

OCCLUSAL SPLINT THERAPY IN THE TREATMENT OF MYOFACIAL PAIN DYSFUNCTION SYNDROME (MPDS)

¹ABDUL WAHID

²MUHAMMAD RAZA

³FAHIM ULLAH

⁴MONSIF IQBAL

ABSTRACT

The aim of the present study was to compare the hard and soft occlusal splint therapy for the treatment of symptoms of temporomandibular myofascial pain dysfunction syndrome (TMPDs).

This study included 50 patients (age range 20–45 years) diagnosed with TMPDs. Patients were divided into two groups for providing hard and soft splints by simple randomization. Group I received vacuum formed Soft while Group II Hard acrylic resin maxillary splints for 6 months. Before treatment and on follow up at 1, 2, 3, 4 and 6 months after treatment, the researcher measured all parameters of TMJ function including mouth opening, pain visual analog scores and tenderness of masticatory muscles.

All recorded TMJ function parameters showed statistically significant improvement in both groups during 6 months period.

Both hard acrylic and soft rubber splints improved TMPDs symptoms but hard occlusal splints exhibited superior results after 6 months of use.

Key Words: Occlusal splint, Pain, Masticatory muscles, TMPDs.

INTRODUCTION

The etiology of temporomandibular disorders (TMDs) is multifactorial and complex like bruxism, extreme mouth opening, traumatic injuries, psychological illness and dental treatments.¹ TMDs are characterized by many symptoms, of these pain in orofacial region, clicking in TMJ, limited mouth opening, headaches, tinnitus, jaw deviation, licking are common symptoms. The successful management of temporomandibular disorders is dependent on identifying and controlling the contributing factors.²

Occlusal splints are used like stabilization splint, modified Hawley splint, and repositioning splint for the treatment of TMDs patients.³ Soft splints, which are more convenient for patients than hard splint, can be

used immediately after provisional diagnosis of TMD. The rationale for using soft splints is that the soft resilient material may help in distributing the heavy load associated with Para functional Habits. Hard splints are thought to reduce TMD symptoms by altering the occlusal equilibrium, changing the afferent impulses to the central nervous system, improving the vertical dimension, correcting the condylar position, and aiding cognitive awareness.⁴ The use of occlusal splints to improve TMD signs and symptoms is controversial.⁴ Objective of this study was to compare the soft and hard occlusal splints for the treatment of TMPDs, to find out the best occlusal splint option for the benefit of TMDs patients.

MATERIALS AND METHODS

This comparative study consisted of 24 males and 26 females, diagnosed as TMDs in the Oral and Maxillofacial Surgery unit in Peshawar Dental College, Peshawar through proper history and clinical examination by using convenience sampling technique. Inclusion criteria consisted of patients of TMPDs, having tenderness of the masticatory muscles, restricted or deviated mandibular movement and myofascial pain duration for at least 3 months. Patients who received other treatments for TMPDs like massage, hot and cold

¹ **Correspondence Author** Dr. Muhammad Raza, Associate Professor, Prosthodontics, Peshawar Dental College, Warsak Road, Peshawar. Mobile no: 03339985955 Email: hmraza77@yahoo.com

² Abdul Wahid, FCPS, Associate Professor Department of Oral & Maxillofacial Surgery, Peshawar Dental College, Peshawar.

³ Fahim Ullah, FCSP, Associate Professor Department of Prosthodontic, Peshawar Dental College Peshawar.

⁴ Monsif Iqbal, FCPS (Pak), MRCS (ENG), Associate Professor Department of Prosthodontic, Department of Prosthetic Dentistry, King Khalid University, Abha, KSA.

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therapy were excluded.

Proper history and clinical examinations were done by maxillofacial consultant. He noted the description of the pain that includes type, frequency, intensity and reaction to jaw movements during speaking, swallowing and chewing. Pain intensities were recorded by using the Visual Analog Scale (VAS, 10-cm line), ranged from 0 (no pain) to 10 (worst possible pain). Mouth opening was measured through Boley gauge, Tenderness of the extra oral masticatory and neck muscles was evaluated by digital palpation, the medial and lateral pterygoids muscle was also manipulated during examination. The tenderness of the TM Joint and muscles were graded as 1 (negative i.e No tenderness), 2 (moderate i.e. tenderness to palpation with or without grimace or flinch), or 3 (severe i.e tenderness with withdrawal (Jump sign)).

Patients were then divided into two groups by simple randomization by using even and odd technique and were treated for 6 months with either hard flat occlusal splints fabricated from transparent acrylic resin (hard splint group) vacuum-formed soft occlusal splints constructed from 2-mm-thick elastic rubber sheets (soft splint group), for Maxillary arch. Patients were recalled weekly during the first month and then monthly in 2, 3, 4 and 6 months of treatment.

TMJ functional parameters, including, mouth opening range, VAS scores for pain, tenderness of the masticatory muscles and TMJ, and range of mouth were recorded before treatment and at each monthly follow-up visit.

TMJ functional parameters were measured and compared between groups. For this study adequate treatment was defined as maximum mouth opening of greater than 38 mm and pain VAS scores less than 2. For statistical analysis, one-way ANOVA was used to evaluate the effect of time on parameters in each group, whereas the independent Student t-test was used to compare the two groups at each follow-up interval by using SPSS version 20. The significance level for this study was set at $p \leq 0.05$

RESULTS

The study consisted of a total fifty patients (24 Males and 26 Females) having TMDs. Age of the patients ranged from 19 to 48 years. Mouth opening (Table 1), VAS score (Table 2), TMJ tenderness (Table 3), Masticatory (Table 4) and neck muscles tenderness (Table 5) improvement was observed significantly throughout the study period. The results showed that VAS score for both hard and soft groups decreased throughout observational period without any significant difference between both the groups (Table 2). There was greater improvement in tenderness of muscles in patients on

TABLE 1: MEAN VALUES OF MOUTH OPENING FOR BOTH GROUPS

Months	Hard Splint Group	Soft Splint Group	
Preoperative	26.0 ± 3.8	27.2 ± 0.5	
After 1st Month	28.0 ± 3.9	28.4 ± 2.9	
After 2nd Month	30.3 ± 4.6	30.0 ± 3.4	
After 3rd Month	32.3 ± 0.5	30.2 ± 0.4	P=0.045
After 4th Month	35.2 ± 2.0	34.2 ± 1.8	
After 6th Month	36.0 ± 3.2	35.4 ± 2.7	

TABLE 2: MEAN VALUES OF PAIN SCORES (VAS) FOR BOTH GROUPS

Months	Hard Splint Group	Soft Splint Group	
Preoperative	8.2 ± 1.6	8.1 ± 1.4	
After 1st Month	7.1 ± 1.9	7.1 ± 1.9	
After 2nd Month	6.0 ± 2.3	6.4 ± 2.5	
After 3rd Month	2.9 ± 1.7	3.1 ± 1.9	P=0.245
After 4th Month	1.4 ± 0.7	1.6 ± 0.7	
After 6th Month	0.4 ± 0.5	0.5 ± 0.6	

TABLE 3: MEAN VALUES OF JOINT TENDERNESS FOR BOTH GROUPS

Months	Hard Splint Group	Soft Splint Group	
Preoperative	2.5 ± 0.6	2.4 ± 0.6	
After 1st Month	2.1 ± 0.5	2.3 ± 0.4	
After 2nd Month	1.6 ± 0.7	1.7 ± 0.5	
After 3rd Month	1.3 ± 0.5	1.4 ± 0.5	P=0.087
After 4th Month	1.0 ± 0.3	1.6 ± 0.4	
After 6th Month	1.0 ± 0.00	1.1 ± 0.1	

TABLE 4: PERCENT OF NEGATIVE SIGNS OF TENDERNESS OF MASTICATORY MUSCLES OF BOTH GROUPS

Months	Hard Splint Group	Soft Splint Group
Preoperative	19.2 %	17.1%
After 1st Month	41.1%	28.2%
After 2nd Month	75.0%	44.4%
After 3rd Month	100%	83.3%
After 4th Month	100%	100%
After 6th Month	100%	100%

TABLE 5: PERCENT OF NEGATIVE SIGNS OF TENDERNESS OF NECK MUSCLES OF BOTH GROUPS

Months	Hard Splint Group	Soft Splint Group
Preoperative	57.2%	34.3%
After 1st Month	74.9%	45.2%
After 2nd Month	97.3%	67.1%
After 3rd Month	99.2%	90.4%
After 4th Month	100%	94.4%
After 6th Month	100%	95.3%

hard splint therapy (Table 4 and 5). Masticatory and neck tenderness disappeared by 3 Month in the hard splint group, but remained at 4 Month in the soft splint groups (Table 4 and 5). Regarding mouth opening initial response of the hard splint was better than soft splint but both groups patient showed a significant mouth opening after four month treatment (Table 1).

DISCUSSION

TMD can be treated through conservative and surgical interventions but conservative treatment is considered more beneficial. Conservative treatment includes splint therapy.⁵ Splints are of two types on the basis of materials Hard and Soft. These splints could be made to fit on either the maxillary or mandibular arch features, but maxillary splints are better options. Occlusal splints works on the principle of Muscles relaxing, unloading of the joint, repositioning of the joint, occlusal disengagement and restoration of the occluso vertical dimension.⁴

In present study significant improvement in mouth opening was observed in both groups. These results are comparable to Suvinen and Reade,⁶ who reported a 7.4-mm increase in jaw opening after splint therapy. Both splint therapies relieved the painful muscular spasm and muscular tenderness leading to maximal jaw opening.

In the current study, significant reduction in the TMJ tenderness, muscular pain VAS score was observed in both Hard and soft splint groups. These observation were similar to the study done by Amin⁷ Hard splints were more effective throughout the study period. These results were in contrast to the study of Tsuga *et al.*⁸ who found that hard splints were ineffective in reducing muscle pain. Reduction in muscle pain was due to reduction of abnormal muscle hyperactivity because occlusal splints contacts on all of the teeth, with immediate disclusion of all posterior teeth by the anterior teeth and condylar guidance. This will relax the elevator and positioning muscles.⁷⁻⁸

There are conflicts regarding the efficacy of both splints. In this study both splints were effective, these findings were in accordance to the randomized trials of Amin⁷ and Truelove *et al.*⁹ they found that all the patients improved irrespective of splint type, but in contrast to the study of Davies and Gray¹⁰ who found no advantage of any particular splint use. In present study hard splints were effective than soft splints in contrast to the study by Pettengill *et al.*¹¹ that stated no difference between both splints. Hard splint had long lasting hard occluding surface while soft can be easily adjusted to contact pattern.¹¹

The result is in accordance with Block *et al.*¹² who concluded that almost 74% of patients with TMPDs had complete remission of symptoms after 6 weeks of occlusal splint therapy but maximum improvement in study participants were observed in three months period.

Although for the treatment of TMD this study supports the use of both hard, and soft splints but further research is needed to investigate the most appropriate design, regime, and EMG activity following the splint therapy.

CONCLUSIONS

Both splints therapies are helpful in the improvement of TMPDs. Three months is considered to be the minimum period for splint therapy to improve symptoms. Hard splint therapy showed earlier improvement of some TMPDs symptoms.

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CONTRIBUTIONS BY AUTHORS

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|-------------------------|------------------------------------------------------------------------|
| 1 Abdul Wahid: | Main author, Principal Investigator. |
| 2 Muhammad Raza: | Objective setting, research designing and Material and method setting. |
| 3 Fahim Ullah: | Literature review, Result, Discussion and drafting. |
| 4 Monsif Iqbal: | Proof reading |