PNS- Spinal Nerves

MUDr. Azzat Al-Redouan
GANGLIA

3 TYPES OF GANGLIA

**SENSORY GANGLION** has cell bodies only and NO synapses. Examples:
- Posterior (dorsal) root
- Trigeminal
- Glossopharyngeal
- Geniculate
- Vagal

**SYMPATHETIC GANGLION** has either a synapse or a fibre passing through it to synapse later. Examples:
- Sympathetic chain
- Sympathetic peripheral ganglia (coeliac, renal, superior mesenteric)

**PARASYMPATHETIC GANGLION** has parasympathetic nerves synapsing and both a somatic sensory and a sympathetic nerve passing through it. Examples:
- Ciliary
- Pterygopalatine
- Submandibular
- Otic
Ganglion

Draw a ganglion
Peripheral branches segment

Four primary branches segment

Meningeal branch

Root segment

Spinal ganglion

Dorsal root

Ventral root

Spinal cord

Dorsal branch

Ventral branch

Communicating branch
Spinal Cord Reflex Arc

- Golgi tendon organ
- Muscle tendon junction
- Tension
- Relaxation response
- Muscle belly
Spinal Nerve

Draw a spinal nerve
Spinal Autonomic Nervous System

A) Sympathetic

B) Parasympathetic
Celiac Ganglia

- Splanchnic nn.
  - Greater
  - Lesser
  - Least

- Aorta
- Esophagus
- Diaphragm
- Anterior vagal trunk
- Posterior vagal trunk (to celiac ganglion)
- Celiac a. and ganglion
- Superior mesenteric a. and ganglion
- Right crus of diaphragm

Sympathetic trunk
Dermatomes

Dorsal root
Segment of spinal cord
First thoracic ventral root
Peripheral nerve
Skin surface with parts of 3 dermatomes
Dermatomes of the Hand

Palmar Surface
- Musculocutaneous nerve
- Radial nerve
- Median nerve
- Ulnar nerve

Dorsal Surface
- Medial antebrachial cutaneous nerve
- Musculocutaneous nerve
- Musculocutan nerve
- Radial nerve
- Median nerve

EBMCONsult
(1) Saphenous nerve.
(2) Deep peroneal nerve.
(3) Superficial peroneal nerve.
(4) Medial plantar nerve.
(5) Lateral plantar nerve.
(6) Tibial nerve.
(7) Sural nerve.
CERVICAL PLEXUS

Draw the cervical plexus
Right Phrenic n. Palsy
brachial plexus – simplified scheme

Brachial Plexus

Supraclavicular portion

Lateral pectoral N

Musculocutaneous N

Axillary N

Radial N

Median N

Ulnar N

Clavicle

Lateral pectoral N

Scalenus anteriors

Subclavian N

Trunk

C5

C6

C7

C8

T1

Long Thoracic N

Axillary A

Musculocutaneous N

Lateral pectoral N

Scalenus anteriors

Subclavian N

Trunk

Superior

Middle

Inferior

Medial

Musculocutaneous brahial N

Medial Cutaneous Antibrachial N

Thoracodorsal N

Intraclavicular portion

Scaleanus Fissure

Suprascapular N

Local Scapular N

Intercostal N
Dissection Appearance
Dissection Appearance
BRACHIAL PLEXUS

Draw the brachial plexus
General Overview of Function

ANTEROIOR COMPARTMENT (PREAXILLARY)

FLEXOR

MIDAXILLARY LINE

EXTENSOR

POSTERIOR COMPARTMENT (POSTAXILLARY)
Clinical Application – Injuries
(Upper Roots) *Injury at supraclavicular portion.
Clinical Application – Injuries

(Lower Roots) *Injury Infraclavicular portion, axillary fossa.
Clinical Application – Injuries
(Upper Roots Injury)  (Lower Roots Injury)

177 Erb’s palsy.
178 Klumpke palsy.
Clinical Application – Imaging (Sonography)

* Can detect compression e.g. tumors
* Anaesthesia guidance

Supraclavicular

Intraclavicular

Supraclavicular Brachial Plexus
Axillary view
Long Thoracic n. & Common Injuries

C5-C7
Axillary n. & Common Injuries

C5-C6

Anterior terminal division
Posterior terminal division

Deltoid
Upper lateral cutaneous nerve of arm
Teres minor
Musculocutaneous n. & Common Injuries

C5-C7
Ulnar n. & Common Injuries
C7-T1
Reflexes

- Some, but not all, of the nerve roots have a reflex. C5, C6 and C7 have reflexes. L4 and S1 have reflexes.
- For example, when the C6 nerve is pinched, there is loss of the pronator reflex in the forearm. When the L5 nerve is pinched, there is no reflex loss. Not all nerves have a reflex which can be tested.
- List of Reflexes of Commonly Injured Nerve Roots
  - C5 – Flexion at the elbow, biceps.
  - C6 – Flexion at the elbow, brachioradialis.
  - C7 – Extension at the elbow, triceps.
  - C8 – Finger flexion.
  - L4 – The knee reflex, quadriceps.
  - L5 – No reflex.
  - S1 – The ankle reflex, gastrocnemius.
Examine the function of brachial plexus:

a) on your self
b) on a colleague
Intercostal nerves
Lumbosacral Plexus
LUMBAR PLEXUS

Draw the Lumbar plexus
Femoral n.
L2-L4

Obturator n.
L2-L4
Lumbar plexus Syndrome
Draw the Sacral plexus
S2-S4

Pudendal n.
In Obstetric
Sciatic n. & Sciatica
L5-S3
<table>
<thead>
<tr>
<th>Sensation</th>
<th>Motor Function</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Peroneal Nerve</strong></td>
<td><strong>Peroneal Nerve</strong></td>
</tr>
<tr>
<td>Palpate dorsal surface of the</td>
<td>The ability to dorsiflex</td>
</tr>
<tr>
<td>foot</td>
<td>ankle and toes</td>
</tr>
<tr>
<td><strong>Tibial Nerve</strong></td>
<td><strong>Tibial Nerve</strong></td>
</tr>
<tr>
<td>Palpate plantar surface of</td>
<td>The ability to plantar flex</td>
</tr>
<tr>
<td>foot</td>
<td>ankle and toes</td>
</tr>
</tbody>
</table>
Common Fibular nerve injuries

L4-S2
Tibial n. - Proximal injury

L4-S3

Sensory:
Sensory Loss over: Lateral side of the leg and foot (sural nerve). Trophic ulcers in the sole.

Complete division results in the following clinical features:

Motor:
All the muscles in the back of the leg and the sole of the foot are paralyzed.

The opposing muscles dorsiflex the foot at the ankle joint and evert the foot at the subtalar joint, an attitude referred to as Talipes calcaneovalgus.
Tibial n. - distal injury
L4-S2
Reflexes

- Some, but not all, of the nerve roots have a reflex. C5, C6 and C7 have reflexes. L4 and S1 have reflexes.
- For example, when the C6 nerve is pinched, there is loss of the pronator reflex in the forearm. When the L5 nerve is pinched, there is no reflex loss. Not all nerves have a reflex which can be tested.
- List of Reflexes of Commonly Injured Nerve Roots
  - C5 – Flexion at the elbow, biceps.
  - C6 – Flexion at the elbow, brachioradialis.
  - C7 – Extension at the elbow, triceps.
  - C8 – Finger flexion.
  - L4 – The knee reflex, quadriceps.
  - L5 – No reflex.
  - S1 – The ankle reflex, gastrocnemius.
Examine the function of sciatic nerve:

a) on your self
b) on a colleague
Ask before being Asked !