Division of Spinal Cord and Spinal Nerve

- Cervical Spinal cord: Cervical spinal nerve originates.
- Lumbar Spinal cord: Lumbar spinal nerve originates.
- Sacral Spinal cord: Sacral spinal nerve originates.
- Coccygeal or Caudal spinal cord: Caudal spinal nerve originates.

- All Spinal Nerves are Paired
The spinal nerves are arranged in pairs. In goat e.g., there are usually thirty six (36) pairs of spinal nerves.

1. Cervical (C) nerves  8 pairs
2. Thoracic (T) nerves 13 pairs
3. Lumbar (L) nerves  6 pairs
4. Sacral nerves (S)  5 pairs
5. Coccygeal or Caudal nerves (Ca) : 4 pairs
Comparative Study in the Number of Spinal Nerves in Different animals and Birds

- Dog: 35-36 pairs
- Cat: 31 pairs
- Horse: 44 pairs
- Cattle: 36 pairs
- Pig: 39 pairs
- Bird (chicken): 30-33 pairs
Formation of Spinal Nerve

Dorsal Root of Spinal Nerve (Sensory)

Dorsal Root Ganglion

Spinal Nerve. Pass through Intervertebral Foramina of Vertebral Column

Ventral Root of Spinal Nerve (Motor)
Branches of a Spinal Nerve

Dorsal branch of a spinal nerve which supplies to the epaxial muscle (muscle around the vertebral column) and skin.

Ventral branch of a spinal nerve which supplies to the hypoaxial muscle (muscle and skin ventral to the transeverse process of Vertebral column. It also supplies to the fore and hind limb by forming brachial and lumbosacral plexus.)
Supply of Cervical Nerve

- First and second nerve supply to the external ear, masseter muscle, muscle of the neck and throat region.
- Third and fourth supply to the neck muscles.
- Fifth, sixth and seventh ventral cervical nerve supply to the neck and in addition Phrenic nerve forms from these three nerves and supply to the diaphragm (in cat 4th to 7th).
- Ventral branches of 6th to 8th forms brachial plexus and supply the fore limb.
Supply of Thoracic Nerve

- Ventral branches of 1\textsuperscript{st} one (in goat/sheep) or 1\textsuperscript{st} and 2\textsuperscript{nd} (in cattle, horse, dog) in association with last three ventral cervical spinal nerves forms brachial plexus and supply all the structures of fore limb.

- Remaining ventral thoracic nerve (intercostal nerve) supply muscles in between ribs and skin.

- Last ventral thoracic nerve supply in association with first lumber to the flank region.
Brachial Plexus

Brachial plexus is formed by the anastomosis of the ventral branches of last three cervical and first 1\textsuperscript{st} one (in goat/sheep) or 1\textsuperscript{st} and 2\textsuperscript{nd} (in cattle, horse, dog) ventral branches of the thoracic spinal nerves. Brachial plexus forms to supply all the structures of fore limb, and lateral wall of thorax and abdomen of animals.
There are 11 pairs of nerves of brachial plexus.
Supply of the branches of Brachial Plexus

1. Suprascapular nerve: Supraspinatus and infraspinatus muscles. Paralysis of this nerve causes “Sweeny” in horses which is characterized by the atrophy of the supra- and infraspinatus muscles.

2. Subscapular nerve: Supply to the subscapularis muscles.

3. Musculocutaneous nerve: Supply to the coracobrachialis muscle and biceps brachii muscles.

4. Pectoral nerve: Supply to the pectoralis muscles.

5. Axillary nerve: Supply to the teres major, teres minor and deltoideus muscles.
Supply of the branches of Brachial Plexus

6. Radial nerve: Supply to the extensor muscles of the forearm.

7. Median and Ulnar nerve: Both supply to the flexor muscle.

8. Thoracodorsal nerve: Supply to the latissimus dorsi muscles.


10. Lateral Thoracic: Lateral aspect of the thoracic and abdominal region including skin.
Lumbar Spinal Nerve and Plexuses

Supply of Lumbar nerves

1. Iliohypogastric n. Skin of the abdomen and inguinal mammary gland.

2. Ilioinguinal n. Skin and muscles of abdomen, and inguinal mammary gland.
Supply of Lumbar nerves

3. **Lateral Cutaneous Femoral Nerve**: Skin over the distal thigh and stifle joint.

4+5. **Genitofemoral Nerve**: Inguinal mammary gland, Skin surrounding the vulva of cat and dog. Prepuce and scrotum of male
Supply of Lumbar nerves

Clinical problem: Paralysis. Of this nerve cause fixation (stiffness) of Stifle joint causing whole limb incapable of Supporting weight.
**Paravertebral Lumbar Anesthesia**

Between the last thoracic and L₁ and in between L₁ – L₂, and L₂ - L₃

**Indication:**

1. **Laparotomy:** (Opening of the abdomen through flank* region). Most of the operation of the abdominal and pelvic organs.
2. **Operation of the mammary gland in female and genitalia of the male.**

* Soft lateral abdominal wall consisting of abdominal muscles, fascia, and skin.
Lumbosacral Plexus

Definition: It is the anastomosis of the Ventral branches of last three lumbar and First two sacral nerves.
Lumbosacral Plexus

1. Cranial Gluteal Nerve: supply to the middle and deep gluteal muscle.

Lumbosacral Plexus

3. Caudal Cutaneous
   - Femoral n.: Skin of the thigh and knee joint

4. Pudendal n.
   - In the male: Penile muscles and glans penis.
   - In the female: Vulva.
   - Both in male and female: Skin around the anus.
Lumbosacral Plexus

5. Caudal Rectal n.: Caudal rectal part, sphincter of anus, and skin around the anus.

6. Sciatic n.: Largest and thickest of the lumbosacral plexus. Supply to the deep gluteal, obturator, Quadriceps, and gemelli muscle. Also to the capsule of the hip Joint.
Lumbosacral Plexus

7. **Tibial nerve**: Most of the *flexor* muscles of the leg.
8. **Fibular nerve**: Most of the *extensor* muscles of the leg.

In dog fibular nerve is known as **Peroneal Nerve**. Paralysis of the common peroneal nerve in dog causes overextension of the hock joint.
Sacral Spinal Nerve

• Usually 5 pairs.
• The first to forms the lumbosacral plexus.
• The last 3 pairs innervates the rectum, anus and perineum (around the anus).
Epidural Anesthesia

• Desensitization of part of the lumbosacral plexus, sacral, and caudal nerves by placing the local anesthetics on the epidural space through intervertebral foramina.

• Two types of epidural anesthesia:
  (1) High epidural anesthesia
  (2) Low epidural anesthesia.
Indication of epidural anesthesia:

High epidural: Caesarean section.

Low epidural anesthesia:
Docking and any operation in the perineum.
Assignments

Write a descriptive notes on (1) the spinal nerves and (2) autonomic nervous system of animals.

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