

Is the lateral pterygoid muscle palpable?

A pilot study for determining the possibilities of palpating the lateral pterygoid muscle

Language: English

Authors:

Wolfgang Stelzenmüller, Physiotherapy practice Neu-Isenburg

Dominic Weber, Radiological Joint Practice, Dept. for ENT and Dental Diagnostics, Frankfurt am Main

Dr. Volkan Özkan, Orthodontic Office Dr. Toll, Bad Soden/Ts

Prof. Dr. Wolfgang B. Freesmeyer, Department for Restorative Dentistry, Division of Prosthetics, Charité Berlin

Dr. Dr. Horst Umstadt, Clinic for Oral and Cranio-Maxillofacial Surgery, Philipps University, Marburg

Date/Event/Venue:

28/11/2004

AFDT

Bad Homburg Maritim Hotel

Poster Award

Best awarded poster presentation

Introduction

In numerous studies, the intraoral palpability of the lateral caput of the lateral pterygoid muscle has been questionable because of its topography [Türp and Minagi 2001, Stratmann et al. 2000, Mahlendorf and Stratmann 1989]. Thus, none of the recently published studies has provided reliable proof for or against the possibility of digital intraoral palpation, although palpation of the muscle is part of most of the examination catalogues for clinical functional analysis. Topography: In the infratemporal fossa originating at the lateral pterygoid plate and attached to the condylar process. Function: Protrusion and abduction (bilateral activity), mediotrusion (unilateral activity). Significance of digital palpability: In manual functional diagnostics, the muscle structure and pain sensation can be determined by digital palpation and subsequently treated by functional massage (opening and closing the mouth during digital palpation).

Material and Methods

Inclusion criteria:

30-year-old proband. Clinically and morphologically normal disc-condyle complex and bilaterally symmetrical muscle conditions after verification by MRI and manual functional analysis. No functional disorder of the chewing muscles.

2. Course of the examination:

- a. Checking the postulated access pathway based on anatomical preparations (figures 6-8).
- b. Digital palpation of the lateral pterygoid muscle. After laterotrusion of the mandible to the examined side, the index finger is run parallel to the superior alveolar process along the oral vestibule beyond the maxillary tuberosity up to the lateral pterygoid plate. The cranial part of the medial pterygoid muscle is crossed here. During palpation, the palpating finger makes a craniomedial movement at the end.
- c. MRI examination with acquisition of statistic T2-weighted axial slices for verifying bilaterally equivalent muscle conditions. Subsequent determination of the scanning axes and kinematic real-time imaging (true fisp) during intraoral digital muscle palpation. MRI apparatus: Siemens Symphony 1.5 Telsa
- d. Electromyogram: Localization and identification of the lateral pterygoid muscle using an EMG apparatus from the Dantec Co. (Keypoint Portable, Keypoint System Software 3.03). The electrode needle (monopolar lumen electrode from the Medtronic Co. 50 x 0.45 mm) is dorsocranially inserted about 3.5 cm into the middle of the soft-tissue gap, which is formed by the semilunar incisure and the zygomatic bone. For maximal innervation of the lateral pterygoid muscle, the patient is asked to shift the lower jaw in the contralateral direction. The monitor setting is adjusted to 100 ms. The amplification is in the 100-500 μ V range.

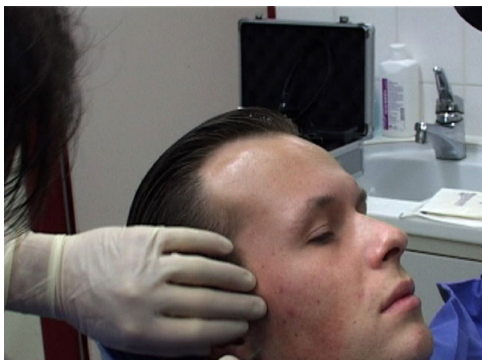


Figure 1: Palpation of the incisure



Figure 2: Insertion of the electrode



Figure 3: Palpation in MRI



Figure 4: Palpation with mouth open

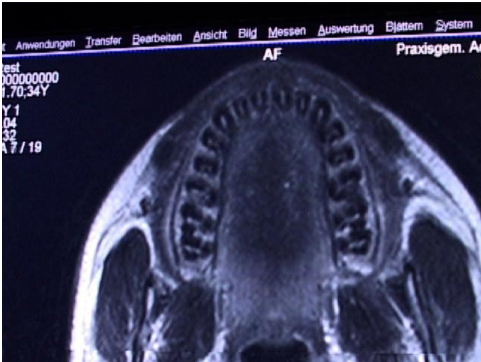


Figure 5: Fulfillment of the inclusion criteria

Results

- a. Digital muscle palpation was performed intraorally according to the above-mentioned criteria (see 2b, Materials and methods) on five preparations after exposure of the infratemporal fossa and visualization of the lateral pterygoid muscle. Direct digital palpation of the lateral pterygoid muscle was seen in all five cases.



Figure 6: Access pathway



Figure 7: Palpation via the oral vestibule



Figure 8: Red: lateral pterygoid muscle
Yellow: medial pterygoid muscle

- b. The successful palpation was carried out and approved during laterotrusion to the examined side (relaxation). While opening and closing the mouth (contraction) the muscle is palpable.



Figure 9: laterotrusion



Figure 10: Palpation of the lateral pterygoid muscle(s. 2b)

c. In the real-time kinematic measurements, an impression of the lateral caput of the left lateral pterygoid muscle was found up to 6 mm.



Figure 11: Measurement slice before palpation

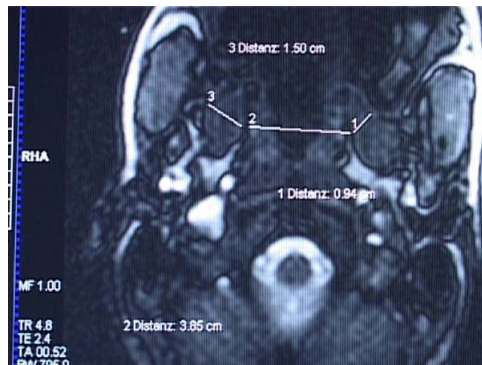


Figure 12: Measurement slice during palpation

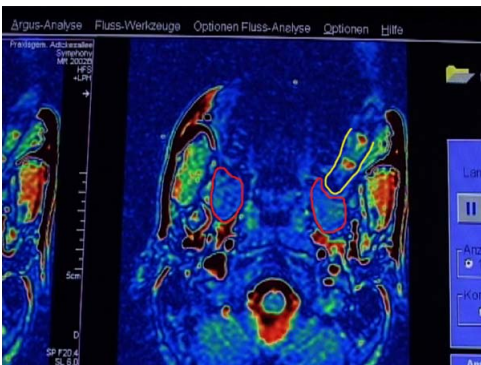


Figure 13: Red: lateral pterygoid muscle
Yellow: palpating finger

d. Electromyographic detection by direct signal conduction with concomitant palpation is possible. The injection electrode tested in situ in the muscle was felt transorally with the palpating finger.



Figure 14: EMG at rest

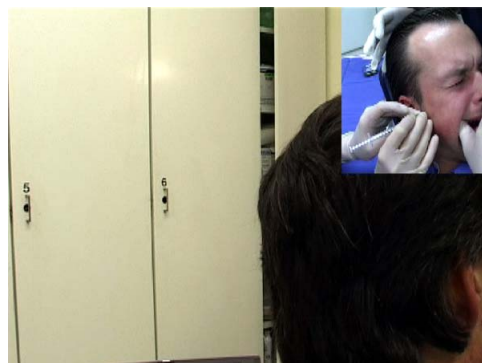


Figure 15: EMG during palpation

Conclusions

In contrast to reports in the literature [Türp and Minagi 2001, Stratmann et al. 2000, Mahlendorf and Stratmann 1989], we reliably confirmed the palpation of the lateral pterygoid muscle, which was controlled by two imaging procedures. All three of the procedures confirmed palpation. The difficulty in reliably identifying the muscle seems to be due to the fact that the medial pterygoid muscle must be passed before palpating the lateral pterygoid muscle.

Literature

- Türp JC, Minagi S., Palpation of the lateral pterygoid region in TMD--where is the evidence?, J Dent. 2001 Sep;29(7):475-83
- Stratmann U, Mokrys K, Meyer U, et. al., Clinical anatomy and palpability of the inferior lateral pterygoid muscle, J Prosthet Dent. 2000 May;83(5):548-54
- Long JH Jr., Occlusal adjustment as treatment for tenderness in the muscles of mastication in category patients, J Prosthet Dent. 1992 Apr;67(4):519-24
- Mahlendorff M, Stratmann U., Macro-anatomical studies on the palpability of the lateral inferior pterygoid muscle, Dtsch Zahnarztl Z. 1989 Nov;44(11 Spec No):S78-81
- Thomas CA, Okeson JP., Evaluation of lateral pterygoid muscle symptoms using a common palpation technique and a method of functional manipulation, Cranio. 1987 Apr;5(2):125-9

This Poster was submitted by [Volkan Özkan](#).

Correspondence address:

Wolfgang Stelzenmüller
Physiotherapy practice Neu-Isenburg
Stresemannstr. 2-4
63303 Dreieich



Is the lateral pterygoid muscle palpable?

A pilot study for determining the possibilities of palpating the lateral pterygoid muscle

Stelzenmüller W.¹, Weber D.², Özkan V.³, Freesmeyer W.B.⁴, Umstadt H.E.⁵

¹Physiotherapy Practice New, Marburg; ²Stomatologisches Joint Practice Adickesallee Frankfurt am Main; ³Dept. for ENT and Dental Diagnostics, KfO Medizin Dr. Toll, Bad Soden/Ta.; ⁴Department for Restorative Dentistry, Division of Prosthodontics, Charité Berlin Campus Benjamin Franklin; ⁵Clinic for Oral and Cranio-Maxillofacial Surgery, Philipps University, Marburg

Introduction

In numerous studies, the intraoral palpability of the lateral caput of the lateral pterygoid muscle has been questionable because of its topography [Türp and Minagi 2001, Stratmann et al. 2000, Mahlendorf and Stratmann 1999]. Thus, none of the recently published studies has provided reliable proof for or against the possibility of digital intraoral palpation, although palpation of the muscle is part of most of the examination catalogues for clinical functional analysis.

Topography: In the infratemporal fossa originating at the lateral pterygoid plate and attached to the condylar process.

Function: Protrusion and abduction (bilateral activity), mediotrusion (unilateral activity).

Significance of digital palpability: In manual functional diagnostics, the muscle structure and pain sensation can be determined by digital palpation and subsequently treated by functional massage (opening and closing the mouth during digital palpation).

Materials and methods

1. **Inclusion criteria:** 30 year old subject. Clinically and morphologically normal disc, craniocervical complex and bilaterally symmetrical muscle conditions after verification by MRI and manual functional analysis. No functional disorder of the chewing muscles.
2. **Course of the examination:**
 - a. Checking the postulated access pathway based on anatomical preparations (figures 6 & 7)
 - b. Digital palpation of the lateral pterygoid muscle. After laterotrusion of the mandible to the examined side, the index finger is run parallel to the superior alveolar process along the oral vestibule beyond the maxillary tuberosity up to the lateral pterygoid plate. The cranial part of the medial pterygoid muscle is crossed here. During palpation, the palpating finger makes a craniomedial movement at the end.
 - c. MRI examination with acquisition of static T2-weighted axial slices for verifying bilaterally equivalent muscle conditions. Subsequent determination of the scanning axes and kinematic real-time imaging (True-isp) during intraoral digital muscle palpation. MRI apparatus: Siemens Symphony 1.5 Tesla

- d. **Electromyogram:** Localization and identification of the lateral pterygoid muscle using an EMG apparatus from the Dantec Co. (Keypoint Portable, Keypoint System Software 3.03). The electrode needle (monopolar lumen electrode from the Medtronic Co., 50 x 0.45 mm) is dorsocranially inserted about 3.5 cm into the middle of the soft tissue gap, which is formed by the semilunar incisure and the zygomatic bone. For maximal innervation of the lateral pterygoid muscle, the patient is asked to shift the lower jaw in the contralateral direction. The monitor setting is adjusted to 100 ms. The amplification is in the 100-300 µV range.



Left: Figure 1: Palpation of the incisure
Right: Figure 2: insertion of the electrode



Figure 3: Palpation in MRI Figure 4: Palpation with mouth open Figure 5: Full extent of the inclusion criteria

Results

- a. Digital muscle palpation was performed intraorally according to the above mentioned criteria (see 2b, Materials and methods) on five preparations after exposure of the infratemporal fossa and visualization of the lateral pterygoid muscle. Direct digital palpation of the lateral pterygoid muscle was seen in all five cases.



Figure 6: Access pathway Figure 7: Palpation via the oral vestibule Figure 8: Red: lateral pterygoid muscle Yellow: medial pterygoid muscle

- b. The successful palpation was carried out and approved during laterotrusion to the examined side (relaxation). While opening and closing the mouth (contraction) the muscle is palpable.



Left: Figure 9: laterotrusion
Right: Figure 10: Palpation of the lateral pterygoid muscle (s. 2b)

- c. In the real-time kinematic measurements, an impression of the lateral caput of the left lateral pterygoid muscle was found up to 6 mm.

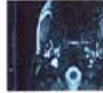


Figure 11: Measurement slice before palpation Figure 12: Measurement slice during palpation Figure 13: Red: lateral pterygoid muscle Yellow: palpating finger

- d. Electromyographic detection by direct signal conduction with concomitant palpation is possible. The injection electrode tested in situ in the muscle was felt transversely with the palpating finger.



Left: Figure 14: EMG at rest
Right: Figure 15: EMG during palpation

Discussion

In contrast to reports in the literature [Türp and Minagi 2001, Stratmann et al. 2000, Mahlendorf and Stratmann 1999], we reliably confirmed the palpation of the lateral pterygoid muscle, which was controlled by two imaging procedures. All three of the procedures confirmed palpation. The difficulty in reliably identifying the muscle seems to be due to the fact that the medial pterygoid muscle must be passed before palpating the lateral pterygoid muscle.

Conclusion

The basic requirement for successfully palpating the lateral pterygoid muscle is exact knowledge of muscle topography and the intraoral palpation pathway. After documented palpation of the muscle belly in cadaverous preparations, MRI and EMG also visualized palpation of the lateral pterygoid muscle in vivo. The palpation technique seems to be essential and basically feasible.

Acknowledgments

We would like to thank Prof. Dr. H.-W. Wörff, Executive Director of the Anatomical Institute II of Dr. Senckenberg's Anatomy at the Johann Wolfgang Goethe University Hospital in Frankfurt am Main, Mr. D. Toll, DDS, KFO Bad Soden/Ta., Dr. Robert Aarns, Executive Partner of the Joint Radiological Practice Adickesallee Frankfurt am Main and our proband, Mr. Gregor Kutack, doctoral candidate.

Literature

- Türp JC, Minagi S. Palpation of the lateral pterygoid region in TMD - where is the evidence? J Dent 2001 Sep;29(7):478-80.
- Stratmann U, Mokeys K, Meyer U, et al. Clinical anatomy and palpability of the inferior lateral pterygoid muscle. J Prosthet Dent. 2000 May;83(5):548-56.
- Long JH Jr. Occlusal adjustment as treatment for tenderness in the muscles of mastication in category 1 patients. J Prosthet Dent. 1992 Apr;67(4):519-24.
- Mahlendorf M, Stratmann U. Macro-anatomical studies on the palpability of the lateral inferior pterygoid muscle. Dtsch Zahnärztl Z. 1999 Nov;44(11 Spec No):578-80.
- Thomas CA, Dawson PE. Evaluation of lateral pterygoid muscle symptoms using a common palpation technique and a method of functional manipulation. Cranio. 1987 Apr;5(2):126-9.