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Anatomical study on anomalies of the digastric muscle of neck region

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Abstract

The digastric muscle has the anterior belly and the posterior belly linked by an intermediate tendon attached to the body and greater horn of the hyoid bone and is characterized to have many variations that do not necessarily produce clinical symptoms. The present study was conducted to investigate anatomical variations of the digastric muscles in the samples of adult cadaveric specimens and discuss clinical significance. The study consisted of 16 (n = 16) adult cadaveric head and neck specimens consisting of n = 10 males and n = 6 females between the age ranging from 33 – 76 years old. The results showed that among the 16 cadavers studied, n = 14 specimens had normal anterior and posterior bellied digastric muscles, while in n = 2 (12.5%) cadavers (1 male and 1 female), variations in the accessory bellies of diagastric muscle were observed. In the present study, n = 14 cadavers out of n = 16 samples showed usual anatomy. In one (n=1) female cadaver sample an accessory belly of the anterior digastric was observed on the left side. The origin of the single accessory belly is tendinous arising from digastric fossa of mandible and had a fleshy attachment to the body of the hyoid bone. No anterior belly of the digastric muscle was present on the right side of the cadaver sample. The posterior bellies were observed to be normal on both the sides. In another one (male) cadaver, an accessory anterior belly was found originating from the mandible's digastric fossa, between the right and left anterior bellies of the digastric muscles dividing into right and left accessory bellies close to its attachment to the hyoid bone. The right accessory belly was found inserted to the muscle fibers on the right side of the anterior belly and to the greater horn of the hyoid bone. The left accessory belly was observed united to the intermediate tendon on the left side and inserted to the body of the hyoid bone and the posterior bellies were observed to be normal on both the sides. The possible occurrences of such anomalies should be considered during surgical procedures involving the submental region and floor of the mouth. Therefore, these findings may be of much significance to the anatomists and contributes to the knowledge of the morphological variations in the digastric muscle, thus facilitating diagnostic and surgical procedures on the anterior area of the neck that could help prevent clinical errors and thus avoid unnecessary invasive procedures in the neck.

Keywords: Anamaolies, anterior belly, digastric muscle, hyoid bone, posterior belly, variation

Introduction

The digastric muscle is an important muscle in the neck, which pulls the mandible downward to open the jaw and elevates the hyoid bone for stabilization during swallowing, and it is also involved in chewing and speech [1, 2, 3, 4].

The digastric muscle has two bellies, the anterior belly and the posterior belly linked by an intermediate tendon that runs in a fibrous sling attached to the body and greater horn of the hyoid bone [5, 6].

The digastric muscle is characterized to have many variations that do not necessarily produce clinical symptoms, recognizing its variations would help physicians to make better evaluations and treatment plans for their patients.

The data on anatomical variations may affect diagnostic and therapeutic procedures in the head and neck surgery. The advent of modern diagnostic techniques such as computed tomography (CT) and magnetic resonance imaging (MRI) has increased the importance of accurately identifying normal variations and anomalies in the floor of the mouth. With the improved plastic surgical technology and higher demand for aesthetics, the digastric muscle plays an important role in the facial reconstructive surgeries. Therefore, it is essential for physicians to familiarize themselves with any variations of the neck muscles to avoid misinterpretations of the radiological images and make right treatment plans for their patients

Therefore, the present study was aimed to investigate anatomical variations of the digastric muscles in the selected samples of adult cadaveric specimens and discuss clinical significance.

Materials and Methods

The present study was conducted on sample size of 16 adult cadaveric head and neck specimens consisting of 10 males and 6 females between the age ranging from 33 – 76 years old. The specimens were obtained from the Department of Clinical Anatomy, Rajiv Gandhi Institute of Medical Sciences and Surabhi Institute of Medical Sciences, Telangana, India.

Ethical clearance was obtained from the College Ethical Committee. All the cadaver specimens were dissected bilaterally according to Cunningham manual, 3rd volume. The submental region was dissected by routine technique of removing the skin and subcutaneous fascia overlying the anterior aspect of the neck and gently retracted superiorly exposing the underlying digastric muscles. This study was performed according to the provisions of the Declaration of Helsinki in 1995 (as revised in Edinburgh 2000).

Results

In the present study, among the 16 cadavers studied, n = 14

specimens had normal anterior and posterior bellied digastric muscles, while in n = 2 cadavers (1 male and 1 female), variations in the accessory bellies of diagastric muscle were observed.

In the present study cadavers, an accessory anterior belly of digastrics muscle on the right side was found arising from the digastric fossa on the base of the mandible and the posterior bellies were observed arising from the mastoid notch of the temporal bone with a usual insertion into the intermediate tendon that is found attached to the body and greater horn of the hyoid bone. In addition to this usual anatomy, in one (n = 1) female cadaver sample an accessory belly of the anterior digastric was observed on the left side.

The origin of the single accessory belly is tendinous arising from digastric fossa of mandible and had a fleshy attachment to the body of the hyoid bone. No anterior belly of the digastric muscle was present on the right side of the cadaver sample. The posterior bellies were observed to be normal on both the sides.

In the second (male) cadaver, an accessory anterior belly was found originating from the mandible's digastric fossa, between the right and left anterior bellies of the digastric muscles dividing into right and left accessory bellies close to its attachment to the hyoid bone.

The right accessory belly was found inserted to the muscle fibers on the right side of the anterior belly and to the greater horn of the hyoid bone. The left accessory belly was observed united to the intermediate tendon on the left side and inserted to the body of the hyoid bone. The posterior bellies were observed to be normal on both the sides.

Discussion and Conclusion

The morphological variations in the digastric muscle are common and are extensively reported in the anatomical literature, in particular, regarding the presence of the accessory belly in the anterior belly of the digastric muscle (ABDM).

The commonly documented evidence on the morphologic variations in the digastric musculature includes the presence of an accessory belly in the ABDM. Various authors have reported these anatomical variations according to their origin, course, composition and location [7, 8] and their investigations on the variations of this muscle have a great value in diagnosis and making right treatment plans for patients.

Although the variations of the digastric muscle do not necessarily produce clinical symptoms, they still play an important role in the clinical setting. Knowledge on the anatomy of the digastric muscle and its variations is of importance, especially during radiographic imaging of the submental region. Several authors reported that the anterior digastric muscle shows great variability in its form and attachment [9, 10, 11].

The occurrence of variations of the anterior belly of the digastric muscle was reported in 5.9%- 65.8% of the population [12, 13, 14, 15, 16, 17]. The present study showed digastric muscle anomalies in n = 2 (12.5%) cadaver specimens out of 16 of the cadaver samples studied. The incidence may vary in different ethnic populations. The possible cause of such variation could be explained by the abnormal and aberrant migration of the neural crest cells in the first pharyngeal arch, that leads to the development of an accessory anterior belly [18, 19, 20] and result in either a unilateral or bilateral accessory belly [20]. Sargon and Celik [21] and Peker *et al* [22] have stated the unilateral variation of the anterior digastric belly is more common.

Due to its location and tissue density, an accessory digastric muscle could easily be confused as a normal or metastatic submental lymph node, lipoma, hematoma or accessory lobe of submandibular gland in radiological diagnosis [19, 20, 23, 24]. Therefore, it is important to be aware of such anatomical variations of the submental region during imaging interpretation and during differential diagnosis of neck masses. Hence, establishment of correct diagnosis can avoid unnecessary biopsy and surgery [16].

In addition, the possible occurrences of such anomalies should be considered during surgical procedures involving the submental region and floor of the mouth. Furthermore, the anterior belly of the digastric muscle is often used in plastic surgery for functional restoration of the lower lip in patients with facial nerve palsy [25].

Therefore, these findings may be of much significance to the anatomists and contributes to the knowledge of the morphological variations that exists in the digastric muscle, thus facilitating diagnostic and surgical procedures on the anterior area of the neck that could help prevent clinical errors.

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