



Contents lists available at [ScienceDirect](#)

Japanese Dental Science Review

journal homepage: www.elsevier.com/locate/jdsr



Review Article

The usefulness of diagnostic imaging for the assessment of pain symptoms in temporomandibular disorders



Shigeaki Suenaga^{a,*}, Kunihiro Nagayama^b, Taisuke Nagasawa^a, Hiroko Indo^a, Hideyuki J. Majima^a

^a Department of Maxillofacial Radiology, Division of Oncology, Kagoshima University Graduate School of Medical and Sciences, 8-35-1 Sakuragaoka, Kagoshima 890-8544, Japan

^b Department of Orthodontics and Dentofacial Orthopedics, Kagoshima University Graduate School of Medical and Sciences, 8-35-1 Sakuragaoka, Kagoshima 890-8544, Japan

Received 25 May 2015; received in revised form 14 April 2016; accepted 26 April 2016

KEYWORDS

Temporomandibular disorders;
Joint pain;
Masticatory muscle pain;
Diagnostic imaging;
Magnetic resonance imaging;
Cone beam computed tomography

Summary The causes of pain symptoms in the temporomandibular joint (TMJ) and masticatory muscle (MM) regions may not be determined by clinical examination alone. In this review, we document that pain symptoms of the TMJ and MM regions in patients with temporomandibular disorders (TMDs) are associated with computed tomography and magnetic resonance (MR) findings of internal derangement, joint effusion, osteoarthritis, and bone marrow edema. However, it is emphasized that these imaging findings must not be regarded as the unique and dominant factors in defining TMJ pain. High signal intensity and prominent enhancement of the posterior disk attachment on fat saturation T2-weighted imaging and dynamic MR imaging with contrast material are closely correlated with the severity of TMJ pain. Magnetic transfer contrast, MR spectroscopy, diffusion tensor imaging, and ultrasonography findings have helped identify intramuscular edema and contracture as one of the causes of MM pain and fatigue. Recently, changes in brain as detected by functional MR neuroimaging have been associated with changes in the TMJ and MM regions. The thalamus, the primary somatosensory cortex, the insula, and the anterior and mid-cingulate cortices are most frequently associated with TMD pain.

© 2016 Japanese Association for Dental Science. Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

* Corresponding author. Tel.: +81 99 275 6272; fax: +81 99 275 6278.
E-mail address: suenaga@dent.kagoshima-u.ac.jp (S. Suenaga).

Contents

1. Introduction	94
2. Internal derangement-related joint pain	94
3. Effusion-related joint pain	94
4. Pathological posterior disk attachment-related joint pain	96
5. Bone marrow abnormalities-related joint pain	97
6. Osteoarthritis and degenerative joint diseases-related joint pain	97
7. Myositis and muscle edema/contracture-related myofascial pain, muscle pain, and fatigue	98
8. Relationship between joint pain, muscle pain, and brain activation	100
9. Tumor involvement, inflammatory process and autoimmune disease-related orofacial and joint pain	101
10. Conclusions	101
Conflict of interest statement	102
Acknowledgements	102
References	102

1. Introduction

Pain is the most common symptom of temporomandibular disorders (TMDs) [1,2]. Pain symptoms in the temporomandibular joint (TMJ) and masticatory muscle (MM) regions are the main complaints of TMD patients seeking treatment. However, the causes of pain symptoms in the TMJ and MM regions are not yet fully understood. In the orofacial, TMJ, and MM regions, pain can have various origins, including musculoskeletal, vascular, neurovascular, neuropathic, psychogenic, and infectious diseases. In general, the causes of pain symptoms may not be determined by clinical examination alone. Ideally, the diagnosis of TMD pain is reached by a combination of clinical manifestations and diagnostic imaging confirmation.

Computed tomography (CT) and magnetic resonance (MR) are useful tools for imaging the TMJ region of TMD patients, particularly for assessing degenerative bony changes, disk position and configuration, inflammatory pathological changes in the posterior disk attachment, the presence of effusion in joint spaces, and bone marrow edematous involvement. MR imaging with contrast material studies provide additional information regarding soft-tissue changes in the posterior disk attachment of the TMJ and the TMJ capsule. Recently, MR sequences such as magnetization transfer contrast (MTC) imaging, magnetic resonance spectroscopy (MRS), diffusion tensor imaging, and ultrasonography (US) have been applied to evaluate masticatory muscle changes such as edema and fibrosis.

This review focuses on the characteristics of the imaging findings for various pain symptoms seen in TMDs.

2. Internal derangement-related joint pain

Pain symptoms frequently arise in patients with TMJ internal derangement (ID) instead of TMDs. The articular disk of the TMJ is composed of a biconcave fibrocartilaginous structure. TMJ ID is defined as an abnormal positional relationship between the articular disk and the mandibular condyle and the articular eminence, and it signifies an interference with smooth joint movement [3]. According to Wilkes [4] and Al-Moraissi [5], TMJ ID was classified into the following five stages: patients with early stage ID (stage 1) complain of

clicking sounds upon jaw opening and closing. There is no pain or dysfunction at this stage. Early/intermediate stage of ID (stage 2) manifests with clicking of the joint, intermittent locking episodes, and transient pain. Intermediate stage ID (stage 3), also known as accurate closed lock, manifests with limited mouth opening, deviation of jaw upon opening to the affected side, and pain in the involved joint. The disorder usually has an acute onset of symptoms. Intermediate/late stages of ID (stage 4) are characterized by limited mouth opening and various degrees of pain. Chronic closed lock is the term commonly used to describe this stage. Late stage ID (stage 5) signifies the development of advanced degenerative changes in the joint, and clinically manifests with crepitus and grinding sounds, episodic or continuous pain, and difficulty with function.

MR imaging for ID could be used when clinical examination cannot predict the true position of the disk [6]. Disk positional changes have been regarded as the main factor contributing to the development of abnormal mechanical trauma/microtrauma and secondary inflammatory disorder within the TMJ [7]. Many investigators have reported that anterior disk displacement (ADD) is an important source of joint pain [8–12]. ADD without reduction may produce more mechanical stress, and stretch the posterior disk attachment and joint capsule more than ADD with reduction, causing more painful joints [8,10,11]. According to Sano et al. [13], the majority of asymptomatic individuals show normal disk position, but one-third show ADD. Some publications have demonstrated that ADD of the TMJ does not necessarily correlate with joint pain [14–16]. The study of the relationship between sideways disk displacement and joint pain has yielded controversial results [17,18].

Dynamic motion MR imaging for ID complements static MR imaging by providing additional information about disk and condyle mobility, disk reduction, and topographic changes in the disk–condyle relationship between various stages of the open-mouth movement [19–23]. It has been reported that ADD using pseudo-dynamic MR imaging, particularly ADD without reduction, is an important source of TMJ pain [23].

3. Effusion-related joint pain

Joint effusion, which is defined as a large collection of fluid in the joint space, has been detected as hyperintense signal

Download English Version:

<https://daneshyari.com/en/article/3136559>

Download Persian Version:

<https://daneshyari.com/article/3136559>

[Daneshyari.com](https://daneshyari.com)