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Comparative Evaluation and Correlation of Neurologic Symptoms, Otologic Symptoms and Proximity of TMJ Disk with Condyle in Class II (Vertical) Mild, Moderate and Severe TMD Cases as Compared to Non-TMD Cases

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Abstract

Introduction: Temporomandibular disorder is a collective term used to describe a number of related disorders affecting the TMJ, muscles of mastication and associated structures all of which have common symptoms like pain and reduced jaw opening. Most of the studies on temporomandibular disorders in literature are related to malocclusion teeth and orthodontic treatment. In literature the role of "Neurologic" and "Otologic" symptoms have been researched in isolations. There is a need to co-relate these findings with the severity of temporomandibular disorders in patients seeking orthodontic treatment.

Objectives: To evaluate and compare neurologic symptoms, otologic symptoms and its correlation with the proximity of TMJ disk and condyle in mild, moderate and severe Class II (vertical) TMD cases.

Methodology: Grading of TMD using Helkimo and Craniomandibular index and evaluation of neurologic and otologic symptoms by separate questionnaires and its correlation with the proximity of TMJ disk and condyle using MRI.

Results: Degree of association of neurologic and otologic symptoms with TMD.

Conclusion: Temporomandibular disorders can be diagnosed by assessing the extra-craniofacial symptoms like neurologic and otologic symptoms and may help in early diagnosis and evaluating the potential risk factors for developing temporomandibular disorders. Hence a study is planned in the department.

Keywords: Temporomandibular joint; TMD; Helkimo index; Craniomandibular index; Neurologic symptoms; Otologic symptoms

Introduction

Temporomandibular disorder is a broad term used to describe a number of interlinked disorders affecting the TMJ, muscles of mastication and associated structures all of which have common symptoms such as pain and reduced jaw opening [1,2]. The term 'Temporomandibular disorders' covers a constellation of conditions. There have been many attempts to categorise these conditions but all have shortfalls. Some classify by anatomy, some by etiology and some by frequency of presentation,We should be aware, however that is considerable overlap in any classification system because there are often not clinically appropriate. No one system, therefore, satisfies all the crieteria. According to Rieder, et al. the prevalence of patients with at least one symptom of TMD ranged from 33% to 50%. However the patients that need professional attention range around 10% [3].

The etiology of TMD is complex and multifactorial. There are various factors that can contribute to this disorder such as structural deformities of the joints, pathological alteration of the joints, changes in masticatory musculature, genetic factors, psychological factors micro and macro trauma [4,5]. According to a study conducted in 2013, Leonor Satnez-prez concluded that there was a correlation between occlusal anomalies, malocclusion and TMD [6]. But there are studies contraindicating this and stating that there is no direct correlation between malocclusion and TMD [7]. Various other studies have been documented in literature relating TMD and orthodontic treatment, most of them concluding a negative co-relation [8]. Most of the studies in literature are related to malocclusion teeth and orthodontic treatment and these extensive studies have led to the development of diagnostic criteria for TMD [9].

As Orthodontists we have studied the above association but there are structures other than the craniofacial structure that may also help in easy detection of temporomandibular disorders in patients seeking orthodontic treatment that needs to be researched and co-related as they may be beneficial in taking measures and stop the future progress of the condition [10]. In literature the role of "Neurologic" and "Otologic" symptoms have been researched in isolations. Also the proximity of the mandibular nerve and ear to the condyle and articular disc of TMJ may have a role in the symptomatology of TMD [11].

There is a need to co-relate these findings with the severity of temporomandibular disorders in patients seeking orthodontic treatment. Hence a study is planned in the department. It is important to have an understanding of anatomy not able to understand the objectives of some treatment options. Differential diagnosis is often a

complex procedure but must not be avoided. Facial pain is a minefield of potential diagnoses and must be approached logically.

Aim

To evaluate, compare and co-relate neurologic symptoms, otologic symptoms and proximity of TMJ disk and condyle in class II (vertical) mild, moderate and severe temporomandibular cases as compared to non-TMD cases.

Objectives

- Grading of TMD using Helkimo index.
- To evaluate neurologic and otologic symptoms in Class II (vertical) mild, moderate and severe temporomandibular disorder cases.
- To evaluate the proximity of TMJ disk and condyle in Class II (vertical) mild, moderate and severe temporomandibular disorder cases.
- To compare neurologic and otologic symptoms in Class II (vertical) mild, moderate and severe TMD cases with non-TMD cases.
- To compare the proximity of TMJ disk and condyle in Class II (vertical) mild, moderate and severe TMD cases with non-TMD cases.
- To correlate the neurologic and otologic symptoms with the proximity of TMJ disk and condyle in Class II (vertical) mild, moderate and severe TMD cases.

Materials and Methods

Study design

Inclusion criteria:

- Patients with Class I malocclusion (diagnosed using cephalometric analysis)
- Patients with Class II (vertical) malocclussion and temporomandibular disorder.
- All permanent teeth present.
- Adult age group (Table 1).

Class I	Class II (vertical)
ANB 2°	ANB <4°
Wit's Appraisal 0-1 mm	Wit's Appraisal <2 mm
FMA 22°-28°	FMA <2°
Beta angle 27°-33°	Beta angle <25°
MP 32°-36°	MP <31°
Overjet 2-4 mm	Overjet 0-2 mm
Overbite 2-4 mm	Overbite >4 mm

Table 1: Inclusion Criteria of different classes

Exclusion criteria:

- Non-TMD class II (vertical) cases.
- All class II (horizontal) cases.
- Class III malocclusion cases.
- Patients with myofascial pain dysfunction and myalgia.
- Previous intervention with TMJ surgery or trauma to TMJ
- Patients with bony disorders.
- Previous with history of Neurological disorders.
- Patients with gross pathology of ears.

Methodology

The observational study will be conducted in the Department Of Orthdontics and Dentofacial Orthopaedics, Sharad Pawar Dental College, Sawangi (M), Wardha. Approval from the Ethical Committee has been obtained. (Reference no. DMIMS (DU)/IEC/2020-21/9400)

Total of 60 adult patients (class I, class II vertical) will be selected from the outpatient Department (OPD) of Orthodontics and Dentofacial Orthopaedics of Sharad Pawar Dental College, Sawangi, Wardha.

For observing all universal precautions and infection control procedures will be taken. The patients will be divided into 4 groups:

Group A (control group): 15 Class I non-TMD cases.

Group B: 15 Class II (vertical) mild TMD cases.

Group C: 15 Class II (vertical) moderate TMD cases.

Group D: 15 Class II (vertical) severe TMD cases.

Informed and written consent will be obtained from all the patients. For all the patients.

Helkimo anamestic and clinical dysfunction indices will be obtained [9].

Craniomandibular index will be obtained for all patients.

Based on this temporomandibular disorders will be graded into mild moderate and severe cases.

The neurologic and otologic symptoms will be evaluated by separate questionnaires.

The proximity of the TMJ disk and condyle will be assessed using MRI and will be co-related with the outcomes of the questionnaire evaluation of Neurologic and Otologic symptoms.

Sample size

The calculation of sample size was calculated based on the values from the article comparison of the efficacy of a questionnaire, oral history, and clinical examination in detecting signs and symptoms of occlusal and temporomandibular joint dysfunction

$n=N*X/(X+N-1)$,

Considering the prevalence of severe cases as 0.95%, 15 patients would be taken in each group.

15 patients in 4 groups

Hence,

Total sample size=60

Results

The Neurologic and otologic symptoms may be associated with temporomandibular disorders depending on the severity of the disorder and there may be a correlation between these symptoms and the proximity of TMJ disk and condyle.

Discussion

The incidence of temporomandibular disorders in constantly increasing. Also the causative factors of TMD is said to be of multiple origin which has led to the formulation of diagnostic criteria for TMD. But all the symptoms assessed for its diagnosis are related to symptoms of craniofacial structures like malocclusion, habits or bone deformities. Assessing the neurologic and otologic symptoms in patients with mild, moderate and severe cases of TMD will lead to a broad spectrum approach for diagnosis and prevention of risk factors that lead to development of temporomandibular disorders.

Kusda, et al. conducted an analytical study relating otological symptoms with temporomandibular disorders in male and female patients, TMD evaluated by RDC/TMD. Records of 485 patients were analysed for prevalence of ear complaints. The study concluded that otological symptoms like tinnitus, deafness, fullness in ears, dizziness were associated with TMD regardless of age and sex [12].

Pedulla, et al. (2008) evaluating the cause of neuropathic pain in patients with temporomandibular disorders using Magnetic Resonance Imaging (MRI). A total of 48 patients (16 with TMD and neuropathic pain, 16 with TMD and no neuropathic pain and 16 healthy patients) were evaluated. The distance between mandibular nerve and TMJ disk was evaluated using MRI. The study concluded that neuropathic pain in patients with TMD may be due to the close proximity between TMJ disk and mandibular nerve [13].

Other related studies by Helkimo [14], Fricton, et al. [15], Awasthi, et al. [16]. Sundrani, et al. [17], Muraraka, et al. [18] were reviewed. Gupta, et al. reported about stress distribution in the temporomandibular joint after mandibular protraction [19]. Similar study was reported by Shrivastava, et al. [20].

Conclusion

No such studies have been carried out to evaluate the extra-craniofacial symptoms in temporomandibular disorders correlating it to TMJ disk proximity. This may help in early diagnosis of TMD and evaluating the potential risk factors for developing temporomandibular disorders and hence avoiding or delaying its development.

Scope

This study will help us to diagnose TMD's by assessing the extra-craniofacial symptoms (neurologic and otologic symptoms). An early diagnosis will be possible and will thus help in decreasing the severity of TMD or avoiding its development.

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