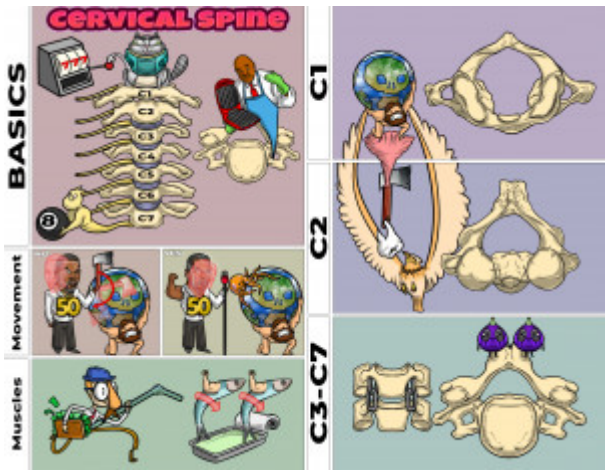
Cervical Spine

The cervical spine, colloquially called “the neck”, has 7 vertebrae. The most superior vertebrae, C1, is called the Atlas, after the Greek titan who holds the world on his shoulders. Immediately beneath C1 is C2, called the Axis because it facilitates half the rotation of the cervical spine. C2 has a superior bony protuberance called the dens or the odontoid process that articulates with C1. The dens is held to C1 by the cruciate ligament and cushioned by a bursa. The occiput of the skull’s articulation with the Atlas is referred to as the OA joint. The Atlas articulating with the Axis is referred to at the AA. The OA comprises 50% of the flexion and extension of the neck, and the AA comprises 50% of the rotation of the neck. C3 to C7 are referred to as typical vertebrae because they more strongly resemble the other vertebrae and each other as opposed to C1 and C2. C2 to C6 typically have bifid spinous processes projecting posteriorly, transverse processes laterally and articular pillars between those two. Osteopathic physicians evaluate vertebral movement by palpating the articular pillars. Between the vertebral body and the transverse process is the transverse foramen. Passing through the transverse foramen, C1 to C6, is the vertebral artery.



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Basics

7 Vertebrae
Lucky (7) Slot-machine Vertabrae
The cervical spine is broken up into 7 segments. C1 and C2 are atypical, whereas C3 to C7 are typical.

8 Nerve Roots
(8) Ball Nerve Roots
There are eight cervical nerve roots. C1 to C7 exit above their corresponding vertebrae. C8 exits between C7 and T1. Nerve roots C3 to C5 innervate the diaphragm. Nerve roots C5 to T1 make up the brachial plexus, a network of nerves that innervate the upper extremity.

Transverse Foramen
Tranverse Foreman
The transverse foramen is an opening in the vertebrae between the vertebral body and the transverse process. The vertebral artery, after arising from the first part of the subclavian artery, passes through the transverse foramina of C6 to C1 and into the foramen magnum. Accompanying the vertebral artery through the transverse foramen is the vertebral vein. The vertebral vein mainly serves the cervical spinal cord and adjacent vertebrae. The cervical vertebrae are the only vertebrae with transverse foramen.

C1

Atlas
World Atlas
C1, the Atlas, is named after the Greek Titan who holds the world on his shoulders. Similarly, the occiput is held up by C1. C1 also articulates with the dens of C2, held secure by the cruciate ligament.

Transverse Ligament Attaches to Axis
Transverse Ligament Attaches to Axe
The transverse ligament, also known as the cruciate ligament, attaches to C1 and C2. It acts much like a seat belt originating from C1, sneaking over the dens of C2 and inserting into C1.

C2

Axis
Axe
C2 is often referred to as the axis because half of the rotation of the cervical spine occurs here.

Dens

Dental

The dens, also known as the odontoid process, projects superiorly to articulate with the anterior arch of C1. The dens is named after the Latin word for “tooth”.

Alar Ligament Attaches it to Skull

A-lark Ligament Attached to Skull

The alar ligaments are two strong fibrous cords a half-centimeter in width that attach the dens to the occiput. Along with the cruciate ligament, the alar ligaments help stabilize the upper cervical spine. These ligaments can be lax in certain diseases, such as Down Syndrome and Rheumatoid Arthritis.

C3-C7

Luschka

Luschka-link

The Joints of Luschka are present from C3 to C7. There are superolateral projections coming from the vertebral bodies in the cervical spine; these articulate with the vertebrae immediately superior to them. The articulations that these projections make are referred to as the Joints of Luschka. These joints exist to prevent herniated discs from impinging on cervical nerve roots.

Bifid

Bi-fig

C2 to C6 have bifid spinous processes; this means that their bony posterior projections fork into two.

Muscles

Scalenes

Sardines Sidebend Same Side and Flex

The scalenes originate from the transverse processes of the cervical vertebrae. The anterior and middle scalenes then attach to the first rib. The posterior scalene attaches to the second rib. When both left and right scalenes contract, they flex the neck. When only one side contracts, they sidebend the neck ipsilaterally.

SCM Sidebends Towards and Rotates Away (STRA)

SCaMmer STRAw

The sternocleidomastoid, also known as the SCM, is a muscle of the neck that runs from the nuchal line and mastoid process of the skull and attaches to the sternum and clavicle. When contracted unilaterally, the SCM will rotate the head contralaterally and sidebend the head ipsilaterally. The action of one SCM may be remembered as “STRAw”: Sidebend Towards, Rotate Away”. Contracted bilaterally, the SCM flexes the neck.

Movement

50% Rotation AA

(50) Cent Rotating Atlas-axe

The Atlantal-Axial joint is where C1 and C2 meet. Half of the total rotation of the neck happens here. Almost no flexion or extension happens at this joint. For this reason, the AA joint is sometimes called the “No” joint, as it facilitates shaking the head “no”.

50% Flexion/Extension OA

(50) Cent Flexing/Extension-cord Octopus-Atlas

The Occipital-Atlantal joint is the occiput on top of C1. Half of the total flexion and extension of the neck happen at this joint. The OA joint has what is referred to as “type-I like mechanics” because rotation and sidebending occur to opposite sides. Unlike true type I mechanics, the joint may also be flexed or extended while rotated and sidebent to opposite sides. . Because of the large motions in flexion and extension, the OA joint is sometimes called the “yes” joint, as it facilitates nodding the head “yes”.
