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8th Edition of International Conference on Clinical and Medical Case Reports - An anomalous digastric muscle in the carotid sheath: a case report with its embryological perspective and clinical relevance

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Abstract

Although infrahyoid muscles show considerable variations in their development, existence of an anomalous digastric muscle in the neck was seldom reported. During dissection of triangles of the neck for medical undergraduate students, we came across an anomalous digastric muscle in the carotid sheath of left side of neck. It was observed in a middle-aged cadaver at College of Medicine and Health Sciences, Sultan Qaboos University, Muscat, Oman. Digastric muscle was located within the carotid sheath between the common and internal carotid arteries and internal jugular vein. It had two bellies; cranial belly and caudal belly which were connected by an intermediate tendon. The cranial belly of the muscle was attached to the petrous part of the temporal bone. The caudal belly extended into the superior mediastinum and merged with the connective tissue around the left brachiocephalic vein. In addition, the caudal belly of the muscle was connected to the lateral margin of the sternohyoid by few muscle fasciculi. The total length of muscle was 15.5 cm and the width of cranial belly, intermediate tendon and caudal belly was found to be 5 mm, 2 mm and 4 mm, respectively. The anomalous muscle reported in the present case might have formed by the abnormal splitting, growth and/or differentiation of lingual-infrahyoid-diaphragmatic band. Due to its close relation, the anomalous muscle may cause compression of vascular structures in the carotid sheath and it may cause confusion during diagnostic imaging of neck soft tissues. The knowledge of reported variation is clinically important while evaluating the compression of internal jugular vein in patients with idiopathic intracranial hypertension and during the surgical repair of carotid arteries. D. Reiraint, Z. Quadir, W. Xu, L. Waltz, M. Ferry, "Microstructural investigation of roll bonded nanocrystalline stainless steel sheets", The 16th International Conference on the Textures of Materials (ICOTOM 16), Bombay (India), 12-17 December 2011.

Key words:

Anterior belly, Posterior belly, Variation, Stylohyoid muscle, Mylohyoid muscle, Hyoid bone

Anatomy

There is a pair of digastric muscles in the neck, and each digastric muscle has the anterior belly and the posterior belly. The anterior belly is attached to the digastric fossa on the base of the mandible close to the midline and runs toward the hyoid bone. The posterior belly is attached to the notch of the mastoid process of the temporal bone and also runs toward the hyoid bone. The two bellies meet as the intermediate tendon, which penetrates the stylohyoid muscle and also

passes through the fibrous loop which is attached to the body and greater cornu of the hyoid bone. However, as the study of Kim et al. showed, the intermediate tendon does not have to penetrate the stylohyoid muscle. The intermediate tendon can lie medial or lateral to the stylohyoid muscle instead of penetrating it. An important surgical landmark can be described by the digastric muscle. The submandibular triangle is a triangular area on each side demarcated by the mandible superiorly, the anterior belly of the digastric muscle medially and the posterior belly of the digastric muscle laterally. Each submandibular triangle contains the submandibular gland, submandibular lymph nodes, hypoglossal nerve, facial artery and facial vein.

Embryology :

The prenatal life consists of the embryonic period and the fetal period. The embryonic period is the first eight postfertilizational weeks, and the fetal period begins at the 9th postfertilizational week and lasts until the birth. The embryonic period can be divided into 23 stages, which are known as the Carnegie stages. During the stages 10 to 13, the five pairs of the pharyngeal arches are formed as the population of the neural crest

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cells migrate more caudally from the embryonic pharynx which is the most cranial portion of the foregut. The anterior belly of the digastric muscle, mylohyoid muscle, tensor tympani muscle, tensor veli palatine muscle, muscles of mastication (the temporalis muscle, masseter muscle and lateral and medial pterygoid muscles), genial tubercle of the mandible and mandibular nerve of the trigeminal nerve are derived from the first pharyngeal arch which is also called the mandibular arch and first seen at the stage 10 (28 to 30 days). The posterior belly of the digastric muscle, stapedius muscle, buccinator muscle, auricular muscles, occipitofrontalis muscle, facial muscles, platysma muscle, stylohyoid muscle, stylohyoid ligament, lesser horn and upper part of the body of the hyoid bone and facial nerve are derived from the second pharyngeal arch which is also called the hyoid arch and first seen at the stage 11 (28 to 30 days). The stylopharyngeus muscle, greater horn and lower part of the body of the hyoid bone and glossopharyngeal nerve are derived from the third pharyngeal arch which is first seen at the stage 12 (29 to 31 days). The cricothyroid muscle, inferior pharyngeal constrictor muscle, levator veli palatini muscle, thyroid cartilage and pharyngeal branch of the vagus nerve are derived from the fourth pharyngeal arch which is first seen at the stage 13 (30 to 33 days). Since both the digastric muscle and mylohyoid muscle develop from the first pharyngeal arch, their anomalies are often found simultaneously.

Clinical Significance

The protection of the airway during swallowing food is essential and achieved through the laryngeal sphincter closure, laryngeal covering by the epiglottis and larynx elevation anteriorly and superiorly. The elevation of the larynx can be achieved by elevating the hyoid bone from which the laryngeal cartilages are suspended, and the suprahyoid muscles consisting of the geniohyoid muscle, mylohyoid muscle and anterior belly and posterior belly of the digastric muscle are involved in elevating the hyoid bone anteriorly and superiorly. A tumor can cause muscle enlargement and asymmetry, and it can be shown as an increased muscle bulk with the contrast enhancement on CT.

An anterior accessory muscle can be seen as a pseudomass on CT, but unlike a tumor, it does not show the abnormal contrast enhancement. Also, a tumor shows higher signal on T2 weighted MRI while a pseudomass does not show the higher signal. However, although the T2 weighted MRI is useful to detect the soft tissue tumors in the neck, it can still fail to detect the tumor. The marginal mandibular branch of the facial nerve innervates muscles that lower the lip such as the depressor anguli oris and depressor labii inferioris muscles. Therefore, an injury of the marginal mandibular branch of the facial nerve can produce an asymmetric smile. When there is complete paralysis of the marginal mandibular branch of the facial nerve, the anterior belly of the digastric muscle, intermediate tendon and small portion of the posterior belly as a whole can be used as a flap. The end of the flap (i.e., the cut part of the posterior belly) is sewn on the lower lip while the anterior belly is being attached to the digastric fossa, then the lip of the patient can be lowered, thereby making the patient smile again. Oral cancer sometimes necessitates the resection of the anterior mandibular arch, and postoperatively the depression of the tongue can cause the stridor, in which case the tracheostomy may be necessary. The depression of the tongue can be prevented by attaching the tongue muscle to the intermediate tendon of the digastric muscle, thereby avoiding the stridor and tracheostomy postoperatively.

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