

The **first cervical vertebra** (C1/atlas) is an atypical cervical vertebra, which is adapted to support the head. It is the only vertebra that does not possess a body and instead consists of a ring of bone comprised of an anterior and posterior arch joined by two lateral masses. The lateral masses bear the superior and inferior articular facets.

The short and flattened anterior arch of the atlas has an anterior tubercle anteriorly in the midline (which is palpable at the back of the **oro-pharynx**) to which the **anterior longitudinal ligament** attaches and a concave circular facet for articulation with the dens of C2 (axis) posteriorly. The atlanto-occipital membrane attaches to the superior aspect of the anterior arch and is continuous with the anterior longitudinal ligament.

The posterior arch, representing the pedicles and laminae of a typical vertebra, forms three-fifths of the ring. On its superior surface, immediately behind the lateral mass, the posterior arch is grooved on its superior surface by the vertebral artery and vein. The groove may be converted into a foramen (arcuate foramen) due to ossification of the free margin of the posterior atlanto-occipital membrane known as a 'posterior ponticle' (ponticulum posticus). The posterior ponticle passes from the posterior aspect of the lateral mass to the ipsilateral posterior arch. A posterior ponticle is best observed on a plain film lateral view of the cervical spine and is present in approximately 15% of the population.

The posterior tubercle is situated in the midline, on the posterior aspect of the posterior arch. The tubercle is a rudimentary spinous process that projects posteriorly and gives attachment to the ligamentum nuchae. The superior and inferior borders of the posterior arch give attachment to the posterior atlanto-occipital membrane and ligament flava, respectively.

The transverse processes are longer than those of the other cervical vertebrae, except those of C7. The palpable and broad, flat apex represents the posterior tubercle of other cervical vertebrae. The foramina transversaria, adjacent to the lateral masses, transmit the **vertebral arteries** and veins and associated sympathetic plexuses. The foramen transversarium may be deficient anteriorly. The transverse process can be palpated between the angle of the mandible and mastoid process of the temporal bone.

The ovoid lateral masses have superior and inferior surfaces. The superior surfaces carry kidney-shaped, concave articular facets directed superiorly and medially for articulation with the occipital condyles. Each facet may be divided into larger anterior and smaller posterior parts. The flat or slightly concave inferior articular facets are circular and face infero-medially; they are orientated more obliquely to the horizontal plane than the superior articular facets. The inferior articular facets articulate with the superior articular facets of the axis at the atlanto-axial joint. On the medial surface of each lateral mass is a tubercle for attachment of the **transverse band of the cruciform ligament** (Syn. transverse ligament of the atlas).

Atlanto-Occipital Joint

The atlanto-occipital joint is made up of the occipital condyles and the superior articular facets of C1 (atlas). These facets lie on the lateral masses, which have a corresponding inferior articular facet for articulation with C2 (axis). The atlanto-occipital joint is essentially a uni-planar joint, with a sliding and rolling action between the components. Flexion and extension are the predominant movements and there is some lateral flexion.

Atlanto-Axial Joint

The lateral masses support the articular facets for the **atlanto-axial (C1/C2) joint**. The combination of the position and shape of these joints, as well as the atlanto-odontal articulation gives the C1/C2 joint a large range of motion, particularly in rotation. The C2 facet positions demonstrate its functional nature, with the superior facets being anterior to articulate with C1, whilst the inferior facets are relatively posterior, in line with the typical vertebrae below.

Ossification

A center appears in each lateral mass during the seventh week in-utero, and extends into the posterior arches, which unite between the third and fourth years. A single center appears in the fibrocartilaginous

anterior arch at the end of the first year, this unites with the lateral masses between the sixth and eighth years and gives rise to the anterior parts of the superior articular facets.