ORIGINAL ARTICLE

Impact of supportive therapy for otological changes in patients with temporomandibular joint disorders*

Impacto da terapia de suporte nas alterações otológicas em pacientes com desordem temporomandibular

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SUMMARY

BACKGROUND AND OBJECTIVES: Otological symptoms complaints may be associated to temporomandibular joint disorders (TMD). Occlusal splint is an alternative to treat TMD because it provides ideal occlusion to patients, acting on painful symptoms. Considering the conservative and reversible characteristics of supportive therapy with occlusal splints, this study aimed at evaluating its impact on the frequency of otological changes in TMD patients.

METHOD: An intervention study was carried out with 35 patients with TMD-associated otological symptoms. TMD patients were considered those with at least three signs and three symptoms of morbidity, being one of them earache, tinnitus, sensation of hypoacusis, ear fullness or dizziness. Patients were submitted to clinical evaluation, orientations and fabrication of maxillary occlusal splint in thermoplastic acrylic resin. Splint adjustments and symptoms evaluation were performed fortnightly. Fischer Exact test was used for statistical analysis of the prevalence of signs and symptoms before (BE) and after (AF) therapy with significance level of 5% ($p < 0.05$).

RESULTS: Nineteen patients have finished the treatment. There has been decrease in the prevalence of otological signs and symptoms: tinnitus (BE = 14; AF = 6; $p = 0.009$), earache (BE = 13; AF = 4; $p = 0.003$), ear fullness (BE =12; AF = 4; $p = 0.006$), dizziness (BE = 11; AF = 4; $p = 0.009$) and hypoacusis (BE = 10; AF = 2; $p = 0.001$).

CONCLUSION: Occlusal splint is a conservative and reversible therapy able to improve TMD-related otological symptoms.

Keywords: Ear diseases, Temporomandibular joint disorders, Therapy.

RESUMO

JUSTIFICATIVA E OBJETIVOS: As queixas de sintomas otológicos podem estar associadas a quadros de disfunção temporomandibular (DTM). A placa miorrelaxante é uma alternativa de tratamento para a DTM, pois oferece oclusão ideal para o paciente, atuando nos sintomas de dor. Considerando as características conservadoras e reversíveis da terapia de suporte com placa miorrelaxante, o objetivo deste estudo foi avaliar seu impacto na frequência de alterações otológicas em pacientes com DTM.

MÉTODO: Realizou-se estudo de intervenção em 35 pacientes com sintomas otológicos associados à DTM. Foram considerados portadores de DTM aqueles que

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apresentassem pelo menos três sinais e três sintomas da morbidade, sendo um deles otalgia, zumbido, sensação de hipoacusia, sensação de plenitude auricular ou tontura. Os pacientes foram submetidos a exame clínico, orientações e confecção de placa miorrelaxante maxilar em resina acrílica termoplastificável. Ajustes da placa e avaliação dos sintomas foram realizados quinzenalmente. Utilizou-se o teste Exato de Fisher para análise estatística da diferença entre a prevalência de sinais e sintomas antes (AN) e após (AP) a terapia, com nível de significância de 5% ($p < 0,05$).

RESULTADOS: Dezenove pacientes concluíram o tratamento. Observou-se redução na prevalência de sinais e sintomas otológicos: zumbido (AN = 14; AP = 6; p = 0,009), otalgia (AN = 13; AP = 4; p = 0,003), sensação de plenitude auricular (AN = 12; AP = 4; p = 0,006), tontura (AN = 11; AP = 4; p = 0,009) e de hipoacusia (AN = 10; AP = 2; p = 0,001).

CONCLUSÃO: A placa miorrelaxante é uma terapia conservadora e reversível que mostrou ser capaz de melhorar os sintomas otológicos associados à DTM.

Descritores: Otopatias, Terapêutica, Transtornos da articulação temporomandibular.

INTRODUCTION

Temporomandibular disorder (TMD) includes a group of stomatognathic system abnormalities which cause generally chronic and non progressive pain which impacts quality of life (QL). It involves symptoms in temporomandibular joint (TMJ), masticatory muscles and associated structures such as ear, with presence of tinnitus and earache[1]. Tinnitus has a prevalence of 22% in TMD patients[2].

Earache may be TMJ pain perceived more posteriorly, since just a thin part of the temporal bone separates TMJ from external auditory canal and middle ear. In addition, TMJ and part of auditory structures originate in the first branchial arch, more precisely in Meckel's cartilage and some ear and masticatory system structures have trigeminal with common innervation, thus justifying pain in this region[3]. So, anatomical proximity together with similar phylogenic heritage may contribute for the difficulty patients have to locate pain[3]. Another manifestation secondary to TMD pain are trigger-points (TP), especially in sternocleidomastoid, masseter and medial pterygoid muscles which, when stimulated, cause local and distant pain[4]. The formation of algogenous points in these muscles may cause irradiation to the ear generating tinnitus[4].

Occlusal splint is an alternative treatment for TMD. It has fundamentally an orthopedic function and is alternative to rapidly delete the memory of traumatic occlusion, temporarily changing nociception caused by dental contact. Although its action mechanism is not totally clear, the splint supplies ideal occlusion for patients, since condyles are in a more stable musculoskeletal position[5]. Systematic reviews confirm its action on pain[6] and on dental wear control in cases of bruxism[9].

This study aimed at evaluating the impact of supportive therapy with occlusal splint in the frequency of otological changes in TMD patients.

METHOD

This was an intervention study in patients with otological symptoms associated to TMD.

To identify eligible patients, cards of patients who voluntarily attended the Temporomandibular Disorder and Orofacial Pain of a public Dentistry School were screened. Fifty patients were pre-selected and after applying inclusion and exclusion criteria the sample totaled 35 patients.

Inclusion criteria were: (a) adult patients, (b) both genders, (c) without systemic involvement, (d) with TMD and at least one otological symptom (earache, tinnitus, sensation of hypoacusis, sensation of ear fullness or dizziness) as primary complaint. TMD patients were considered those with at least three signs and three symptoms of the morbidity, such as TMJ pain, headache, muscle pain, jaw movement limitation, abnormal static and dynamic occlusion, joint noises, muscle fatigue, pain when chewing, open mandibular locking, difficulty to chew, dental wear or mouth opening limitation, and one of them should be earache, tinnitus, dizziness sensation of hypoacusis or of ear fullness. Exclusion criteria were: (a) patients with TMD whose primary complaint was not an otological symptom and (b) presence of systemic involvement. All individuals agreed in participating in the study by signing the Free and Informed Consent Term (FICT).

During evaluation and dental treatment, patients were submitted to history and physical evaluation, orientation about jaw position at rest and neuromuscular relaxation with a maxillary occlusal splint, made of thermoplastic acrylic resin.

Patients were oriented to use the occlusal splint for a minimum period of two months and maximum of six months, as follows: 24 hours per day in the first three weeks, 16 hours in the next three weeks, 12 hours for three more weeks and then for 8 hours during sleep until discharge.

Splints were adjusted in centric relation position with car-

bon paper (AccuFilm® (Parkell Inc., Edgewood, New York, USA). Symptoms were evaluated fortnightly using the pain scale (0-3) with the following categories: "0" no pain or discomfort, "1" discomfort, "2" pain and "3" severe pain.
Total follow up time was six months. Discharged patients were oriented to interrupt the use of the splint at the moment they would start the second part of the treatment, consisting in orthodontics, rehabilitation with dental prosthesis, physical therapy or global postural reeducation (RPG). Those not improving were oriented to continue the treatment, which consisted in maintaining therapy and/or use alternatives such as physical therapy, laser therapy or needling. All alternatives were performed twice a week. Physical therapy used stretching, relaxation and massage techniques; laser therapy was made up of punctual laser applications (Three Light®, Clean Line, São Paulo, Brazil) at TMJ region using 80 mW power, 795 nm wavelength and dose of 4 J/cm^2. Dry needling was indicated for patients with PG. The technique was performed twice a week with short needle (Unoject® Nova DFL, Rio de Janeiro, Brazil) inserted at a depth of 1 to 2 centimeters in acute 30^o angle between the needle and the skin, in different directions, with movements to inside the tissue. Data were analyzed by the SPSS 17 program (IBM Corp., Chicago, IL, USA), using Fischer Exact test to analyze differences between the prevalence of signs and symptoms before (BE) and after (AF) the therapy, with significance level of 5% ($p < 0.05$).
This study was approved by the Research Ethics Committee, University Salgado de Oliveira, under opinion 15/2004.

RESULTS

From 35 selected patients, 19 have finished the treatment. There has been predominance of females (94.7%) and of the fourth decade of life (36.8%).
With regard to symptoms, among those related to the ear, tinnitus was the most prevalent, predominating unilaterally to the right, while for parafunctional habits, clenching was the most frequent (Table 1).
All symptoms were slightly improved (Table 2). Except for tinnitus, all patients reporting pretreatment symptoms as severe had resolution or at least decrease in intensity. In addition, the frequency of patients with no symptoms has increased for all evaluated symptoms.

Table 1 – Clinic characteristics of the sample (n = 19).

Variables	Absolute Frequency (%)
Otological symptoms	
Tinnitus	14 (73.7)
Earache	13 (68.4)
Ear fullness	12 (63.2)
Dizziness	11 (57.9)
Hypoacusis	10 (52.6)
Parafunctional habits	
Teeth clenching	15 (78.9)
Unilateral chewing	12 (63.2)
Onychophagia	1 (5.3)
Teeth grinding	1 (5.3)

Table 2 – Distribution of otological symptoms by intensity. before and after supportive therapy with myorelaxant splint (n = 19).

Intensidade	Symptoms									
	Tinnitus N (%)		Earache N (%)		Ear fullness N (%)		Dizziness N (%)		Hypoacusis N (%)	
	Before	After	Before	After	Before	After	Before	After	Before	After
Absent (%)	5 (26.3)	13 (68.4)	6 (31.6)	15 (78.9)	7 (36.8)	15 (78.9)	8 (42.1)	15 (78.9)	10 (52.6)	17 (89.5)
Mild (%)	1 (5.3)	2 (10.5)	1 (5.3)	3 (15.8)	4 (21.1)	3 (15.8)	4 (21.1)	3 (15.8)	1 (5.3)	1 (5.3)
Moderate (%)	3 (15.8)	2 (10.5)	2 (10.5)	1 (5.3)	2 (10.5)	1 (5.3)	4 (21.1)	1 (5.3)	6 (31.6)	1 (5.3)
Severe (%)	10 (52.6)	2 (10.5)	10 (52.6)	0 (0.0)	6 (31.6)	0 (0.0)	3 (15.8)	0 (0.0)	2 (10.5)	0 (0.0)

DISCUSSION

Otological symptoms may be associated to TMD. In our study, tinnitus was the most prevalent otological symptom, followed by earache, and in line with previous study[10]. The relationship between these symptoms and TMD is not totally explained by the literature and there are controversies as to audiological findings in these patients[10]. This may be explained by anatomical proximity. So, as from some deep and constant pain site – muscular, visceral, neural or vascular – secondary effects may be present in the ear. Earache in TMD patients may be referred pain, the origin of which may be in some hyperactive muscle or in TMJ itself. Myospasm of tensor muscle of tympanic membrane may be a secondary effect as response to TMD pain[11], and may pull the hammer and the tympanic membrane, changing sound conduction through the middle ear, which would justify the complaint of subjective hypoacusis and also of earache[12].

Another important finding was related to the presence of parafunctional habits which was also significant in the sample. Masticatory muscles hyperactivity may lead to reflex hyperactivity of tensor muscle of tympanic membrane, justifying the tinnitus reported by patients. Conversely, muscle relaxation obtained with occlusal splints has improved such symptom[13]. This justifies our results because 78.9% of patients reported clenching and 73.7% tinnitus; after treatment, only 31.5% have maintained the symptom.

In these cases, the occlusal splint promotes a temporary change in proprioception caused by dental contact and decreases motor activity related to parafunctional habits[5], justifying the improvement of otological symptoms. Clinical studies and systematic reviews also emphasize its effectiveness for TMD-related pain[6,8,14]. Al-Ani et al.[7] state that in spite of the lack of enough scientific evidences about the effectiveness of occlusal splints for myofascial pain, this therapy relieves pain intensity both at rest and at palpation, and improves depression of patients with myofascial pain as compared to untreated patients.

Although there are no studies with strong evidences of the effectiveness of occlusal splints to treat otological changes, one may state that this therapy deserves consideration for being noninvasive and reversible, that is, there is change in occlusal conditions and dimensions to a more physiological and functional situation with no need for more invasive and irreversible procedures, such as orthodontic treatment or surgery. The splint promotes changes in the occlusal relationship of TMJ and chewing forces, in addition to improving joint and muscle functions of the stomatognathic system. Other possible therapies would be occlusal adjustment, surgeries and orthodontic treatment, but all are invasive and irreversible.

Sample size and lack of a control group may be considered a limiting factor for our study. However, considering the impact of TMD in QL of patients, our findings support the hypothesis that this less invasive and reversible therapy is an effective treatment for this condition,

promoting improvement in patients' well being. So, we stress the need for further studies to complement our findings and to confirm the evidences that supportive therapy is the treatment of choice for similar cases.

Another factor deserving consideration is related to pain evaluation, which is subjective and highly variable among individuals, representing a difficulty for studies on the subject. In spite of this variation in pain perception among individuals, we have used a pain scale as the tool for patients to report their level of pain, thus providing a scale for patients' discomfort intensity.

The variety of TMD manifestations is, in general, associated to the number of structures which are part of the stomatognathic system[15], and may be reported by patients or be found during physical evaluation. Some symptoms may also be found in ENT disorders making difficult the task of finding their etiology. So, the interaction between dentists and ENT specialists is needed, taking into consideration early diagnosis and patients' well being.

CONCLUSION

Occlusal splints were able to improve otological symptoms associated to TMD. This treatment should be taken into consideration since it is a conservative and reversible therapy.

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Submitted in February 02, 2012.
Accepted for publication in August 29, 2012.
Conflict of interests: None – Sponsoring sources: None