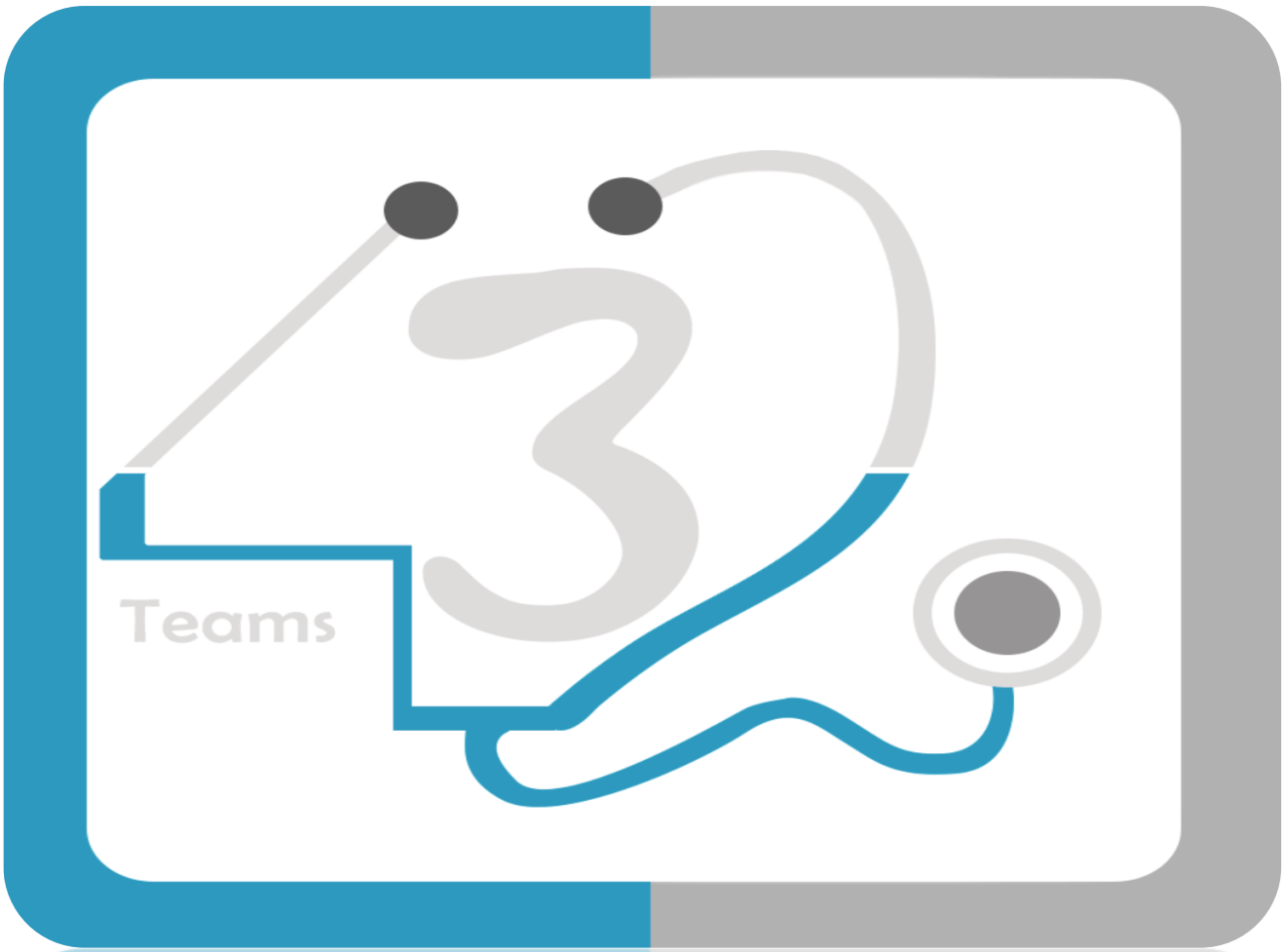


ANATOMY TEAM

LECTURE (4)

Thoracolumber Spine

Thoracolumbar Spine

Objectives

At the end of the lecture, students should be able to:

- ***Distinguish the thoracic and lumbar vertebrae from each other and from vertebrae of the cervical region***
- ***Describe the characteristic features of a thoracic and a lumbar vertebra.***
- ***Compare the movements occurring in thoracic and lumbar regions.***
- ***Describe the joints between the vertebral bodies and the vertebral arches.***
- ***List and identify the ligaments of the intervertebral joints.***

تنويه : هذا الملف غير كافي ولا يعتبر مرجع أساسي للمذاكره وإنما هو للمراجعه فقط ، المرجع الاساسي هو السلايدز ولا يوجد أي اختلاف بين سلايدز الاولاد والبنات.

Thoracolumbar Spine

Vocabulary

Spine = vertebral column

Vertebra → Singular

Vertebrae → Plural

Lamina → Singular

Laminae → Plural

Some important notes: VERY IMPORTANT!!

- Thoracic → Connected anteriorly to thoracic cage = Ribs + sternum
- Lumbar → Abdomen
- The only vertebrae that have special names are C1 "Atlas" , C2 "Axis" and C7 "**Prominens"**, while the rest of the vertebrae are named as "First letter of the region + the number of vertebrae" e.g. Thoracic + number 1 = T1
- As we go down the vertebral column, the vertebrae get larger in size. "Cervical < Thoracic < Lumbar"
- Therefore, T12 should be thicker, larger and heavier than T1 but still have the same characteristics.
- Curvatures of the spine are only seen laterally. يعني بس اشوفها من الجنب لو جيت من قدام ما اقدر اشوفها
- Curvatures that are present at birth → Primary curvatures
- Curvatures that develop after birth → Secondary curvatures
- Babies are born with only two curvatures, Thoracic and Sacral therefore, they are primary curvature.
- Lumbar and Cervical appear later after birth, therefore, they are secondary curvatures.
- New born babies cannot hold their heads because there is no curvature at the cervical region. After 4-5 months, the baby will be able to hold his/her neck, this indicates that the cervical curvature has appeared.
- When the baby starts walking, it indicates the appearance of the lumbar curvature.

- Thoracic spine is rigid because it is attached to the thoracic cage which contains heart and lungs, so there will be limited movements that are only needed for respiration.
- Lumbar spine is highly flexible and allows different types of movements.
- An arch of a thoracic vertebra contains: 2 pedicles + 2 laminae.
- Laminae join from both sides forming spinous process. → Left lamina + right lamina = Spinous process
- Thoracic vertebrae do not contain foramen transversarium on their transverse processes.
- Thoracic vertebrae have 7 process = 2 transverse + 2 inferior + 2 superior + 1 spinous.
- Costal facets of the thoracic vertebrae are present on:
  1- Transverse process → articulation with tubercles of the ribs.
  2- Sides of the bodies → articulation with the head of the ribs.
- T11 and T12 do not have costal facets on their transverse process. Therefore, they do not articulate with the tubercles of the ribs.
- **Pedicles** join the body with transverse processes.
- **Laminae** join transverse processes with spinous processes.
- Every rib articulates with two facets on the thoracic vertebrae.
- Anulus fibrosus means ring of fibrous tissue.
- Joints between two vertebral arches are synovial.
- Another name for the synovial joints between two vertebral arches is "zygapophyseal joint"
- There are four synovial joint in each vertebra.
- Postvertebral muscles = muscles behind the vertebral column.
- rectus abdominis muscle. Rectus means straight.
- Psoas muscles. Pronounced as (saw-as muscle)
- "The L5 body is largely responsible for the lumbosacral angle between the long axis of the lumbar region of the vertebral column and that of the sacrum" this means: the curvature that is formed between the sacral and lumbar region is caused by L5 → y3ni it goes forward forming an angle.
- "The fifth lumbar vertebra is by far the most common site of spondylolysis and spondylolisthesis" Since the L5 vertebra carries the weight of the whole body, it will be to most common site of compression.

-**Spondylolysis** is a condition in which there is a defect in a portion of the spine called the pars interarticularis (a small segment of bone joining the facet joints in the back of the spine)

- **Spondylolisthesis** is a condition in which a bone (vertebra) in the spine slips out of the proper position onto the bone below it انزلاق غضروفي .

- **To read more about Spodylosis:**

http://www.umm.edu/spinecenter/education/spondylolysis_spondylolisthesis.htm

http://orthoinfo.aaos.org/topic.cfm?topic=a00053

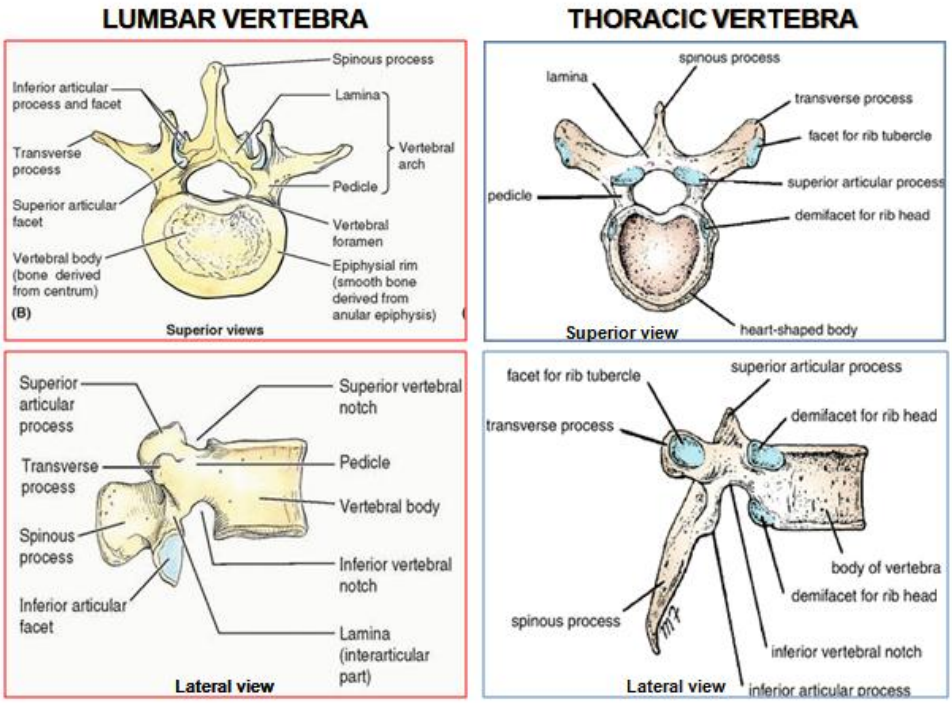
http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0002240/

The Spinal Ligaments:
http://www.youtube.com/watch?v=GQ4193o5Q7Q

Gross anatomy of vertebral column:

http://www.youtube.com/watch?v=VIpnyCof1xA

Thoracic vertebra vs. Lumbar vertebra



	Lumbar	Thoracic
Spinous process	short, flat, & quadrangular and project backward.	long and inclined downward
Body	**Size:** large **Shape:** kidney shaped	**Size:** medium **Shape:** heart shaped
Vertebral foramen	Triangular	Circular
Superior articular processes	Face **medially**	Face backward and **laterally**
Inferior articular processes	Face **laterally**	Face forward and **medially**

***Exception:** The inferior articular processes of the T12 face **laterally**!

Review

- **What gives the thoracic spin its rigidity?**

  Its articulation with the rib cage.

- **What types of movements can occur in the lumbar spine?**
  Flexion, extension, lateral flexion→ extensive
  Rotation→ least extensive

- **What are the components of a typical thoracic vertebra?**
  1-Bodies.
  2- vertebral arches.
  3-seven processes for muscular and articular connections.

- **Describe the laminae, pedicles and the transverse processes and body of lumbar vertebra?**
  -Transverse processes → long and slender.
  -Pedicles → strong and directed backward.
  -Laminae → thick
  -Body→ large and kidney shape

- **Describe the joints between two vertebral bodies?**
  -The upper and lower surfaces of the bodies of adjacent vertebrae are covered by thin plates of **hyaline cartilage.**
  -Sandwiched between the plates of hyaline cartilage is an **intervertebral disc of fibrocartilage.**

- **What does an intervertebral disc consist of?**
  -Peripheral part → anulus fibrosus (Fibrocartilage)
  -Central part → nucleus pulposus (gelatinous material: large amount of water+ a small number of collagen fibers + a few cartilage cells)

- **What is the function of the intervertebral disc?**

1. Allow one vertebra to rock forward or backward on another, as in flexion and extension of the vertebral column. يعني سمح بحركة الفقرات
2. "Serve as shock absorbers when the load on the vertebral column is suddenly increased, as when one is jumping from a height." That means: It protects the vertebral column and returns it shape back to normal after jumping from a height.

- **Mention a complication that may occur in the intervertebral disc?**

  The anulus fibrosus may rupture, → nucleus pulposus herniates (gets out of its normal place) → nucleus pulposus protrude into the vertebral canal → it may press on the spinal nerve roots, the spinal nerve, or even the spinal cord.

  The above condition is called "intervertebral disc prolapse" or "intervertebral disc herniation". To read more:
  http://www.nlm.nih.gov/medlineplus/ency/article/000442.htm

- **What are the characteristics of the anterior longitudinal ligament ?**

  -Wide.

  -Strongly attached to:

  1-the front and sides of the vertebral bodies. **2-**the intervertebral discs.

- **What are the characteristics of the posterior longitudinal ligament ?**

  -Weak

  -Narrow

  -Attached to: posterior borders of the discs.

- **What is the function of the anterior and posterior longitudinal ligaments?**

  Holding the vertebrae firmly together but at the same time permit a small amount of movement to take place between them.

- **What is the function of each of the following ligaments?**
  - **Ligamentum flavum:** connects the laminae of adjacent vertebrae.
  - **Interspinous ligament:** connects adjacent spines.
  - **Supraspinous ligament:** runs between the tips of adjacent spines.
  - **Intertransverse ligament:** runs between adjacent transverse processes.

- **The type and range of movements possible in each region of the vertebral column largely depends on what?**
  1. Thickness of the intervertebral discs
  2. Shape and direction of the articular processes.

- **Name the muscles that are producing rotation in the thoracic region?**
  semispinalis + rotator muscles, assisted (helped) by the oblique muscles of the anterolateral abdominal wall.

- **Name the muscles that produce movement in the lumbar region?**
  1. **Flexion** → rectus abdominis + the psoas muscles ممكن نسوي قصة هنا انو لما اكلك يكون بصوص سيكا بتسوي فلكشن عشان الابدومن بيعورك .
  2. **Extension** → the postvertebral muscles.
  3. **Lateral flexion** → the postvertebral muscles + the quadratus lumborum +the oblique muscles of the anterolateral abdominal wall. *The psoas may also play a part in this movement.
  4. **Rotation** → the rotator muscles + oblique muscles of the anterolateral abdominal wall.

To make this easier:

- Anterolateral abdominal wall → rotation + lateral flexion in lumbar region + helps in rotation of the thoracic region.
- Psoas → Flexion + lateral flexion in lumbar region.
- Postvertebral muscle → extension + lateral flexion in lumbar region.
- Rotator muscle → من اسمها rotation in both thoracic and lumbar region.

MCQ

1. **The curvature of the thoracic region is:**
   A. primary, convex anteriorly
   B. secondary, convex anteriorly
   C. secondary, concave anteriorly
   D. primary, concave anteriorly

2. **The Costal facets of the transverse process in the thoracic vertebrae articulates with:**
   A. The head of the rib.
   B. The tubercles of the ribs.
   C. The superior articular process of the adjacent vertebra.
   D. The inferior articular process of the adjacent vertebra.

3. **The shape of the vertebral foramen of the lumbar vertebra is:**
   A. Triangular
   B. Kidney shaped
   C. Heart shaped
   D. Circular

4. **What are the thickest regions of the intervertebral disc?**
   A. Thoracic and lumbar
   B. Sacral and cervical
   C. Cervical and lumbar
   D. Sacral and coccygeal

5. **The intervertebral disc is not found between:**
   A. T1 & T2
   B. C1 & C2
   C. L1 & L2
   D. T11 & T12

6. **How many synovial joints are found in each vertebra?**

A. 2
B. 7
C. 1
D. 4

7. **Which movement is least extensive in lumbar region?**

A. Extension
B. Rotation
C. Lateral flexion
D. Flexion

8. **Extension in the lumbar region is produced by:**

A. Psoas muscle
B. Postvertebral muscle
C. quadratus lumborum
D. semispinalis

9. **Which vertebrae is responsible for the lumbosacral angle:**

A. L1
B. S1
C. L5
D. S5

10. **The anulus fibrosus is composed of:**

A. Fibrocartilage
B. Gelatinous material
C. Trabecular bone
D. Synovial fluid

1	**D**
2	B
3	A
4	C
5	B
6	D
7	B
8	B
9	C
10	A

GOOD LUCK :)