

Importance of knowledge of the lateral pterygoid muscle's anatomy and its variations

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Dear editor,

In the present letter, we shall discuss the importance of the relevance of the knowledge of the lateral pterygoid muscle morphology for the dentistry profession, regarding a review published by our team in the 3rd volume of this year, in which we have collected evidence regarding the percentage of anatomical variation of the lateral pterygoid muscle reported in the literature, which is much less than what actually occurs in the population. Furthermore, it should be noted that in pathologies of the temporomandibular joint, this muscle plays a crucial role, for it is compromised or is even the cause of the pathology.

The process leading to the anatomical knowledge of the lateral pterygoid muscle (LPM) becomes quite complex both at the level of the general study and its dissection, because access to the LPM is complex due to its anatomical location in the deep part of the infratemporal fossa, and also attributed to the large number of vascular and nervous structures that surround it. Knowing the anatomy of the LPM has become very im-

portant both for the study of anatomists on dissection tables, as well as for health professionals, such as dental surgeons who operate in the clinic day by day with surgical or conservative management of the LPM. In the classic description of the LPM anatomy, it is noted that this muscle has 2 bellies, but there are anatomical variations that have been studied frequently over time (Coskun et al., 2009). In this regard, Stocke's review provides us with the following data on its variability: the authors reviewed 68 articles of the LPM, of which 60 articles (88.2%) identified an LPM with two heads; 5 studies (7.4%) described an MPL with three heads, and finally 3 studies (4.4%) described an LPM with one head. These results should be carefully considered because some of the studies mentioned above examined the temporomandibular joint (TMJ) region, but did not focus on LPM and its anatomical variations (Stocke et al., 2018).

From his professional development, the dental surgeon acquires anatomical knowledge and recognizes the clinical importance of LPM, given his agonistic participation in the function of TMJ, as part of the group of masticatory muscles, contributing both to normal function and to different pathological conditions to which LPM is faced. In

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this short commentary we will describe how LPM influences the following pathological conditions; temporomandibular disorders (TMD), trauma to the TMJ, and, finally, the participation of the LPM in the headache symptoms (Staniszewski et al., 2018; Desmons et al., 2006).

TMD from the clinical and semiological study are characterized by presenting painful symptoms in the TMJ and its surrounding structures (Murray et al., 2007). One of the classic characteristics of patients with TMD is that they have functional hypertrophy of the LPM, although the above is not associated as a classic sign, many studies report this condition in patients with TMD (Laney et al., 2001). One of the characteristics of TMD is that the main masticatory muscle affected is the LPM, which makes it extremely important to know its anatomy and anatomical variations, since in the literature review by Valenzuela et al. (2020) it was found as one of the reported results that LPM anatomical variations with either three bellies or 1 muscular belly, could be one of the factors that come to combine the appearance or symptoms of TMD.

Another pathological condition where the LPM plays an important role in the clinical presentation of the pathology and in the rehabilitation processes is TMJ trauma. Being traumatic events where the mechanism of injury involves axial loads on the TMJ or some bone component of the joint, since these types of loads greatly compromise the LPM in trauma (Cao et al., 2015). Clinical experiments have shown that the LPM exerts loads on the mandibular condyle, which favors osteogenesis, playing a crucial role in the formation of bone callus after the fracture, as long as the loads are regulated and graduated with a correct rehabilitation process. If TMJ growth is left without gradual management, it will produce deformities in bone growth, which will not be beneficial for LPM or TMJ (Philling et al., 2006). Associated with the above, no studies were found that related anatomical variations with this bone formation after the fracture or osteogenesis but, based on the mechanics and the insertion in the variations of the LPM, it could be interesting to study the relationship between LPM variations and TMJ trauma (Bernal et al., 2016).

Last but not least, we will now describe how LPM can be the cause of migraine processes in TMJ pathologies. As we mentioned previously, the LPM tends to present hypertrophy in patients with TMD who simultaneously had symptoms of migraine. In addition, if we introduce ourselves to the analysis of the migraine clinic, patients often present or describe abnormal mandibular movements that in many cases seem to be common signs in patients with migraine and TMD. Although radiologically not all patients with TMD and migraine showed hypertrophy of the LPM, as in the case of traumatic events, no studies were found to report variations in the LPM associated with migraine (Pereira et al.,

2015).

We believe as a team that LPM research in recent years has become crucial for the study and management of dental pathologies, which is why knowing the anatomy and mechanics of this muscle becomes very important in the treatment and diagnosis decision of various TMJ pathologies. New lines of research and future studies will decipher the unknowns that are generated as we create new knowledge about LPM. We are fully aware that LPM participates in more clinical conditions, but according to the incidence of what is reported in the scientific literature, it is the reason why we decided to give guidance to the three conditions mentioned in this short commentary.

REFERENCES

- BERNAL C, GONZALEZ O, MORENO M (2016) New anatomo-radiological findings of the lateral pterygoid muscle. *Surg Radiol Anat*, 54: 1-11.
- CAO Y, ZHANG W, YAP AU, XIE QF, FU KY (2012) Clinical characteristics of lateral pterygoid myospasm: a retrospective study of 18 patients. *Oral Surg Oral Med Oral Pathol Oral Radiol*, 113(6): 762-765.
- COSKUN G, GOVSA F, OZGUR Z (2009) Examination of the heads of the lateral pterygoid muscle on the temporomandibular joint. *J Craniofac Surg*, 20: 219-223.
- DESMONS S, GRAUX F, ATASSI M, LIBERSA P, DUPAS PH (2007) The lateral pterygoid muscle, a heterogeneous unit implicated in temporomandibular disorder: a literature review. *J Cranio*, 25(4): 283-291.
- LAMEY PJ, BURNETT CA, FARTASH L, CLIFFORD TJ, MCGOVERN JM (2001) Migraine and masticatory muscle volume, bite force, and craniofacial morphology. *Headache*, 41: 49-56.
- MURRAY G, BHUTADA M, PECK C, PHANACHET I, SAE-LEE D, WHITTLE T (2007) The human lateral pterygoid muscle. *Arch Oral Biol*, 52: 377-80.
- PEREIRA SL, FERREIRA AL, OLIVEIRA T, FLORES IL, DIBO A, MIN LL (2015) Lateral pterygoid muscle volume and migraine in patients with temporomandibular disorders. *Imaging Sci Dent*, 45(1): 1-5.
- PILLING E, SCHNEIDER M, MAI R, LOUKOTA RA, ECKELT U (2006) Minimally invasive fracture treatment with cannulated lag screws in intracapsular fractures of the condyle. *J Oral Maxillofac Surg*, 64: 868-872.
- STOCKLE M, FANGHANEL J, KNUTTEL H, ALAMANOS C, BEHR M (2019) The morphological variations of the lateral pterygoid muscle: A systematic review. *Ann Anat*, 222: 79-87.
- STANISZEWSKI K, LYGRE H, BIFULCO E, KVINNSLAND S, WILLASSEN L, HELGELAND E, BERGE T, ROSÉN A (2018) Temporomandibular disorders related to stress and HPA-axis regulation. *Pain Res Manag*, 70: 207-251.
- VALENZUELA JJ, ORELLANA M, GOLD M, GARCIA G, SANTANA E (2020) Anatomy of the lateral pterygoid

muscle and its relationship with temporomandibular disorders. A literature reviews. *Eur J Anat*, 24(3): 249-256.