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CASE REPORT

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A case of a bilateral accessory digastric muscle

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Abnormalities of the anterior belly of the digastric muscle are rare but have received increased attention by radiologists in recent years in an attempt to avoid confusion with submental cysts or enlarged submental lymph nodes on CT or MR images. We present a case of bilateral accessory digastric muscles which fuse (partially) with the midline raphe of the mylohyoid muscle. Fibres from the right accessory anterior digastric muscle proceeded to decussate and join the mylohyoid muscle and the contralateral insertion of the digastric muscle. Embryological development and possible clinical consequences are discussed.

Key words: accessory digastric muscle, anterior belly, trigastric,

INTRODUCTION

The anterior belly of the digastric muscle lies upon the inferior surface of the mylohyoid muscle and divides the region between the hyoid bone and the mandible into 3 triangles: 2 submandibular triangles laterally and medially between them, separated by the anterior bellies of the digastric muscles, the submental triangle [7]. The anterior belly arises from the intermediate tendon of the digastric muscle and courses anteromedially to insert on the digastric fossa of the mandible, lateral to the midline [11]. It is generally agreed that the function of the digastric muscle is to stabilise and regulate the position of the hyoid bone and to assist in jaw movements, primarily opening [2, 3, 18]. The two bellies of the digastric muscle arise from two different embryological precursors and are therefore supplied by two different nerves. The anterior belly arises from the first pharyngeal arch, and is therefore supplied by a branch of the trigeminal nerve (CN V), the nerve to the mylohyoid. In contrast, the posterior belly arises from the second pharyngeal arch and thus derives its nerve supply from the facial nerve (CN VII). Abnormalities of the pharyngeal arches during development can lead to multiple malformations of the head and neck with varying clinical consequences.

Variations in the origin, insertion, and location of the anterior belly of the digastric muscle have rarely been described in the literature [4–6, 11, 14]. No anatomical or embryological textbooks contain data on such anomalies, although Gray's Anatomy makes reference to the anterior belly crossing the midline and fusing with the mylohyoid muscle [22]. We present a case of bilateral occurrence of an accessory head of the anterior digastric muscle (AcADM) which arose from the digastric fossa and inserted upon the midline raphe (on the right) and on the mylohyoid muscle.

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CASE REPORT

The anomaly was found in a 73-year-old male cadaver during a routine student dissection at Harvard Medical School, during the Human Body Course in the fall of 2003. The dissection of the anterior triangle of the neck began with a midline incision from the mental protuberance inferiorly to the sternal notch. Bilateral incisions were then made from the mastoid processes along the anterior border of the sternocleidomastoid to terminate at the sternal notch. The resulting triangular flap was reflected superiorly, including skin, superficial fascia, platysma muscle and underlying connective tissue.

Upon exposure of the anterior triangle, two AcADMs (right and left) were observed as originating from the digastric fossa on the postero-inferior surface of the body of the mandible (Fig. 1). The left AcADM took its origin from a separate tendon medial to the main belly of the anterior digastric muscle and proceeded posteromedially to insert upon the midline raphe of the mylohyoid muscle.

The right AcADM arose similarly, as described above, medial to the origin of the main belly of the anterior digastric muscle. In contrast, the right AcADM immediately bifurcated into two heads (lateral and medial). The lateral head rejoined with the main belly of the anterior digastric muscle, while the medial head continued to insert upon the midline raphe of the mylohyoid muscle. Fibres from the right Ac-ADM then proceeded to decussate and join the mylohyoid muscle and the contralateral (left) insertion of the digastric muscle. The intermediate tendon of the digastric was found bilaterally in its usual position, being anchored by a sling to the hyoid bone and connected to the posterior belly of the digastric muscle, which was also found in its normal anatomical position bilaterally.

The dimensions of the muscles were measured with the aid of the Lucia program (digital image analysis software), as previously described [9]. The tendon of the AcADM was measured at the origin and found to be 6 mm in width for both the left and right AcADMs. The left AcADM reached a maximum width of 11 mm just before its insertion onto the midline raphe. The maximum width of the right Ac-ADM was 8 mm, measured immediately proximal to its bifurcation into medial and lateral heads, which had maximum widths of 5 mm and 4 mm, respectively. The length of the left AcADM was measured from its origin to its insertion upon the midline raphe and found to be 3.5 cm. The length of the right AcADM was measured from its origin to the point of bifurcation and found to be 1.3 cm. The medial head of the right AcADM (measured from the bifurcation to its insertion on the midline raphe) was found to be 2.2 cm in length. The lateral head of the right

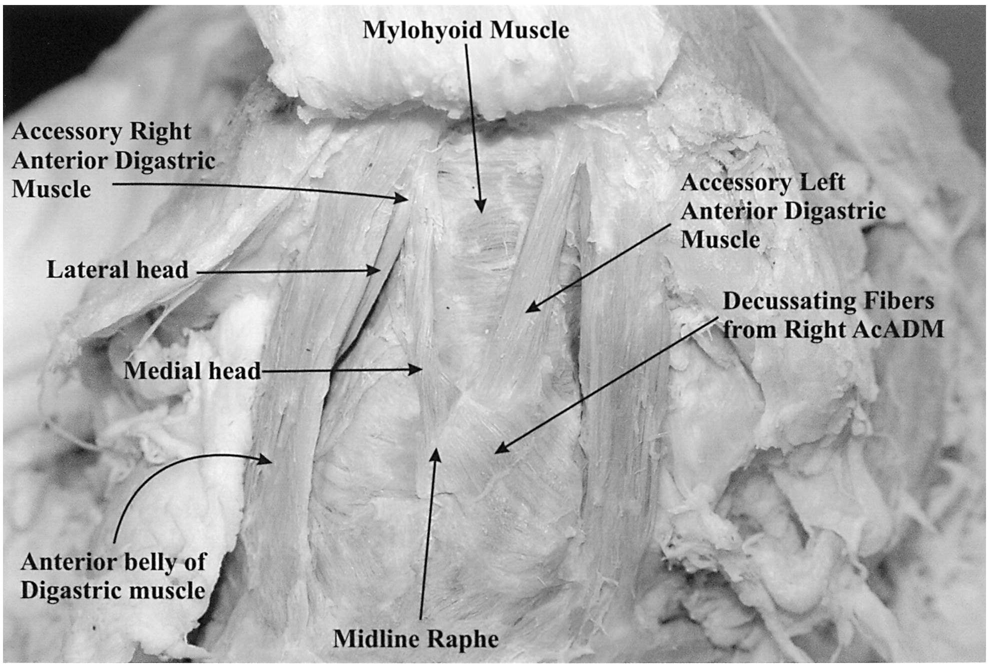

Figure 1. Bilateral accessory anterior digatric muscles are shown here with assymetrical insertions. The left AcADM inserts upon the midline raphe of the mylohyoid muscle. The right AcADM bifurcates into medial and lateral heads.

AcADM (measured from the bifurcation to its rejoining with the main belly of the anterior digastric muscle) was found to be 1.6cm in length.

The nerve supply was identified bilaterally, as arising from the nerve to the mylohyoid. This nerve was found to supply both the normal anterior belly of the digastric muscle and the AcADM.

DISCUSSION

The majority of reported variations of the digastric muscles are found in French and Italian literature from the late 19th and early 20th centuries [10, 13, 16, 19]. A few recent reports have been published, which describe various abnormalities of the anterior belly of the digastric muscle [1, 4, 6, 11, 15, 20, 21, 24]. Norton [11], in 2000, reported a case of bilateral occurrence of accessory digastric muscles, which inserted upon the midline raphe, decussated, and continued to rejoin the contralateral anterior bellies of the digastric muscles before their transition into the intermediate tendons. The anomaly reported in that case was symmetrical bilaterally. Furthermore, Uzun et al. [21] presented a case in which 3 anterior and posterior bellies of the digastric muscle had their normal origin and course and were joined by an intermediate tendon. The accessory anterior bellies originated from the digastric fossa, and inserted to the hyoid bone with a common fibrous band. To the best of our knowledge, this is the first reported case of an AcADM arising bilaterally but with an asymmetric course and insertion.

The complexity of the sequential development of this region naturally gives rise to potentially countless variations. The anterior belly of the digastric muscle, along with the other muscles of mastication, arises from the first pharyngeal arch [23]. The pharyngeal arches begin to develop early in the 4th week of development as neural crest cells migrate into the developing head and neck. By the end of the 4th week, well defined pairs of pharyngeal arches are visible externally [12]. Both the mylohyoid muscle and the anterior belly of the digastric muscle are derived from this first pharyngeal arch. Conversely, the posterior belly of the digastric muscle arises from the second pharyngeal arch. It is possible that during embryological development some of the neural crest cells composing the 1st pharyngeal arch undergo an aberrant migration leading to the development of an AcADM. Another possibility is that the proximity of the pharyngeal arches allows a minimal amount of fusion between the contralateral corresponding arches, thereby leading to the development of accessory muscle fibres which fuse with and cross the midline.

Because the discovery of this anomaly was made post-mortem, it is unknown whether the presence of the bilateral AcADM had any clinical consequences in this case. The importance of this anomaly lies in its potential for confounding diagnosis in both radiological and surgical assessments of the floor of the mouth. For the surgeon the anterior belly of the digastric muscle serves as an important landmark to aid dissection during certain procedures. As a boundary of the submental triangle the anterior belly of the digastric muscle serves as a guideline for the removal of diseased submental nodes and adipose tissue during malignant disease. The presence of AcADM could potentially give false boundaries of the submental triangle, resulting in incomplete removal of the malignant tissues. Other complications could include mistaking AcADM for malignant tissue and subsequent removal of muscle tissue during radical suprahyoid neck dissections [17, 20].

The presence of AcADM may also lead to confusion in radiological diagnostic procedures. The importance of recognising similar anomalies was highlighted in the paper of Larson and Lufkin, which described the risk of confusion of anomalies of the floor of the mouth during CT and MR imaging techniques [8]. Increased muscle bulk in the midline may be falsely identified during CT scanning as a pseudomass of the mylohyoid muscle. In addition, accessory muscles such as AcADM might be mistakenly identified as an enlargement of the submental nodes, unless the surgeon or radiologist is aware of the possibility of these variations [11, 15].

The presence of an AcADM could lead to misdiagnosis, particularly when using CT or MR imaging techniques [1, 11, 15, 24].

CONCLUSIONS

We present a unique case of bilateral accessory digastric muscles which fuse (partially) with the midline raphe of the mylohyoid muscle. Fibres from the right accessory anterior digastric muscle proceeded to decussate and join the mylohyoid muscle and the contralateral insertion of the digastric muscle. Although several cases studies have been published describing various anomalies of the anterior digastric muscle and their clinical significance, there have been no reports to date which have provided statistical data with regard to the common variations and their incidence. A thorough investigation of the detailed anatomy of the region, including the occurrence of muscular variations, might prove very useful to radiologists, surgeons and anatomists alike.

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