

Masseter Muscle Inserted in the Temporomandibular Joint Discocapsular Complex, a Case Report

Inserción del Músculo Masétero en el Complejo Discocapsular de la Articulación Temporomandibular, Reporte de un Caso

Iván Suazo Galdames; Mario Cantín López; Ignacio Roa Henriquez; Pedro Aravena Torres & César Coronado Gallardo

SUAZO, G. I.; CANTÍN, L. M.; ROA, H. I.; ARAVENA, T. P. & CORONADO, G. C. Masseter muscle insert in the temporomandibular joint discocapsular complex, a case report. *Int. J. Odontostomat.*, 2(2):143-146, 2008.

ABSTRACT: The presence of muscle insertions in the temporomandibular joint disc have a great importance in the dynamic joint. This article presents a case of bilateral insertion of deep fascicle of the masseter muscle in the temporomandibular joint capsule and disc in a Spain corpse, describes the microscopic and macroscopic appearance of variation and a brief review of the functional implications.

KEY WORDS: temporomandibular joint, muscle-disc apparatus, masseter muscle.

INTRODUCTION

Normal functioning of the temporomandibular joint depends of its morphological components harmony (articular surfaces, disc, ligaments, muscles). Several authors have indicated the functional importance of muscle-disc apparatus (Bade *et al.*, 1994; Bade, 1999; Alomar *et al.*, 2007), establishing an intimate relationship that exists between the pterygoideus lateralis muscle and disc (Le Toux *al.*, 1989, Murray *et al.*, 2007), involved in the pathogenesis of temporomandibular disorders (Lafreniere *et al.*, 1997). In addition, Dauber (1987) indicated the role of pterygoideus lateralis muscle in the muscle-disc apparatus, also involved the deep fascicle of the masseter muscle and the temporalis muscle, playing a role in the disk stabilizing during the function.

Histological and anatomical studies have described the insertion of the masseter muscle in the temporomandibular joint capsule and articular disc (Couly *et al.*, 1975; Griffin *et al.*, 1975; Schmolke, 1994; Bravetti *et al.*, 2004)

Due to the importance of understanding the muscular relations with the components of tempo-

mandibular joint for the interpretation of the temporomandibular disorders (Kieser & Herbison, 2000), in this work is analyzed and described macroscopic and microscopically a case of masseters muscle insertion on the disc and capsule of the temporomandibular joint.

RELATE OF CASE

In this study was used an adult male corpse, 55 year old, Spanish nationality, donated to the Universidad de Talca from the Universidad Cardenal Herrera de Valencia, Spain. The corpse was preserved through intravascular injection of fixative conservative based on formaldehyde and its arterial territory replete with red coloured latex.

Macroscopy. Was conducted a dissection of the region by planes in the left and right temporomasseteric regions, for it was made a pre-auricular skin incisions elongated to the basilar edge of mandible, removed the surface flat the masseteric fascia was is desinserted

from the zygomatic arch. The masseters fascicles were dissected, the superficial fascicle has complied with the classical provision with fibers oriented obliquely to its insertion into the zygomatic bone. In the deep fascicle of the masseter muscle their fibers disposed in vertical orientation, originating mainly from the middle third of the mandibular ramus inserting in the lower margin and the lateral face of zygomatic arch, fixing firmly from anterior zygomatic tubercle and extends posteriorly to the posterior zygomatic tubercle of the temporal bone. From the posterior third insertion, the deep masseter muscle creates a flat triangular band whose fibers diverge toward superior and posterior, that perforated the posterolateral segment of the temporomandibular joint capsule, inserted in it and ending in the posterolateral segment of joint disc (Fig. 1).

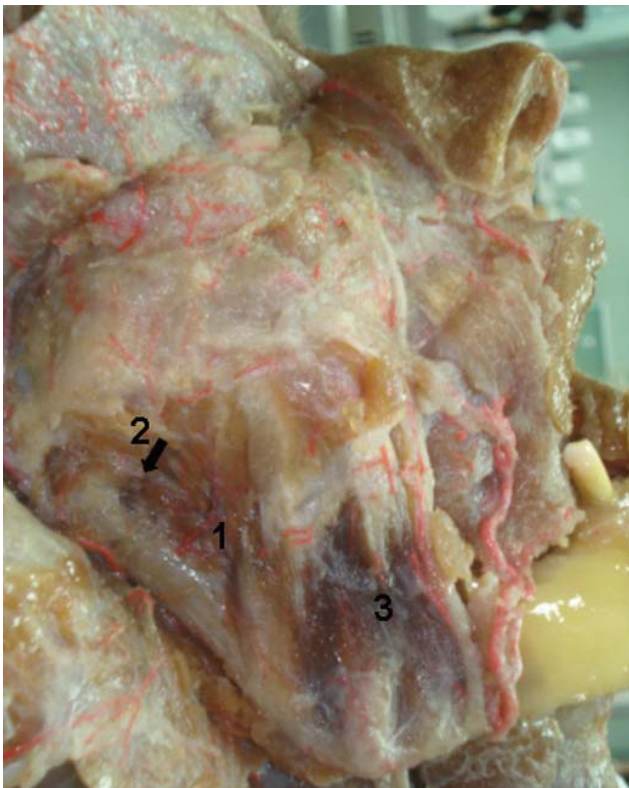


Fig 1. Deep masseter muscle (1), posterior fibers of deep masseter muscle reaching to the temporomandibular joint, note the oblique and posterior guidance of these fibers (2) and Superfial masseter muscle (3).

Histology. Once the dissection of the joints, was conducted in block section of the temporomandibular joint region, 0.5cm exceeding the limits defined by the joint capsule, obtained the pieces were put in buffered formalin for 72 hours and descalcificated with Nitric acid 5% for 7 days. Then the pieces were included in paraffin and were seriated sections microtomed at a thickness

of 20 mm, stained with hematoxylin eosin, each slides was observed using an optical microscope ZEISS, model 0.25 Standard (Germany). In Figure 2, a human ATM coronal cut can be seen articular disk (D), capsule (CA) whit disgregated fibrous tissue and striated muscle fiber (MF) projecting obliquely towards the lower end of the joint capsule. Details of muscle fibers can be seen in Fig. 3.

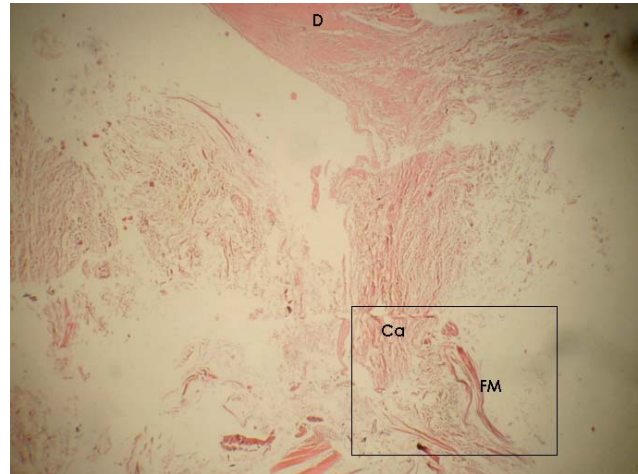


Fig 2. Coronal section of human ATM (hematoxylin-eosin 3.2 X) shows joint disc (D), capsule (CA) whit disgregated fibrous tissue and striated muscle fibers (MF).

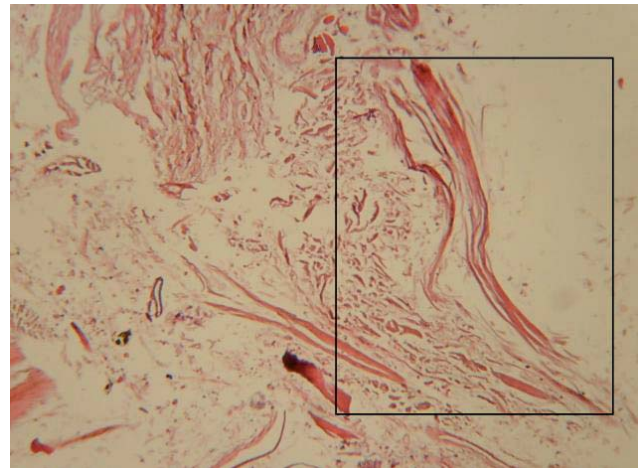


Fig 3. Details of the area defined in Figure 2, have shown striated muscle fibers (10 X).

DISCUSSION

The role of the muscles in the movement that makes the articular disc in mandibular movement has been discussed by many authors (Iwasaki *et al.*, 2003, Dargaud & Vinkka-Puhakka, 2004).

In this paper presents a corpse with bilateral of deep fascicle of masseter muscle in the temporomandibular joint capsule and articular disc, this case can be regarded as an anatomical variation, as the classical authors do not consider insertions of masseter at this level (Testut, 1981; Rouvière & Delmas, 1999; Figún & Garino, 2001; Latarjet & Ruiz-Liard, 2004), but this disposition has been reported by some authors (Couly *et al.*; Bravetti *et al.*), which have indicated that the activity of the muscles inserts in the lateral side of the disc establishes a balance with the

forces that carried out the pterygoideus lateralis muscle.

For Itoh & Hayashi (2000) coordinated activity of masseters and anterior temporal muscle can minimize tensions in the middle joint disc, while for Baba *et al.*, (2005) altered masseter activity during sleep can be related with the emergence of signs and symptoms of temporomandibular disorders. Variations as presented in this report justify a proper clinical analysis of muscle-disc apparatus of the temporomandibular joint.

SUAZO, G. I.; CANTÍN, L. M.; ROA, H. I.; ARAVENA, T. P.; & CORONADO, G. C. Inserción del músculo masétero en el complejo discocapsular de la articulación temporomandibular, reporte de un caso. *Int. J. Odontostomat.*, 2(2):143-146, 2008.

RESUMEN: La presencia de inserciones musculares en el disco de la articulación temporomandibular tiene gran importancia en la dinámica de la articulación. En este artículo se presenta un caso de la inserción bilateral del fascículo profundo del músculo masétero en la cápsula y disco de la articulación temporomandibular en un cadáver español, se describe el aspecto macroscópico y microscópico de la variación y se realiza una breve revisión de las implicancias funcionales.

PALABRAS CLAVE: Articulación Temporomandibular, Aparato Disco Muscular, Músculo Masetero.

REFERENCES

- Alomar, X.; Medrano, J.; Cabratosa, J.; Clavero, J. A.; Lorente, M.; Serra, I.; Monill, J. M. & Salvador, A. Anatomy of the temporomandibular joint. *Semin. Ultrasound CT MR*, 28(3):170-83, 2007.
- Baba, K.; Haketa, T.; Sasaki, Y.; Ohyama, T. & Clark, G. T. Association between masseter muscle activity levels recorded during sleep and signs and symptoms of temporomandibular disorders in healthy young adults. *J. Orofac. Pain*, 19:226-31, 2005.
- Bade, H. The function of the disco-muscular apparatus in the human temporomandibular joint. *Ann. Anat.*, 181:65-7, 1999.
- Bade, H.; Schenck, C. & Koebke, J. The function of discomuscular relationships in the human temporomandibular joint. *Acta Anat. (Basel)*, 151:258-67, 1994.
- Bravetti, P.; Membre, H.; El Haddioui, Gérard, H.; Fyard, J. P.; Mahler, P. & Gaudy, J. F. Histological study of the human temporo-mandibular joint and its surrounding muscles. *Surg. Radiol. Anat.*, 26(5):371-8, 2004.
- Couly, G.; Hureau, J. & Vaillant, J. M. The dynamic complex of the temporomandibular meniscus. *Rev. Stomatol. Chir. Maxillofac.*, 76(8):597-605, 1975.
- Dargaud, J. & Vinkka-Puhakka, H. The temporomandibular articulation. *Morphologie*, 88:3-12, 2004.
- Dauber, W. Die Nachbarschaftsbeziehungen des Discus articularis des Kiefergelenks und ihre funktionelle Deutung. *Schweiz MSchr. Zahnmed*, 97:427-37, 1987.
- Figún, M. & Garino, R. *Anatomía Odontológica Funcional y Aplicada*. 2ª. ed. Buenos Aires, El Ateneo, 2001.
- Griffin, C. J., Hawthorn, R. & Harris, R. Anatomy and histology of the human temporomandibular joint. *Monogr. Oral Sci.*, 4:1-26, 1975.
- Itoh, K. I. & Hayashi, T. Functions of masseter and temporalis muscles in the control of temporomandibular joint loading--a static analysis using a two-dimensional rigid-body spring model. *Front Med. Biol. Eng.*, 10:17-31, 2000.

Iwasaki, L. R.; Baird, B. W.; McCall, W. D. Jr. & Nickel, J. C. Muscle and temporomandibular joint forces associated with chincup loading predicted by numerical modeling. *Am. J. Orthod. Dentofacial Orthop.*, 124:530-40, 2003.

Kieser, J. A. & Herbison, G. P. Anatomical knowledge and clinical evaluation of the muscles of mastication. *Clin. Anat.*, 13:94-6, 2000.

Lafreniere, C. M.; Lamontagne, M. & el-Sawy, R. The role of the lateral pterygoid muscles in TMJ disorders during static conditions. *Cranio*, 15:38-52, 1997.

Latarjet, M. & Ruiz-Liard, A. *Atlas de Anatomía*. 2ª ed. Buenos Aires, Panamericana, 2004.

Le Toux, G.; Duval, J. M. & Darnault, P. The human temporo-mandibular joint: current anatomic and physiologic status. *Surg. Radiol. Anat.*, 11:283-8, 1989.

Murray, G. M.; Bhutada, M.; Peck, C. C.; Phanachet, I.; Sae-Lee, D. & Whittle, T. The human lateral pterygoid muscle. *Arch. Oral Biol.*, 52:377-80, 2007.

Rouvière, H. & Delmas, A. *Anatomía Humana Descriptiva, Topográfica y Funcional*. 10 a ed. Barcelona, Masson, 1999.

Schmolke, C. The relationship between the temporomandibular joint capsule, articular disc and jaw muscles. *J. Anat.*, 184(2):335-45, 1994.

Testut, L. *Tratado de Anatomía Topográfica*. 8ª ed. Barcelona, Salvat, 1981.

Correspondence to:
Prof. Dr. Iván Suazo Galdames
Unidad de Anatomía Normal
Universidad de Talca
Avenida Lircay s/n oficina N°104
Talca - CHILE

Phone 56-71-201682

Email: isuazo@utalca.cl

REceived: 16-06-2008

Accepted: 22-07-2008