MUSCULOSKELETAL SYSTEM
ANATOMY

NERVES OF THE LOWER LIMB 1

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What is the importance of plexuses?

plexuses provides us the advantage of a phenomenon called convergence and divergence, which means that a number of fibers coming from different spinal segments will unite in one nerve, and on the other hand a single spinal segment can innervate a group of muscles.

The lumbar plexus:

originated from ventral rami L1 - L4, supplies the anterio-lateral abdominal wall (sensory & motor), external genetalia (mainly sensory), and the antero-medial side of the thigh.

- nerves of the lumbar plexus:

in relation to the psoas major muscle:

1- obturator nerve: runs at the medial border of psoas major
2- lumbosacral trunk: runs at the medial border of psoas major
3- genitofemoral nerve: pierces psoas major and runs on its anterior surface

and the remaining nerves runs lateral to psoas major.

Iliohypogastric nerve:

- Relations: receiving branches from the subcostal nerve (which is not a part of the lumbar plexus but does the same job and skips the intercostal spaces) the iliohypogastric nerve runs posterior to psoas major and anterior to quadratus lumborum, then it leaves the psoas major lateraly (the first nerve after the lateral border of psoas major), passes behind the kidneys and other abdominal structures, reaches the iliac crest, passes above the inguinal ligament, near the
iliac crest it pierces the transversus abdominis and divides between it and internal oblique muscle into two cutaneous branches (anterior and lateral).

- as in the abdomen it innervates all abdominal muscles, and when it ends as cutaneous branches it innervates the skin.

**Ilioinguinal nerve:**

- **Relations:** runs almost the same way as iliohypogastric nerve, posterior to psoas major and anterior to quadratus lumborum, then runs lateral to psoas major and inferior to the iliohypogastric nerve, then reaches the iliac crest and near to it perforates the transversus abdominis muscle and gives rise to two cutaneous branches, then pierces the internal oblique muscle and runs from the anterior superior iliac spine to the pubic tubercle alongside the inguinal ligament.

**Lateral cutaneous nerve of the thigh:**

- **Relations:** runs at the lateral border of psoas major and crosses the iliacus obliquely, then runs at the level of the iliac fossa, then from the anterior superior iliac spine it runs inferior to the inguinal ligament to the lower limb (anterior branch) and from the greater sciatic foramen (posteriorly) and innervates the lateral side of the thigh.
Genitofemoral nerve:

- **Relations**: the only nerve that pierces the psoas major and runs on its anterior surface and passes through the deep inguinal canal, divides into:

1. genital branch (motor) that enters spermatic cord and supplies cremaster muscle and anterior scrotal skin
2. femoral branch (sensory) that supplies a small area of skin over the anterosuperior part of thigh.

Femoral nerve:

- it is the largest branch of the lumbar plexus, arises from the dorsal divisions of the ventral rami L2-L4, supplies the anterior compartment of the thigh - the skin on the upper thigh - inner leg - and the muscles that extend the knee joint.

- **Relations**: runs between psoas major and iliacus muscles, below the inguinal ligament, lateral to the femoral sheath:

- femoral nerve (femoral artery | femoral vein | femoral lymph node)

  most lateral  

  most medial
- Branches:

A- in the abdomen: muscular branch to iliacus muscle

B- in the thigh: 1- muscular branches to sartorius, pectineus and quadriceps femoris

2- cutaneous branches: medial cutaneous nerve of the thigh, intermediate cutaneous nerve of the thigh, and saphenous nerve (below the knee)

3- articular branches for the hip and knee joints

- Injury:

results from stabs or gunshot wound, complete division of the femoral nerve is rare. Injury in the femoral nerve paralyze the quadriceps femoris (all the anterior compartment), which results in: knee joint can't be extended against resistance, and usually press against the distal thigh during walking. Also the injury in this nerve results in the loss of sensation along the medial part of the lower limb and the anterior part of the thigh.

Saphenous nerve:

- Relations:

In Femoral triangle, Within Adductor canal, Cross Femoral artery, Between Sartorius & gracilis tendons, Accompanies great saphenous vein, Anterior to Medial malleolus
Obturateur nerve (nerve of the medial side of thigh):

- Relations:
  Obturator nerve leaves the psoas major medially, crosses the pelvic brim posterior to the common iliac vessels (deep to the bifurcation of the common iliac vessels), then runs on the lateral wall of the pelvis between the external and internal iliac vessels, then reaches the obturator foramen, joins the obturator vessels and exits the true pelvis through the obturator canal (a pathway within the membrane of the obturator foramen, obturator internus, and obturator externus muscles), then it reaches the medial side of the thigh.

- Divisions:
  After exiting the obturator canal, the obturator nerve divides into two branches:

  1- Anterior division: runs anterior to the obturator externus and adductor brevis muscles and posterior to adductor longus (between brevis and longus), it is also accompanied with the profunda femoris artery.

  2- Posterior division: perforates obturator externus muscle, runs posterior to the adductor brevis and anterior to the adductor magnus muscles (between brevis and magnus).
- Branches:

1- sensory nerve to the peritoneum in the lateral wall of pelvis.

2- branches of anterior division:

A- muscular branches for: gracilis, adductor brevis, and adductor longus muscles.

B- cutaneous branch for: medial side of the thigh.

C- articular branch for: hip joint

3- branches of posterior division:

A- muscular branches for: obturator externus and adductor magnus muscles

B- articular branch for: knee joint

- Injury:

Injury to the obturator nerve is rare, but results in paralysis of the adductor muscles, which means impairment of the adduction action, also results in loss of sensation in a small area at the medial side of the thigh.