PATIENTS REFERRED TO SPLINT THERAPY: A SURVEY OF ONE HUNDRED FOURTY TWO PATIENTS

ABSTRACT

Background and Aim: The aim of this clinical study was to evaluate the splint usage patterns of the patients who were suffered with temporomandibular disorder symptoms.

Subjects and Methods: 175 patients were treated with occlusal splints. 128 patients used their splints as recommended. 14 patients did not use their splints. Splints were adjusted to have flat occlusal contacts for all opposing teeth. Uniform anterior and canine guidance was established. At least 1 year after the treatment, splint usage patterns and the outcome of splint therapy were assessed with the use of a questionnaire by phone.

Results: 142 patients replied our call and answered all of the questions. 128 patients used their splints as recommended. 14 patients did not use their splints. 29 patients reported that their complaints were not change and 3 patients reported that their complaints got worse.

Conclusion: The patients with temporomandibular disorder symptoms were treated with occlusal splints. The complaints of patients who used splints as recommended were mostly decreased.

Key words: Splint Therapy, Stabilization Splints

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INTRODUCTION

Temporomandibular disorder (TMD) is a very common problem in today's society however, the aetiology of TMD has multifactorial origin. The major difficulty for identifying the TMD arises from its complex relationship with other structures of the head, neck and scapular girdle, in addition to the great variety of signs and symptoms that can be related to temporomandibular joint (TMJ) by these structures. Consequently, many different therapies, some conservative and revert symptoms that can be related to TMJ reversible, others irreversible, have been advocated for patients with TMD. A number of successful treatment outcomes have been reported. Therapies may include occlusal splints, physiotherapy, relaxing appliances and pharmacological interventions.

The is general consensus that splints are useful in the conservative treatment of TMD, although the mechanism of efficacy is not fully understood. Practitioners use many different types of splints (e.g. stabilization, repositioning, distraction) fabricated from both hard and soft materials. Some of the rationales for use of an interocclusal splint have included management of pain and dysfunction of the masticatory muscles, modification of intermaxillary relationships and occlusal force distribution, reduction of parafunctional activity, removal of occlusal interferences, changing intracapsular structural relationships in the TMJ, and control of tooth wear and mobility.

Occlusal splint therapy is the most frequent form of initial TMD treatment, despite the fact that all of the effects on the treatment of TMD symptoms are controversial.

There are various types of occlusal splints (bite plates or intra-oral appliances of variable designs used in the management of TMD) described in the literature and they have different indications and functions. Occlusal splints may have an effect on masticatory forces, reduce tooth mobility and other oral pathological dysfunctions could be a therapy for muscular dysfunctions and facial pain and influence the anatomical relationships of the TMJ. The most frequently used splint for TMD and bruxism treatment is stabilization splint (SS). The stabilization splint is one such permissive type of occlusal splint and is also known as the Tanner appliance, the Fox appliance, the Michigan splint or the centric relation appliance. The stabilization splint is a hard acrylic splint and provides a temporary and removable ideal occlusion (ideal contact between the teeth for the muscles and the temporomandibular joints). Providing an ideal occlusion by the use of splint therapy reduces abnormal muscle activity and produces ‘neuromuscular balance’. Normally, it is suggested that patients wear the splint only at night as it is mainly during the rapid eye movement period of sleep that the subjects appear to perform excessive parafunction (clenching and grinding of the teeth). The splint needs to be adjusted (rebalancing of the splint to the new position of the jaw by grinding some of its surface points, since the lower jaw will adopt a new position as a result of wearing the splint) over several visits as the masticatory muscles relax until a consistent jaw relationship is reached. The patients then should be reviewed at regular intervals. After a period of successful splint therapy (normally between two to three months) patients can gradually reduce the time to wear the splint and eventually stop using the splint totally.

A number of clinical studies have specifically evaluated the treatment of TMD with SS and clinical success has been reported. When properly adjusted, the SS delivers a good method of providing centric relation occlusion (the position of the jaw relative to the skull when the muscles are at their most relaxed and least strained position), eliminating posterior interferences (any predominant contacts between the back teeth that interfere with or hinder harmonious jaw movement), provides anterior guidance on anterior teeth (the contact between the anterior teeth without any posterior contact during jaw movements), reducing neuromuscular activity, and obtains stable occlusal relationships with uniform tooth contacts throughout the dental arch.

The possibility to influence to topographical relationship of the intra-articular TMJ components is essential in the treatment of intra-capsular disorders caused by disc-condyle displacement. One reason for the multi-factorial aetiology of TMJ disorders is the internal rearrangement of the joint. Therefore, occlusal splints are used for rehabilitation of disc interference disorders. The aim of therapeutic intervention is to re-establish a correct disc-condyle relationship to achieve painless and functional mandibular movements. A non permissive type occlusal splint, which is specially used to recapture a partial or complete anterior disc displacement, is called “anterior repositioning splint” has a ramp or indentations that position the mandible inferiorly and anteriorly and secure it there. This appliance which also known as orthopedic repositioning splint induces a therapeutic mandibular position, forward to the maximal intercuspal position of the patient and affects the
The aim of this study was to evaluate the splint usage patterns of the patients who was referred to our clinic with TMD symptoms.

SUBJECTS AND METHODS

The patients who were consecutively treated, were recorded for this study. Two hundred three patients (156 female, 47 male), aged between 19-52 (mean age 29.3) were included in the study. The following criteria were used to determine the status of the TMJ:

1. Normal TMJ: maximum interincisal opening of 40 mm or more, normal range of protrusive and lateral excursions, no joint sounds, no pain on palpation of the TMJ.
2. Anteriorly displaced disc with reduction: reciprocal click at TMJ, no click after disc recapture in protrusion.
3. Anteriorly displaced disc without reduction: maximum interincisal opening of less than 40 mm, history of clicking, and deflection of mandible the effected side, hard end feel at maximum opening (intraarticular limitation) was differentiated from soft end feel (extraarticular limitation) by the mild passive force to lower incisors. When the mouth could not open wider even if mild force, the limitation was recorded as hard-end-feel.

175 of 203 patients were treated with occlusal splints. Maxillary anterior repositioning splints were made using autopolymerizing methyl methacrylate (Paladur, Heraeus-Kulzer, Hanau, Germany) and adjusted intraorally at a protruded position. The stabilization splints were made for each patient adjusted to have flat occlusal contacts for all opposing teeth. Uniform anterior and canine guidance were established. All occlusal appliances were fabricated and adjusted by the same clinician. Patients were informed how to use their splints. No muscle relaxants, analgesics or anti-inflammatory agents were prescribed during the course of the treatment.

At least 1 year after the treatment, splint usage patterns and the outcome of splint therapy were assessed with the use of a questionnaire by phone. The questionnaire is presented in Table 1.

RESULTS

Orofacial pain was the main complaint of all patients before treatment. Among these patients 64 patients complained of limited opening, 82 patients complained of TMJ sounds. A total of 142 patients replied our call and answered all the questions. 95 of these patients were SS users and anterior repositioning splint waere made for the rest of the patients. 128 patients used their splints as recommended. 14 patients did not use their splints either because they found their splints uncomfortable or did not help their complaints. 9 of these patients were anterior repositioning splint users.

In the follow-up period 96 of 128 patients reported that their complaints were decreased significantly. 29 patients reported that their complaints were not change and got worse for 3 patients. The results were summarized in Figure 1. 131 patients reported that they attended their control appointments. None of the patients referred to any other institutions or sought any other form of treatment.

DISCUSSION

This clinical study evaluated the splint usage patterns of the patients who were referred to Hacettepe Dental Clinic. The distribution of frequency of TMD symptoms were classified for these patients by utilizing a questionnaire.

In this study, from the individuals, more than 52% showed habits of clenching or grinding the teeth. However, 25% of them were classified as without TMD although they have such habits. This finding is supported by the statements of de Wijer et al. They pointed out that clenching or grinding habits can be highly destructive, however do not affect generally the mouth structures in some individuals.

The questionnaire which was used in the study provided a substantial amount of information in short time and demonstrated to be sensitive for the degree of TMD. The questionnaire was a simple and suitable tool with easy understanding for the patient. Also, it provided less influence of the examiner on the patient answers.

This study demonstrated that this type of a questionnaire provides the information not only regarding the frequency of symptoms of TMD, but also the severity of symptoms. Additionally, it demonstrated whether there is a need or not for treatment for the patients with clinical signs. Although in the literature there is no statistically significant difference between stabilization splints and non-occluding splints for any of the outcomes that can be measured. There is also a weak evidence to suggest that stabilization therapy may be beneficial in comparison to no treatment in terms
However, stabilization splints are widely used in the treatment of TMD. In current study 96 of 128 patients reported that their complaints were decreased significantly after one year of splint usage. Both SS and anterior repositioning splints are reported to be able to decrease muscle and joint pain and increase mandibular function. The anterior repositioning splint seems to be superior to the stabilization splint in eliminating reciprocal clicking and palpatory tenderness of the temporomandibular joint. The recapture of the disc is permanent in only a small percentage of patients suggesting that the use of irreversible procedures must be carefully evaluated.15

![Figure 1. The change of complaints at the time of the survey](image_url)

<table>
<thead>
<tr>
<th>Complaints</th>
<th>Before Treatment</th>
<th>SPLINT Usage</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>TMJ sound</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Limited Opening</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Other</td>
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<table>
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<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
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<tbody>
<tr>
<td>1. Before the treatment which complaints do you have?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Did you prescribed an intraoral splint?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>3. Did you use this splint as recommended? If not why didn’t you use the splint?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>4. Do your complaints ceased or continuing?</td>
<td>Ceased</td>
<td>Unchanged</td>
</tr>
<tr>
<td>5. Did you attend your control appointments?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>6. Did you seek for any other form of treatment from other institutions?</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
The investigation of the influence of the Michigan splint, not only intra articular TMJ structures relationship, but also neuromuscular and brain activities represents a multidimensional area of investigation. Kordass et al. suggested that Michigan splint could reduce cerebral activation in order to relax muscle activation. However, in that study, the splint was used only by asymptomatic persons. Ohnuki et al. reported no significant difference in the rates of joints that showed DD without reduction, as well as in the degree of DD with or without reduction between pre-treatment and post-treatment MRI. This study suggests that the various treatments (including stabilization splint) do not necessarily improve the displaced disc, but are important for the improvement of signs and symptoms. The goal of the anterior repositioning splint therapy is to produce some measure of invasive, irreversible change, which to improve the possibility of disc reduction, or the achievement of a physiological relationship between the disc and the condyle have by an identical metric method showed a successful repositioning of the disc to the physiological position to the condyle. The metrical analysis with MRI on the basis of the small sample size by Fayed et al. showed that disc recapture was better by stabilization splint than anterior repositioning splint, but appliances were effective in eliminating pain and clicking.

**CONCLUSION**

Within the limitations of this study, it can be concluded that the splint therapy for TMD symptoms had high success rate in the patients who used their splints as recommended and the complaints of patients were mostly decreased.

**REFERENCES**