

Comparative Evaluation of Clinical Performance of Different Kind Of Occlusal Splint Therapy in the Management of Myofascial Pain

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Abstract: Occlusal splint therapy is chosen for the treatment of dysfunctions in the Orofacial region for several reasons. The aim of this study was to compare the effectiveness of hard and soft occlusal splint in the management of myofascial pain. Thereby subjects seeking treatment for myofascial pain were randomly assigned for the splint group and soft splint group. Modified severely index and objective pain analysis using muscular palpation score. Follow up was done and the patient was examined on baseline, 7, 30, 60 and 90 days. All patients improved over time. The statistical analysis was done using 't' and paired 't' test and the results showed that both hard and soft splints are effective but the hard splint is more effective compared to soft splint.

Key words: Splints, occlusal splint, splint therapy, hard splint, soft splint, TMD, Myofascial pain, Temporomandibular disorder.

I. Introduction

The temporomandibular joint (TMJ) forms one of the most fascinating and complex synovial Systems in the body. Movements of the TMJ are regulated by an intricate neurological controlling mechanism, which is essential for the system to function normally and efficiently¹.

Over the years, several diagnostic treatments have been suggested by various authors for musculoskeletal disorders of the temporomandibular region, reflecting the different theories of etiology probably responsible for the various signs and symptoms presenting in the patients. Due to the difficulty in determining the etiology and the possibility that the symptoms are secondary to some other disorders of TMJ or muscles of mastication, initial treatment given should be reversible². An occlusal splint is removable device usually made of acrylic that fits over the occlusal and incisor surfaces of the teeth in one arch creating precise occlusal contact with the teeth of the opposing arch. The use of occlusal splints either alone or in combination with other treatment modalities is the most common form of pain management in patients with temporomandibular disorders (TMD)^{3,7}. Occlusal splint therapy is chosen for the treatment of dysfunctions in the Orofacial region for several reasons. It is relatively simple, reversible, non invasive and costs less than other treatments. There are different types of splints like hard, directive, permissive and repositioning splint. It is difficult for clinicians to make evidence-based decisions regarding splint therapy because few data has compared different occlusal splint designs^{9,10}. Occlusal splints are often included in the treatment plan for most TMD patients, including myofascial pain patients. The exact mechanism of action of occlusal splints is yet not completely understood^{11, 12}. Some theories that tried to explain its mechanism would include alteration or improvement of occlusal condition, change in peripheral (motor or afferent) impulses to the central nervous system, alteration or raise in the vertical dimension, alteration of the temporomandibular joint (TMJ) condylar position and increase in the cognitive awareness, placebo effect and regression to the mean^{13,14}.

Many therapies have been advocated for treating TMD. Splints are thought to unload the joint by disarticulating the dentition and increasing the vertical dimension of occlusion. By unloading the joint, there will be a reduction in both synovitis and masticatory muscle activity. Therefore, the result is a reduction in symptoms. These appliances may also change condylar position and the existing occlusal relationship, thereby reducing abnormal muscle activity and spasm¹. Most occlusal splints have one primary function that is to alter an occlusion so they do not interfere with complete seating of the condyles in centric relation¹⁵. There are conflicting reports regarding efficacy of splints. Hence this study was carried out to evaluate the clinical efficacy of soft occlusal splint therapy in comparison to hard occlusal splint in the management of myofascial pain dysfunction syndrome.

II. Material method:

This study was conducted in the department of prosthodontics and department of oral medicine and radiology. Study sample consisted of 30 patients diagnosed with myofascial pain from department of oral medicine. Sample selection was based on a standardized and complete clinical examination based on the Research Diagnostic Criteria - temporomandibular disorders (RDC-TMD)¹⁵.

Study was approved by ethical clearance of Institutional Review Board. Informed consent was obtained from each patient prior to participation in this study.

The inclusion criteria for selecting patients –

1. Group I: Muscle disorder
 - a. Myofascial pain
 - b. Myofascial pain with limited opening
2. Age: 18–65 years old
3. Should have at least six natural teeth in each quadrant.

Exclusion criteria included:

1. Previous experience with occlusal splint therapy
2. Any obvious dental decay or periodontal disease to which fascial pain could be attributed
3. History of trauma in the pain area in less than 30 days
4. Any systemic condition associated with widespread pain (e.g. fibromyalgia)
5. Medical history of current drug addiction
6. Any other disorders like TMJ osteoarthritis or capsulitis.
7. Patient with Psychiatric disorder.
8. Subject not willing to accept treatment.

Patients were randomly assigned using randomized table and categorized into two groups, each groups consist of 15 patients each -

Group 1: Hard splint

Group 2: Soft splint

The splints for group 1 were fabricated with 3mm thickness of acrylic between the maxillary and mandibular posterior teeth. The splints were adjusted to create uniform occlusal contact of the centric cusps against the splint on all occluding posterior teeth, anterior teeth was in contact with the splint.

Group 2: A soft occlusal splint was fabricated from a 3 mm thick, soft polyvinyl sheet. The fabrication was done in a vacuum former, pressure moulding device (BIOSTAR® SCHEU-DENTAL GmbH, Iserlohn, Germany) with a thermally controlled, infrared heater over the mandibular cast and occlusal contacts were neutralized. Ethical approval was taken from the institution. Study period was for 3 months with evaluation at 7 days, 1 month, 2 months and 3 months after splint insertion. Patients were instructed to wear splint for 24hrs a day for 7 days and take out during meals. Each patient was evaluated according to the subjective and objective assessment.

1. Subjective pain analysis was done using Mod-SSI. This scale has 28, characters for each of the three variables: intensity, frequency and pain duration. An average of the three variables was obtained and final scores ranged from 0.035 to 1.

2. Objective pain report analysis Muscular palpation (masseter, temporalis and pterygoid muscles) was performed bilaterally with tight and constant pressure of approximately 1.500 g and were classified on a scale from 0 to 3(0, no pain; 1, verbally reported pain; 2, pain or discomfort followed by fascial musculature contraction and 3, when the patient backed away or showed lacrimation). The obtained data of subjective pain analysis using MOD-SSI were subjected statistical analysis using student's paired 'T' test. The obtained data of objective pain report of muscular palpation between the two groups were compared using student's 'T' test.

III. Discussion

A study of temporomandibular disorder and their treatment reveals a group of disorders which have no certain etiology and are multifactorial. The precipitating factors vary from patient to patient; furthermore, the condition is cyclic within an individual patient. Successful treatment outcome are claim for a wide variety of treatment modalities. A reduction of pain with splint therapy is well documented. Many studies have reported resolution of symptoms after insertion of a splint^{16,17,18}.

A hard acrylic splint that provides a temporary and removable ideal occlusion. Providing an ideal occlusion by the use of splint therapy reduces abnormal muscle activity and produces neuromuscular balance¹⁹.

Hard or soft removable acrylic appliances covering the teeth have been used to eliminate occlusal disharmonies^{20,21}, prevent wear and mobility of the teeth^{22,23}, reduce bruxism and parafunction^{24,25}, treat masticator y muscle dysfunction (34-37) and correct derangement of TMJ^{26,27,28}.

Soft splints have been used as an interim appliance until acrylic-resin splints could be provided. These appliances have also been suggested as prognostic tool to evaluate whether an acrylic-resin splint would be advantageous²⁹.

It has been suggested that the soft occlusal surface of soft splint may contribute to occlusal changes³⁰.

Soft splints have been advocated for patients with temporomandibular disorders (TMD). However, there are few trials that have evaluated efficacy, and outcomes have been variable. Research on TMD recommended the evaluation of pain in the masticatory muscle through subjective pain and digital palpation³¹. The MOD SSI is more complete than visual Analogue scale because it takes into consideration, pain frequency and duration along with its intensity²².

Sample selection was based on a standardized and complete clinical examination based on the Research Diagnostic Criteria - temporomandibular disorders (RDC-TMD)¹⁵

In our study, statistical analyses was done for Modified SSI score showed significantly reduced for both groups reflecting a patients improvement in muscle pain with hard and soft splints (table 2).

Change in tenderness to digital palpation has been shown to be a reliable outcome measure in clinical trials on TMD. The results for objective palpation (Table 3) (student 'T' test and paired 'T' test) showed statistically significant difference between baseline and 90 days for both hard and soft splints. For hard splint there was significant difference respectively starting from 7, 60 and 90 days.

Harkins et al found that 93% of the 42 patients who were given soft splints and had reduction in their symptoms and also reported good to excellent results with the subsequent acrylic-resin splint used during the next 3 to 6 months. He also found that 74% of the patients who wore a soft splint had a reduction in facial myalgia³¹.

A high degree of patient acceptance has been reported with soft splints. The soft, resilient material may help dissipate some of the heavy loading that occurs during parafunctional activities. In a study done by Nevarro et al who cited that soft splints are ineffective, our study has found that soft splints are effective in reducing the symptoms of myofacial pain³² but it took a longer period for the soft splints as compared with hard splints.

A study done by Okeson on nocturnal EMJ comparison of hard and soft splints reported significantly less effect with soft splint¹⁷, it is in accordance with our study. In consistent with our study, the study of True Love et al the authors randomized subjects into 3 groups, all patients improved every time regardless of splint design²⁰.

Davies et al in their study on the pattern of splint usage found no advantage of any particular pattern of splint use³³.

Study of Suvinen T et al have also shown an improvement after splint therapy³⁴. Occlusal splint therapy decreased the pain and tenderness in the muscles and joints of the patients in the present study. In contrast to Pettengill et al who did not find any difference between hard and soft splints³⁵ in our study hard splint was more effective compared to soft splint although soft splints also showed significant reduction in pain. The present study supports the use of hard and soft splints in the management of myofacial pain dysfunction syndrome. Research is needed to further investigate the most appropriate usage regime of hard and soft splints, the different design of splints and EMG studies.

IV. Conclusion:

This study supports the use of occlusal splint therapy as it is reversible with fewer side effects, cost effective and better patient compliance. The results showed that both hard and soft splints reduced the MOD SSI scores and digital palpation scores. These findings suggest that clinicians when managing myofacial pain dysfunction should consider occlusal splint therapy. The type of splint did not affect the overall results among the two groups.

V. Results:

The sample included thirty patients (15 in each group), the distribution of data is shown in Table :1. The mean, Standard deviation and the p – values for MOD-SSI and palpation are shown in table:2 and table:3 respectively. Figure 1 and Figure 2 show the mean and the follow up for MOD-SSI and palpation respectively. The statistical analysis was done using 't' and 'paired t' test. The results with respect to subjective SSI scores showed statistically significant differences between baseline and 90 days for both hard and soft splint groups. The results with objective muscle palpation between baseline and 90 days showed non-significant results.

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