

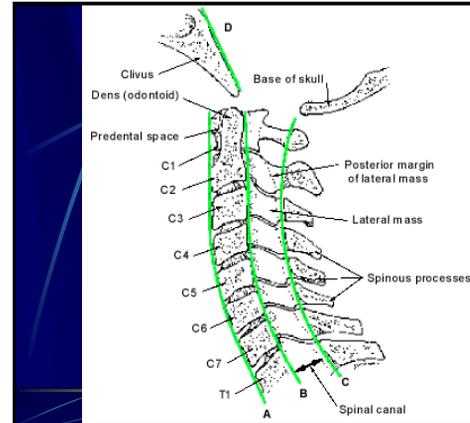
## Articulations of the Cervical Spine

Functional Anatomy of the Cervical Spine

## Sections of the Cervical Spine



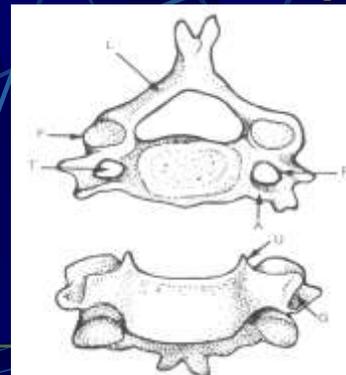
- Can be divided into Upper and Lower Cervical Spine.
- Some authors include a third section - the junction between the upper and lower regions.



## Vertebral Bodies

- Wider transversely as compared to anteroposterior direction.
- Significantly smaller than either the thoracic or lumbar vertebral bodies.
- Serves as a load-bearing structure for compressive forces.

## Lower Cervical Spine



## Unciform Processes

- Found on the superior posterolateral rim of the vertebral bodies.
- Unciform process consists of a ridge than runs anteroposteriorly.
- Converts the superior planar surface to a concave surface.
- The inferior aspect of the vertebra above is reciprocally shaped.



## Unciform Processes

- This articulation (vertebra above and unciform processes) is referred to as the uncovertebral joints or the joints of Luschka.
- These are not considered true synovial joints.
- The anterior rim of the vertebral body projects downwards in front of the disc below.



## Unciform Processes

- The downwards projection and the unciform processes provide an encasement for the intervertebral disc.
- Uncinate processes are absent at birth and develop between ages 6-9 years.
- They are mature at age 18.
- Initial degenerative changes in the cervical spine occur at these joints of Luschka.



## Unciform Processes

- The shape of these joints decrease the amount of lateral movement available.
- This decreases the likelihood of compromise of the lateral neural components.
- These process are however subject to anterior and posterior shear forces which occur during flexion and extension.



## Pedicles

- Project posterolaterally from the vertebral bodies.
- This means the spinal canal is relatively large and triangular rather than round.
- The anterior wall of the spinal canal is relatively straight.

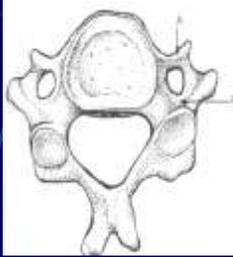


## Transverse Processes

- Comprised of anterior and posterior components united by a small strut of bone.
- The whole arrangement is referred to as the transverse process.
- The space in the middle is called the transverse foramen.
- The vertebral artery courses through this foramen.

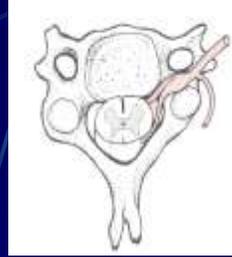


## Transverse Processes



- Anterior and Posterior processes joined by a strut of bone form the transverse process.

## Cervical Nerve Roots



- Cervical nerve roots exit and lie in the groove of the transverse process.

## Spinous Processes

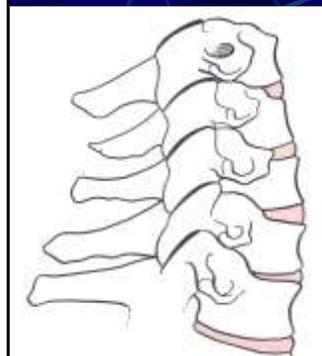
- In the lower cervical region the SP are relatively short with bifid tips.
- Increase in length between the 3rd cervical spine and the 2nd thoracic spine.
- If spinous processes are too long then range of extension is compromised.
- The bifid tips decrease this impaction to some extent.

## Apophyseal Joints

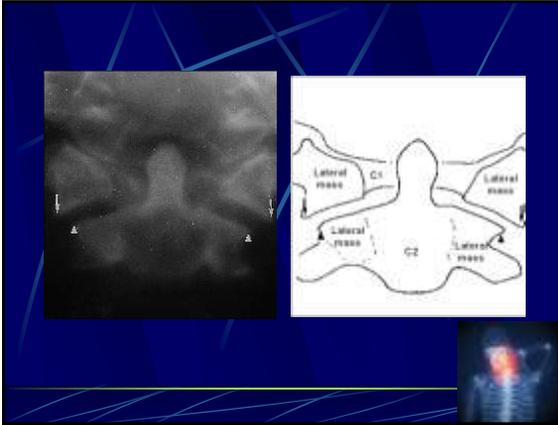
- Each vertebra in the lower cervical spine has two superior articular processes and two inferior articular processes.
- These articular processes have articular facets and combined they form the articular pillar.

## Articular Facets

- Mean inclination is 45 degrees to the frontal plane.
- Superior facets face posterior and superior.
- Inferior facets face anterior and inferior.
- Joints are surrounded by a joint capsule.



## Arrangement of Articular Facets



## Movement Patterns

- ### Flexion and extension
- Movement from Occiput to C2 occurs as a unit, the remaining segments move in isolation.
  - During flexion an anterior translation of the vertebra occurs.
  - During extension a posterior translation occurs.
  - This translation totals approx. 2 - 3.5 mm.

- ### Lateral Flexion and Rotation
- Below the level of C2, rotation and lateral flexion occur simultaneously.
  - Rotation and lateral flexion occurs in an ipsilateral direction.
  - If the cervical spine is flexed to the left, the spinous processes rotate to the left also.
  - This is due to the plane of the facets.

## Upper Cervical Spine

Occipito-atlanto-axial Segment

- ### Atlas
- 1st cervical vertebra
  - Lacks a vertebral body and is replaced by a superior projection from the second vertebra - the dens (odontoid process).
  - Resembles a washer sitting on a peg between the occiput and the axis.
  - Bony regions - anterior arch, lateral masses and posterior arch.

## The Atlas

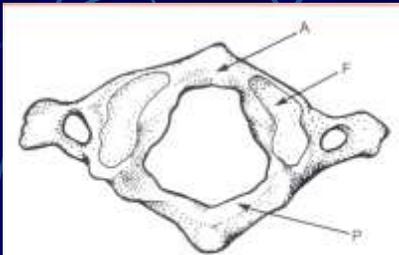


Figure 4-15. Bony elements of the atlas. A, anterior arch of the atlas; F, facet for occipital condyles; P, posterior arch of the atlas.

## Atlas

- On the inner aspect of the right and left anterior arch are two bony tubercles.
- Attachment of the transverse ligament of the cruciate (cruciform) ligament complex.
- This ligament holds the dens in place and prevents compression of the spinal cord.

## The Axis

- The second cervical vertebra.
- A pivot on which the combined occiput and atlas rotate.
- The dens is located on the superior aspect of the vertebra body.
- Dens articulates with the anterior arch of the atlas.
- Apical ligament attaches the tip of the dens to the occiput.

## Alar and Apical Ligaments



## The Dens and the Brain

- The dens lies in close proximity to the brainstem.
- Fracture dislocation of the dens can be fatal.
- Disease that weakens these ligaments can be dangerous.
- Caution must be used therefore with manual techniques.

## Upper Cervical Joints

- There are a lot of synovial joints present with these small bones.
- Between the condyles of the occiput and the atlas.
- Between the lateral masses of the atlas and axis.
- Between the dens and the anterior arch.
- No intervertebral discs are present.

## Flexion and Extension

- Occurs at both C0-1 and C1-2 regions.
- C0-1 has slightly more flexion/extension than C1-2.
- Approx 45 degrees of flexion/extension takes place - 25 degrees at C0-1 and 20 at C1-2.



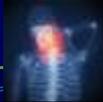
## Rotation

- Small amount of rotation occurs at C0-1.
- Approximately 40 degrees of rotation occur at C1-2.
- Nearly 60% of cervical rotation occurs at the upper cervical spine.



## Things for You to Review

- The ligaments of the cervical spine
  - Ligamentum Nuchae
  - Supraspinous ligament
  - Ligamentum Flavum
  - Posterior Atlanto-occipital ligament
  - Antlanto-axial membrane
  - Anterior and posterior longitudinal ligaments



## Things for You to Review

- Muscles of the cervical spine
  - Trapezius muscle
  - Sternocleidomastoid muscle
  - Rhomboids and Levator scapula
  - Paravertebral fascia and splenius muscle
  - Semispinalis muscle group
  - Longissimus muscle group
  - Suboccipital muscles
  - Scalene muscles



## Things for You to Review

- Muscles of the cervical spine
  - Longus colli and capitis muscles
  - Rectus capitis anterior and lateralis
  - Infrahyoid and suprahyoid muscles

