

EFFICACY OF OCCLUSAL APPLIANCE THERAPY IN THE MANAGEMENT OF TEMPOROMANDIBULAR DISORDERS

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ABSTRACT

Objective: The purpose of this study is to evaluate the efficacy of hard occlusal appliance therapy for the treatment of temporomandibular disorders.

Materials and Methods: This cross sectional study was carried out in the Prosthodontics department at Armed Forces Institute of Dentistry, Rawalpindi.

Results: A total of 94 subjects were included in this study, out of which, 38 were females while 56 were males.

Conclusion: This study advocates the use of occlusal splint therapy for the management of TMDs. It is simple, with fewer side effects, cost effective, noninvasive, and better patient compliance.

Keywords: Mandible, disorders, occlusal splints, articular fossa, compliance.

INTRODUCTION

Temporomandibular disorders (TMD's) are commonly encountered disorders of the temporomandibular joint. 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.¹ TMDs have a multifactorial etiology, ranging from bruxism, traumatic bite, psychological illness, extreme mouth opening, occlusal disharmony and anatomic variations being the leading causes.² Pain is one of the crucial symptoms that need to be addressed timely in order to achieve patient comfort.

TMD's can be treated conservatively provided the patient reports timely and the clinician has the required skills and laboratory assistance, without

which conservative treatment might not be possible. Conservative treatments include physical therapy, localized steam application, external muscle massage,³ occlusal adjustment, analgesia, psychotropic medication, splint therapy^{4,5} alternative therapies such as acupuncture, as well as treatment modalities such as ultrasound, soft laser, diathermy, and infrared radiation. Surgical treatments include meniscoplasty and meniscectomy.^{6,7}

Occlusal appliance therapy consists of a number of splints, they may be classified according to the material from which they are made or by whether they cover some or all the teeth in the dental arch. Complete coverage splints may be further classified as directive and permissive splints. Occlusal adjustment of a permissive splint establishes occlusion of the opposing functional cusps in centric relation, while directive splints aim to achieve functional cusp contacts in a therapeutic anterior position of the mandible. 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.

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The purpose of this study is to evaluate the efficacy of hard occlusal appliance therapy for the treatment of temporomandibular disorders. This was compared by evaluating improvement in muscle pain, joint sounds, and limited jaw function.

MATERIALS AND METHODS

This cross sectional study was carried out at Prosthodontics department, Armed Forces Institute of Dentistry, Rawalpindi after approval from the ethical committee. A total of 94 subjects were evaluated both clinically and radiographically. All patients, both males and females diagnosed with myofascial pain dysfunction (non-inflammatory myalgia and myofascial pain) and internal derangement disorders (disc displacement and disc dislocation with reduction) reporting to the Prosthodontics department (AFID) from November 2016 till August 2018 were included. Patients between the ages 15-50 years having complete dentition were included. Patients with bone diseases (Osteoporosis, osteopetrosis, osteomalacia), suffering from debilitating diseases (Rheumatoid arthritis, poliomyelitis, chronic obstructive pulmonary disease), Dyskinesia, and those with history of orthodontic treatment or orthognathic surgery were excluded from the study.

A thorough history was obtained from each patient and detailed oral examination was carried out to evaluate the type of TMD. Each subject was interviewed using modified Fosenca's questionnaire.⁷ Patients were evaluated concerning facial pain, joint sounds and limitation in mandibular movement. Those reporting with one or more of these symptoms were asked further questions regarding their severity and functional consequences in order to reach the diagnosis of the type of TMD. Upon reaching the diagnosis, patients were given a hard stabilization splint, soft occlusal splint or an anterior positioning splint. Each patient was reviewed after 3 weeks interval for a duration of 6 months. The modified Fosenca's questionnaire was filled on each subsequent visit to record the effect of the occlusal splint on the existing condition and compare it from baseline data.

Data was entered and analyzed using SPSS version 20.0, descriptive statistics were calculated for both qualitative and quantitative variables. Quantitative variables like age were presented as mean $\pm$ SD. Qualitative variables like effect of the occlusal splint on TMDs, were presented in terms of

frequencies and percentages.

RESULTS

A total of 94 subjects were included in this study, out of which, 38 were females while 56 were males. Tables 1-3 describes the variation in clicking over a period of 6 months during splint therapy. A significant difference was seen in joint sounds at 3 months of splint therapy ($\alpha=.026$). While, no significant difference was seen at 6 months. Changes in TMJ pain are described in tables 4-6. Tables 7- 9 show improvement in limitation of mouth opening as the treatment progressed.

Out of 97 patients, 63 had limited mouth opening (less than 35mm). 6 patients with LMO were prescribed soft while the rest 57 were given hard stabilization splint. At 3 month followup, only 1 in the soft splint group and 13 in hard splint group had LMO. At 6 months followup, only 4 patients in the hard splint group still had LMO while the rest achieved normal MO. However, results were not statistically significant. The elaborated results are shown in tables 7-9.

DISCUSSION

Occlusal appliance therapy increases the vertical dimension of the patient. As the vertical

dimension increases from the occlusal contact on the insertion of the occlusal splint, muscular effort decreases resulting in the relaxing of the muscles and hence, TMJ8. Tsuga et al. (1989) performed a study on hard splints and found that it is ineffective in reducing muscle pain⁹ which is in contrast with our study. In the present study, initially 88 patients presented with the complaint of pain, which reduced to 34 in number after 3 months of splint wear and further reduced to 8 patients in a duration of months. In 1988, a study done by Harkins et al. concluded that soft splints had a reduction in facial myalgia.¹⁰ Truelove et al. (2006) did a randomized trial in which they found that all the patients improved irrespective of splint design,¹¹ which is in accordance with our study, where there was both subjective and objective reduction in pain.

Joint loading depends on the splint design. Several studies have concluded that part of the occlusal force applied on the teeth is transmitted to the TMJ,¹² yet the more anterior the tooth contact on the splint is, the higher the load that is transferred to joint. It

Table 1: clicking at the initial presentation

Diagnosis	Splint used	Absent	USC	BSC	URC	BRC	Total
Non inflammatory myalgia	Soft splint	10	3	3	0	2	18
	Hard splint	15	3	0	0	1	19
	Total	25	6	3	0	3	37
Disc displacement	Soft splint	2	12	12	1	2	29
	Hard splint	2	4	9	1	2	18
	Total	4	16	21	2	4	47
Disc dislocation with reduction	Soft splint	0	0	0	0	0	0
	Hard splint	0	0	1	1	8	10
	Total	0	0	1	1	8	10
Total	Soft splint	12	15	15	1	4	47
	Hard splint	17	7	10	2	11	47
	Total	29	22	25	3	15	94

(USC: unilateral single click, BSC: bilateral single click, URC: unilateral reciprocal click, BRC: bilateral reciprocal click)

Table 2: clicking at 3 months

Diagnosis	Splint used	Absent	USC	BSC	URC	BRC	Total
Non inflammatory myalgia	Soft splint	14	2	2	0	0	18
	Hard splint	19	0	0	0	0	19
	Total	33	2	2	0	0	37
Disc displacement	Soft splint	15	6	7	1	0	29
	Hard splint	12	1	4	0	1	18
	Total	27	7	11	1	1	47
Disc dislocation with reduction	Soft splint	0	0	0	0	0	0
	Hard splint	7	0	1	0	2	10
	Total	7	0	1	0	2	10
Total	Soft splint	29	8	9	1	0	47
	Hard splint	38	1	5	0	3	47
	Total	67	9	14	1	3	94

(USC: unilateral single click, BSC: bilateral single click, URC: unilateral reciprocal click, BRC: bilateral reciprocal click)

also has been reported that the TMJ is submitted to tension forces (compression and distraction) during unilateral clenching, and that the force applied to the contralateral joint side is reduced highly when simultaneous contacts are established at both working and nonworking sides.

When considering the presence of joint clicking, we found a general improvement. Although it is considered to be one of the goals of TMD treatment, the resolution of TMJ clicking no longer is the primary objective of using oral splints. In a one-year controlled study with a sample comparable to that used in our study, Conti and colleagues found similar outcomes for improvement of joint noises between

subjects wearing oral splints and subjects in a no treatment group.¹³

CONCLUSION

This study advocates the use of occlusal splint therapy for the management of TMDs. It is simple, with fewer side effects, cost effective, noninvasive, and better patient compliance. The findings from this study suggest the clinicians to consider occlusal splints as a therapeutic protocol when managing patients with myofascial pain dysfunction.

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Table 3: clicking at 6 months

Diagnosis	Splint used	Absent	USC	BSC	URC	BRC	Total
Non inflammatory myalgia	Soft splint	14	2	2	0	0	18
	Hard splint	19	0	0	0	0	19
	Total	33	2	2	0	0	37
Disc displacement	Soft splint	23	3	3	0	0	29
	Hard splint	17	0	1	0	0	18
	Total	40	3	4	0	0	47
Disc dislocation with reduction	Soft splint	0	0	0	0	0	0
	Hard splint	10	0	0	0	0	10
	Total	10	0	0	0	0	10
Total	Soft splint	37	5	5	0	0	47
	Hard splint	46	0	1	0	0	47
	Total	83	5	6	0	0	94

(USC: unilateral single click, BSC: bilateral single click, URC: unilateral reciprocal click, BRC: bilateral reciprocal click)

Table 4: TMJ pain at the initial presentation

Diagnosis	Splint used	Absent	Present	Total
Non inflammatory myalgia	Soft splint	2	16	18
	Hard splint	4	17	19
	Total	4	33	37
Disc displacement	Soft splint	0	29	29
	Hard splint	0	18	18
	Total	0	47	47
Disc dislocation with reduction	Soft splint	0	0	0
	Hard splint	2	8	10
	Total	2	8	10
Total	Soft splint	2	45	47
	Hard splint	4	43	47
	Total	6	88	94

Table 5: TMJ pain at 3 months follow up

Diagnosis	Splint used	Absent	Present	Total
Non inflammatory myalgia	Soft splint	8	10	18
	Hard splint	16	3	19
	Total	24	13	37
Disc displacement	Soft splint	15	14	29
	Hard splint	14	4	18
	Total	29	18	47
Disc dislocation with reduction	Soft splint	0	0	0
	Hard splint	7	3	10
	Total	7	3	10
Total	Soft splint	23	24	47
	Hard splint	37	10	47
	Total	60	34	94

Table 6: TMJ pain at 6 months follow up

Diagnosis	Splint used	Absent	Present	Total
Non inflammatory myalgia	Soft splint	17	1	18
	Hard splint	18	1	19
	Total	35	2	37
Disc displacement	Soft splint	25	4	29
	Hard splint	17	1	18
	Total	42	5	47
Disc dislocation with reduction	Soft splint	0	0	0
	Hard splint	9	1	10
	Total	9	1	10
Total	Soft splint	42	5	47
	Hard splint	44	3	47
	Total	86	8	94

Table 7: LMO at initial presentation

Diagnosis	Splint used	Absent	Present	Total
Non inflammatory myalgia	Soft splint	6	12	18
	Hard splint	6	13	19
	Total	12	35	37
Disc displacement	Soft splint	10	19	29
	Hard splint	2	16	18
	Total	12	35	47
Disc dislocation with reduction	Soft splint	0	0	0
	Hard splint	6	4	10
	Total	6	4	10
Total	Soft splint	16	31	47
	Hard splint	14	33	47
	Total	30	64	94

Table 8: LMO at 3 months

Diagnosis	Splint used	Absent	Present	Total
Non inflammatory myalgia	Soft splint	9	9	18
	Hard splint	15	4	19
	Total	24	13	37
Disc displacement	Soft splint	18	11	29
	Hard splint	14	4	18
	Total	32	14	47
Disc dislocation with reduction	Soft splint	0	0	0
	Hard splint	10	0	10
	Total	10	0	10

Table 9: LMO at 6 months follow up

Diagnosis	Splint used	Absent	Present	Total
Non inflammatory myalgia	Soft splint	17	1	18
	Hard splint	19	0	19
	Total	36	1	37
Disc displacement	Soft splint	27	2	29
	Hard splint	17	1	18
	Total	44	3	47
Disc dislocation with reduction	Soft splint	0	0	0
	Hard splint	10	0	10
	Total	10	0	10
Total	Soft splint	44	3	47
	Hard splint	46	1	47
	Total	90	4	94

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