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Short Communication

Bilateral, asymmetric anomalies of the anterior bellies of digastric muscles

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Abstract: Bilateral, asymmetric anomalies of the anterior bellies of digastric muscles were observed during dissection of the submental region. Specifically, four extra muscle bundles were found between the anterior bellies of the digastric muscle. Although anomalies of the anterior bellies of digastric muscles are often observed, this complicated pattern of digastric anomalies has not been previously reported. Our findings and previous observations illustrate the morphogenetic complexity of the anterior belly of the digastric muscle derived from the first pharyngeal arch, which gives rise to jaw musculature such as the mylohyoid muscle. (J Oral Sci 53, 523-527, 2011)

Keywords: digastric muscle; anterior belly; anatomical variation; anomalies; dissection.

Introduction

The digastric muscle is one of the suprahyoid muscles and commonly has two bellies linked by an intermediate tendon that is attached to the hyoid bone. Anatomical variation in the digastric muscle is often observed, including absence of the intermediate tendon, a shift in the origin of the posterior belly, and fusion of the anterior belly with the mylohyoid muscle. Wide variation in shape, length, and innervation has also been reported (1-46), and the anterior belly frequently exhibits accessory musculature. It is widely believed that the digastric muscle regulates the position of the hyoid bone and assists in jaw movement, swallowing, and chewing. Thus, elucidating the anatomy of the digastric muscle is important for understanding these functions. Anomalies of the digastric muscle may also affect examination, diagnosis, and therapeutic strategies of diseases and disorders of the head and neck region. In the present study, we report a rarely observed pattern in the anterior belly of the digastric muscle.

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Methods and Results

We discovered a case of bilateral, asymmetric anomalies in the anterior bellies of digastric muscles during a dissection course at Niigata University School of Medicine in 2010. In the anterior triangle region of the neck, extra muscle bundles were observed bilaterally and asymmetrically in the anterior bellies of the digastric muscles (Fig. 1). On the left side, a thin, triangular bundle arose from an intermediate tendon and was attached to the midline raphe of the mylohyoid muscle (Fig. 1B, LAC). On the right side, there was a thin bundle similar to the

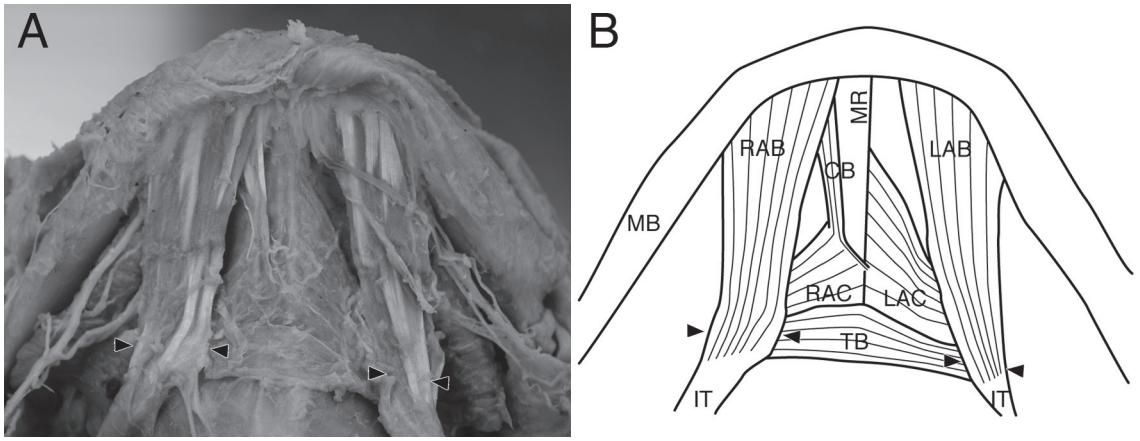

Fig. 1 Photograph of the submental region. A and B: The platysma was removed from the clavicle and pulled back to reveal the digastric muscles. Four accessory bellies were observed between the left and right anterior bellies of the digastric muscle. B: Schematic drawing of the digastric muscles in A. Accessory bellies were traced without blood vessels and nerves. Arrowheads indicate the edges of the anterior belly of the digastric muscle. The posterior part of the RAB was wider than that of the LAB.
MB: mandibular bone, MR: midline raphe of mylohyoid muscle, RAB: right anterior belly, LAB: left anterior belly, RAC: right accessory belly, LAC: left accessory belly, CB: crossover bundle, TB: transverse bundle, IT: intermediate tendon.

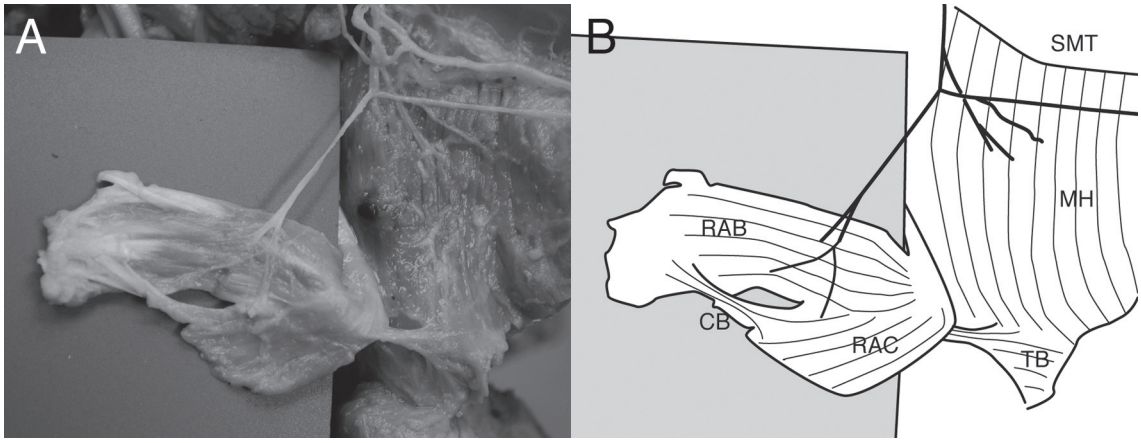

Fig. 2 The anterior belly of the digastric muscle on the right side and its innervation. A and B: A small board was placed behind the muscle before taking the photograph. The anterior belly was removed from the digastric fossa and everted. The mylohyoid muscle was cut along the midline because the cephalic region was separated from the body and divided sagittally. A portion of the transverse bundle was attached to the mylohyoid muscle. B: A schematic drawing of the digastric muscle in A, showing innervation patterns of the right mylohyoid nerve.
RAB: right anterior belly, RAC: right accessory belly, MH: mylohyoid muscle, CB: crossover bundle, TB: transverse bundle, SMT: submandibular triangle.

one found on the left side (Fig. 1B, RAC); however, the anterior half of this muscle was connected to a narrow bundle (Fig. 1B, CB) that was attached to the digastric fossa of the mandible. A very thin medial section of CB crossed the midline raphe to the opposite side. Another accessory bundle was positioned transversely between the left and right intermediate tendons of the digastric muscle (Fig. 1B, TB). This bundle (TB) was continuous and not separated at the midline.

Although the general appearance of the native anterior bellies was normal, there was a slight morphologic difference between them. The posterior part of the anterior

belly on the right side was wider than that on the left side (Fig. 1).

Innervation of the anterior belly of the digastric muscle was also investigated (Fig. 2). The mylohyoid nerve passed between the mylohyoid muscle and the anterior bellies of the digastric muscle. The nerve innervated the mylohyoid muscle, the anterior belly of the digastric muscle, and accessory bundles on the right side. Facial nerves innervated the posterior bellies of the digastric muscle. We were unsuccessful in determining the innervation of TB.

Discussion

We observed four accessory muscle bundles located between the left and right anterior bellies of the digastric muscle. The nerve entered the inner surface of these muscles. According to Sakamoto and Akita (37), this innervation pattern is classified as digastric, not mylohyoid. These anatomic findings suggest that the bundles were accessory bundles of the anterior belly of the digastric muscle rather than of the mylohyoid or posterior belly. Several different criteria have been used to classify abnormalities of the digastric muscle (7,12,13,16). According to Yamada's classification (13), the present anomaly is a complex anomaly (Komplizierte form). The frequency of anomalies in the anterior belly of the digastric muscle is reported to be between 5.9% and 65.8% (2,5,7,8,12,13,16,29). However, complex anomalies are only 7.7% to 31.9% of all anomalies (7,12,13,16,36). A combination of accessory bundles, as observed in this study, has not been reported. We exhaustively studied anatomic variations shown in illustrations or pictures in 300 cases from 42 selected reports (3,4,6,7,9-14,17-46), including papers written in Japanese (15,16 and the references therein). There were two reports of accessory bundles similar to the transverse bundle we found (15,41). None of the cases in the literature matched the anomaly described in this report, which indicates that the present case is a very rare anomaly of the digastric muscle.

Our discovery illustrates the complexity of morphogenesis in the anterior belly of the digastric muscle, which arises from the mesenchyme of the first branchial arch together with other muscles such as the mylohyoid muscle. The complexity of morphogenesis of the first branchial arch may also account for a number of previously observed anomalies and suggests that other novel patterns of digastric variation are likely to be observed. Therefore, the possible discovery of anomalies of the digastric muscle should be taken into consideration during dissection and clinical procedures involving the head and neck.

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