

Development of innovative training solutions in the field of functional evaluation aimed at updating of the curricula of health sciences schools



## MODULE BIOMECHANICS OF SPINE

### Didactic Unit C: HOW DO I ASSESS SPINE?

C.I. What methods may I apply to assess the function of the spine appropriately?



## CLASS INDEX

- Assessing impairment: anamnesis and physical examination of the spine
  - Measuring function in the spine: the most widespread devices
- 
- **Class workshop**  
Physical examination: movement analysis

# Assessing impairment: anamnesis and physical examination of the spine

## MEDICAL HISTORY (ANAMNESIS)

- Personal data: age, profession, employment status, health habits, etc.
- Previous pathologies
- Current illness:
  - When and where the pain appeared; time of evolution.
  - Nature of the pain: mechanical/inflammatory/neuropathic. Attenuating or exacerbating factors.
  - Location and frequency of pain. Radiating and territory.
  - Other associated symptoms: cephalaea, dizziness, sensory or motor impairment, etc.



# Assessing impairment: anamnesis and physical examination of the spine

## MEDICAL HISTORY (ANAMNESIS)

- Essential! Detect:



### Warning signs

#### Interference in the progression of the illness

##### YELLOW FLAGS

- Job environment: incapacitations or compensations.
- Prior treatment has failed.
- Mistaken beliefs about pain or fear of it.
- Psychosocial factors: patient's acceptance of their role as an ill person, disorders or alterations in mood, lack of social or family support or over-protective behaviours.

#### Possible serious underlying cause.

##### RED FLAGS (lumbar pain)

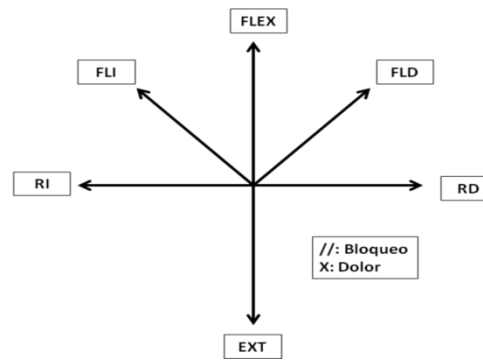
- Neurological condition: severe paresis.
- Cauda equina syndrome.
- Ankylosing spondylitis pain.
- Prior trauma.
- Constitutional syndrome.
- Personal oncological antecedents.
- Associated fever syndrome.
- Drug addiction via parents.
- Steroid use.
- 1<sup>st</sup> episode at <20 or >50 years of age.



# Assessing impairment: anamnesis and physical examination of the spine

## PHYSICAL EXAMINATION: CERVICAL SPINE

- Inspection: asymmetries, attitude, posture, lumps, changes in skin colour, atrophies, etc.
- Palpation: painful areas, vertebral alignment, stability of the cervical structures, bulges, contractions or increase in muscle fibre tone, etc.
- Exploration of cervical mobility: active and passive.



# Assessing impairment: anamnesis and physical examination of the spine

## PHYSICAL EXAMINATION: CERVICAL SPINE

Neurological exploration (if advisable!): osteotendinous reflexes, strength and sensitivity.

Root	Painful territory	Sensory damage	Muscular weakness	Reflexes affected
<b>C3-C4</b>	Paraspinal muscles, superior shoulder	Neck	Diaphragm, nuchal muscles, strap muscles	None
<b>C5</b>	Neck, shoulder, anterior arm	Shoulder	Deltoid, supraspinatus, infraspinatus, rhomboid, biceps, brachioradialis	Biceps, brachioradialis
<b>C6</b>	Neck, shoulder, anterior upper arm extending to antecubital fossa	Thumb, index finger, radial forearm	Deltoid, supraspinatus, infraspinatus, rhomboid, biceps, brachioradialis, pronator teres, flexor carpi radialis, extensor carpi radialis	Biceps, brachioradialis
<b>C7</b>	Neck, shoulder, dorsum of forearm	Middle finger	Triceps, latissimus dorsi, pronator teres, flexor carpi radialis, extensor carpi radialis	Triceps
<b>C8</b>	Neck, shoulder, ulnar forearm	Ring, little fingers, hypothenar eminence	Intrinsic hand muscles, finger extensors, finger flexors	None
<b>T1</b>	Neck, shoulder, ulnar arm	Ulnar forearm	Intrinsic hand muscles (Homer's syndrome)	None

# Assessing impairment: anamnesis and physical examination of the spine

## PHYSICAL EXAMINATION: CERVICAL SPINE

Specific tests: only if indicated and depending on diagnostic suspicion.



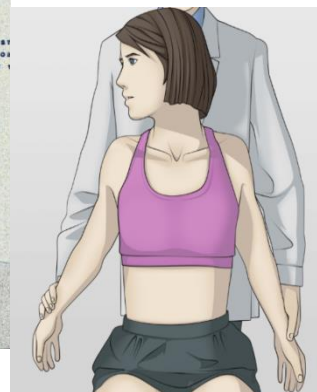
SPURLING TEST



JACKSON TEST



LASÈGUE BRAQUIAL



ADSON TEST



SOTO-HALL TEST

# Assessing impairment: anamnesis and physical examination of the spine

## PHYSICAL EXAMINATION: DORSAL AND LUMBAR SPINE

- Inspection: asymmetries, attitude, posture, lumps, changes in skin colour, deformity and alterations in physiological curves in the lateral plane, atrophies (including atrophy of lower limbs) etc.
- Palpation: painful areas, vertebral alignment, stability of the dorsolumbar structures and pelvis, bulges, contractions or increase in muscle fibre tone, etc.
- Exploration of dorsal and lumbar mobility: active and passive.
  - Dorsal: flexion and extension (extension: reduction of kyphosis/flexion: voluntary increase of dorsal kyphosis) + rotations.
  - Lumbar: flexion and extension, rotation, lateral flexion.

# Assessing impairment: anamnesis and physical examination of the spine

## PHYSICAL EXAMINATION: CERVICAL SPINE

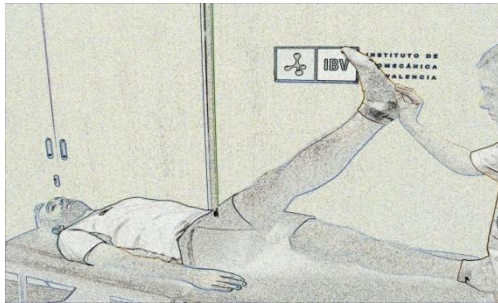
Neurological exploration (if indicated!): osteotendinous reflexes, strength and sensitivity.

Root	Painful territory	Sensory damage	Muscular weakness	Reflexes affected
L3	Anterior thigh, groin	Anterior thigh	Iliopsoas, adductors, quadriceps	Knee
L4	Anterior thigh	Medial calf, medial foot	Quadriceps, adductors, (iliopsoas)	Knee
L5	Posterolateral thigh and calf, extending into toe and dorsum of foot	Dorsum of foot, great toe, lateral calf	Tibialis anterior, tibialis posterior, extensor hallucis longus, peronei, gluteus medius, tensor fascia latae	None
S1	Posterolateral thigh and calf, extending into toe and dorsum of foot	Lateral foot, posterior calf, sole of foot	Gastroc-soleus, hamstrings, gluteus maximus	Ankle

# Assessing impairment: anamnesis and physical examination of the spine

## PHYSICAL EXAMINATION: LUMBAR SPINE

Specific tests: only if indicated and depending on diagnostic suspicion.



**LASÈGUE & BRAGARD TEST**



**REVERSE LASÈGUE**



**LASÈGUE IN DECUBITUS (LATERAL)**

## Other manoeuvres

**LASÈGUE BILATERAL IN SEDESTATION**

**NERI TEST**

**PHALEN**

**LASÈGUE IN DECUBITUS PRONE (BARRAQUER-FERRÉ)**

**VALSALVA**

# Measuring function in spine: the most widespread devices & clinical scales

## MOVEMENT ASSESSMENT

- Classic goniometers
- Inclinometers

Others:

Electronic inclinometers



Photogrammetry: gold standard in measuring kinetic parameters (related to mobility: angles, speed, acceleration).



## CLASS INDEX

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Physical examination: movement analysis

## Physical examination: movement analysis



- Form work groups.
  - In order to measure each segment, one of you will act as the patient and the others will take the measurement and note down the results.
  - Change roles to measure each segment.
  - You must follow the instructions for the measurement you have in your work sheet, and indicate the angle obtained in each field's corresponding segment.
  - You may ask your teacher if you have any queries.
- You can take the measurements with the GONIOMETER, INCLINOMETER or both, depending on what instruments you have in the class.

## Physical examination: movement analysis



- You are going to take measurements of mobility using a goniometer and/or inclinometer (instructions in the physical examination file).

In addition, you are going to carry out several tests to measure the flexibility of the dorsal and lumbar column using a tape measure.

### DORSAL COLUMN

#### Ott's test

This is used to measure the degree of flexibility in the dorsal column. It is carried out with the patient standing, measuring the distance between a point marking vertebra (spinous process) C7 and a point 30 cm below.

The subject is asked to perform an anterior flexion, attempting to curve the dorsal region as much as possible, and vice-versa; **with normal subjects performing anterior flexion, the distance between the two points marked increases from 2 to 4 cm**, and in extension it decreases by 1-2 cm.

## Physical examination: movement analysis



- You are going to take measurements of mobility using a goniometer and/or inclinometer (instructions in the physical examination file).  
In addition, you are going to carry out several tests to measure the flexibility of the dorsal and lumbar column using a tape measure.

### LUMBAR COLUMN

#### Schöber's test

In this case, the two points marked correspond to vertebra S1 and a point 10 cm below.

**This distance should increase in flexion by about 5 cm for normal subjects**, and decrease in extension by 2 to 3 cm. The test is positive (pathological) in flexion when there is an increase of less than 5 cm in the distance calculated between the two points.



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