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Relationship between Lateral Pterygoid Muscle and Internal Derangement of Tmj On Assessment Using Mri Imaging: A Review

Sreejith V P[1], Ajun Suri[2], Rahila Banu[2], Arjun Gopinath[3], Jibin Jose Tom[4]
1 Professor and HOD, Department of Oral and Maxillofacial Surgery, Kannur Dental College, Anjarakandy, Kerala
2 Post Graduate Student, Department of Oral and Maxillofacial Surgery, Kannur Dental College, Anjarakandy, Kerala.
3 Reader, Department of Oral and Maxillofacial Surgery, Kannur Dental College, Anjarakandy, Kerala.
4 Assistant Professor, Department of Oral and Maxillofacial Surgery, Kannur Dental College, Anjarakandy, Kerala.
Corresponding Author : Ajun Suri,

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ABSTRACT: STATEMENT OF PROBLEM: The recent literature underlines the interrelation between the lateral pterygoid muscle attachment and internal derangement of TMJ assessed using MRI imaging.
PURPOSE: The purpose of this review was to appraise the available literature on the correlation between the effect of internal derangement of TMJ on lateral pterygoid muscle or vice versa.
MATERIAL AND METHODS: An electronic search restricted to the English language publications beginning in 1992 were performed in PubMed, Science Direct. Additional publications revealed by reviewing the reference lists of articles identified through PubMed search were also taken into account. The literature search covered the years 1992 to 2019. The focus of the searches were on publications that contained data related to original studies on internal derangement of TMJ, effect on lateral pterygoid muscle, position of attachment of lateral pterygoid muscle, MRI imaging of TMJ with internal derangement.
RESULTS: The search produced numerous potentially relevant titles, of which only a few were found eligible. While there was no statistically significant correlation between the lateral pterygoid muscle attachment type and TMJ derangement, significant change in the thickness of lateral pterygoid muscle was seen in internal derangement of TMJ.
CONCLUSION: Clinicians should be aware of the various conditions associated with TMJ pain. Thorough investigation should be carried out using the best available resources in this developing digital world through the treatment planned based on the outcome of the investigations.

KEYWORDS: Internal derangement, temporomandibular joint, lateral pterygoid muscle, MRI Imaging, Disc displacement

I. INTRODUCTION

Temporomandibular joint (TMJ) is a joint connecting the jaw bone to the skull. It is a bilateral synovial articulation between the temporal bone of the skull above and the mandible below. It is a bilateral joint that functions as one unit.

Temporomandibular joint pain is generally due to internal derangements, which is an abnormal relationship of the disc to adjacent articular surfaces of the joint. Disc displacement is an example of internal derangement. This is when the articular disc, attached anteriorly to the superior head of the lateral pterygoid muscle and posteriorly to the retrodiscal tissue, moves out from between the condyle and the fossa, so that the mandible and temporal bone contact is made on something other than the articular disc. Thisis usually very painful, because unlike these adjacent tissues, the central portion of the disc contains no sensory innervation.

In most instances of disorder, the disc is displaced anteriorly upon translation, or the anterior and inferior sliding motion of the condyle forward within the fossa and down the articular eminence.

There are various modalities available for imaging TMJ and the best is MRI evaluation. The study should include oblique sagittal spin and gradient echo T2 WIs on each TMJ separately both in open and closed mouth positions. Normally the disc is biconcave structure, returns low signal on all sequences, located between the condyle and temporal bone and its posterior band is located at 12 o'clock position[1] with the angle between its

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posterior limit and vertical orientation of the condyle doesn't exceed 10^{o}.

The aim of this review is to assess the effect of internal derangement of TMJ on the lateral pterygoid muscle through years of research on individuals using MRI imaging.

II. MATERIALS AND METHODS

This is a narrative review of the pertinent literature on correlation between the lateral pterygoid muscle and internal derangement of TMJ upon MRI imaging is based on scientific articles restricted to English language published between 1992 and 2019, indexed in Science Direct and PubMed databases. The focus of the searches were on publications that contained data related to original studies associated data related to internal derangement of TMJ, effect on lateral pterygoid muscle, position of attachment of lateral pterygoid muscle, MRI imaging of TMJ with internal derangement.

III. DISCUSSION

Various studies have been conducted over decades to relate the effects of TMJ derangement on the Lateral Pterygoid muscle as well as the attachment of lateral pterygoid muscle as a possible etiology of TMJ derangement.

A study by Am. J Radiol in 1992 was carried out relating thickness of lateral pterygoid muscle and type of disc displacement using MRI imaging. Measurements were made when both the muscle heads had sharp images and were present in two consecutive sections. Disc positions were classified as a) Normal where the disc was located superior to the condyle in which the posterior band of the TMJ disc is at the apex of condylar head, b) Disc displacement with reduction where the disc is displaced anteriorly in the closed mouth position but comes to normal position during opening of mouth, c) Disc displacement without reduction where the disc is displaced in both closed and opened mouth positions, and d) Posterior disc displacement where the disc is displaced posteriorly in open and closed mouth positions[1].

In an experimental study by Murray G M in 2004 he concluded that the two heads of the lateral pterygoid muscle namely the superior head and the inferior head, has a major role in controlling the mandible and TMJ function[2]. Anatomic study of TMJ showed hypertrophy of superior belly of lateral pterygoid in TMJ with pathological changes of discs or osseous changes of the condyle[3]. Manual traction of the superior head of lateral pterygoid in cadavers have shown to bring both condyles and disc forward together[4]. Another study by Lund J P in 2005 concluded that any disturbance to the activity of lateral pterygoid muscle becomes an etiology of TMJ disorders[5].

N Taskaya Yilmaz in 2005 conducted a study on 115patients with internal derangement and 21 patients without clinical symptoms where disc position and lateral pterygoid muscle, presence of muscle atrophy and degeneration were evaluated. It was concluded that since superior head of lateral pterygoid is attached to disc, it can easily displace anteriorly. This will reduce the function of superior head of lateral pterygoid muscle causing muscle atrophy. The activity is further reduced as the disc permanently dislocates in TMJ with anterior disc displacement without reduction. Spasm of lateral pterygoid causes disc displacement and atrophy[4].

Guhan Dergin in 2012 conducted a study on 49 patients with any one of a TMJ disorders like clicking, locking, restricted movement or pain. The lateral pterygoid attachments were classified into three types: Type 1 where the fibers of the superior head were attached to the disc and inferior head to the condyle, Type 2: where the fibers of the superior head were attached to the condyle and disc and inferior head to the condyle and Type 3: where the fibers of the superior head were attached to the disc and the fibres of middle part and inferior head were attached to the condyle. There was no statistically significant correlation found between the type of muscle attachment and presence and absence of disc displacement, disc degeneration, articular surface degeneration and mobility[6].

In a study by Shivlal Rawlaniin 2013, females in the third and fourth decade of life showed disc displacement in TMJ. In symptomatic patients, most common abnormality was disc displacement with reduction followed by disc displacement without reduction and posterior disc displacement. There was a significant hypertrophy of lateral pterygoid muscle in temporomandibular disorders and it was concluded that it can aggravate internal derangement of TMJ or internal derangement can affect the function and thickness of lateral pterygoid muscle[7].

In a research by S.G. Finden in 2019 patients with displacement of the TMJ disc with and without reduction were identified. Absolute measurements of thickness as well as region-of-interest measurements were placed over the two heads of the lateral pterygoid muscle bilaterally on sagittal T1- and T2-weighted images. Statistically significant differences between the superior and inferior heads of the lateral pterygoid muscle were calculated and were correlated with the degree of disk derangement. In patients with disk

derangement, a significant difference was found in superior head of lateral pterygoid muscle[9].

IV. CONCLUSION

Internal derangement of TMJ is responsible for the significance in thickness of lateral pterygoid muscle when compared to normal. The present data provokes the need for additional studies to assess the role of superior head of lateral pterygoid in normal function and in temporomandibular disorders. Clinicians should carry out investigations using the best available resources in this developing digital world. Recognizing the alterations of lateral pterygoid muscle will improve the understanding of clinical symptoms and lead to better diagnosis and treatment planning.

CONFLICT OF INTEREST

No conflict of interest.

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