Lower limb nerve injuries

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Objectives:

• Femoral nerve injuries
• Proximal sciatic nerve injuries
• Common peroneal nerve injuries
• Tibialis posterior nerve injuries
Anatomy: the femoral nerve comes from the lumbar plexus, formed by union of dorsal divisions of anterior rami of L2, L3, L4. It runs along the psoas major muscle and traverses behind the inguinal ligament into the femoral triangle lateral to the femoral vessels.
Nerve supply:

1- **articular branches** to the hip and knee joints.

2- **It gives motor innervation** to iliopsoas, pectineus, sartorius, and quadriceps femoris.

3- **It gives sensory branches:** It gives the **anterior cutaneous branches** that arise in the femoral triangle, they supply the skin on the **anteromedial thigh. The last cutaneous branch of the femoral nerve is the saphenous nerve** which supplies the skin on the **medial side of the leg and the foot.**
What actions does the femoral nerve bring about?

Hip flexion, knee extension
Weakness of the knee extension (quadriceps) and numbness of the anterior thigh and medial aspect of the leg. The knee jerk is depressed.
How does it commonly injured?

A gunshot wound, a knife stab, bleeding into the thigh, pelvic fracture or by a traction during an operation
Evaluation

1) CT scan to the plevic in case of suspected hematoma
2) Nerve conduction studies and needle electromyography

Treatment

It depends on the cause, in case of hematoma evacuation is needed, surgery is indicated in case of decompression
The **lumbosacral trunk** is formed by the combination of the 4th and 5th lumbar roots, it descends into the pelvis to meet the sacral roots (s1-s4) as they emerge from the spinal cord.

Nerves of sacral plexus descend down the posterior pelvic wall. They have two main destinations:

a- **Leave the pelvis via the greater sciatic foramen** (what concerns us)

b- **Remain in the pelvis** – these nerves innervate the pelvic muscles, organs and perineum
Nerves leaving the pelvis through the greater sciatic foramen: 1) superior gluteal nerve
   2) inferior gluteal nerve
3) Sciatic nerve
4) Posterior cutaneous nerve of the thigh
5) Pudendal Nerve
6) Nerve to obturator internus & superior gemellus muscles
7) Nerve to quadratus femoris and inferior gemellus muscles
Sciatic nerve (L4–S3)

The sciatic nerve is derived from the lumbosacral plexus. After its formation, it leaves the pelvis and enters the gluteal region via greater sciatic foramen. It emerges inferiorly to the piriformis muscle and descends in an inferolateral direction.

As the nerve moves through the gluteal region, it crosses the posterior surface of the superior gemellus, obturator internus, inferior gemellus. It then enters the posterior thigh by passing deep to the long head of the biceps femoris.

Within the posterior thigh, the nerve gives rise to branches to the hamstring muscles and adductor magnus. When the sciatic nerve reaches the apex of the popliteal fossa, it terminates by bifurcating into the tibial and common peroneal (fibular) nerves.
Motor Functions of sciatic nerve
Innervates all of the muscles in the posterior compartment of the thigh, including the **hamstring portion** of adductor magnus, (apart from the short head of the biceps femoris which is supplied by common peroneal nerve).

**Tibial Portion** - innervates all muscles in the **posterior compartment** of the leg. All muscles in the sole of the foot.

**Common peroneal Portion** (Fibular)
Short head of biceps femoris, **all muscles in the anterior and lateral compartments of the leg** and extensor digitorum brevis.
**Sensory Functions:**

**Tibial Portion:** Innervates the skin on the posterolateral and medial surfaces of the foot as well as the sole of the foot.

**Common peroneal Portion:**
Innervates the skin on the anterolateral surface of the leg and the dorsal aspect of the foot.
The course of the common peroneal nerve
It descends obliquely along the lateral side of the popliteal fossa to the head of the fibula. It lies between the tendon of the biceps femoris and lateral head of the gastrocnemius muscle, winds around the neck of the fibula, between the peroneus longus and the bone, and divides beneath the muscle into the superficial peroneal nerve and deep peroneal nerve.
The tibial nerve: The tibial nerve passes through the popliteal fossa to pass below the arch of soleus. Below the soleus muscle the nerve lies close to the tibia and supplies the tibialis posterior, the flexor digitorum longus and the flexor hallucis longus. The nerve passes into the foot running posterior to the medial malleolus. Here it is bound down by the flexor retinaculum in company with the posterior tibial artery. In the foot, the nerve divides into medial and lateral plantar branches.
What actions does the sciatic nerve bring about?

Hip extension, knee flexion and rotation
What will result of damage to this nerve and clinical presentation?

The hamstringing and all the muscles below the knee are paralysed. The ankle jerk is absent. Sensation below the knee is lost except the medial side of the leg which is supplied by the saphenaus a branch of the femoral nerve. The patient walks with a drop foot and a high stepping gait to avoid dragging the insensitive foot on the ground.
If sensory loss extends into the thigh and the gluteal muscles suspect an associated lumbosacral plexus injury.
In late cases the limb is wasted with fixed deformity of the foot and trophic ulcers on the sole.
How is it commonly injured?

Posterior hip dislocation (car accident) *(m.c)*
Stab injury at the gluteal region
• Acquired hip dislocation

- When femur is flexed, adducted and medially located

- Post hip dislocation is more common

- Results sciatic nerve injury
The common peroneal nerve is often damaged at the level of the fibular neck either by knee dislocation or during operative correction of knee valgus or lateral ligament injuries.
What actions does the common peroneal nerve bring about?

Foot inversion, eversion and dorsiflexion
What is the result of damage to this nerve?

The patient has a drop foot and can neither dorsiflex nor evert their foot. He walk with high steeping gait to avoid catching the toes. Sensation is lost over the front and outer half of the leg and the dorsum of the foot.
Foot drop

It is inability to raise the front part of the foot due to weakness or paralysis of the tibialis anterior muscle that lifts the foot up.

When the patient is walking he will have a steppage gait meaning he slaps his foot down on the floor and his gait will show he is raising his thigh up in an exaggerated fashion.

Video: https://www.youtube.com/watch?v=J7-L9MFRXD8
The tibial nerve supplies the flexors of the ankle and toes. Injury to this nerve will result in inability to plantarflex the ankle or flex the toes, sensation is lost over the sole.

The posterior tibial nerve runs behind the medial malleolus gives off a small calcaneal branch then divides into medial and lateral planter nerves which supply the intrinsic muscles of the foot.

Fractures and dislocations of the ankle may injure any of these branches. Posterior tibial nerve injuries cause wide sensory loss and clawing of the toes due to paralysis to the intrinsic muscles.
Thank you.