Pharyngeal Arch Derivatives: 2nd Arch

The pharyngeal arches (also known as branchial arches) are a fundamental aspect of vertebrate head and neck development. They are all derived from mesoderm and appear early in the third to fourth gestational week, and differentiate into terminal structures by the seventh to eighth gestational week. They are comprised of cartilage support (serving as a precursor to skeletal elements), arterial supply (from the aortic arch system) and cranial nerve supply. In the second pharyngeal arch, Reichert's cartilage develops into the stapes, styloid process, lesser horn of the hyoid and stylohyoid ligament. The muscles derived from this arch include the muscles of facial expression, stapedius, stylohyoid, platysma and posterior belly of the digastric. The cranial nerve supply to these structures is CN VII (facial nerve).

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Cartilage

Reichert's Cartilage
Record-player Cartilage
Reichert’s cartilage includes the stapes, styloid process, lesser horn of the hyoid bone and stylohyoid ligament.

Stapes
Stapler
The stapes (Latin for stirrup) is the smallest bone in the middle ear. Its head articulates with the incus, and its base inserts onto the oval window of the tympanic cavity.

Styloid Process
Stylus
The styloid process is a pointed piece of bone that extends from the temporal bone, and it serves as an anchor point for muscles associated with the tongue and larynx.

Lesser Horn of Hyoid
Lesser Horn of Hieroglyph
The hyoid is a horseshoe-shaped bone that is located in the anterior neck at the level of C3. It is located between the mandible and the thyroid cartilage. The second pharyngeal arch gives rise to the lesser horn of the hyoid, while the third pharyngeal arch gives rise to the greater horn of the hyoid.

Stylohyoid Ligament
Stylus-hieroglyph Ligament
The stylohyoid ligament attaches the tip of the styloid process of the temporal bone to the lesser horn of the hyoid bone.

Muscles

Muscles of Facial Expression
Muscles for Facial Expressions
The muscles of facial expression move the skin, and change facial expressions to convey mood. Since all muscles of facial expression develop from the second pharyngeal arch, they are all innervated by CN VII (facial).

Stapedius
Stapled-ear
The stapedius muscle is located in the middle ear and is responsible for stabilizing the stapes and preventing sound from being too loud. Since this muscle develops from the second pharyngeal arch, it is innervated by CN VII (facial).

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Stylohyoid

Stylus-hieroglyph

The stylohyoid muscle originates from the tip of the styloid process of the temporal bone and inserts on the lesser horn of the hyoid bone. It elevates the hyoid during swallowing. Since this muscle develops from the second pharyngeal arch, it is innervated by CN VII (facial).

Platysma

Platypus

The platysma is a broad, thin sheet of muscle in the subcutaneous tissue of the neck. The platysma acts to tense the skin, as well as depress the mandible and draw the corners of the mouth inferiorly (i.e. to grimace). Since this muscle develops from the second pharyngeal arch, it is innervated by CN VII (facial).

Posterior Belly of Digastric

Post with Dyed-digastric

The digastric is composed of two bellies, anterior and posterior, which are connected by a pulley-like tendon. The posterior belly of the digastric originates from the mastoid process of the temporal bone, and is responsible for drawing back the hyoid bone. Since this muscle develops from the second pharyngeal arch, it is innervated by CN VII (facial). It is important to note that the anterior belly of the digastric develops from the first pharyngeal arch, and consequently is innervated by CN V (trigeminal).

Nerves

CN VII

Cranial Nerve (7) Facial-lotion

CN VII is also known as the facial nerve. It is a motor and sensory nerve that controls the muscles of facial expression, stapedius, stylohyoid, platysma and posterior belly of the digastric. It is also responsible for taste sensations from the anterior 2/3 of the tongue, among other functions.

Conditions

Congenital Pharyngocutaneous Fistula

Pregnant-lady with Pharaoh-skin showing a Fist-tunnel

Congenital pharyngocutaneous fistula is persistence of the cleft and pouch, resulting in a fistula between the tonsillar area and the lateral neck. It is often found along the anterior border of the sternocleidomastoid muscle (SCM).

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