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<th>An anatomical study of a muscle bundle separated from the medial pterygoid muscle</th>
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<td>Author(s)</td>
<td>Abe, S; Iida, T; Ide, Y; Saitoh, C</td>
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ABSTRACT: When mandibular dentures are fabricated, marginal sealing should be taken into consideration for the stability of the denture. We selected specimens of the medial pterygoid muscle showing insertion of an independent small muscle bundle at its insertion site, and evaluated the anatomical relationship between the morphology of the insertion site and the denture. The insertion of the pterygoid muscle was classified according to the insertion morphology of the independent small muscle bundle into three types using the retromolar pad as a reference: Type I, insertion of the independent muscle bundle posterior to the retromolar pad; Type II, insertion immediately below the retromolar pad; and Type III, insertion into the fascia of the mylohyoid muscle. Types II and III muscles seem to affect the denture because of their closeness to the mandibular denture. In the oral cavity, the independent small muscle bundle studied appeared as a streak-like structure. When such a structure is detected during examination for denture fabrication, the following consideration is necessary. Since the medial pterygoid muscle is a mouth-closing muscle, this independent small muscle bundle may contract during mouth closing, appearing more markedly in the oral cavity. Therefore, examination should be performed not only with the mouth closed but also with assumed centric occlusion.

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In the fabrication of mandibular dentures, marginal sealing should be taken into consideration for the maintenance and stability of the denture. In particular, on the lingual side, the harmony with the tongue and the oral cavity is important, and accurate anatomical knowledge is necessary. Many books contain the anatomical information, especially on the lingual side, needed for the fabrication of mandibular dentures, i.e., the anatomical relationship between the lingual margin of the mandibular denture plate and the pterygoid muscle. However, there have been no studies which discussed the medial pterygoid muscle. Therefore, we selected specimens of the medial pterygoid muscle showing insertion of an independent small muscle bundle at its insertion site and evaluated the anatomical relationship to the denture.

Materials and Methods

We removed the medial pterygoid muscle from 42 male autopsy cases (84 muscle specimens) used for anatomical training at Tokyo Dental College between 1993 and 1995. Of these autopsy cases, five (10 specimens) showing insertion of an independent small muscle bundle at the insertion site of this muscle were entered...
into this study. The age range was 59 to 72 years. Since the state of occlusion was not likely to affect the morphology at the muscle insertion site, the dental formula was not recorded.

After the head was sagittally cut, the mandibular lingual side was approached from the medial side. The mylohyoid muscle, lingual nerve, medial pterygoid muscle, pterygomandibular ligament, and a part of the cheek muscle were exposed and their positional relationships observed.

Results

The insertion of the medial pterygoid muscle was classified according to the insertion morphology of the independent small muscle bundle into three types using the retromolar pad as a reference: Type I, insertion of the independent muscle bundle posterior to the retromolar pad (Figure 1); Type II, insertion immediately below the retromolar pad (Figure 2); and Type III, insertion into the fascia of the mylohyoid muscle (Figure 3).

Type I was observed in five of the ten specimens (five autopsy cases), Type II in three specimens, and Type III in two specimens (Table 1).

**Type I**

The medial pterygoid muscle and cheek muscle were removed, and the pterygomandibular ligament at the origin of the cheek muscle was exposed. As an inferior incision was made along the pterygomandibular ligament, an independent small muscle bundle of the medial pterygoid muscle appeared along the ligament. There was

<table>
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<td>1R I</td>
<td>4R II</td>
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<tr>
<td>1L I</td>
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<td>2R II</td>
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<td>2L I</td>
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<td>3R III</td>
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Figure 1

Type I: Insertion of the independent muscle bundle posterior to the retromolar pad (8); BM, buccinator muscle; RP, retromolar pad; D, denture; LN, lingual nerve; MPM, medial pterygoid muscle.

Figure 2

Type II: Insertion immediately below the retromolar pad (8); MPM, medial pterygoid muscle; RP, retromolar pad; D, denture; M, mylohyoid muscle.

Figure 3

Type III: Insertion into the fascia of the mylohyoid muscle (8); MPM, medial pterygoid muscle; M, mylohyoid muscle; LN, lingual nerve.
a lingual nerve between the medial pterygoid muscle and the independent small muscle bundle. The independent muscle bundle was inserted posterior to the retromolar pad. Type I was bilaterally observed in Cases 1 and 5 but only on the left side in Case 2.

Type II
As with Type I, the lingual nerve was present between the medial pterygoid muscle and an independent small muscle bundle. The muscle bundle extended downward, inserting immediately below the retromolar pad. Type II was bilaterally observed in Case 4 but only on the right side in Case 2.

Type III
As with Types I and II, the lingual nerve was present between the medial pterygoid muscle and an independent small muscle. The muscle bundle extended downward, inserting into the fascia of the mylohyoid muscle. Type III was bilaterally observed in Case 3.

Origin of the Independent Small Muscle Bundle
The independent small muscle bundle originated in the posterior bone wall of the maxilla in all ten specimens (Figure 4).

Intramuscular Distribution of the Medial Pterygoid Nerve
No independent nerve entered this independent small muscle bundle. In all specimens, the medial pterygoid nerve branched off, entering the small muscle bundle.

Discussion
The anatomical description for the fabrication process of mandibular dentures has not previously contained the description of the medial pterygoid muscle. The medial pterygoid muscle is a mouth-closing muscle that originates in the pterygoid plate and is inserted into the medial surface of the mandibular ramus. Concerning its origin, a bundle of this muscle has been reported to be attached to the posterior bone wall of the maxilla. However, its insertion has not been anatomically clarified in detail. This is partly because the medial pterygoid is present in a deep area, and its origin and insertion are difficult to observe.

We morphologically evaluated the insertion of the medial pterygoid muscle and observed insertion of an independent small muscle bundle in ten (11.9%) of the 84 autopsy specimens. Considering this percentage, the insertion of an independent small muscle bundle should be regarded as a variation of the medial pterygoid muscle in the clinical setting. In all ten specimens, the lingual nerve was present between the small muscle bundle and the remaining pterygoid muscle, making this small muscle bundle independent. This finding suggests that the muscle bundle formed at the stage of the development of the lingual nerve and medial pterygoid muscle.

Effects on the Denture
As shown in Figures 1, 2, and 3, Type II and III muscles were close to the mandibular denture, suggesting their effects on the denture. In the oral cavity, the independent muscle bundles in Types II and III may appear as a streak-like structure. When this structure is detected during examination for denture fabrication, consideration is needed. Since the medial pterygoid muscle is a mouth-clothing muscle, this independent small muscle bundle may contract during mouth-closing, more markedly appearing in the oral cavity. Therefore, examination should be performed not only with the mouth open but also with assumed centric occlusion.

A Type I muscle may not affect the mandibular denture based on the site of its insertion. However, the small muscle bundle in Type I runs along the pterygomandibular ligament at the origin of the cheek muscle; thus it may effect the margin of the maxillary denture plate during contraction (Figure 5).

Acknowledgements
This study was prompted by the request of an anatomical study by Dr. Kondo, a dentist in Shizuoka Prefecture, who said, “In examination of patients with an edentulous..."
jaw, a streak-like structure sometimes appears on the medial side of the retromolar pad. In such patients, the mandibular denture is unstable.” This is a question that can be raised only by dentists such as Kondo who have performed maintenance for a long period after denture application. We express deep gratitude to this great practitioner.

References

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