



Therapy of displaced disk of the temporomandibular joint in relation to anxiety

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Abstract

Background and Purpose: Occlusal splint is the most frequent reversible and unspecific form of initial treatment of patients with disc displacement (DD) of temporomandibular joint (TMJ). The purpose of this study was to determine the success in eliminating clinical symptoms in patients with DD after occlusal splint therapy, possibly depending on a level of anxiety.

Materials and Methods: DD was diagnosed in 40 patients (mean age 35.5, 76% women) using Research Diagnostic Criteria for Temporomandibular Disorders Axis I and was confirmed by magnetic resonance imaging of the TMJs. Pain intensity was rated on a visual-analogue scale (VAS). The control group consisted of 25 asymptomatic volunteers (mean age 23.4, 72% women). The anxiety was confirmed by Spielberger's State-Trait Anxiety Inventory (STAI).

Results: By applying occlusal splint, a reduction of pain was achieved in 61% of TMJs. A higher level of anxiety was determined for all examined patients without statistically significant difference ($p > 0.05$) with respect to asymptomatic volunteers. Also, success of splint treatment was not dependent on anxiety ($p > 0.05$). Statistically significant differences ($p < 0.05$) between patients with lower (< 5) and higher (≥ 5) degree of pain were rated on the VAS for duration of splint therapy and depending on sex.

Conclusion: We found no correlation between success of occlusal splint therapy and anxiety. Applying Michigan splint eliminated pain with or no joint sound present in 88% of TMJs. Psychological factors are considered to play potential roles in the development of temporomandibular pain and are the reason why some patients do not respond to treatment modalities.

INTRODUCTION

Temporomandibular disorders (TMD) are arthrogenic and myogenic disorders in the area of temporomandibular joints (TMJs) and/or masticatory muscles. Their main clinical characteristic is musculoske-

Abbreviations:

DD – disc displacement
STAI – State-Trait Anxiety Inventory
TMD – temporomandibular disorder
TMJ – temporomandibular joint
TMP – temporomandibular pain
VAS – visual-analogue scale

letal pain and they are the most common causes of pain in the stomatognathous system. Anterior disc displacement (DD) or malposition, as well as osteoarthritis of articular surfaces, are intra-articular TMDs (1, 2, 3).

Etiopathogenesis of DD has not been entirely explained. The most often mentioned etiological factors are: macrotrauma, dorsocranial displacement of condyles in the articular fossa and decreased lubrication during an increased joint load (4, 5). Magnetic resonance imaging (MRI) is the gold standard in soft tissue diagnostics, particularly in articular DD (6).

It is believed that the etiopathogenic importance of certain factors for the development of TMDs largely depends on psychological factors (e.g. anxiety). In this case, the relationship between the patients' psychological condition and their reaction to experiencing pain is very important, as well as the pathophysiological mechanisms of chronic pain where its intensity is often independent of clinical findings (7, 8, 9).

Reversible, non-invasive therapeutic means are recommended for treatment. Dentists most often use the Michigan or stabilization splint for treatment (10, 11, 12). The most common accompanying therapeutic means is pharmacotherapy. Non-steroidal anti-inflammatory drugs (NSAID) are used with the purpose of reducing pain or controlling its intensity (13, 14).

The purpose of this study is to determine the success in eliminating clinical symptoms in patients with DD after occlusal splint therapy, possibly depending on a level of anxiety.

MATERIAL AND METHODS

DD was examined in 40 patients (mean age 35.5, 76% women) at the Department of Prosthodontics, School of Dental Medicine, University of Zagreb. Clinical criteria were: pain, clicking and/or limited mouth opening, with the use of Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) Axis I (physical examination) and manual examination techniques by Bumann and Groot Landeweer (15, 16). Clinical diagnosis was confirmed by MRI of the TMJs (Figure 1, 2). Temporomandibular pain (TMP) intensity was rated on the visual-analogue scale (VAS=0–10). For initial treatment of all patients the fabrication of Michigan splint was indicated (Figure 3) (17). The clinical condition of patients was monitored during 3–6 months of therapy.

The control group consisted of 25 students of dental medicine (mean age 23.4, 72% women). On the basis of their medical history and clinical examination, clinical symptoms and signs of TMDs were ruled out (17). On request of the Ethics Committee, School of Dental Medicine, University of Zagreb, all subjects signed an Informed Consent form confirming their voluntary participation in this research.

Anxiety testing was conducted using the psychological measuring instrument State-Trait Anxiety Inventory (STAI) by Spielberger (18) according to age- and sex-re-

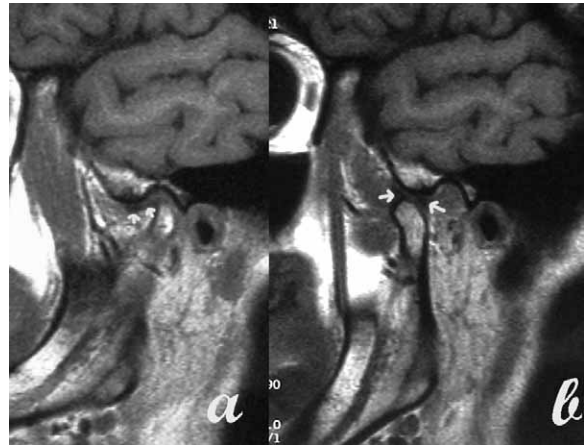


Figure 1. MRI of DD with reduction (arrow) with the mouth closed (a) and open (b).

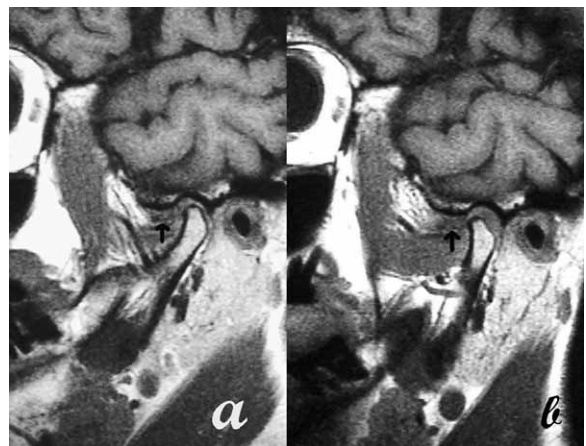


Figure 2. MRI of DD without reduction (arrow) with the mouth closed (a) and open (b).



Figure 3. Michigan splint in the patient's mouth.

lated reference values. STAI 1 test measures anxiety as a subjective state, a feeling lasting for a week, including the day of testing, and STAI test 2 measures anxiety as a

TABLE 1

Distribution of patients by sex and their subjective pain evaluation.

Pain evaluation by VAS		Sex		Total
		male	female	
<5	n (%)	7 (47.0%)	8 (53.0%)	15
≥5	n (%)	3 (11.2%)	22 (88.8%)	25
total	n (%)	10 (25%)	30 (75%)	40

VAS, visual analogue scale; n, number of patients

relatively stable individual characteristic during life in general.

TMJs of all subjects were recorded bilaterally and, at the same time, on the parasagittal level: seven layers 3 mm thick with a 256x192 matrix, field of view of 160x160 and T₁ weighted image with a repetition time (TR) of 450 ms and an echo time (TE) of 12 ms ("Harmony" magnet, Siemens Erlangen, magnetic field strength of 1 T).

Statistical analysis was performed with the *Statistica* and SAS statistical program. T-test and Fisher's exact test were used.

RESULTS

Previous pain duration was expressed as acute (up to one month; 30% of patients), sub-acute (from one to six months; 37% of patients) and chronic (more than six months; 33% of the patients). Eighty percent of patients regularly used the Michigan splint, 67% declared carrying the Michigan splint was comfortable. Application Michigan splint was eliminated pain in 42.4% of TMJs,

in 35.6% of TMJs pain was eliminated with the joint sound still present, and pain was still present in 22% of TMJs.

There was a significant difference between patients classified by sex depending on lower (<5) or higher (≥5) evaluation of pain by VAS (Fischer's exact test $p=0.0237$) (Table 1). There was no significant correlation of the VAS evaluated TMP intensity before and the clinical findings after the Michigan splint treatment (Fischer's exact test $p=0.12$ – Figure 4). Statistically significant differences (t-test, $p=0.011$) between patients with lower (<5, mean 3.4 months) and higher (≥5, mean 4.5 months) degree of pain were rated on the VAS during splint therapy.

A higher level of anxiety was determined for all examined patients (the mean score in STAI 1=38.43, STAI 2=40.10) without statistically significant difference (t-tests, $p=0.09$ for STAI 1 and $p=0.23$ for STAI 2) with respect to the control group (STAI 1=34.25, STAI 2=39.00).

Also, success of splint treatment was not dependent on anxiety (Table 2). The inclusion of only patients with determined anxiety depending on age and gender (according to Spielberger those are three groups of subjects aged: ≤39, 40–49, and 50≥) resulted in 62.5% of patients with anxiety according to STAI 1=42.84, and 72.5% of patients with anxiety according to the STAI 2=44.20. Statistically significant differences between patients with lower (<5) and higher (≥5) degree of pain were rated on VAS for subscale STAI 2 (Table 3).

DISCUSSION

TMD is characterized by a multifactorial etiology, with a number of mutually interacting physical and psychosocial factors. Also, TMP constitutes the most com-

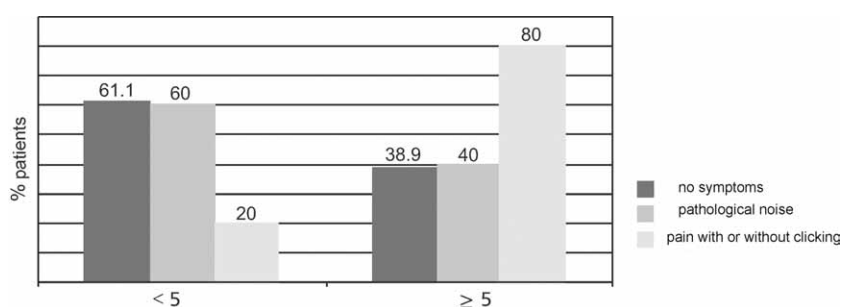


Figure 4. Comparison of VAS pain evaluations with the clinical results of initial splint therapy.

TABLE 2

Evaluation of success of the splint therapy.

STAI test (scores)	No discomfort (n=21)	Significant improvement (n=9)	Improvement (n=6)	Clinical picture unchanged (n=4)	t-test
STAI 1	35.8	43.1	40.3	38.8	$p=0.079$ (n. s.)
STAI 2	38.6	42.4	42.8	38.3	$p=0.447$ (n. s.)

n, number of patients; n.s., not significant

TABLE 3

Distribution of patients according to the VAS pain estimate and STAI test results.

VAS	<5 (n=15)	≥5 (n=25)	t-test
STAI 1 (scores)	35.7	40.0	p=0.074 (n. s.)
STAI 2 (scores)	36.3	42.3	p=0.012

n, number of patients; n. s., not significant

mon cause of nondental, musculoskeletal pain in the orofacial region. Biopsychosocial conceptualization of pain experience was found to involve close connection between pain and psychosocial factors (19).

Most of DD patients were mainly aged between 20 and 45 years and a majority of them were women. Sex-related differences are shown in our study, but it is unknown why females had a strong overrepresentation (20, 21). Our study showed higher subjective pain evaluation (VAS ≥5) expressed by female patients.

Michigan splint is, as a type of occlusal splint the most frequent reversible and unspecific form of initial therapy of patients with TMD (10). Although small in number, randomized controlled clinical studies show that Michigan splint lessens the arthralgia (11, 12).

Although normal functioning of the TMJ was achieved (no pain), i.e. painless clicking in the TMJ, no significant statistical frequency of pain was shown as compared to the subjectively greater intensity of pain before treatment. Initial symptomatic treatment by Michigan splint was suggested, but there is actually no treatment that represents the gold standard for chronic TMJ pain conditions (22, 23). In comparison with other treatment modalities of TMP caused by DD, physical therapy and supportive therapy by NSAR are effective methods of managing TMP and increasing normal patient's functioning (10, 23).

The reasons for using psychological inventories or tests in a population of patients with DD were to clarify etiologic components by evaluating personality traits or states, and to determine specific factors, like anxiety, with a view to help develop treatment strategies, including splint therapy, and other supportive treatment modalities. Our results showed no differences between increased levels of anxiety on two subscales of STAI. DD affirmed by MRI is considered to be the cause of pain and other dysfunctional symptoms in the masticatory system. But DD symptoms could not be correlated with TMJ-related findings (24).

Anxiety is the most common affective disorder, and a great problem for psychiatry and general medicine. A certain degree of anxiety is normal and adaptive, as alerting signal, warning of external or internal threat and it has lifesaving qualities (25, 26, 27). Sher (28) assumed in her hypotheses that anxiety development is in connection with a personal level of adaptational reserve.

In a recent study, Čelić *et al.* (9) strongly indicated by using the RDC/TMD Axis II (psychological, behavioural and psychosocial examination), that TMD patients had an increased level of somatization and depression. The RDC/TMD Axis II does not include anxiety measuring, but the Spielberger's STAI is an easy-to-use instrument in practice, as well as a screening measure (7, 21).

Results of our study showed that there was no correlation between success of occlusal splint therapy and anxiety. Application of Michigan splint eliminated pain with or without the joint sound present in 88% of TMJs. A multidimensional understanding (including psychological etiological factors) of TMP improves diagnosis and treatment.

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