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* CERVICAL SPINE :-

- Cervical spine is the most superior portion of the vertebral column, lying below the cranium and the thoracic vertebrae.
- The neck also called the cervical spine, is a well engineered structure of bones, nerves, muscles, ligament and tendons.
- The cervical spine is delicate housing the spinal cord that sends messages from the brain to control all aspects of the body while also remarkably strong and flexible, that allowing the neck to move in all directions.
- It consists of 7 distinct vertebrae, two of which are given unique names:
 - The first cervical vertebrae (C₁) is known as the "atlas".
 - The second cervical vertebrae (C₂) is known as the "axis".
- The top of the cervical spine connects to the skull and the bottom connects to the upper back at about shoulder level. As viewed from the side the cervical spine forms a lordotic

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curve by gently covering toward the front of the body and then back.

* ROLES OF THE CERVICAL SPINE:-

→ The cervical spine performs several roles including:

1) Protecting the Spinal Cord:-

→ The spinal cord is a bundle of nerves that extends from the brain and runs through the cervical spine (upper and middle back) prior to ending just before the lumbar spine (lower back).

→ Each vertebrae has a large hole (vertebral foramen) for the spinal cord to pass through. Together these vertebrae keep the spinal cord shielded inside a bony tunnel called the ~~spinal cord~~ cervical spine.

2) Supporting the head and its movement:-

→ The cervical spine handles a heavy load as the head weighs on average b/w 10 to 13 pounds. In supporting the head, the cervical spine allows for the neck's flexibility and head's range of motion.

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3) Facilitating flow of blood to the brain:-

→ Small holes (Foramina in the transverse processes) in the cervical spine provide a passageway for vertebral arteries to carry blood to the brain.

→ These openings for the blood vessels are present only in the vertebrae of the cervical spine from C1 down to C6 (not in C7 or lower).

+ MOVEMENTS OF THE CERVICAL SPINE:-

→ The cervical spine is the most mobile region of the spine. Head and neck motions typically involve one or more of the following movements of the cervical spine.

1) Flexion:-

→ The cervical spine bends directly toward with the chin tilting down. Neck flexion typically occurs when looking downward or while in forward head posture, such as when sitting with poor posture at a computer.

2) Extension:-

→ The cervical spine straightens or moves directly

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backward with the chin tilting up.

Neck extension is common when performing overhead work.

3) Rotation:-

→ The cervical spine and head turn to one side. Neck rotation is particularly useful when trying to look to the side or over the shoulder.

4) Lateral flexion:-

→ The cervical spine bends to the side with the ear moving toward the shoulder.

→ Some movements can be performed in combination, such as rotating the neck while also flexing it forward.

* JOINTS:-

→ The joints of the cervical spine can be divided into two groups, those that are present throughout the vertebral column and those unique to the cervical spine.

* Present throughout vertebral column:-

→ There are two different joints present throughout vertebral column.

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1) Between vertebral bodies:-

→ Adjacent vertebral bodies are joined by intervertebral discs, made of fibrocartilage. This is a type of cartilaginous joint known as a symphysis.

2) Between vertebral arches:-

→ Formed by the articulation of superior and inferior articular processes from adjacent vertebrae. It is a synovial type joint.

* Unique to Cervical Spine:-

→ There are two joints unique to the cervical spine the atlanto-axial (X_3) and atlanto-occipital joints (X_2).

→ The atlanto-axial joints are formed by the articulation b/w the atlas and the axis.

1) Lateral atlanto-axial joints (X_2):-

→ Formed by the articulation b/w the superior facets of the lateral masses of C_1 and the superior facets of C_2 . These are plane type synovial joints.

2) Medial atlanto-axial joint:-

→ Formed by the articulation of the dens of C_2 with the articular facet of C_1 . This is a pivot type synovial joint.

→ The atlanto-occipital joints consist of an

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articulation b/w the spine and the cranium. They occur b/w the superior facets of the lateral masses of the atlas and the occipital condyles at the base of the cranium. These are the condyloid type synovial joints and permit flexion ~~and~~ the head i.e nodding.

* LIGAMENTS :-

→ There are six major ligaments to consider in the cervical spine. The majority of these ligaments are present throughout the entire vertebral column.

* Present throughout vertebral column:

1) Anterior and Posterior longitudinal ligament :-

→ Long ligament that run the length of the vertebral column covering the vertebral bodies and inter-vertebral discs.

2) Ligaments flavum :-

→ Connects the laminae of the adjacent vertebrae.

3) Interspinoous ligaments :-

→ Connects the spinous process of adjacent vertebrae.

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* Unique to Cervical Spine:-

1) Nuchal ligament:-

→ A continuation of the supraspinous ligament. It attaches to the tip of the spinous processes from C1 - C7 and provides the proximal attachment for the rhomboids and trapezius.

2) Transverse ligament of the atlas:-

→ Connects the lateral masses of the atlas and in doing so anchors the dens in place.

* ANATOMICAL RELATIONSHIP:-

→ The cervical spine has a close relationship with several neuro-vascular structures in the neck.

→ The transverse foramina of the cervical vertebrae provide a passage way by which the vertebral artery, vein and sympathetic nerves can pass the only exception to this is C7, where the vertebral artery passes around the vertebrae instead of through the transverse foramen. The spinal nerves are intimately related to the cervical vertebrae. They extend from above their respective vertebrae through the intervertebral foramen created by the joint at the articular processes. Again

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C7 is an exception, it has a set of spinal nerve extending from above (C7) and below (C8) the vertebrae. Therefore there are 8 spinal nerves associated with seven cervical vertebrae.

* THORACIC SPINE :-

→ The section of the spinal column called the thoracic spine.

→ Began below the cervical spine (C7 neck) roughly at shoulder level and continues downward until it reaches the first level of the low back (L1, lumbar spine).

→ Twelve vertebrae numbered T1 through to T12 from top to bottom make up the thoracic spine.

→ When viewed from the side a normal forward curvature called kyphosis or kyphotic curve is seen because the ribs attached to the thoracic spine vertebrae, this section of the spine is strong and stabilizing with less range of motion than the cervical or (neck) levels. While the thoracic spine is less prone to injury than other sections of the vertebral column. It is the most common location for vertebral fracture

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due to osteoporosis.

→ Scoliosis and other abnormal kyphosis are other thoracic spine disorders.

* THORACIC SPINE BONE BASICS:-

→ The thoracic spine helps to support the body, torso and chest areas and provide an attachment point for each of the rib bones except the 2 at the bottom of ribcage. Like most other spinal vertebrae, the thoracic vertebral bodies are rounded. Bony arches project from the back of each vertebral body forming a hollow protective space containing spinal cord. Thoracic facet joints are paired at the back each vertebrae and allow limited spinal movement.

* FUNCTIONS AND ROLES OF

THORACIC SPINE:-

→ The thoracic spine has twelve (12) vertebrae stacked on top of each other labeled from T₁ down to T₁₂. These vertebrae form the foundation of the thoracic regions sturdy spinal column that supports the neck above, the ribcage, soft tissue flexible joints, blood vessels and nerves.

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→ Some of the thoracic spine most important roles include the following:

1) Protect the Spinal Cord:-

→ The spinal cord is a critical bundle of nerves that sends electrical signals throughout the body. It runs from the base of the brain down through the vertebral canal of the cervical spine and thoracic spine before branching into smaller nerve bundles in the lumbar spine.

2) Ancher the ribcage:-

→ Ribcage supported by the thoracic spine in the back forms a bony structure to surround and protect vital organs such as the heart and lungs. While the cervical spine and lumbar spine are build more for mobility, the thoracic spine is build more for stability.

* JOINTS:-

→ The joints of the thoracic spine can be divided into two groups:

1) Present throughout Vertebral Column:-

→ There are 2 types of joints present throughout the vertebral column.

* Blw vertebral bodies:-

→ Adjacent vertebral bodies are joined by intervertebral discs made

of fibrocartilage. This is a type of cartilaginous joint known as a symphysis -

* Blw Vertebral arches :-

→ Formed by the articulation of the superior and inferior articular processes from adjacent vertebrae. It is a synovial type joint.

* 2) Unique thoracic Spine :-

→ The articulation blw the vertebrae and the ribs are unique to the thoracic spine. For each rib there are two separate articulation costo-vertebral and costo-transverse

→ Each costo-vertebral joint consist of the head of the rib articulating with -

- 1) Superior costal facet of the corresponding vertebrae.
- 2) Inferior costal facet of the superior vertebrae.
- 3) Intervertebral discs separated the two vertebrae.

* LIGAMENTS :-

→ The thoracic spine is strengthened by the presence of numerous ligaments.

* Present throughout Vertebral Column :-

- 1) Anterior and Posterior long ligaments :-

→ Long ligaments that run the length of the vertebral column covering the vertebral

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bodies and intervertebral discs.

2) Ligamentum flavum:-

→ Connects the laminae of adjacent vertebrae.

3) Interspinous ligament:-

→ Connect the spinous processes of the adjacent vertebrae.

4) Supraspinous ligament:-

→ Connects the tips of the adjacent spinous processes.

* Unique to thoracic spine:-

→ A number of small ligaments also support the costo-vertebral joints.

1) Radiate ligament of head of rib:-

→ Fans outwards from the head of the rib to the bodies of the two vertebrae and intervertebral discs.

2) Costo-transverse ligament:-

→ Connects the neck of rib and transverse process.

3) Lateral costotransverse ligament:-

→ Extend from the transverse process to the tubercle of the rib.

4) Superior costotransverse ligament:-

→ Passes from the upper of the neck of the rib to the transverse process of the vertebrae superior to it.

* TYPES OF THORACIC SPINAL DISORDERS:-

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- 1) Osteoporosis increases the risk for thoracic spinal fracture. A common type is a vertebral compression fracture (VCF) that can cause one or more bony bodies to flatten or become wedge shape resulting in spinal cord and/or nerve compression. Sudden and acute back pain is associated with vertebral compression fracture.
- 2) Different types of scoliosis and abnormal side to side curvature of the spine is well known to develop in the thoracic spine and may cause spinal deformity.
- 3) Abnormal kyphosis is an exaggerated amount of forward thoracic spinal curvature while humped back is ^{not} a kind expression, it describes the appearance of the kyphotic deformity. Types of kyphosis include congenital posture related to Scheuermann's disease.

