**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 that 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 occur 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**

**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

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.

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.

Alar and Apical Ligaments

The Dens and the Brain

The dens lies in close proximity to the brainstem.

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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
  - Atlanto-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 capitus muscles
  - Rectus capitus anterior and lateralis
  - Infrahyoid and suprahyoid muscles