

SOFT VERSUS HARD OCCLUSAL SPLINT THERAPY IN THE MANAGEMENT OF TEMPOROMANDIBULAR DISORDERS (TMDS)

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Abstract

Introduction: The temporomandibular joint (TMJ) is interrelated with other neuromuscular components. Defects of any of these components or factors preventing them from working in harmony could lead to temporomandibular disorders (TMDs). Management of TMD includes conservative and surgical interventions. Occlusal adjustment involves repositioning the mandible to a centric position by using prosthodontic or orthodontic appliances. Intraoral occlusal splints are designed to provide even and balanced occlusal contact without forcefully altering the mandibular rest position or permanently altering the dental occlusion.

Methods: This study will include 70 patients who had been diagnosed with MPD or ID of the TMJ in the form of reciprocal clicking. Patients were divided into two groups. They were treated for 6 months with either a vacuum-formed soft occlusal splint constructed from 2-mm-thick elastic rubber sheets (soft splint group) or a hard flat occlusal splint fabricated from transparent acrylic resin (hard splint group).

Results: Comparison between hard and soft splints reveals that both the occlusal splints are effective in reduction of pain, clicking and tenderness and increase in mouth opening. But hard splints give better results in MPDS and disk derangement than soft splints.

Conclusion: Both hard and soft occlusal splint therapies are beneficial in the treatment of TMD; however, soft splint therapy results in earlier improvement of some TMD symptoms. Therefore, this study supports the use of splint therapy for managing MPD and TMDs in patients with anterior disk displacement and reduction.

Introduction

The temporomandibular joint (TMJ) is interrelated with other neuromuscular components. Defects of any of these components or factors preventing them from working in harmony could lead to temporomandibular disorders (TMDs). TMDs have a multifactorial etiology, with bruxism, psychological illness, and traumatic injuries from mastication, extreme mouth opening, and dental treatments being considered as the main causes^{1,2}.

TMDs are characterized by clicking and pain, either confined to the TMJ region or radiating to the eyes, shoulder, and neck. Headaches, tinnitus, jaw deviation, locking, and limited mouth opening are common symptoms.³ An occlusal splint is a removable appliance, usually fabricated of resin, most often designed to cover all the occlusal and incisal surfaces of the teeth in the upper or lower jaw. Occlusal splint therapy has been shown to be useful for the diagnosis and management of various masticatory system disorders.

Splint therapy may be defined as the art and science of establishing neuromuscular harmony in the masticatory system and creating a mechanical disadvantage for parafunctional forces with the help of removable appliances.⁴

Materials & Methods

This study will include 70 patients who had been diagnosed with MPD or ID of the TMJ in the form of reciprocal clicking. Patients were divided into two groups. They were treated for 6 months with either a vacuum-formed soft occlusal splint constructed from 2-mm-thick elastic rubber sheets (soft splint group) or a hard flat occlusal splint fabricated from transparent acrylic resin (hard splint group).

Inclusion criteria:

- Patients diagnosed with MPDS and Internal Disk Derangements with clinical symptoms of pain, clicking, deviation of jaw

Exclusion criteria:

1. Patients with arthritic changes in mandible
2. Patients who underwent any surgery related to TMJ
3. Patients diagnosed of disk displacement with reduction
4. Patients diagnosed with any other causes of Trismus

Fabrication of soft occlusal splint

An alginate impression was made of the maxillary arch which was poured immediately with a suitable gypsum product (die stone). When the stone was adequately set, the cast was withdrawn from the impression. With a pressure or vacuum adapter, a 2-mm thick sheet of ethylene vinyl acetate (EVA) is adapted to cast and finishing is done.

Fabrication of hard stabilization splint

An alginate impressions were made of the maxillary and mandibular arch which were poured immediately with a suitable gypsum product (die stone). Facebow records were taken with the help of Hanau springbow and then were transferred on Hanau whipmax semi-adjustable articulator. The waxed appliance is invested and processed with heat cured acrylic resin and is then adjusted for final fit intraorally

Patients will be recalled after week then monthly after 1, 2, 3, and 6 months of treatment. Monthly follow-up intervals between start of treatment and 1 month, 2 months, 3 months, and 6 months designated as 1 M, 2 M, 3

M, and 6 M, respectively. TMJ functional parameters, including pain -visual analog scale (VAS) scores, tenderness of the masticatory muscles, clicking and tenderness of the TMJ, and range of mouth opening, will be recorded before treatment and at each follow-up visit.

Statistical analysis

Data was subjected Shapiro wilk test to check normality of data and was not following normal distribution so data was subjected to nonparametric tests. Outcome was ordinal with dependent observations so it was analysed using Mann-Whitney U Test for between group comparison and Fried-Man Test for within group comparison.

The statistical analysis was performed using the statistical software package SPSS (Chicago, IL, USA) version 21.0 for MS Windows & P < 0.05 was considered statistically significant. P < 0.01 = Highly Significant (Hs) P < 0.05 = Significant (S) P > 0.05 = Not Significant (Ns)

Results

Hard Splint (Chart 1 to Chart 4)

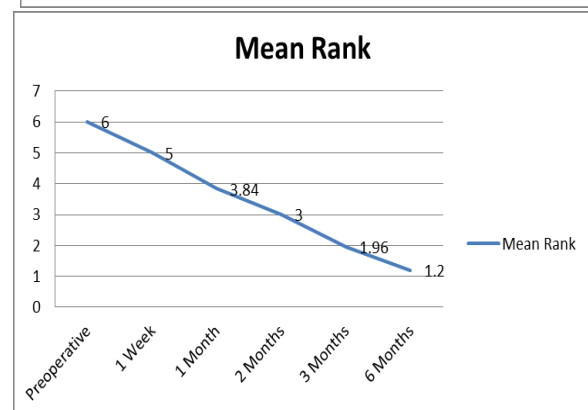
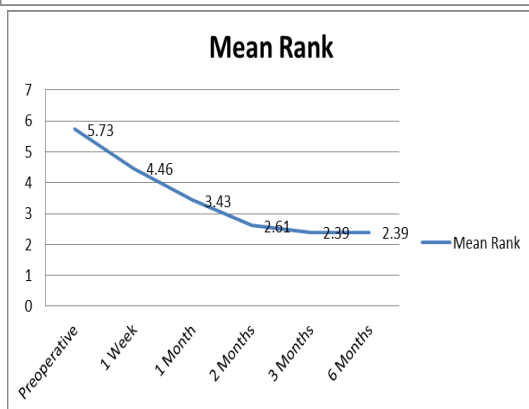
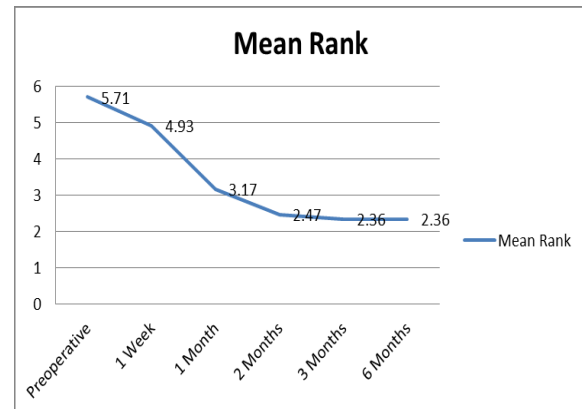
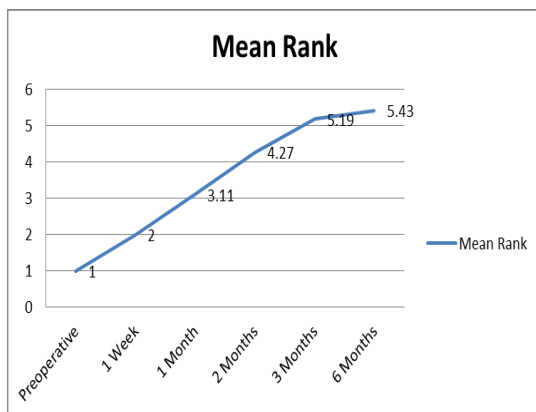
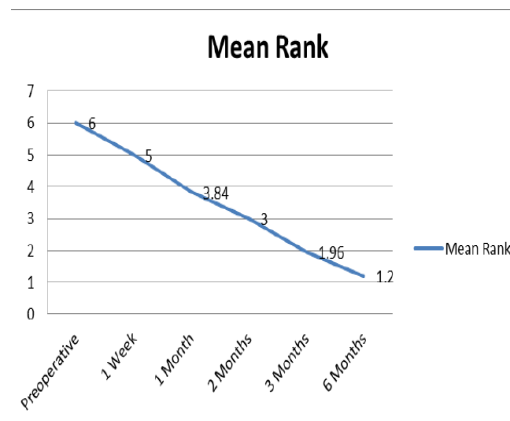
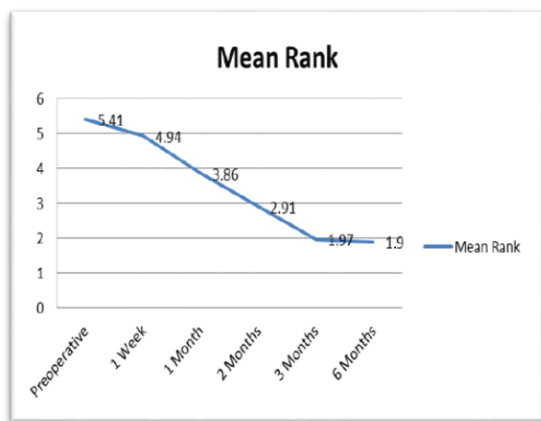
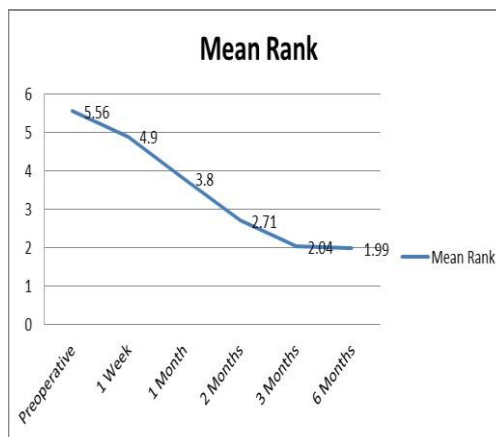
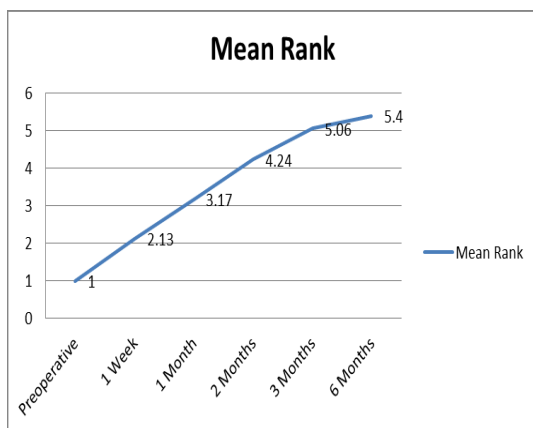


Chart 1 (hard splint) shows evaluation of mouth opening of the patients having MPD or disk derangements. p value here is 0.001, which is highly significant and shows that mouth opening gradually increases over regular period of time.

Chart 2 (hard splint) shows evaluation of tenderness of masticatory muscles. P value here is 0.001, which reveals that tenderness of the masticatory muscles gradually decreases over the period of time.



Soft splint (Chart 5 to Chart 8)

Chart 3 (hard splint) shows evaluation of clicking sound present in the temporomandibular joint. Clicking sound were noted as: 3=severe, 2=moderate, 1=mild or absent. Regular follow ups reveals that clicking sound decreases after giving patient the hard splints. P value here is 0.001, which is highly significant.

Chart 4 (hard splint) shows evaluation of pain score, where pain score was noted using visual analogue score. Pain gradually decreases in regular follow up period, p value is 0.005, which is highly significant. Hard splint is proven highly effective in those patients with MPD and disk derangements.

Chart 5 shows evaluation of mouth opening in the patients of soft splint group. Mouth opening gradually increases in the patients with TMD and MPDS. P value here is 0.001 which is highly significant and shows the effectiveness of the treatment.

Chart 6 shows evaluation of tenderness in the patients of soft splint group. Tenderness of the masticatory muscles decreases over period of time in soft splint group. P value here is 0.001, which is highly significant.

Chart 7 shows evaluation of clicking sound in patients of soft splint group. Clicking sound decreases with the regular follow up period in this group. P value here is 0.001, which is highly significant and shows the effectiveness of the treatment.

Chart 8 (soft splint) shows evaluation of pain score in soft splint group. Pain score was measured using visual analogue score. Pain gradually decreases after giving patient the soft splint. P value here is 0.001, which is highly significant.

Discussion

As most TMD symptoms have a high incidence of remission over time, usually within 2–4 weeks (Dworkin, 1997)⁵, conservative treatment is considered more appropriate than surgery for these disorders. As a conservative treatment of TMDs, soft splints have some advantages, such as their relative simplicity, reversibility, non-invasiveness, and cost. These splints could be made to fit either the maxillary or mandibular arch and often are inserted immediately (Wright et al., 1995)⁶. The present study was conducted to compare the efficiency of soft versus hard occlusal splint therapies for the management of TMDs.

In the current study, gradual rehabilitation using occlusal splints was applied to allow patient accommodation to the intraoral bulk and avoid splint rejection. VAS scores for pain showed significant improvement throughout all study intervals.

Similarly, Raphael et al. (2003)⁷ reported a decrease in VAS scores and the number of painful muscles in patients with myofascial pain after 6 weeks of occlusal splint therapy. A significant improvement in mouth opening was attained in both groups across the study period. This improvement was significant after 1 or 2 months of treatment in the soft or hard splint group, respectively.

Occlusal splint insertion alters the resting position, and adapting to this new position increases the occlusal vertical dimension beyond the free space. The new resting position allows muscles to function more efficiently during contact and reduces muscle activities during postural functions. Meanwhile, the increase in the vertical dimension decreases the muscular effort required, resulting in relaxation of the muscles and TMJ (Mona et al., 2004)⁸. The findings of the present study are in agreement with those of Naikmasur et al. (2008)⁹.

Conclusion

Both hard and soft occlusal splint therapies are beneficial in the treatment of TMD; however, soft splint therapy results in earlier improvement of some TMD symptoms. Six months is considered to be the minimum period for splint therapy to improve TMD symptoms. Therefore, this study supports the use of splint therapy for managing MPD and TMDs in patients with anterior disk displacement and reduction.

References

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