NERVES OF THE LOWER LIMB

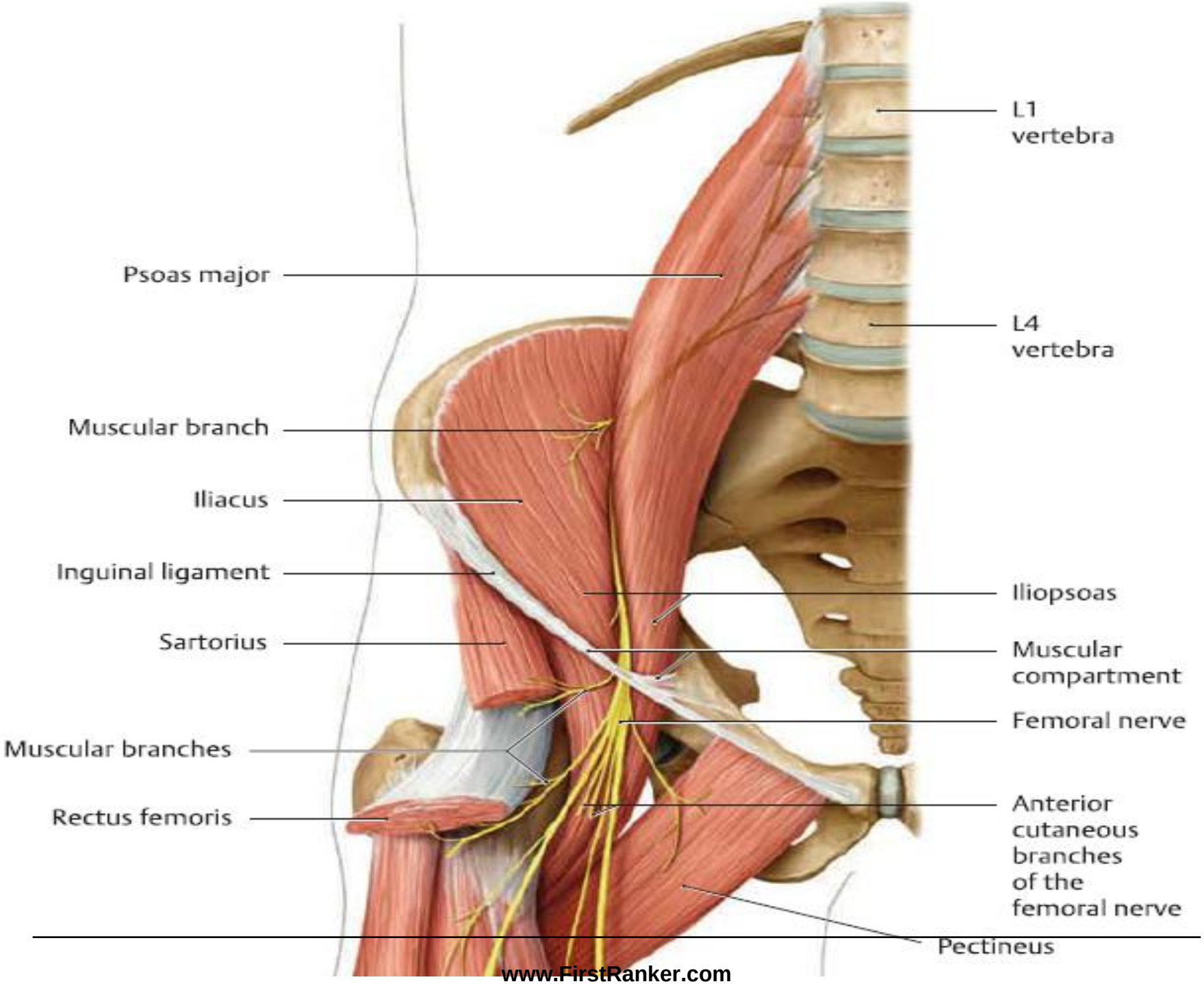
- Derived from the ventral (anterior primary) rami of the lumbar and sacral nerves forming the **lumbar plexus (L1–L4)** and the **sacral plexus (L4–S4).**

- ***Main nerves of the lower limb are →***

1. **Femoral nerve.**
2. **Obturator nerve.**
3. **Sciatic nerve.**
4. **Tibial nerve.**
5. **Common peroneal nerve.**
6. **Superficial peroneal nerve.**
7. **Deep peroneal nerve**.

FEMORAL NERVE

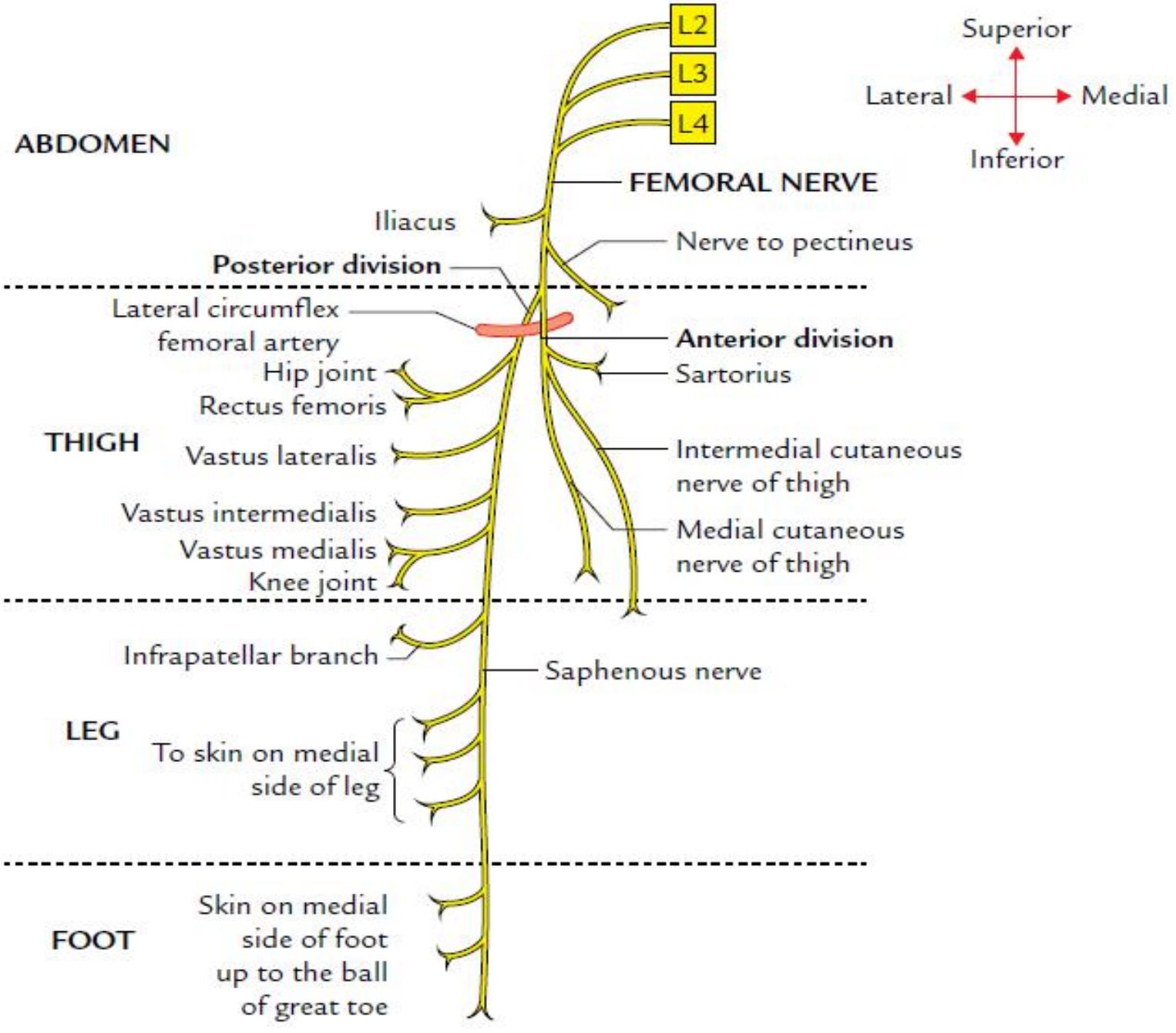
- Nerve of anterior compartment of the thigh
- It arises within the psoas major muscle from the posterior divisions of the L2–L4 ventral rami in the abdomen.
- It enters the thigh posterior to the inguinal ligament just lateral to the femoral sheath.
- About 2 cm below the inguinal ligament it divides into **anterior and posterior divisions which** are separated by the lateral circumflex femoral artery.



- Motor branches supply iliacus in the abdomen and all the muscles of anterior compartment of the thigh.

- Cutaneous branches supply the large area on the anterior and medial aspect of the thigh, medial side of leg, and foot.

- Articular branches to the hip and knee joints.



- **Injury of the femoral nerve:**
- It is rare but may be injured by a stab, gunshot wounds, or a pelvic fracture.

- **The characteristic clinical features are** :

(a) *Motor loss*

– Weak flexion of the thigh, due to paralysis of the iliacus and sartorius muscles.

– Inability to extend the knee, due to paralysis of the quadriceps femoris.

(b) *Sensory loss*

– Sensory loss over the anterior and medial aspects of the thigh, due to involvement of the intermediate and lateral cutaneous nerves of the thigh.

– Sensory loss on the medial side of the leg and foot up to the ball of the great toe (first metatarsophalangeal joint), due to involvement of the saphenous nerve.

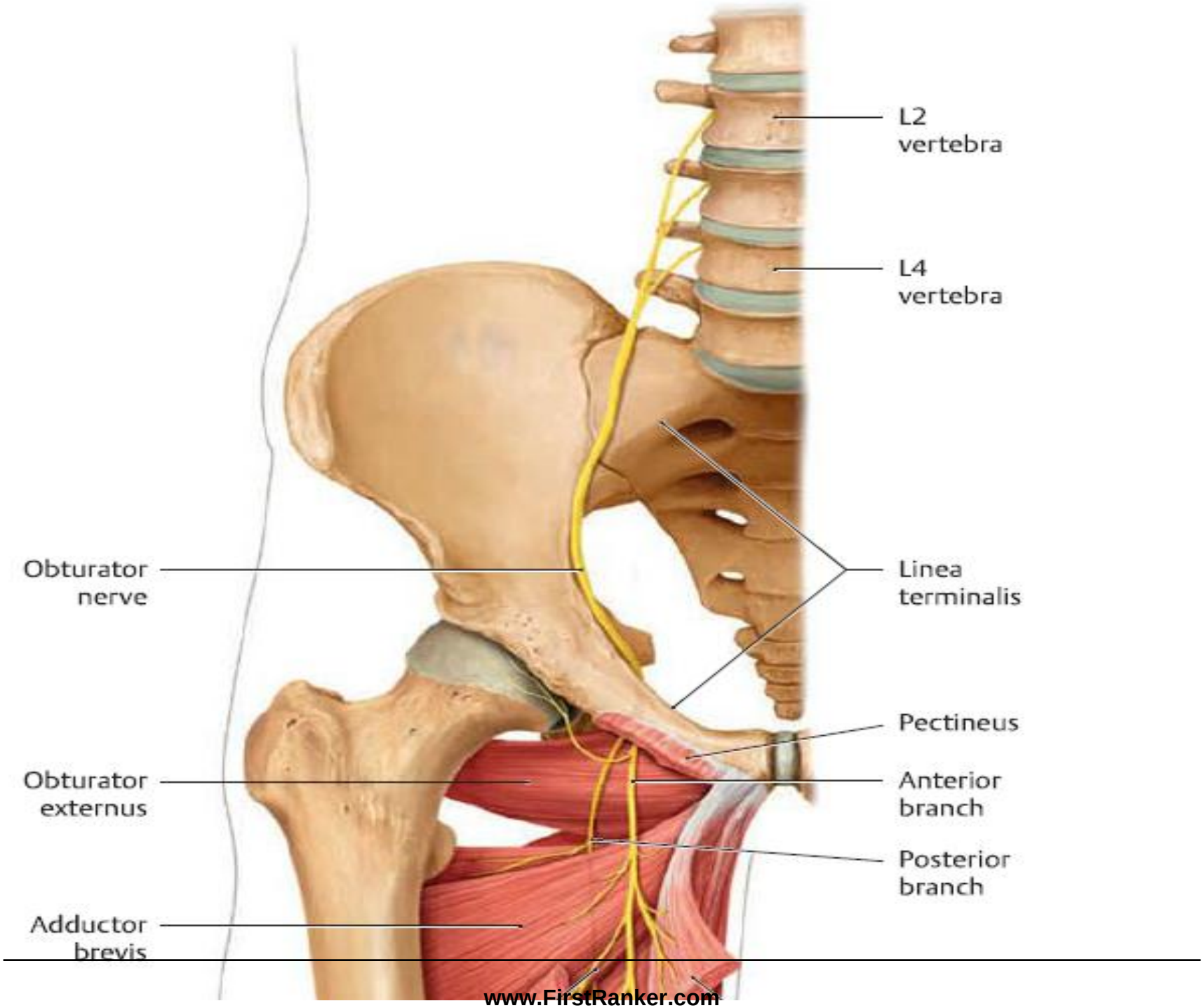
- **Femoral nerve neuropathy:**
- Femoral nerve may be compressed by the retroperitoneal tumors.
- A localized neuropathy of the femoral nerve may occur in diabetes mellitus.
- **The characteristic clinical features are :**

(a) Wasting and weakness of quadriceps leading to considerable difficulty in walking.

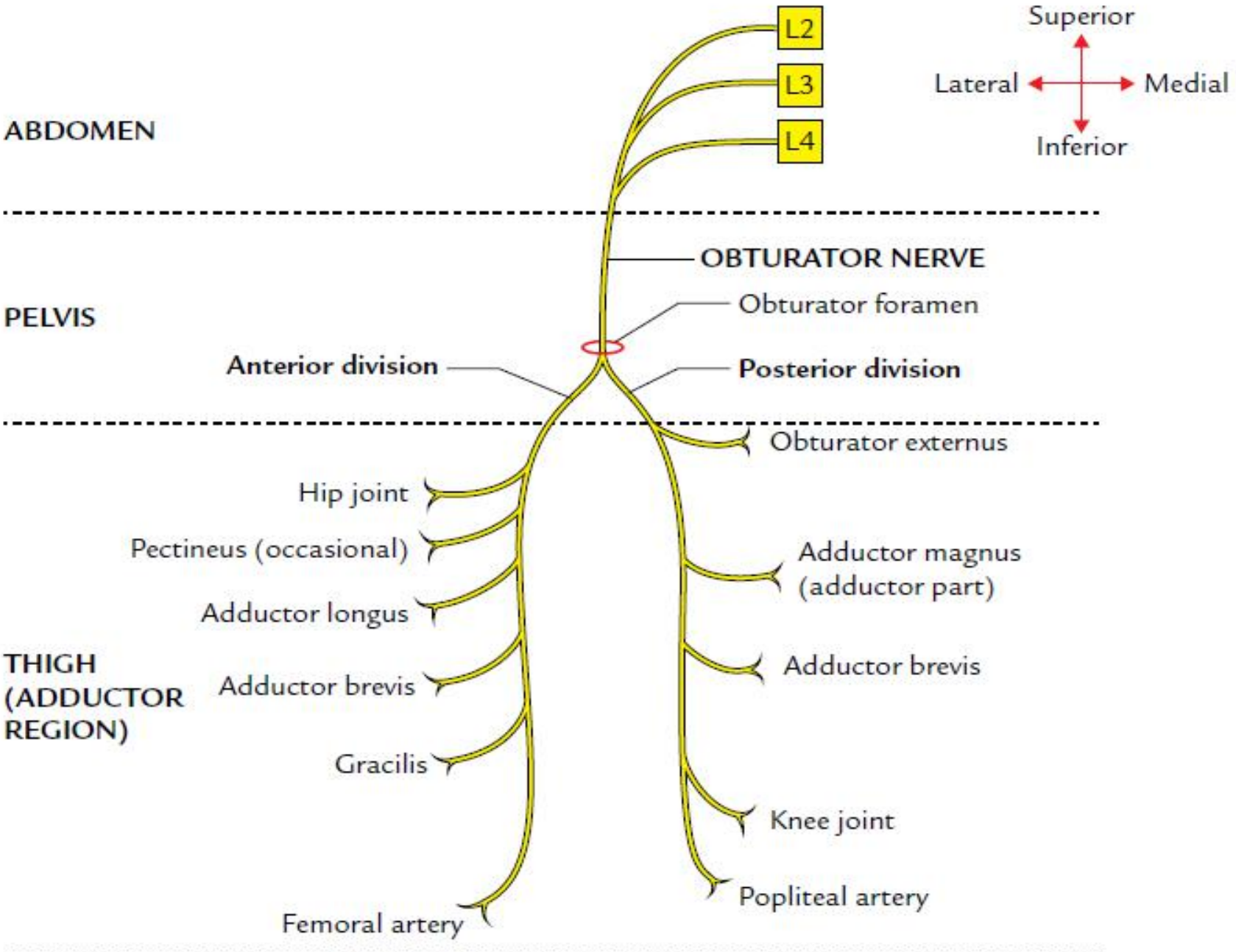
(b) Pain and paraesthesia on the anterior and medial aspects of the thigh extending down along the medial aspect of the leg and foot along the distribution of the saphenous nerve.

OBTURATOR NERVE

- Chief nerve of the adductor compartment of the thigh.
- It arises from the lumbar plexus in the abdomen.
- Formed by the ventral division of the anterior primary rami of L2, L3, L4 spinal nerves.
- It enters the thigh by passing through the obturator canal.
- Near the obturator foramen it divides into **anterior** and **posterior** divisions.



- Motor branches supply all the muscles of the adductor compartment of the thigh.
- Sensory branches supply cutaneous area on the lower-half of the medial aspect of the thigh.
- Articular branches to the hip and knee joints.



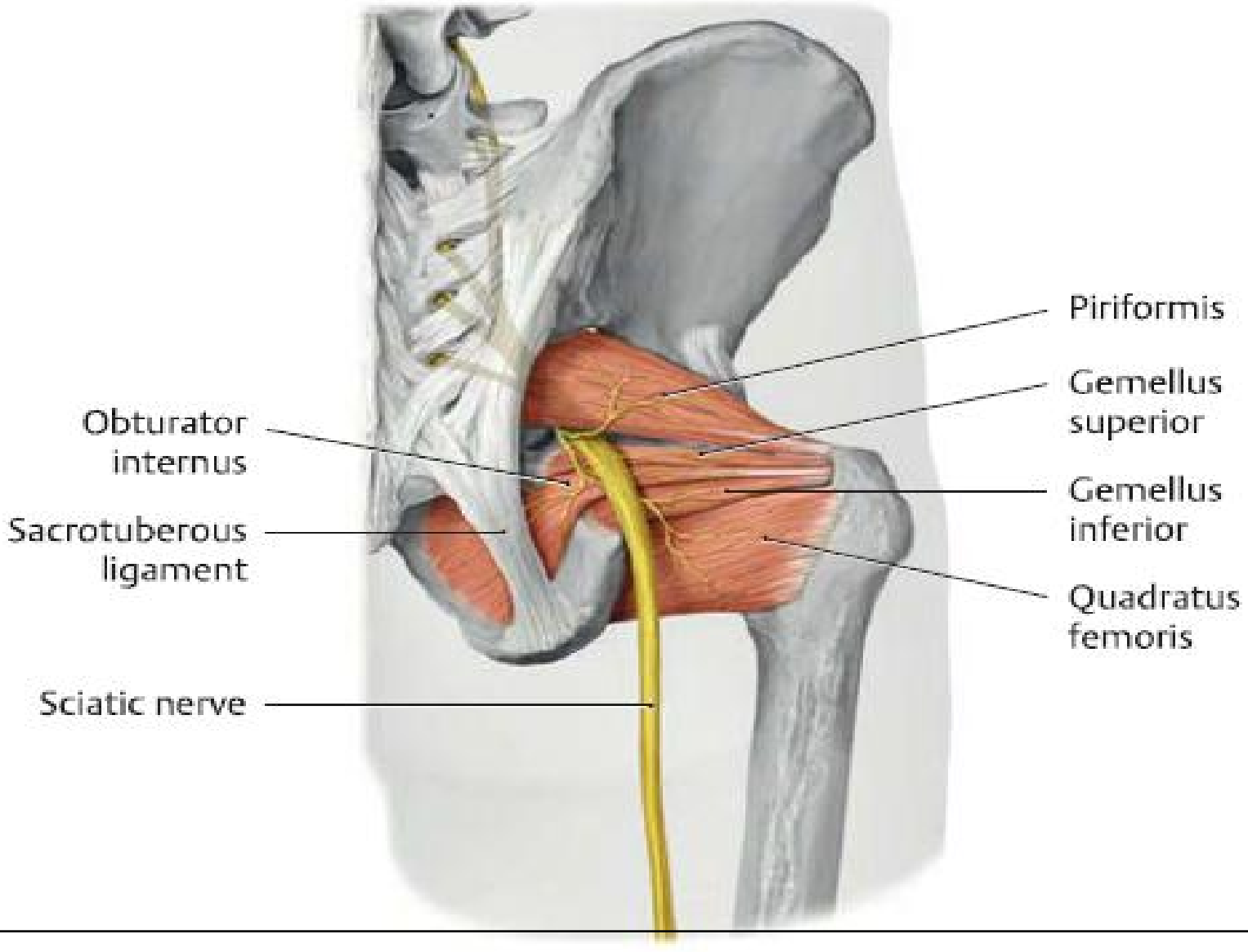
- **Injury of the obturator nerve:**
- Due to anterior dislocation of the hip joint, or during radical retropubic prostatectomy.
- **The characteristic clinical features are :**

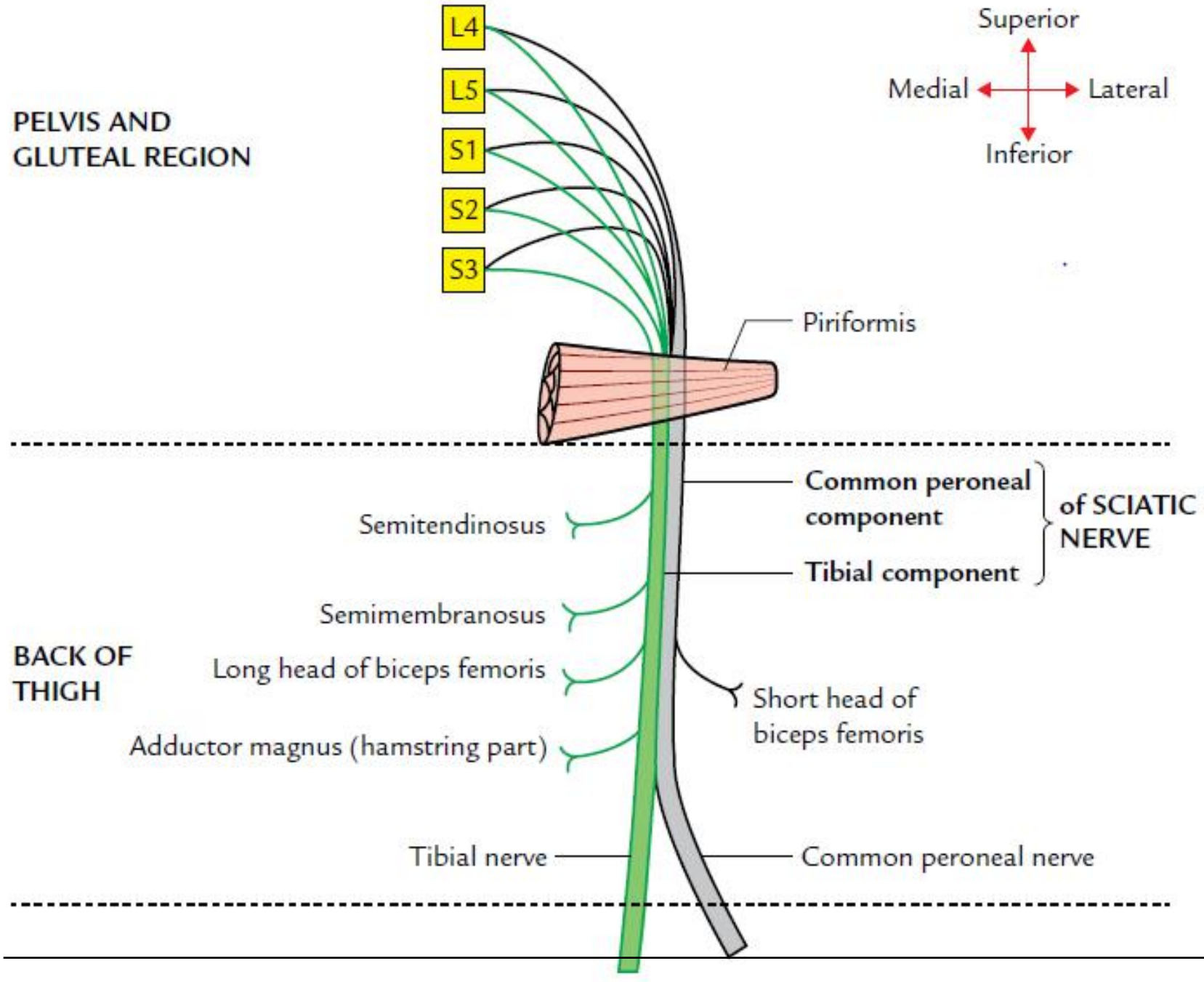
(a) Motor loss*: Loss of adduction of the thigh, due to* paralysis of adductor muscles of the thigh.

(b) ***Sensory loss****: Sensory loss on the medial aspect of* thigh, due to involvement of the cutaneous branch of the anterior division of the obturator nerve.

SCIATIC NERVE

- Thickest nerve in the body.
- Nerve of posterior compartment of the thigh.
- It arises in the pelvis from ventral rami of L4–S3 spinal nerves.
- It leaves the pelvis through greater sciatic foramen below piriformis to enter the gluteal region.
- Just above the popliteal fossa it divides into terminal **tibial** and **common peroneal** nerves.





- **Injury of the sciatic nerve:**
- Cause→
- Misplaced injection in the gluteal region (mc)
- Injured by penetrating wounds
- Posterior dislocation of the hip
- Fracture of the pelvis
- Total hip replacement surgery

- **The characteristic clinical features are** :

(a) *Motor loss*

– Inability to extend the thigh and flex the knee, due to paralysis of the hamstring muscles.

– Loss of all movements below the knee with foot drop, due to paralysis of all the muscles of the leg and foot.

- The motor loss leads to flail foot which leads to great difficulty in walking.
- The patient walks with high stepping gait.

(b) *Sensory loss:*

- The sensory loss on the back of the thigh and whole of the leg and foot (except the area innervated by the saphenous nerve)

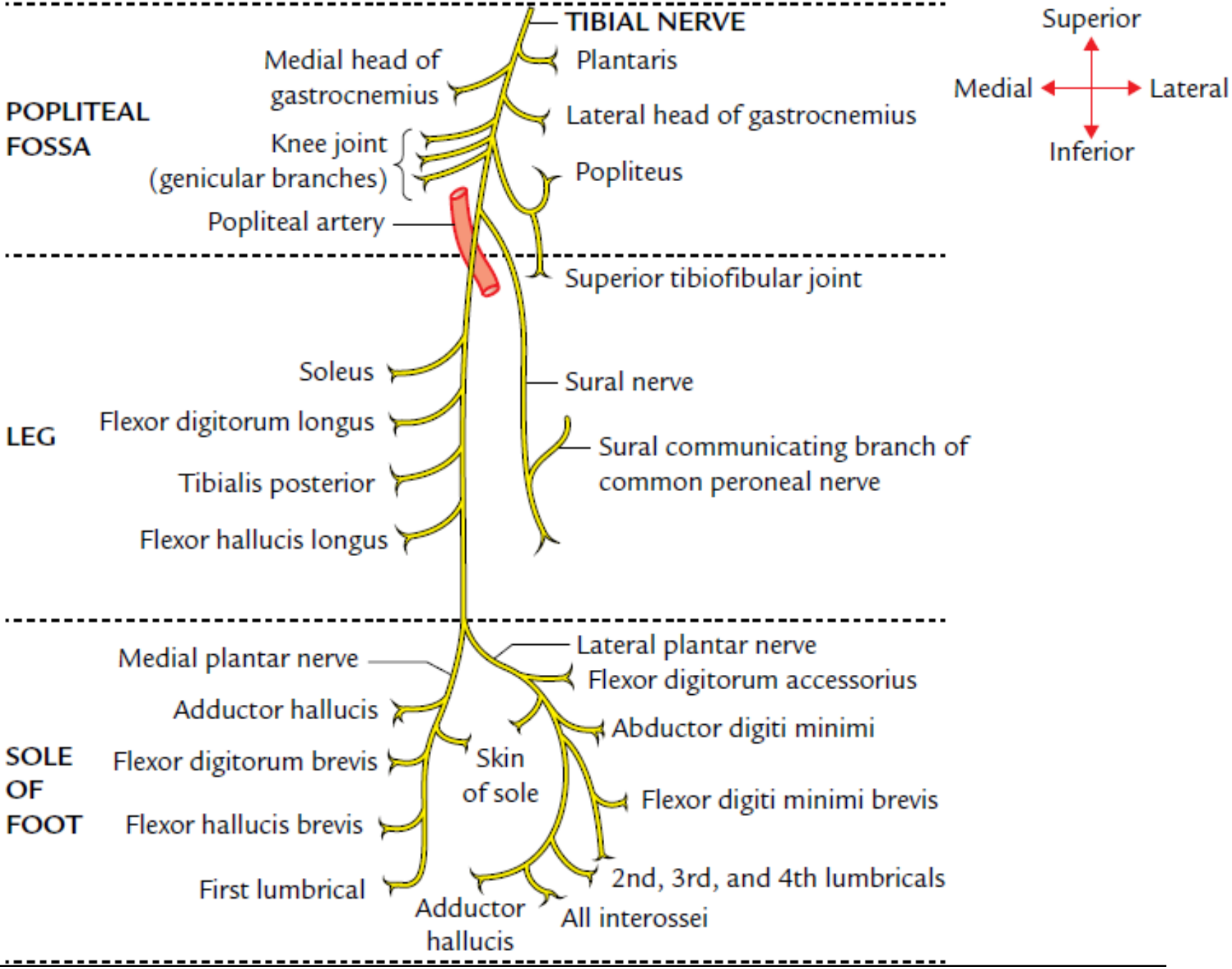
- Due to involvement of the cutaneous nerves derived from the tibial and common peroneal nerves.

- **SCIATICA**
- It is a term applied to a clinical condition
- characterized by shooting pain felt along the course of distribution of the sciatic nerve (e.g., buttock, posterior aspect of thigh, lateral aspect of leg, and dorsum of the foot).

- It occurs due to compression and irritation of L4–S3 spinal nerve roots by herniated intervertebral disc of the lumbar vertebrae.

TIBIAL NERVE

- Larger terminal branch of the sciatic nerve.
- It arises above the popliteal fossa
- Passes downward successively through the middle of popliteal fossa and posterior compartment of the leg, and then enters the sole of the foot by passing deep to the flexor retinaculum.
- It divides into the **medial and lateral plantar nerves.**



- **Effects of injury of the tibial nerve:**
- Injured by a lacerated wound in the popliteal fossa
- posterior dislocation of the knee joint.
- **The characteristic clinical features are :**

(a) *Motor loss:*

– Foot is held dorsiflexed and everted, due to paralysis of the muscles of posterior compartment of the leg.

– Loss of prominence of calf and tendocalcaneus, due to paralysis of the triceps surae muscle (gastrocnemius and soleus).

– Loss of plantar flexion of foot, due to paralysis of the flexors of ankle.

– Inability to stand on the toes, due to loss of plantar flexion of foot

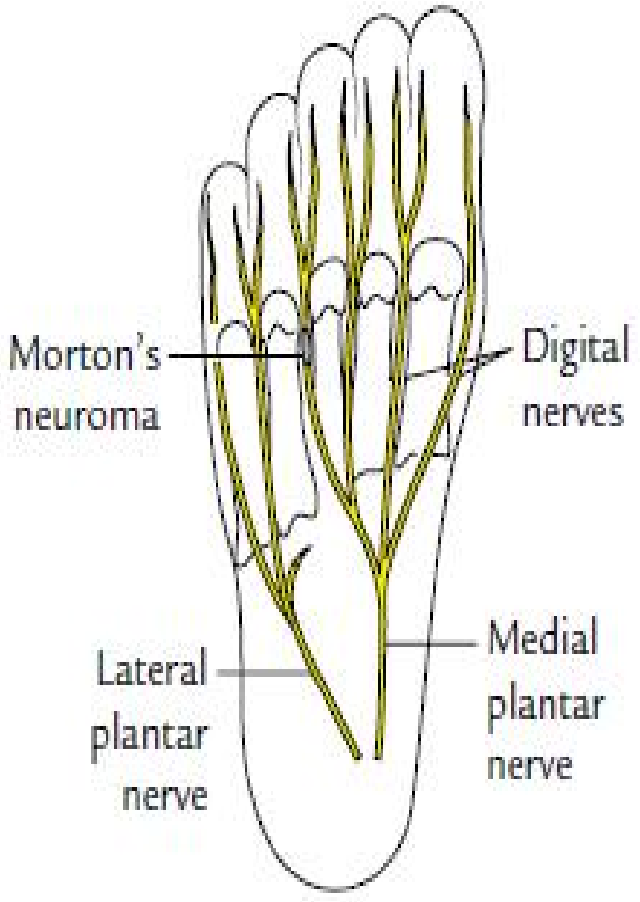
(b) *Sensory loss:*

- *The loss of sensation in the sole and* plantar aspects of the toes including the dorsal aspects of their distal phalanges, due to involvement of the cutaneous branches.

- **Tarsal tunnel syndrome:**
- It occurs due to compression of the tibial nerve in the osseofibrous tunnel under the flexor retinaculum of the ankle.
- It clinically presents as pain and paresthesia in the sole of the foot, which often becomes worse at night.

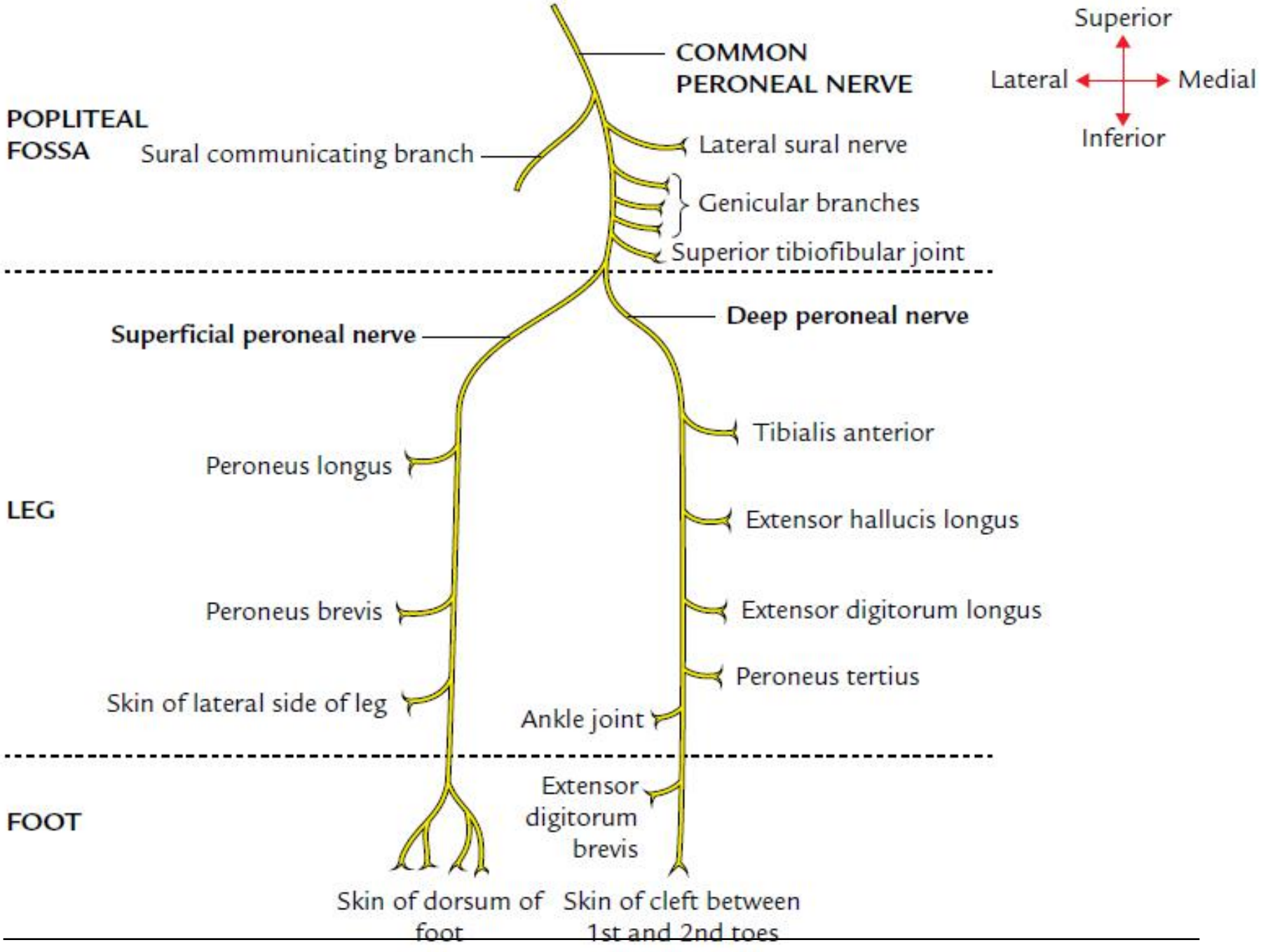
Morton's metatarsalgia (plantar digital neuroma)

- It occurs due to the formation of a neuroma following pressure on one of the plantar digital nerves just prior to its bifurcation at one of the toe clefts.
- It most commonly affects the plantar digital nerve running between the 3rd and 4th metatarsal heads to the third web -space
- it presents as intermittent pain on the plantar aspect of the forefoot usually between the 3rd and 4th metatarsals.



COMMON PERONEAL NERVE

- Smaller terminal branch of the sciatic nerve.
- It arises just above the popliteal fossa.
- it divides into two terminal branches —**deep and superficial peroneal nerves.**



- **Effects of injury to the common peroneal nerve:**
- The common peroneal nerve is extremely vulnerable to injury as it winds around the posterolateral aspect of the neck of the fibula.

- At this site it may be injured by the direct trauma, fracture neck of fibula, or tightly applied plaster cast.

- **The characteristic clinical features:**

(a) *Motor loss:*

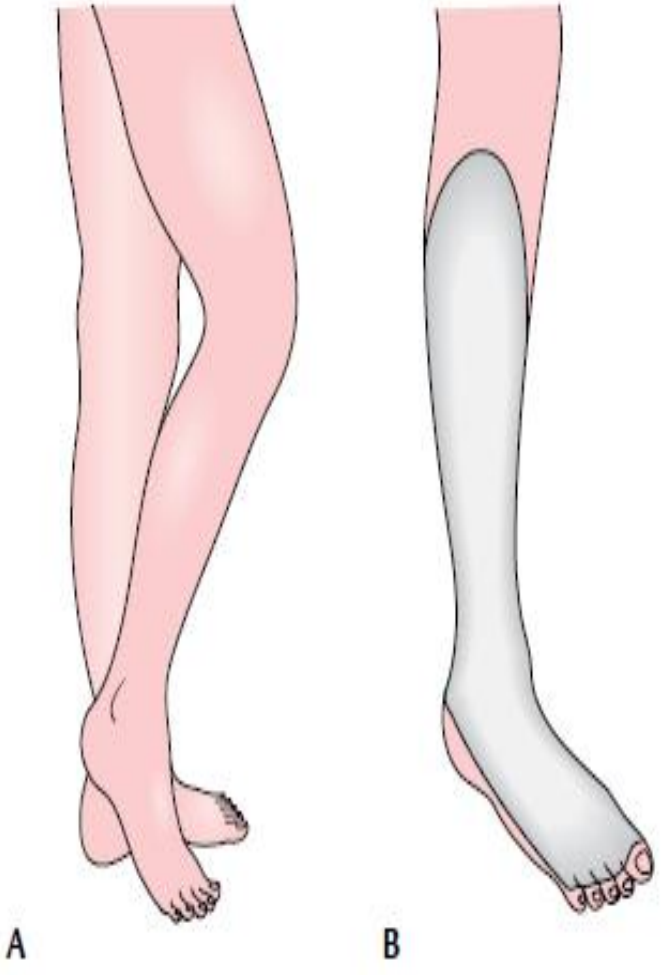
– **Foot drop, due to the paralysis of muscles of the** anterior compartment of the leg.

– **Loss of extension of toes, due to the paralysis** of extensor digitorum longus and extensor hallucis longus.

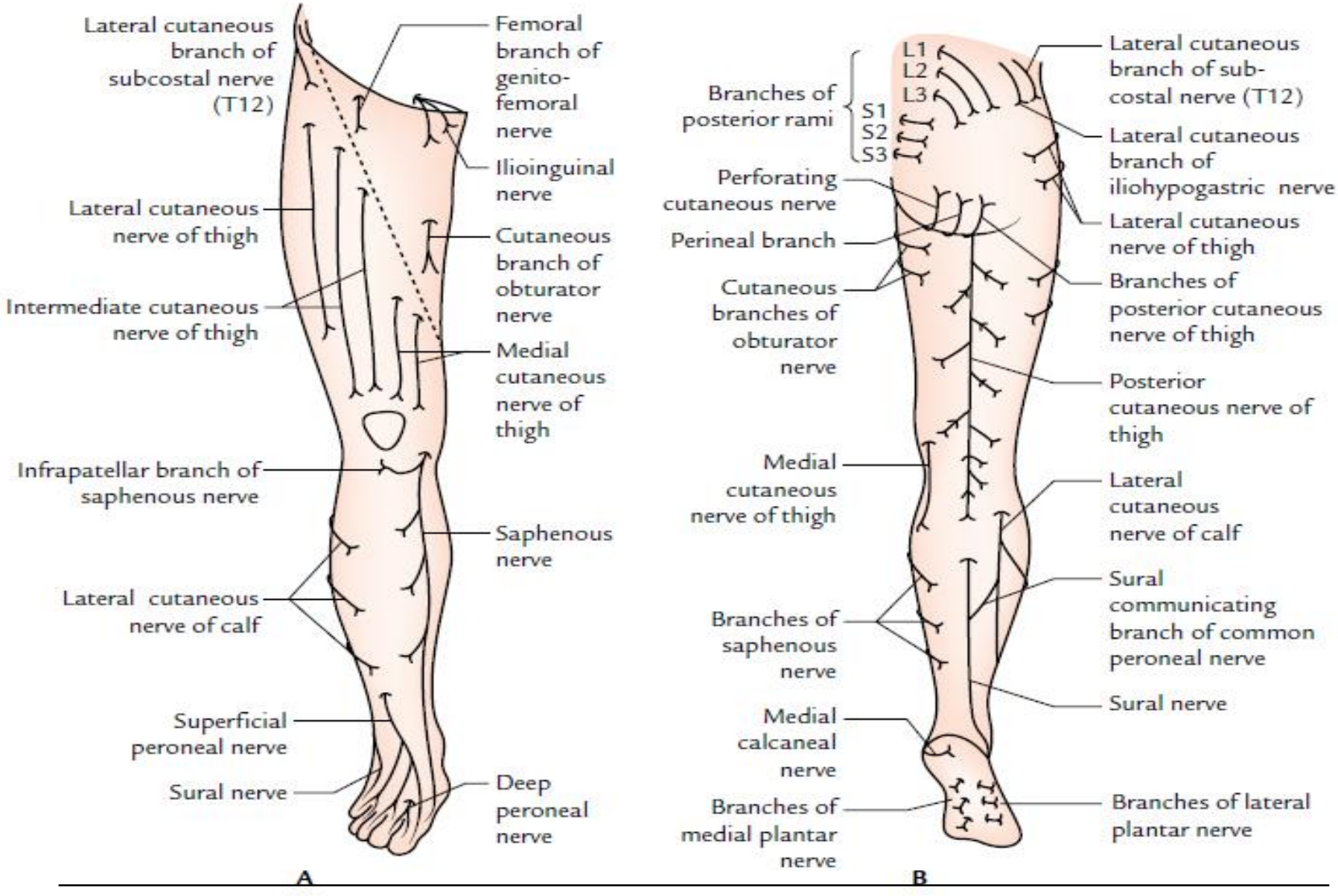
– **Loss of eversion of foot, due to the paralysis of** peroneus longus and peroneus brevis.

(b) *Sensory loss*:

-*Due to involvement of* the cutaneous branches, on the anterolateral aspect of the leg, and whole of dorsum foot (except the areas supplied by the saphenous and sural nerves).



CUTANEOUS INNERVATION OF THE LOWER LIMB



SEGMENTAL INNERVATION OF THE SKIN (DERMATOMES)

Area of the skin supplied by a spinal nerve is termed **dermatome**

Segments	Area supplied
L1, L2, L3	Anterior aspect of the thigh in sequence from above downward
L4	Medial aspect of the leg
L5	Lateral aspect of the leg and medial side of the foo
S1	Lateral side of the foot and sole
S2	Middle of back of the thigh and leg
S3, S4	Buttocks