & lateral margin
- **Base** – Ala of sacrum
- **Floor** – transverse process of L5 & iliolumbar ligament



Ureter crosses common iliac vessels at lateral angle

Nerves of the posterior abdominal wall

➤ **Lumbar plexus** and its branches

➤ **Abdominal part of ANS**

– Sympathetic nerves

- Thoracic splanchnic nerves- greater, lesser & least
- Lumbar splanchnic nerves – from Lumbar sympathetic chain

– Parasympathetic nerves

- Branches from right and left vagus

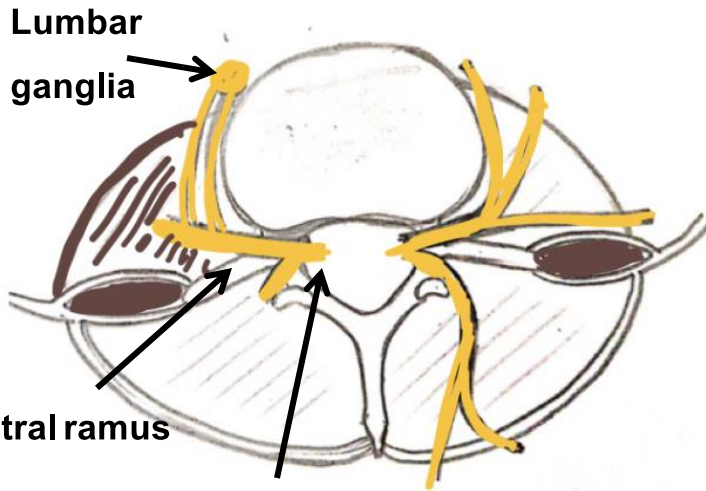
Lumbar Plexus

- Plexus of nerves on posterior abdominal wall
- Nerves taking part –
 - Ventral rami of L1, L2, L3 & L4 (upper part)

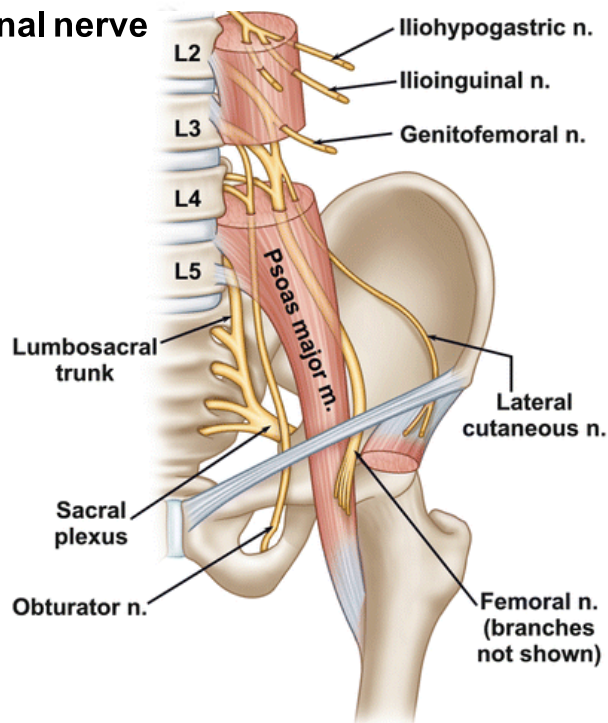
NOTE : Lower part of L4 does not participate in formation of lumbar plexus it joins L5 to form lumbosacral trunk

**The lumbar plexus innervates part of the lower abdominal wall
But is chiefly concerned in supplying
“ skin and muscle borrowed from the trunk by the lower limb”**

Formation & Location of lumbar plexus



Lumbar spinal nerve



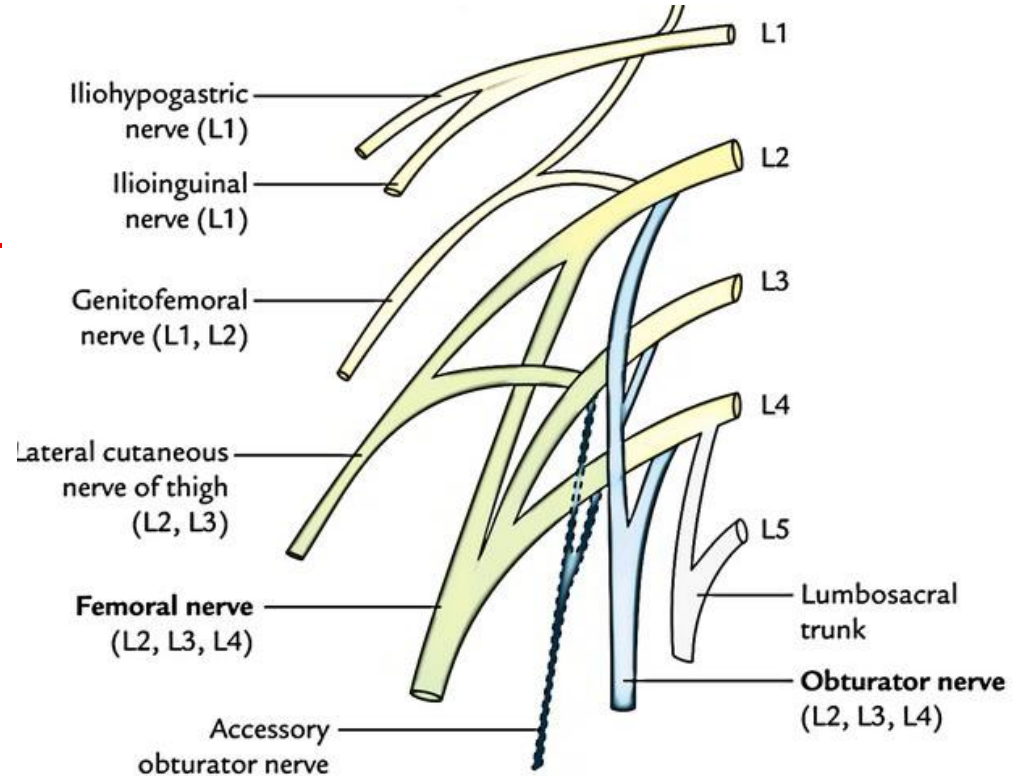
- Anterior primary rami of L1-L4 emerge from respective intervertebral foramina
- Enter the substance of psoas
- Give off branches to psoas and quadratus
- After this they form a plexus – **LUMBAR PLEXUS** within substance of psoas major

Branches of Lumbar plexus

Iliohypogastric & Ilioinguinal- L1

Genitofemoral- L1 , L2

**Lateral femoral cutaneous nerve –
L2, L3 (posterior division)**

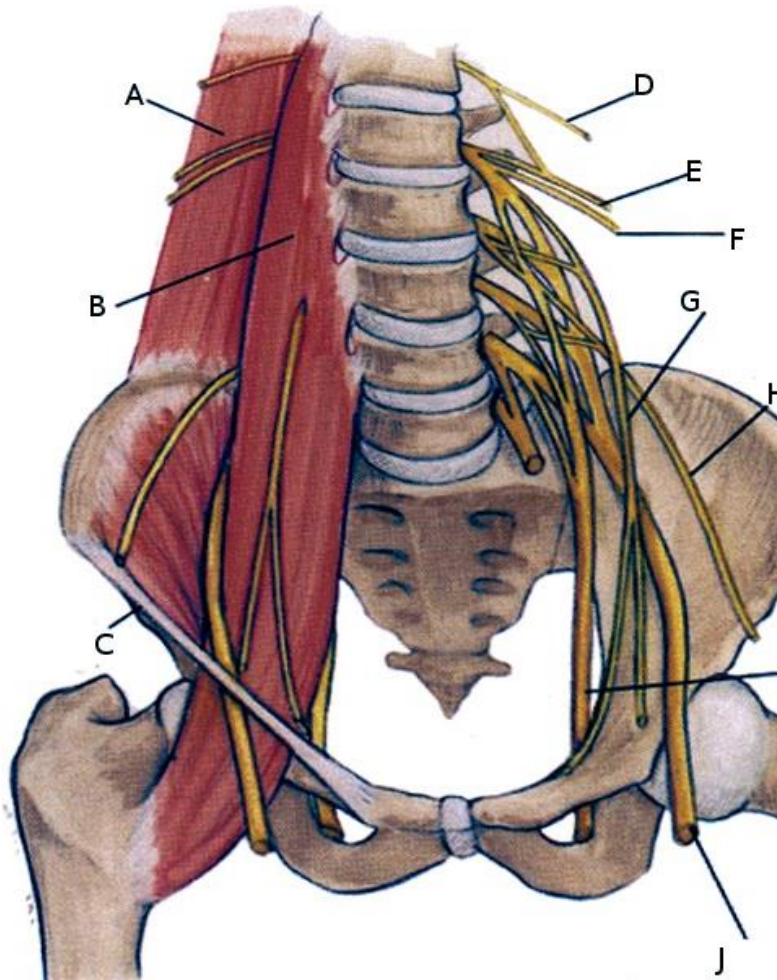


Femoral - L2, L3, L4 (posterior division)

Obturator - L2, L3, L4 (Anterior division)-

Sometimes – Accessory obturator nerve L3, L4 (posterior divisions)

Relation of Psoas major muscle & branches of lumbar plexus



Emerge from lateral border of psoas major:

- iliohypogastric nerve
- Ilioinguinal nerve
- lateral femoral cutaneous nerve
- femoral nerve

Emerges through psoas anteriorly:

- genitofemoral nerve

Emerges from medial border:

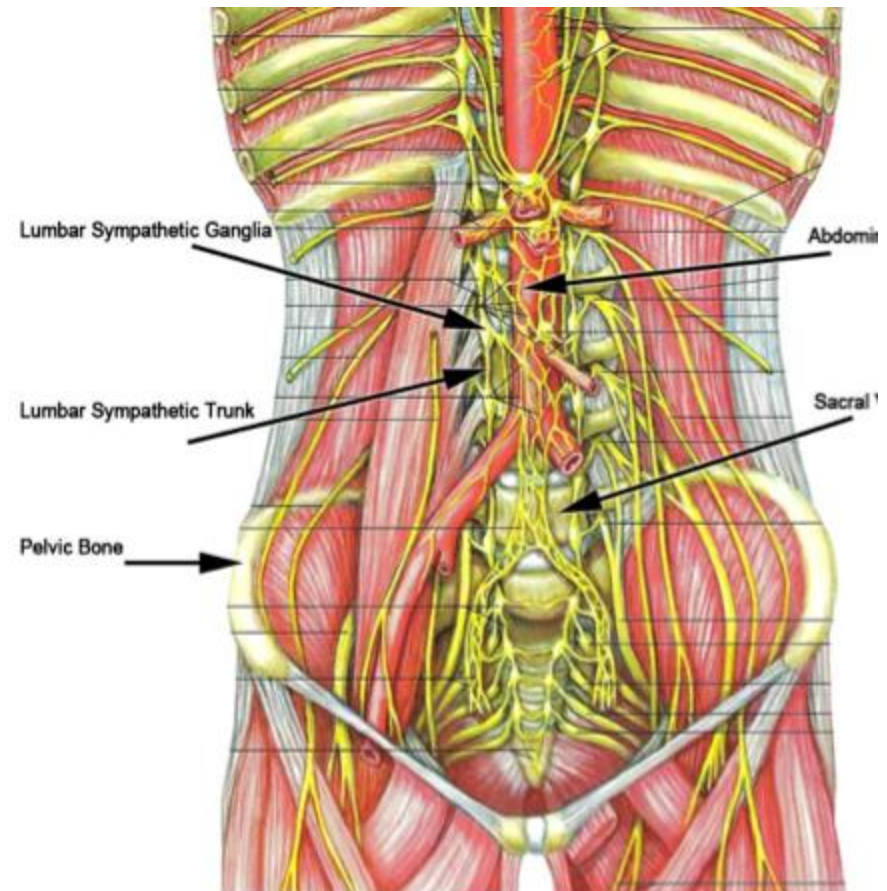
- obturator nerve

Abdominal part of ANS

- Receives both sympathetic and parasympathetic nerves
- **Sympathetic supply**----- twofold supply provided by
 - Lumbar part of sympathetic chain
 - Gives both somatic and visceral branches
 - Somatic branches – supply lower abdominal wall & lower limb
 - Visceral branches – supply only pelvic organs
 - Thoracic part of sympathetic chain through Celiac plexus
 - Celiac plexus gives only visceral branches – supplies all abdominal organs including gonads
- **Parasympathetic supply** ----- twofold supply provided by
 - Vagus nerve from above
 - Pelvic splanchnic nerves from below

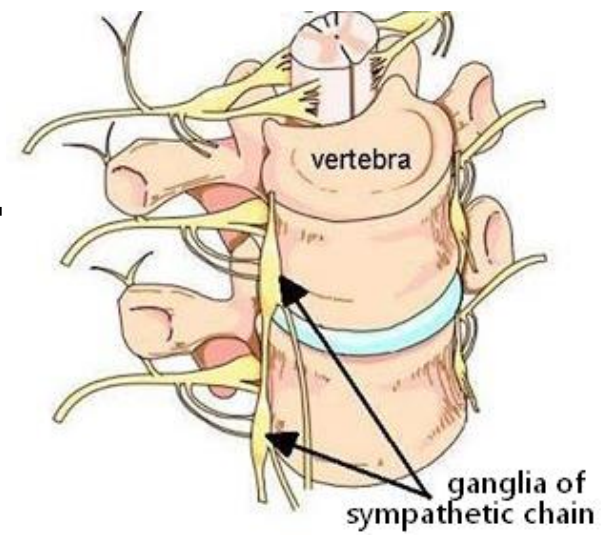
Sympathetic supply- Lumbar sympathetic chain

- Enters abdomen behind medial arcuate ligament
- Descends in front of lumbar vertebrae
- Along medial margin of psoas
- Right trunk is behind IVC
- Left trunk along left margin of aorta
- Passes in front of lumbar vessel
- But, behind common iliac vessels



Sympathetic supply-

Lumbar sympathetic chain contd.



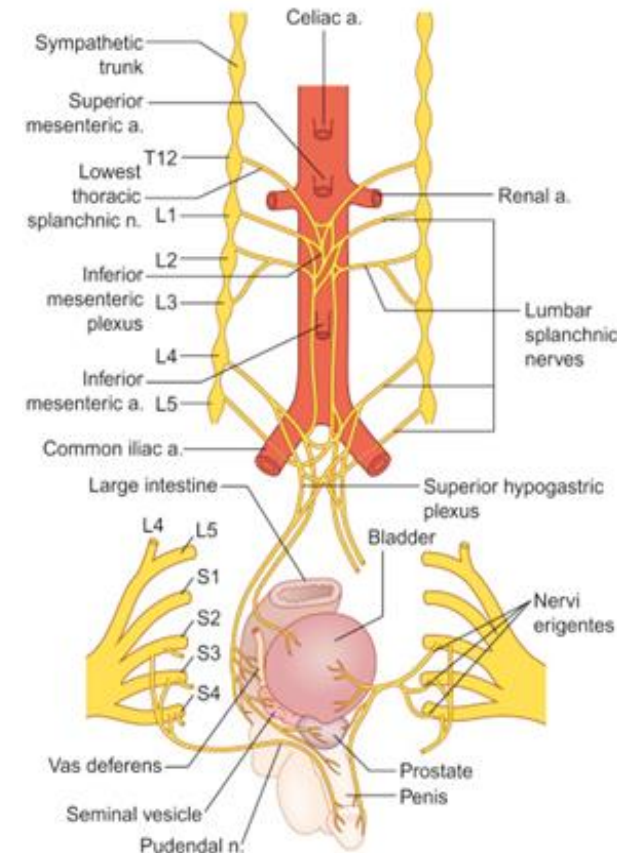
- Ganglia----- usually **4** in number
- Gives off both **somatic** and **visceral branches**

– Somatic branches (grey rami communicantes)

- Pass from ganglia to all five lumbar nerves
- Supply body wall & lower limb

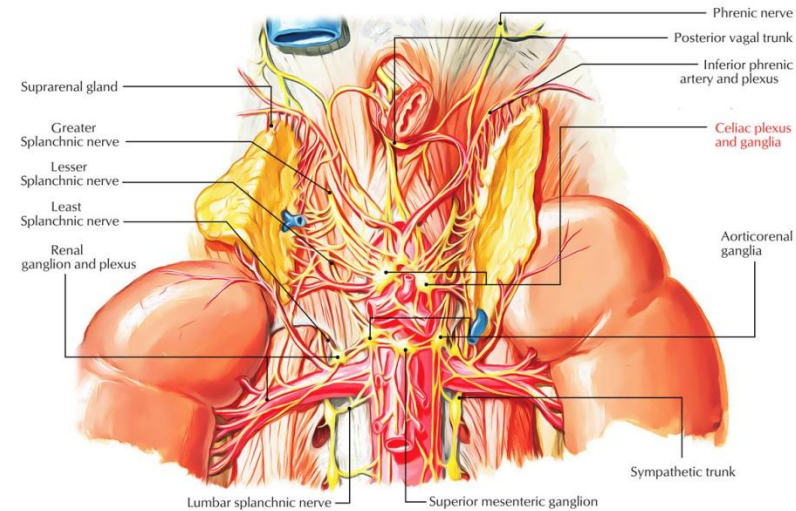
– Visceral Branches(Lumbar splanchnic nerves)

- Arise from all lumbar ganglia
- Join aortic & superior hypogastric plexus



Sympathetic supply- Celiac plexus (solar plexus)

- lies around origin of celiac trunk
- consists of right & left celiac ganglia
- lower detached part – aorticorenal ganglion
- receives pre ganglionic sympathetic fibre through greater and lesser splanchnic nerves
- pre- ganglionic fibres relay in celiac ganglion
- post ganglionic fibres from ganglia ----- form celiac plexus
- post ganglionic fibres pass along all visceral branches of aorta to reach all abdominal viscera



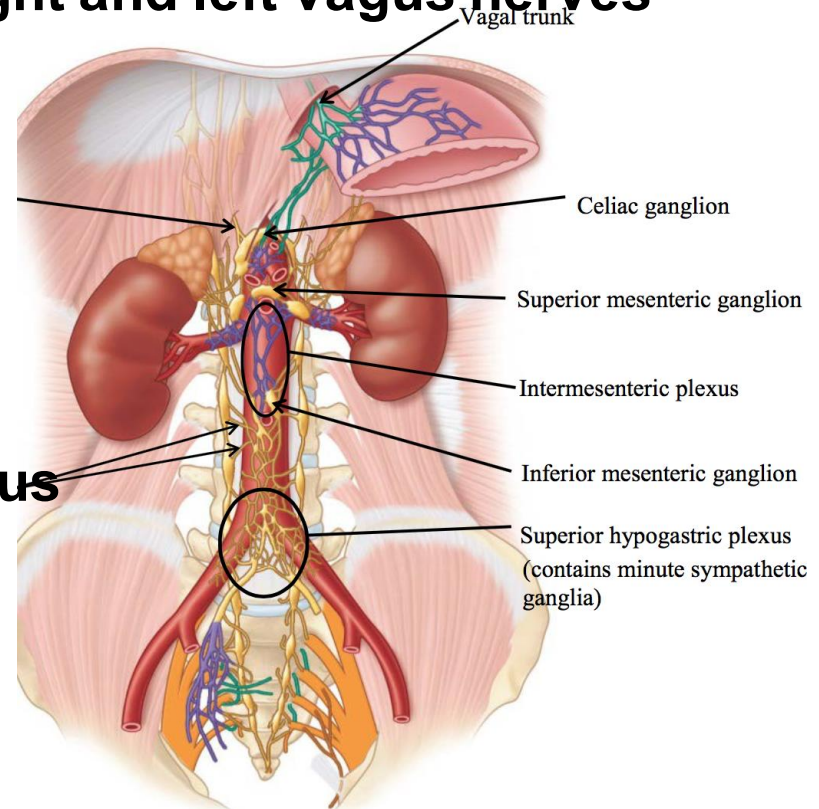
Actions of sympathetic supply

- **Vasomotor**
- **Motor to sphincters**
- **Inhibitory to peristalsis**
- **Carry sensory fibres for all viscera**

Suprarenal medulla receives preganglionic fibres directly
WITHOUT RELAY ----- cause release of adrenalin from
adrenal medulla

Parasympathetic part

- Receive fibres from both vagal trunks
- Both trunks contain fibres from right and left vagus nerves
- Enter celiac plexus
- Pass without relay
- Supply viscera, gut is supplied
- only upto transverse colon by vagus
- Splenic flexure onwards
- parasympathetic supply received through pelvic splanchnic nerves derived from S2, S3 & S4

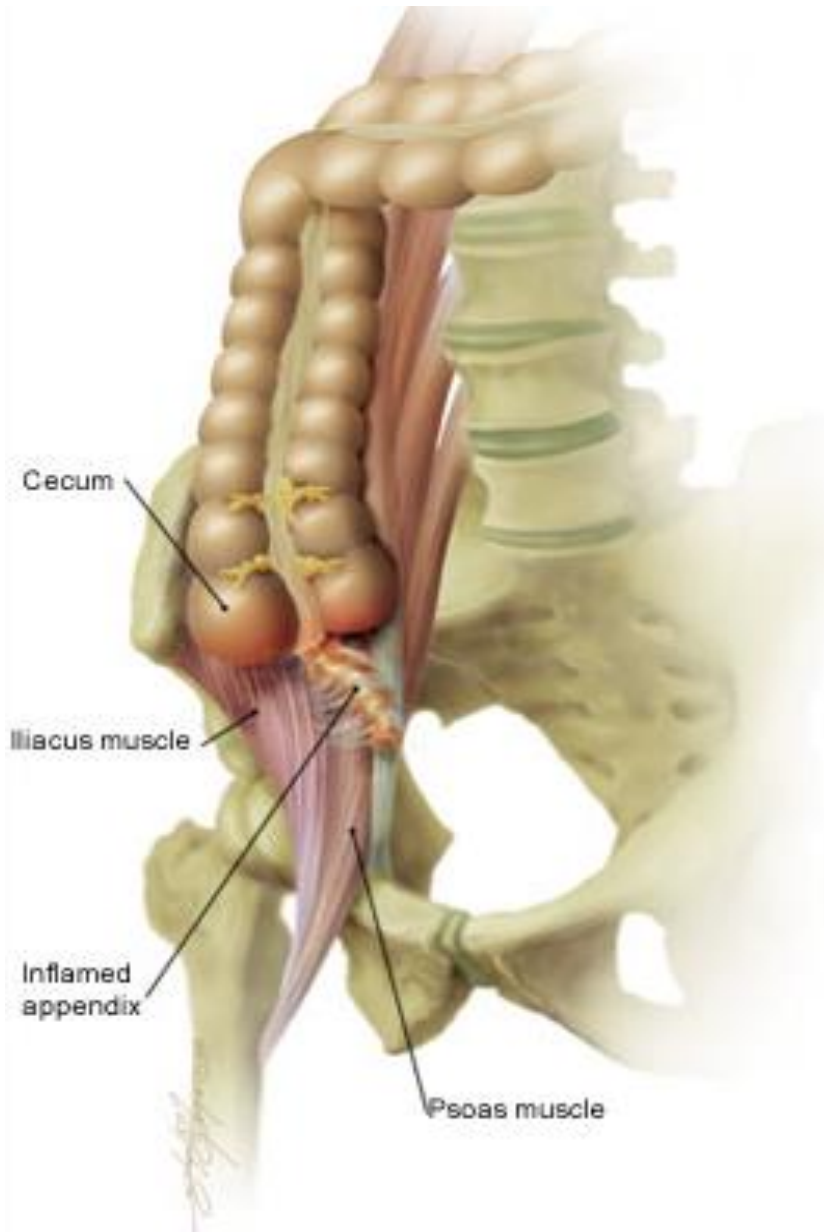


Actions of parasympathetic supply

- **Stimulates peristalsis**
- **Inhibitory to sphincters**
- **Secretomotor to the gut and its glands**
 - **upto transverse colon (vagus),**
 - **beyond splenic flexure of colon to rectum (pelvic splanchnic nerves)**

Applied Anatomy

Appendix & right psoas major muscle



Retrocaecal appendix

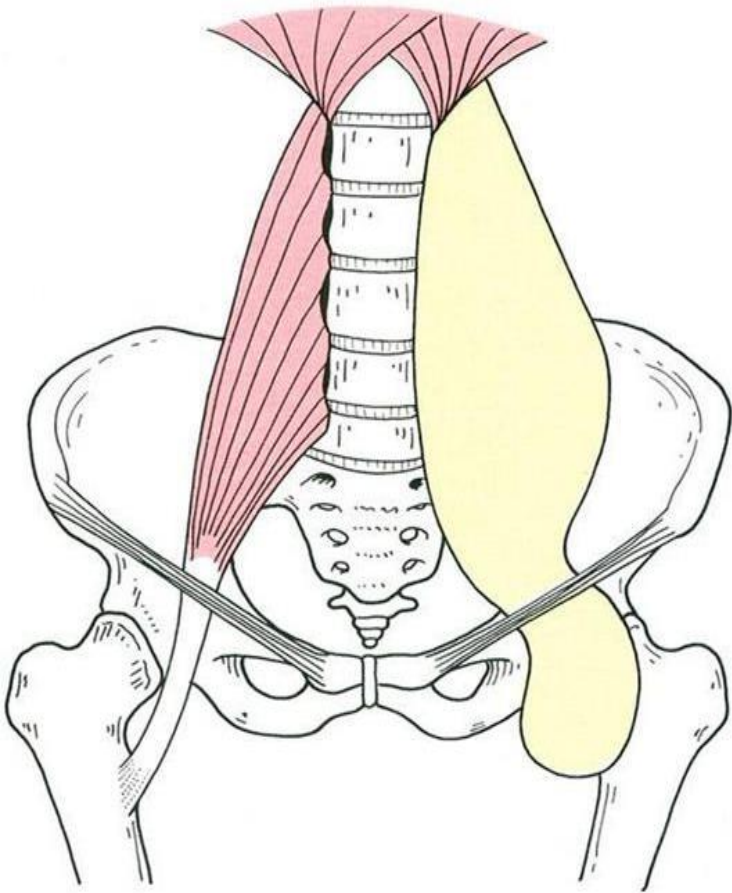
Inflammation of appendix

Spasm of psoas major

Patient keeps right thigh in flexed & medially rotated position

This forms basis of PSOAS TEST

Psoas Abscess



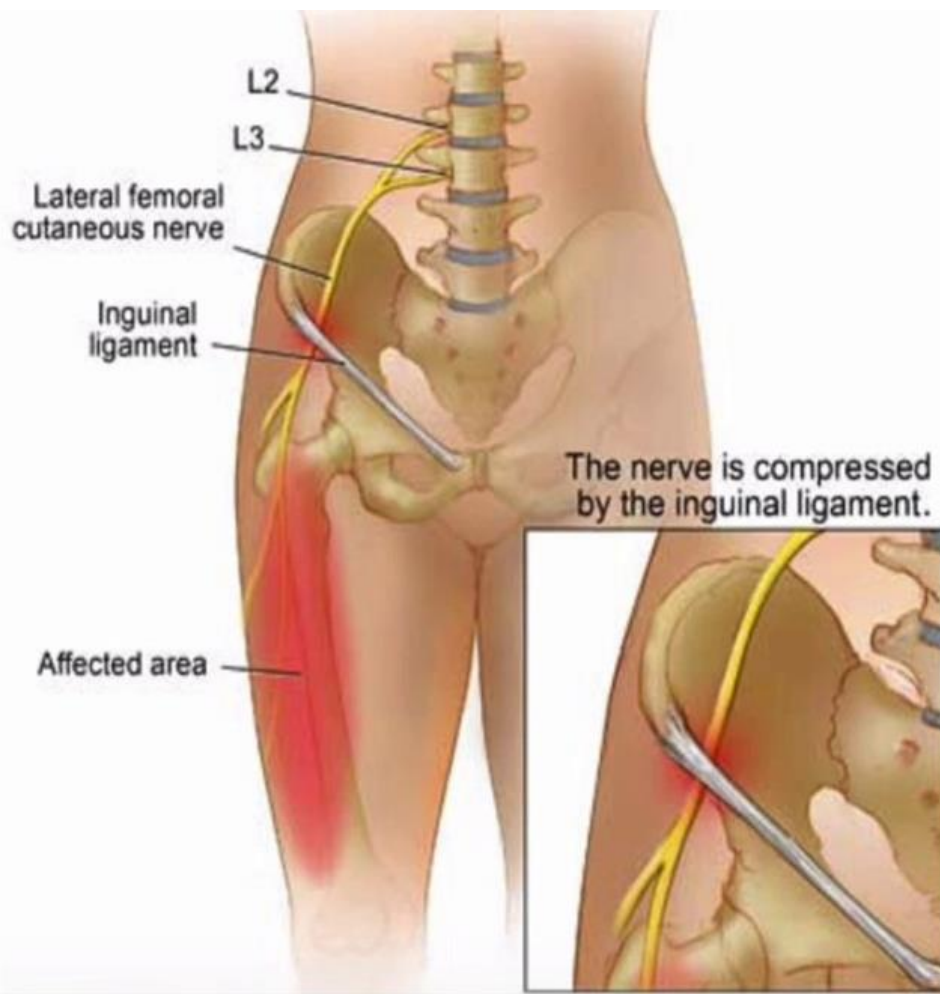
Accumulation of pus in the vertebral column
Pus trickles along psoas muscle within psoas sheath

Collection of pus passes underneath inguinal ligament

Presents as swelling in the groin below inguinal ligament

Psoas sheath and psoas abscess. On the right is a normal psoas sheath; on the left it is shown distended with pus, which tracks under the inguinal ligament to present in the groin.

Meralgia Paresthetica



- Normally Lateral femoral cutaneous nerve passes deep to lateral end of inguinal ligament
- Sometimes, it may pass through substance of inguinal ligament
- Entrapment of nerve causing
- Pain along its distribution