ISSN: 2581-5989
PubMed - National Library of Medicine - ID: 101738774

International Journal of Dental Science and Innovative Research (IJDSIR)
IJDSIR : Dental Publication Service
Available Online at: www.ijdsir.com
Volume – 6, Issue – 4, July - 2023, Page No. : 311 - 318

Effect of flat occlusal splints in anterior disc interference disorders of temporomandibular joint

[1]Dr. Sangeetha Shivaji, Oral & Maxillofacial Surgeon, Aiema Dental, Vellayambalam, Thiruvananthapuram, Kerala, India.

[2]Dr. Ajith Kumar K, Professor, Dept of Oral & Maxillofacial Surgery, Government Dental College, Thiruvananthapuram, Kerala, India.

[3]Dr. Bindu R, Associate Professor, Dept of Oral & Maxillofacial Surgery, Government Dental College, Thiruvananthapuram, Kerala, India.

Corresponding Author: Dr. Bindu R, Associate Professor, Dept of Oral & Maxillofacial Surgery, Government Dental College, Thiruvananthapuram, Kerala, India.

Citation of this Article: Dr. Sangeetha Shivaji, Dr. Ajith Kumar K , Dr. Bindu R, "Effect of flat occlusal splints in anterior disc interference disorders of temporomandibular joint", IJDSIR- July - 2023, Volume – 6, Issue - 4, P. No. 311 – 318.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Background: Temperomandibular disorders include abnormalities of the discal position and/or structures as well as dysfunction of the associated musculature. Temperomandibular Joint disc interference disorders are broadly classified as reducible and nonreducible. Symptoms and signs include painful joint sounds, restriction or deviations in the range of motion, orofacial pain, open and closed locks. Oral splints are the most common therapeutic approach for patients diagnosed with disc interference disorders. These appliances provide a simple and non-invasive form of treatment. The present study aims at categorizing the effect of customized flat occlusal splint.

Primary Objective: To find out the group of disc interference disorders which is most benefitting from the splints.

Secondary Objective: To find out deleterious effects of splints on occlusion, if any and to assess the duration of utilization of splints for deriving maximum therapeutic benefit.

Methodology: Thirty patients with anterior disc displacement, indicating correction with flat occlusal splint therapy were selected. Based on clinical examinations, patients were divided into group A (patients with anterior disc displacement with reduction) and group B (patients with anterior disc displacement without reduction). Custom made acrylic occlusal splints up to 2mm height were fabricated and delivered. Parameters like mouth opening in mm, lateral excursion

in mm and pain in VA scale assessed at intervals, 1 week, 2 weeks, 4weeks, 6 weeks and 8 weeks. The pre splint symptoms were compared against the post splint benefits in both groups.

Results and Conclusion: Anterior disc displacement of temporomandibular joint was more common in females. In group A Clicking was the most common chief complaint (100%) and pain was felt by 73.3%. In group B, 66.7% patients had chief complaint of difficulty in mouth opening and 26.7% had pain during mouth opening. The two groups under the study showed decrease in the pain value with the use of flat occlusal splint. The effectiveness of pain relief was found more in group A. Group A had more improvement in maximum interincisal distance compared to Group B. The study suggests that there is an appreciable change in the temporomandibular excursive movements in both the groups with the use of flat occlusal splint for a period of 8 weeks. There were no clicking sounds while opening and closing in group B patients. The range of opening and closure at which the clicking was felt, decreased with the use of flat occlusal splint in group A patients. In 27% of the cases in Group A, the clicking disappeared after eight weeks of flat occlusal splint wear.

Keywords : Anterior disc displacement, flat occlusal splint, pain, clicking, maximum interincisal distance, lateral excursion.

Introduction

Temporomandibular joint disorders [1,2] is a collective term for a number of clinical signs & symptoms involving masticatory muscles, temporomandibular joint & associated structures. The most common TEMPOROMANDIBULAR JOINT disorders are disc displacement (with and without reduction) pain dysfunction syndrome, internal derangement, degenerative joint disease (arthrosis, arthritis) and trauma. Temporomandibular joint disorders are most common in people between the age of 20 and 40 years and occur more often in women than in men. The most frequent complaint is pain and decrease in the maximal interincisal opening (MIO), which normal values are between 45 -50 mm [3].

The following symptoms like pain at rest, pain during maximum mouth opening and chewing, tenderness of the joint, sounds like clicking and crepitations, difficulty in opening the mouth, intermittent lock, closed lock & early morning stiffiness of joint may occur [4].

Internal derangement of the temporomandibular joint is defined as a disruption within the internal aspect of the temporomandibular joint in which there is a displacement of the disc from its normal functional relationship with the mandibular condyle and the articular portion of the temporal bone [5]. Internal derangement of the temporomandibular joint is characterized by displacement of the intra-articular disc resulting in clicking or popping sounds [6].

Internal derangements can be divided into 2 categories:

Anterior and Posterior disc displacement: Anterior disc displacement is classified into Anterior disc displacement with reduction & Anterior disc displacement without reduction.

Oral splints are the most common therapeutic approach used to treat patients diagnosed with disc interference disorders. There is no consensus on the clinical indications and functioning of oral splints. These appliances or devices provide a relatively simple, reversible and noninvasive form of treatment. The present study aims at categorizing the effect of customized flat occlusal splint in both groups.

Methodology

Patients reporting to the Department of Oral & Maxillofacial surgery, Government Dental College,

Trivandrum with complaints of temporomandibular joint pain, clicking and difficulty in mouth opening diagnosed as anterior disc displacement were selected for this prospective study. Thirty patients, composed of 4 men and 26 women between the age of 18 & 60 years were included in this study. Basic information for each patient and chief complaints were recorded.

Clinical diagnosis of anterior disc displacement with reduction was made based on the presence of reciprocal clicking. Clinical diagnosis of anterior disc displacement without reduction, was made based on the following clinical data: (a) absence of clicking or crepitus; (b) limited mouth opening and jaw deviation towards affected side (c) history of previous clicking and intermittent locking, (d) decreased translation of condyle in the transcranial radiograph.

Each patient was asked to open and close the mouth slowly to detect opening click and reciprocal clicking sounds by palpation at the preauricular area. Then, the patient was asked to open the mouth as wide as possible. Once an opening clicking sound was detected by palpation, the mouth opening was recorded by measuring the distance between the right upper and lower central incisors and reciprocal clicking measured on closing.

Radiographic imaging included a panoramic screening film followed by other temporomandibular joint transcranial (open and closed) views. RA factor estimation was conducted to rule out other systemic diseases and rheumatic arthritis respectively. Before placement of flat occlusal splint, the following parameters were recorded.

Mouth opening – Interincisal distance at active full mouth opening in millimeters measured from right upper central incisor to right lower central incisor.

Lateral excursion in mm towards right and left.

Clicking while opening and closing evaluated by palpatory & auscultatory methods.

Pain experienced by the patient was assessed using subjective evaluation by Visual Analogue scale.

Based on the clinical examination patients were divided into 2 groups.

Group 1 – patients with anterior disc displacement with reduction.

Group 2 – patients with anterior disc displacement without reduction.

Custom made acrylic flat occlusal splint upto 2mm height were fabricated and delivered. The flat occlusal splints were made of hard acrylic, self-curing resin. The patients were instructed to wear the flat occlusal splint all day except for when chewing and brushing teeth and advised to reduce parafunction and avoid hard foods.

After the placement of flat occlusal splint, the same evaluation procedures were performed again for the subjects at 1 week, 2 weeks, 4 weeks, 6 weeks and 8 weeks intervals. All the parameters were once again recorded and documented. The before-treatment parameters were compared to those made at the follow-up examinations. The standard therapeutic time was 8 weeks. Patients evaluated in this study received no other treatment primarily than a flat occlusal splint. The appliance was adjusted on every visit to maintain a stable contact relationship with each opposing tooth in the position of relaxed closure from a postural rest position. The flat occlusal splint was used 24 hours a day except during chewing for first few weeks; then its use was gradually reduced during the following weeks, being first removed for 2 -3 hours between meals and then successively for longer periods till it was discontinued.

Data analysis was performed using software statistical package for social science [SPSS]. Analysis of the

parameters like mouth opening, lateral excursions, clicking at different intervals were done by repeated measure ANOVA. Pretreatment and post treatment comparison of the parameters; mouth opening, lateral excursion, clicking were done using paired t test. Analysis of pain at different intervals were done by Friedman's test. Pretreatment and post treatment comparison of pain were done by Wilcoxon's signed rank test. Two group comparison in mouth opening & lateral excursions were done using independent t-test. Two group comparison of pain were performed using Mann-Whitney U-test.

The final outcome of flat occlusal splint therapy was assessed according to the parameters said earlier and the effectiveness of flat occlusal splints in Disc interference disorders assessed statistically.

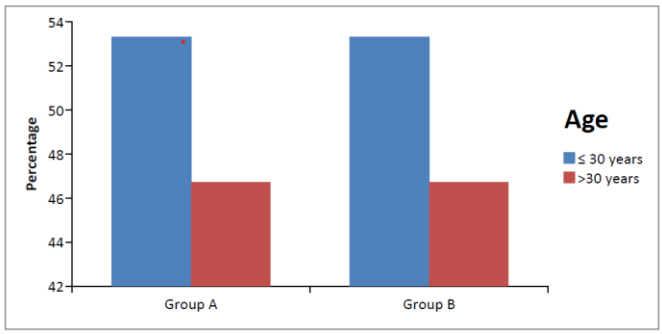
Results

In our study, out of 30 subjects examined, Temporomandibular joint internal derangements are more common in females. 86.7 % of the patients in both group A and B were females. Out of 30 subjects (15 in each group), both groups had 53.3 % of patients below 30 years of age.

Table 1: Comparison of gender

Sex	Group-A		Group-B	
	N	%	N	%
Male	2	13.3	2	13.3
Female	13	86.7	13	86.7
Total	15	100.0	15	100.0

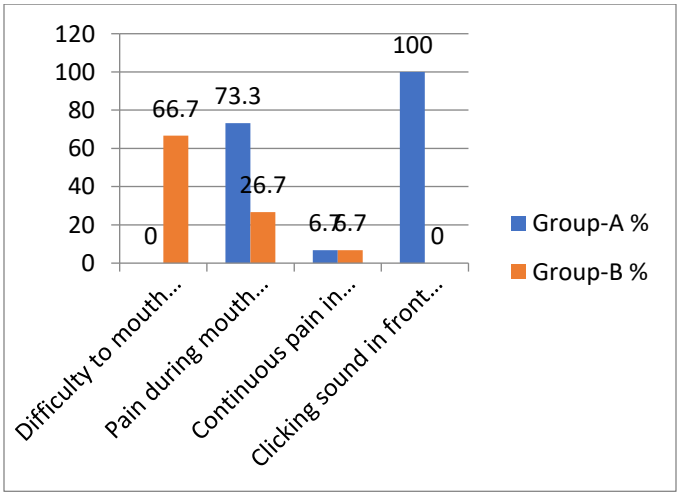
Figure 1: Comparison of age



All the variables such as Mouth opening - maximum Inter incisal distance in millimeters, Pain level assessed with visual analogue scale, Lateral excursion towards right and left in millimeters & Clicking on opening and closing in millimeters were measured at the time of presentation & 1 week, 2 weeks, 4 weeks, 6 weeks & 8 weeks after splint insertion.

100% of patients in Group A had chief complaint of clicking in front of ear. 73.3 % of group A had chief complaints of both pain and clicking infront of the ear during mouth opening. 66.7% patients of group B had chief complaint of difficulty in mouth opening and 26.7 % patients of group B had pain during mouth opening as their chief complaint. There was an increase in the interincisal opening after periodic review checkups.

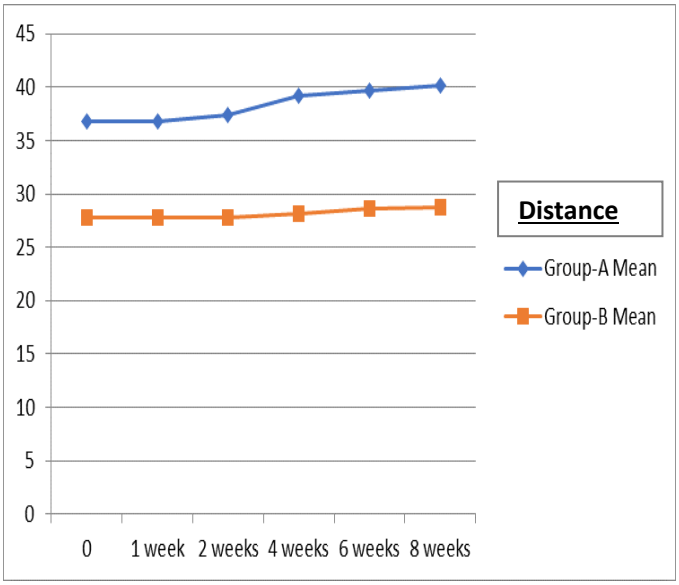
Figure 2: Comparison of chief complaint



The comparative analysis of the interincisal opening values in each periodic intervals of flat splint therapy

showed that the patients with anterior disc displacement with reduction had increased rate of improvement compared to the other group.

Figure 3: Comparison of maximum interincisal opening between different intervals



The two groups under the study showed decrease in the pain value with the use of flat occlusal splint. The effectiveness of pain relief was found more in group A (anterior disc displacement with reduction).

The excursive movements of temporomandibular joint have a definitive improvement both towards right and left sides with the splint wear. The effective change was initiated after two weeks of treatment in both the groups. The study suggests that there is an appreciable change in the temporomandibular excursive movements with the use of flat occlusal splint for a period of 8 weeks in the anterior disc discrepancies with reduction and without reduction.

The range of opening and closure at which the clicking was felt, decreased on the usage of flat occlusal splint in group A patients (anterior disc displacement with reduction).

In 27% of the patients in group A the clicking disappeared after eight weeks of flat occlusal splint wear.

Discussion

Temporomandibular disorders are defined as clinical problems involving the temporomandibular joints, its musculature & associated structures.

According to Chang et al, one of the main symptoms of anterior disc displacement with reduction is temporomandibular joint clicking. It can progress to anterior disc displacement without reduction in the absence of treatment.[7]

The exact mechanism of occlusal splint therapy is still not clearly understood. It has been suggested that it removes the influence of the teeth on the joint position by slight distraction of the joint which in turn, enables damaged connective tissue to heal or the splint unloads the joint space which leads to a reduction in clinical joint sounds and facilitates balanced recruitment of muscles of mastication to reduce muscle tenderness.[7]

The present study aimed at the assessment of pain relief effected by the usage of flat occlusal splint over a period of eight weeks. 73.3 % patients of group A had chief complaints of both clicking and pain during mouth opening. 26.7 % patients of group B had pain during mouth opening as their chief complaint. The periodic check up with visual analogue scale showed that the intensity of the pain episode decreased as increase in the duration of splint wear. The cases with anterior disc displacements with reduction were more effective after splint usage. Disc displacement without reduction patient's pain symptoms also responded favorably with flat occlusal splint.

In group A patients, total remission of pain occurred in 60% of the patients (VAS SCORE 0) and pain symptom improved in 53 % patients at the end of 8th

weeks & pain score reduced to 2. In group B complete relief of pain seen in 20% patients, score reduced to 2 in 40 % of patients and rest of the patients showed a decrease in intensity of pain but a mild pain persisted in them after 8 weeks of therapy. This indicates the need for further evaluation of flat occlusal splint wear for a period of longer duration. In Chen et al's study, the use of occlusal stabilizing splint successfully eliminated pain in 6 of 7 patients [8].

The routine treatment with splint therapy has a positive effect on increasing the altered mouth opening. The previous studies done by Sung-chang [7] and Tsuga [9] showed mouth opening improved with stabilization splint wear. Chung et al's [10] research finding was that the mouth opening improved in 3 months of splint wear.

Anterior disc displacement with reduction: There was an improvement in mouth opening by 5mm in 33.33% patients; 20% had 4 mm increase; 26.67% had 3 mm increase; 13.33% had 2 mm increase. Out of the fifteen patients one patient seem to have no change. In this study there is a definitive significant improvement in the interincisal opening with the use of flat occlusal splint.

Anterior disc displacement without reduction: In 20% of cases the mouth opening increased by 3mm. This shows that the interincisal opening parameter showed a significant change in the anterior disc displacement with reduction cases (Group A) compared to the other group (Group B).

In Chen et al's [8] study patients who had temporomandibular joint click at the initial examination still had a persistent asymptomatic click of reduced intensity following splint therapy. Chang etal [7] while evaluating the severity of joint clicking before treatment and the efficacy of treatment with flat occlusal splints in their study, found that the clicking disappeared completely in patients with lower grade of clicking index. Ninety days after treatment, the clicking sound had disappeared in 83.7% of 49 patients from Group A whose clicking index was ≤2 before starting treatment. However, the clicking sound remained in 88.5% of the 26 patients whose clicking index was 3 before treatment. The splint can significantly decrease or eliminate temporomandibular joint clicking , relieve pain, and improve pain free mouth opening.

In our study the clicking was completely eliminated in 27% cases of group A. The comparative analysis with previous research points out the fact that a further long period of splint wear would have a definite positive effect in the management of clicking. The possibility of gradual remission during long-term insertion still remains.

The clinical examination showed that the range of mandibular excursive movements were limited towards the contralateral side of the internal derangement. Upon the usage of flat occlusal splint, group A had an improvement in lateral excursive movement by 5mm in 33% cases. In group B, 30% patients it improved by 3mm. The comparative assessment of the cases of anterior disc interference with and without reduction showed that group A [with reduction] showed increased effect with splint usage.

Although an anterior repositioning occlusal splint can be used to treat joint clicking, its production and adjustment are complicated and time consuming. Furthermore patients who use this type of splint experience significant early discomfort and it is recommended that these splints be used for less than 6 weeks [7]. The prolonged use of the splints leads to anterior open bite, as reported occasionally in the literature. Fernando & Eduardo [11] reported that these splints can provoke severe occlusal alterations and other complications.

In our study no deleterious effects were found for treatment duration of 8 weeks. Long term use may have unwanted effects but need further research in order to substantiate it. The stabilization splints are safe therapeutic aid in the treatment of disc interference disorders, provided there is a regular follow-up.

Conclusion

According to our study, anterior disc displacement of temporomandibular joint was more common in females. Clicking was the most common chief complaint and pain was felt by 73.3% in group A. In group B, 66.7% patients had chief complaint of difficulty in mouth opening and 26.7 % had pain during mouth opening as their chief complaint. Group A had more improvement in mouth opening compared to Group B .The mouth opening increased after each week. This indicates the fact that time of splint wear is an important factor in the improvement of mouth opening in both the groups. The comparative analysis of the interincisal opening values in each periodic intervals of flat splint therapy showed that the patients with anterior disc displacement with reduction had increased rate of improvement compared to the other group. The two groups under the study showed decrease in the pain value with the use of flat occlusal splint. The effectiveness of pain relief was found more in group A. The study suggests that there is an appreciable change in the temporomandibular excursive movements in both the groups with the use of flat occlusal splint for a period of 8 weeks. There were no clicking sound while opening and closing in group B patients. The range of opening and closure at which the clicking was felt, decreased with the use of flat occlusal splint in group A patients. In 27% of the cases in Group A, the clicking disappeared after eight weeks of flat occlusal splint wear. Hence further studies with increased sample size is required to confirm the extend of correction of temporomandibular joint clicking with flat splint therapy.

The treatment goals for Anterior disc interference disorders of temporomandibular joint are to reduce pain, restore normal function, especially for jaw opening and restore normal lifestyle functioning. In this aspect, the results which here obtained are acceptable. The treatment modality using flat occlusal splint used in this study were effective. So flat occlusal splint should be considered as primary conservative management in disc interference disorders of temporomandibular joint with less risk of adverse effects.

References

1. Lomas J, Gurgenci T, Jackson C, Campbell D. Temporomandibular dysfunction. Aust J Gen Pract. 2018 Apr;47(4):212-215. [PubMed]
2. List T., Jensen R.H. Temporomandibular disorders: old ideas and new concepts. Cephalalgia. 2017; 27:692–704.
3. Shirish I, Tarun G. Temporomandibular joint: disorders, treatments, and biomechanics, Ann Biomed Eng 2009; 37(5): 976–996.
4. Sharmila D, Pradeep D. Internal Derangement of Temporomandibular Joint .IOSR-JDMS 2014; 13(3):66-73.
5. Dolwick F, Katzberg W, Helms C. Internalderangements of the temporomandibular joint: fact orfiction? J Prosthet Dent 1983;49: 415-8.
6. AratiS ,Meenaxi U et al.Arthrocentesis for the treatment of internal derangement of the temporomandibular joint . J Maxillofacial Oral Surg. 2010; 9(4): 350–354.
7. Chang SW, Chuang CY et al; Treatment effects of maxillary flat occlusal splints for painful clicking of the temporomandibular joint; Journal of Medical Science 2010; 26:299–307.

8. Chen CW, Boulton J, Gage J; Effects of splint therapy in TEMPOROMANDIBULAR JOINT dysfunction: A study using magnetic resonance imaging; Australian Dental Journal, vol. 40, issue 2 (1995) pp. 71-78.
9. Tsuga K, Akagawa Y, Hiromichi Tsuru R S;A short-term evaluation of the effectiveness of stabilization-type occlusal splint therapy for specific symptoms of temporomandibular joint dysfunction syndrome; Journal prosthetic dentistry 1989;61:610-13
10. Chung S C, Suk Kim H, The effect of the stabilization splint on the TEMPOROMANDIBULAR JOINT closed lock. The journal of craniomandibular practice April 1993, vol. 11, no.2
11. Ginestal E, Magdaleno F, Side Effects of Stabilization Occlusal Splints: A Report of Three Cases and Literature Review; CRANIO: The Journal of Craniomandibular Practice April 28;2010 (2):128-35