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Original Article OPEN ACCESS

Multimodal Treatment of Unilateral Temporomandibular Disorder (TMD)- Study of 120 Cases

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Abstract

Introduction: *Temporomandibular disorder (TMD) comprises a variety of conditions affecting the anatomy and functional characteristics of the TM joint (TMJ). Its prevalence has been reported to be between 3.7% and 12%, and is three to five times more frequent in women. Conservative treatments for TMD include medication, physiotherapy, occlusal splints, self-management strategies, and interventions based on cognitive behavioral approaches.* ***Materials and Methods:*** *It was a prospective study done over a period of 6 months in the department of Dental Surgery of Bangladesh Navy Hospital, BNS Potenga, Chattagram. Total 120 patients were included in the study. The patients who met the inclusion criteria were assigned randomly to the treatment. And all the patient got 1 month, 4 months & 6 months of follow up individually. Our treatment has been given in three phase (phase I, Phase II & Phase III).* ***Result:*** *After first line treatment total 51 (42.5%) patients were cure and rest of the 69 (57.5%) had the persistence symptoms. Then rests of the patients were received treatment under phase II guideline. And after phase II 48 (40%) patient became symptom free. Rests 21 (17.5%) patient were enrolled for phase III treatment where they were treated with occlusal splint following arthrocentesis plus Methylprednisolone injection. Among them 15 (12.5%) patients were cured but 6 (5%) had persistence moderate symptoms. Total success after completion of the study was 114 (95%).* ***Conclusion:*** *Analgesic with muscle relaxant, alone with soft diet and jaw exercise is a good first line treatment option in primary temporomandibular disorder. But in progressive cases occlusal splint with soft diet and jaw exercise give significant improvement.*

Key words: *Temporomandibular disorder, soft diet, jaw exercise, occlusal splint.*

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Introduction:

According to health sciences definitions, temporomandibular disorder (TMD) comprises a variety of conditions affecting the anatomy and functional characteristics of the TM joint (TMJ). Factors contributing to TMD complexity are related to dentition, clenching, and other related systems that frequently provoke symptoms of muscular, articular and periarticular pain[1]. TMD has considerable prevalence, with significant impact on physical and psychosocial factors[2]. Its prevalence has been reported to be between 3.7% and 12%, and is three to five times more frequent in women[3]. TMD also contributes to a high proportion of socioeconomic costs, which are usually associated with co-morbidities, such as depression and other psychological factors[4] . Also, the loss of work and work productivity is a major issue to consider in TMD patients being treated early on, and it requires significant public education. Although before the 1980s, malocclusion and other related factors were considered fundamental and key causes

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of TMD, during this decade authors began to publish critical articles on these subjects[5]. In current clinical practice, orthodontic treatments are still used to treat TMD; however, it was established in the 1990s that the role of malocclusion in TMD is very limited or nonexistent,[6] and thus these disorders should not be treated with orthodontics[7]. During the 2000–2010 decade, invasive treatments and surgical options for TMD came into use. However, by the end of this decade, clinical experience and several studies included in systematic reviews, such as Guo et al, reported a lack of evidence supporting the use of arthrocentesis or arthroscopy for TMD treatment[8]. Although the cognitive and behavioral profiles of patients with TMD have been debated for some years,[8] it was in the present decade that health professionals began to propose behavior-based therapies[9] as a promising treatment related to cost-effectiveness[10]. This paradigm has since been changing and developing a wider focus, leaving behind the biomedical structural model. Thanks to advances in neuroscience,[11] biopsychosocial models for diagnostics and treatment (including physical, psychological, and pharmacological therapies) currently have more clinical support and scientific growth[12]. A suitable therapeutic approach for TMD should be aimed at alleviating the main signs and symptoms of this condition[13]. The most relevant signs of TMD are the presence of joint sounds (clicking and crepitation), reduced mouth opening, and disrupted jaw movements[14]. However, pain is the primary problem of this pathology, and it is typically the reason these patients request medical care[15]. Also, it is likely the reason that most studies have been aimed at evaluating the effectiveness of various intervention measures related to pain as the main variable[16]. Conservative treatments for TMD include medication, physiotherapy, occlusal splints, self-management strategies, and interventions based on cognitive behavioral approaches[17]. At present, a conservative treatment approach prevails over surgery, given it is less aggressive and usually results in satisfactory clinical outcomes in mild–moderate TMD[18]. In fact, the evidence for the greatest effectiveness of surgical versus conservative intervention to reduce short-term pain in arthrogenic TMD is controversial and inconclusive[19]. Indications for the application of each of the interventions, as well as their potential effects for the treatment of patients with TMD, are described in the following sections. Untreated or inadequately treated internal derangement of TMD can cause chronic disc displacement, which may lead to deformation of the disc and breakdown of the fibrocartilage covering the condyle and fossa, resulting in osteoarthritis of the TMJ[20]. Treatment methods fall into two categories: conservative methods and surgical methods. Conservative treatments include manipulation, medication, modification of habits, physical therapy, and splint therapy[21]. Surgical treatments include arthrocentesis, arthroscopy, and open joint surgeries[22]. The contemporary treatment strategy for ID of the TMJ consists of conservative methods initially. If there is no response to conservative methods, arthrocentesis is generally performed as a second-step therapy. Splint therapy is used to reduce the excessive loading on the joint, relax the masticatory muscles, and support the adaptation of the articular structures and regenerative processes in the joint[21,23]. The first-line treatment has been debated in the literature[24]. Thus, the aim of this prospective clinical study was to evaluate and compare the effectiveness of two different conservative treatment modalities (Medication with physiotherapy/ jaw exercise and splint therapy only) on pain, function, and disability and psychological status of patients.

Materials & Methods:

Patient recruitment and definitions

This prospective clinical study was performed in the Bangladesh Navy Hospital, BNS Potenga, Chattagram. The study protocol was approved by the ethics committee of the hospital. The patients were informed about the study protocol and provided written informed consent to participate. A sample size calculation was performed for the main outcome measure. In order to obtain a power of 0.80, 110 patients were required (estimated effect size 0.20). Considering data loss due to dropouts, a 10% increase in sample size was added (total patient 120). **The inclusion criteria** for the study were clinical and orthopantomogram (OPG) diagnosis of unilateral TMJ persistent pain over 2 weeks. Patients had no history of taking any anti-inflammatory/ muscle relaxant drugs, diet advice and physiotherapy/ jaw exercise. **Exclusion criteria were as follows:** patients with a diagnosis of systemic rheumatic disease, myalgia, degenerative joint disease, or collagen vascular disease, those who were pregnant, and patients who had medical contraindications, were unwilling to receive one of the study treatments, had undergone prior open TMJ surgery, had a malocclusion, or were aged <16 years were excluded from the study. The clinical diagnosis was made based on the clinical Diagnostic Criteria for Temporomandibular Disorders (DC/ TMD)[25]. TMJ disorders was diagnosed by a history of reduction in mouth opening (unassisted maximum inter-incisal mouth opening <35 mm), mandibular opening with assistance increased by 3 mm over unassisted opening, and TMJ pain during palpation and/or function. A previous history of click, click disappearance, and decreased mouth opening must have coincided. The patients who met the inclusion criteria were assigned randomly to the treatment groups. The patients who met the inclusion criteria were assigned randomly to the treatment. And the entire patient got every month follow of every study phase. Our treatment has been given in three phases: Phase I (first/one month), Phase II three months (2nd to 4th months) & Phase III 2 months (5th-6th months).

Phase I- in that phase all the patients received first line Tab. NESO (Naproxen 500+ Esomeprasol 20 Combination) as analgesic and anti-inflammatory drug with PPI, 12 hourly for three weeks, with Tab. Myolax 50mg (Tolperisone Hydrochloride) as muscle relaxant 12 hourly for three weeks. Along with medication all the patients were advised to take soft diet, jaw exercise and physiotherapy for three weeks. After three weeks of first line treatment all patients who were cured were instructed to stop the medication and follow the

conservative advices. And the patients who had persistence symptoms were under went to Phase II treatment.

Phase II- in that phase II patients treated with intra oral customized fabricated occlusal splint with jaw exercise and soft diet advice. We took follow-up of all individual patients in every month of this phase for rest three months. All patients were instructed to use pain medication and muscle relaxant when needed (SOS). And the patients who had persistence symptoms after phase II were under went to Phase III treatment.

Phase III- in this phase, patients were treated with occlusal splint following arthrocentesis plus Methylprednisolone injection. Arthrocentesis was performed under local anaesthesia, which was achieved using intra-articular and overlying skin anaesthesia (4 ml of 2% lidocaine hydrochloride (Jasocaine 2%; Jayson Pharmaceuticals Ltd., Dhaka, Bangladesh). A 21- gauge needle was inserted into the upper joint space via a posterolateral approach. In this technique, the first needle puncture is made 10 mm anterior to the tragus and 2 mm inferior to an imaginary line connecting the tragus and lateral canthus. After superior joint space distension with 2 ml isotonic sodium chloride, a second needle was placed approximately 5 mm anterior to the first needle. The joint was then washed with 120 ml of isotonic sodium chloride. Finally, injection of 1 ml of Depo-Medrol (Pfizer, Belgium) as Methylprednisolone (40mg/ml) was performed. All arthrocentesis procedures were performed by the same surgeon. Anatomical land mark for needle punching has been shown in figure 1.

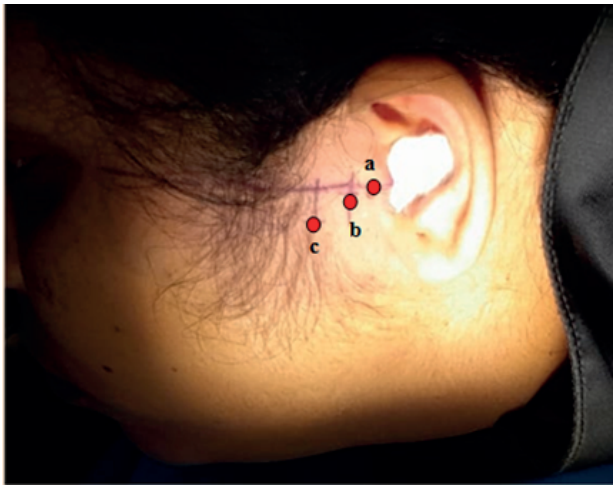

Figure 1: Anatomical landmark for the first and second punctures.

From the center of tragus to lateral canthus is connected for making line. The first puncture point is marked on the line 10 mm front from the mid of tragus (a), and set 2 mm below perpendicularly (b). The second puncture point for outflow needle is 20 mm front from tragus point and 10 mm below from the line (c).

Data collection, outcome assessment & measure

All patients completed the Research Diagnostic Criteria for Temporomandibular Disorders questionnaire at baseline and at every month of total study period thereafter, in order to evaluate the intensity of pain, pain-related disability (including maximum mouth opening) and psychological status. The questionnaire was translated into Bangla also (as mother/ first language of all patients). The clinical records of the patients were also collected at baseline and every month of total study period thereafter. Clinical assessments involved the standardized evaluation of TMD findings, including maximum mouth opening (MMO; measured between the edges of the upper and lower central incisors in millimetres), joint pain on palpation, and mandibular function. Pain was evaluated by patient self-assessment using a visual analogue scale (VAS, 0–10)[26]. The success criteria for surgery for ID of the TMJ were those proposed by the American Association of Oral and Maxillofacial Surgeons (AAOMS), indicating an absence of pain or mild pain and a MMO of 35 mm[27]. Thus treatment was considered successful in the presence of a MMO 35 mm and pain VAS score <3 at the follow-up visits. The percentage of patients who met these criteria was considered as the success rate. These measurements were performed by principle researcher who was unaware of the treatment allocation.

Statistical Analysis

Data were expressed as mean & standard deviation (SD). Descriptive analyses and the $\chi 2$ test were used to compare the patient characteristics and success rates. Repeated measures analysis of variance (ANOVA) was used to test changes over the four time intervals. One-way ANOVA was used to test differences at the same time interval between groups. Comparisons of two time intervals were performed with the paired-sample t-test. The level of significance was set at $P < 0.05$. All statistical analyses were performed using SPSS for Windows, version 20.0 (SPSS, Inc, an IBM Company, Chicago, Illinois).

Result:

A total of 120 patients who fulfilled the inclusion criteria were included in the study, and received first line treatment (phase I). After first line treatment total 51 (42.5%) patients were cure and rest of the 69 (57.5%) had the persistence symptoms. Then rests of the patients were received treatment under phase II guideline. And after phase II 48 (40%) patient became symptom free. Rests 21 (17.5%) patient were enrolled for phase III treatment where they were treated with occlusal splint following arthrocentesis plus Methylprednisolone injection. Among them 15 (12.5%) patients were cured but 6 (5%) had persistence moderate symptoms. Total success after completion of the study was 114 (95%) (Figure 2 and 3). None of the participants dropped out of the study. The baseline characteristics of the study groups, including age, sex, the affected side, and the presence of bruxism, are shown in Table I. There were no differences among the groups in terms of baseline characteristics ($P > 0.05$). Mean age of our study population was 36.5±9.2. Female were predominate in our study. In table II we can observe that average pain score at base line was 6.8 ±1.5, and

after first line treatment of phase I significant (p= 0.000) pain reduction (1.2 ±2.4) was observed among the cured patient. But patient who had persistent pain had no significant improvement after phase I (p=0.734). After completion of phase II treatment significant improvement in pain relief was observed among 48 patients (p <0.000). Rests 21 patients who were received treatment under phase III; and at end of this phase significant improvement was observe among 15 patients, pain score was 0.5 ± 1.2 (p <0.000). But rest 6 patients had persistence moderate pain 4.1± 1.2. And table II showed that average maximum mouth opening MMO (mm) of all patient at base line was 27.6±3.6, after phase I treatment significant (p= 0.000) mouth opening (37.5±4.6) was observed among 51 patients patient. But patient who had persistent restricted mouth opening had no significant improvement after phase I (p=0.075). After completion of phase II treatment, significant improvement in MMO was observed among rest 48 patients (p <0.000). Patients, who had no improvement of MMO after phase II, were treated by arthocentesis with methyl prednisolone. Significant improvement ((p= 0.000) in MMO was observed in majority of the cases after phase III.

Table I: Baseline characteristics of the participants

Characteristics	In total study population	Patient who were cured after			P
		Phase I	Phase II	Phase III	
	n(120)	n(51)	n(48)	n(15)	
Age (years) mean±SD	36.5±9.2	36.4±8.9	38.7±7.6	35.3±10.5	0.088[a]
Gender (female), n(%)	81 (67.5)	33 (64.8)	32 (66.7)	10 (66.7)	0.173[b]
Side R, n(%)	66 (55)	26 (51.9)	28 (57.6)	8 (53.3)	0.413[b]
Bruxism, n(%)	57 (47.5)	26 (51.85)	22 (45.45)	8 (53.3)	0.113[b]

[a]p-value by one-way ANOVA; [b]p-value by χ^2

Table II. Comparisons of pain scores (VAS) after follow-up visits of treatment phases.

Base line After Phase I (one month)	Mean±SD 6.8 ±1.5	P	Comparison with
(Cured patient) **After Phase I (one month)**	**1.2 ±2.4**	0.000	baseline
(persistence symptom patient)	6.1 ±2.1	0.734	baseline
After Phase II (four months) **(Cured patient)**	**1.4 ± 0.8**	0.000	After phase I of persistent symptom group
After Phase II (four months) (persistence symptom patient)	5.5 ± 1.2	0.084	
After Phase III (six months) **(Cured patient)**	**0.5 ± 1.2**	0.000	After phase II of persistent symptom group
After Phase II (Six months) (persistence symptom patient)	4.1± 1.2	0.312	

Table III: Comparisons of MMO values (millimetres) after follow-up visits of treatment phases

Base line After Phase I (one month)	Mean±SD 27.6±3.6	P	Comparison with
(Cured patient) After Phase I (one month)	37.5±4.6	0.000	baseline
(persistence restricted mouth opening)	28.2±2.9	0.275	baseline
After Phase II (four months) **(Cured patient)**	40.3±4.4	0.000	After phase I of persistent symptom group
After Phase II (four months) (persistence restricted mouth opening)	29.81±1.0	0.086	
After Phase III (six months) **(Cured patient)**	38.1±4.1	0.000	After phase II of persistent symptom group
After Phase II (Six months) (persistence restricted mouth opening)	30.53±2.2	0.074	

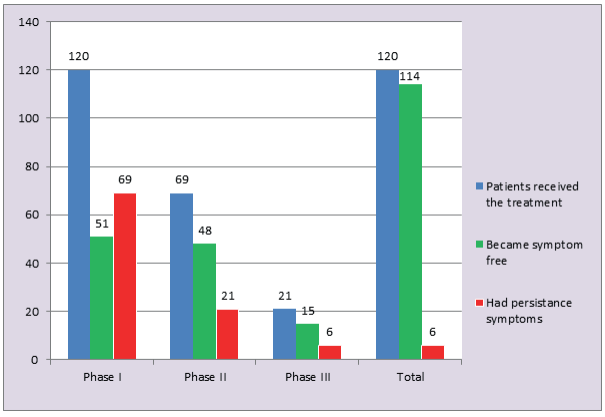

Figure 2: Phase to phase treatment outcome (n) of study population (n).

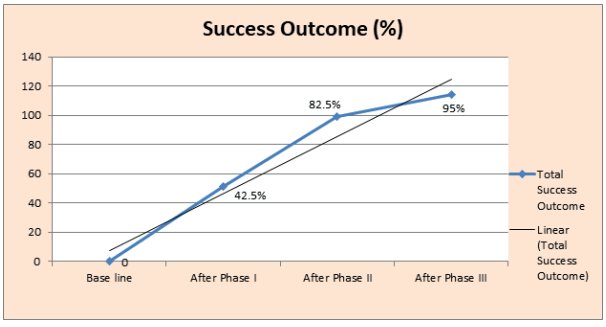

Figure 3: Overall success outcome (%) (phase by phase).

Discussion:

Temporomandibular disorders (TMD) involving inflammation of the articular structures, changes in the intra-articular pressure, alterations in the volume and biochemical composition of the synovial fluid. Splints are considered to cause alterations in the mechanical sensory input arising from the periodontal tissues and masticatory muscles and therefore to decrease intra-articular pressure in the TMJ[23]. Thus, splints are used for the non-surgical treatment of ID of the TMJ to reduce bruxism, stress, and excessive loading on the joint structures. This study compared the effectiveness of medication with life style advices (Soft diet, jaw exercise), splint treatment, and a combination of both therapies in the treatment of unilateral TMD. Based on the results, all three treatment methods yielded significantly improved outcomes regarding pain, joint function, disability and psychological status of the patients compared to baseline. The results indicate that soft diet, jaw exercise with medication as the initial treatment provides comparable results whether used alone or in combination therapy. Furthermore, the improvement after splint therapy reaches similar success rates to those of the other methods during 6 months of follow-up. The splint therapy showed more effective with diet advice and jaw exercise than splint therapy alone. These findings are consistent with those of previous studies. Machon et al. evaluated the effectiveness of various therapeutic options in the treatment of unilateral TMD,

and showed that soft diet and jaw exercise combined with splint therapy achieved higher success rates than splint treatment alone[28]. Vos et al. showed that arthrocentesis reduced the pain and functional impairment more rapidly than conservative treatment in TMJ arthropathy patients[29]. However, the authors observed comparable results for arthrocentesis treatment and conservative treatment after 26 weeks. The authors did not separate the participants according to disc displacement with/without reduction, or unilateral/ bilateral TMD. Strengths of our study include the randomized allocation of participants with only unilateral involvement to the treatment groups, the blinded follow-up recordings, a sufficient sample size. A possible weakness of the study was that the duration after symptom onset was not recorded. The possible differences in the duration of TMD could have affected the results, since it has been shown that the initiation of treatment within a short period after symptom onset increases the treatment efficacy[30-31]. However, the duration of TMD in the patients was assumed to be similar, since the study hospital is the only reference centre in the region for the treatment of TMD. In our treatment methods overall 51 (42.5%) patients were cure after first line 1 month of treatment and rest of the 69 (57.5%) patients received treatment under phase II, among them 48 (40%) patient were became totally symptom free after phase II treatment. Rests 21 (17.5%) patient were enrolled for phase III treatment where they were treated with occlusal splint following arthrocentesis plus Methylprednisolone injection. Among them 15 (12.5%) patients were cured but 6 (5%) had persistence moderate symptoms. Total success after completion of the study was 114 (95%). In the literature, the success rates of splint therapy and arthrocentesis have been reported to be 30–90% and 70–95%, respectively[32-33]. The success rates of the treatment methods were also evaluated in the present study, and they were found to be consistent with those reported in the literature. The mean values of all parameters measured for the patients treated with splint therapy were favourable and improved significantly compared to baseline. However, in terms of the success rate, 60% of the patients met the success criteria, while the success rates for the other treatment methods were over 90% at 6 months[34]. In our study average pain score at base line was 6.8 ±1.5, and after first line treatment of phase I treatment significant (p= 0.000) pain reduction (1.2 ±2.4) was observed among the cured patient. But patient who had persistent pain had no significant improvement after phase I (p=0.734). After completion of phase II & phase III treatment significant improvement in pain relief was observed after both time period, (1.4 ± 0.8) and (0.5 ± 1.2) respectively (p <0.000). Tatli U also reported similar significant reduction of pain score after 6 months of treatment.[33] we also got significant improvement in maximum mouth opening (p <0.000).

Conclusion:

Analgesic with muscle relaxant, along with soft diet and jaw exercise is a good first line treatment option in primary temporomandibular disorder. But in progressive cases occlusal splint with soft diet and jaw exercise followed by (if needed) arthrocentesis plus Methylprednisolone injection give significant improvement.

Conflict of Interest: None.

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Department of Oral & Maxillofacial Surgery (OMS) of Bangladesh Navy Hospital, BNS Patenga, Chattogram.

Reference:

1. Ibsen OA, Phelan JA. Oral pathology for the dental hygienist. Saunders; 2004

2. Conti PC, Pinto-Fiamengui LM, Cunha CO, Conti AC. Orofacial pain and temporomandibular disorders: the impact on oral health and quality of life. Brazilian oral research. 2012;26:120-3.

https://doi.org/10.1590/S1806-83242012000700018

PMid:23318754

3. Magnusson T, Egermark I, Carlsson GE. A longitudinal epidemiologic study of signs and symptoms of temporomandibular disorders from 15 to 35 years of age. Journal of orofacial pain. 2000 Oct 1;14(4).

4. Giannakopoulos NN, Keller L, Rammelsberg P, Kronmüller KT, Schmitter M. Anxiety and depression in patients with chronic temporomandibular pain and in controls. Journal of dentistry. 2010 May 1;38(5):369-76.

https://doi.org/10.1016/j.jdent.2010.01.003

PMid:20079799

5. Greene CS. Orthodontics and temporomandibular disorders. Dental Clinics of North America. 1988 Jul 1;32(3):529-38.

https://doi.org/10.1016/S0011-8532(22)00326-3

PMid:3042477

6. Bales JM, Epstein JB. The role of malocclusion and orthodontics in temporomandibular disorders. Journal (Canadian Dental Association). 1994 Oct 1;60(10):899-905.

7. McNamara JA, Türp JC. Orthodontic treatment and temporomandibular disorders: is there a relationship? Part 1: clinical studies. Journal of Orofacial Orthopedics/Fortschritte der Kieferorthopädie. 1997 Mar;58:74-89.

8. Guo C, Shi Z, Revington P. Arthrocentesis and lavage for treating temporomandibular joint disorders. Cochrane Database of Systematic Reviews. 2009(4).

https://doi.org/10.1002/14651858.CD004973.pub2

9. Orlando B, Manfredini D, Salvetti G, Bosco M. Evaluation of the effectiveness of biobehavioral therapy in the treatment of temporomandibular disorders: a literature review. Behavioral medicine. 2007 Sep 1;33(3):101-18.

https://doi.org/10.3200/BMED.33.3.101-118

PMid:18055333

10. Stowell AW, Gatchel RJ, Wildenstein L. Cost-effectiveness

of treatments for temporomandibular disorders: biopsychosocial intervention versus treatment as usual. The Journal of the American Dental Association. 2007 Feb 1;138(2):202-8.

https://doi.org/10.14219/jada.archive.2007.0137

PMid:17272375

11. Lin CS. Brain signature of chronic orofacial pain: a systematic review and meta-analysis on neuroimaging research of trigeminal neuropathic pain and temporomandibular joint disorders. PLoS One. 2014 Apr 23;9(4):e94300.

https://doi.org/10.1371/journal.pone.0094300

PMid:24759798 PMCid:PMC3997345

12. Suvinen TI, Kemppainen P, Le Bell Y, Valjakka A, Vahlberg T, Forssell H. Research Diagnostic Criteria Axis II in screening and as a part of biopsychosocial subtyping of Finnish patients with temporomandibular disorder pain. J Orofac Pain. 2013 Sep 1;27(4):314-24.

https://doi.org/10.11607/jop.1145

PMid:24171181

13. Gauer RL, Semidey MJ. Diagnosis and treatment of temporomandibular disorders. American family physician. 2015 Mar 15;91(6):378-86.

14. Dworkin SF, Huggins KH, LeResche L, Von Korff M, Howard J, Truelove E, Sommers E. Epidemiology of signs and symptoms in temporomandibular disorders: clinical signs in cases and controls. The Journal of the American Dental Association. 1990 Mar 1;120(3):273-81.

https://doi.org/10.14219/jada.archive.1990.0043

PMid:2312947

15. Oral K, Bal Küçük BU, Ebeoğlu B, Dincer S. Etiology of temporomandibular disorder pain. Agri. 2009 Jul 1;21(3):89-94.

16. Fricton JR, Ouyang W, Nixdorf DR, Schiffman EL, Velly AM, Look JO. Critical appraisal of methods used in randomized controlled trials of treatments for temporomandibular disorders. Journal of orofacial pain. 2010;24(2):139.

17. Ingawale S, Goswami T. Temporomandibular joint: disorders, treatments, and biomechanics. Annals of biomedical engineering. 2009 May;37:976-96.

https://doi.org/10.1007/s10439-009-9659-4

PMid:19252985

18. Scrivani SJ, Keith DA, Kaban LB. Temporomandibular disorders. New England Journal of Medicine. 2008 Dec 18;359(25):2693-705.

https://doi.org/10.1056/NEJMra0802472

PMid:19092154

19. List T, Axelsson S. Management of TMD: evidence from systematic reviews and meta-analyses. Journal of oral rehabilitation. 2010 Jun;37(6):430-51.

https://doi.org/10.1111/j.1365-2842.2010.02089.x

PMid:20438615

20. Dimitroulis G. The prevalence of osteoarthrosis in cases of advanced internal derangement of the temporomandibular joint: a clinical, surgical and histological study. International journal of oral and maxillofacial surgery. 2005 Jun 1;34(4):345-9.

https://doi.org/10.1016/j.ijom.2004.10.013

PMid:1605384

21. Okeson JP. Joint intracapsular disorders: diagnostic and nonsurgical management considerations. Dental Clinics. 2007 Jan 1;51(1):85-103.

https://doi.org/10.1016/j.cden.2006.09.009

PMid:17185061

22. Dimitroulis G, McCullough M, Morrison W. Quality-of-life survey comparing patients before and after discectomy of the temporomandibular joint. Journal of oral and maxillofacial surgery. 2010 Jan 1;68(1):101-6.

https://doi.org/10.1016/j.joms.2009.07.092

PMid:20006162

23. Casares G, Thomas A, Carmona J, Acero J, Vila CN. Influence of oral stabilization appliances in intra-articular pressure of the temporomandibular joint. CRANIO®. 2014 Jul 1;32(3):219-23.

https://doi.org/10.1179/0886963413Z.00000000030

PMid:2500016

24. Alpaslan CA, Kahraman SE, Güner B, Cula S. Does the use of soft or hard splints affect the short-term outcome of temporomandibular joint arthrocentesis?. International journal of oral and maxillofacial surgery. 2008 May 1;37(5):424-7.

https://doi.org/10.1016/j.ijom.2008.01.022

PMid:18356022

25. Schiffman E, Ohrbach R, Truelove E, Look J, Anderson G, Goulet JP, List T, Svensson P, Gonzalez Y, Lobbezoo F, Michelotti A. Diagnostic criteria for temporomandibular disorders (DC/TMD) for clinical and research applications: recommendations of the International RDC/TMD Consortium Network and Orofacial Pain Special Interest Group. Journal of oral & facial pain and headache. 2014;28(1):6.

https://doi.org/10.11607/jop.1151

PMid:24482784 PMCid:PMC4478082

26. Scott J, Huskisson EC. Graphic presentation of pain. Pain 1976;2:175-184.

https://doi.org/10.1016/0304-3959(76)90113-5

PMid:1026900

27. Dolwick ME. Criteria for TMJ meniscus surgery. Rosemont, IL: American Association of Oral and Maxillofacial Surgeons; 1984: 1-40.

28. Machon V, Hirjak D, Lukas J. Therapy of the osteoarthritis of the temporomandibular joint. Journal of Cranio-Maxillofacial Surgery. 2011 Mar 1;39(2):127-30.

https://doi.org/10.1016/j.jcms.2010.04.010
PMid:20692843

29. Vos LM, Slater JH, Stegenga B. Arthrocentesis as initial treatment for temporomandibular joint arthropathy: a randomized controlled trial. Journal of Cranio-Maxillofacial Surgery. 2014 Jul 1;42(5):e134-9.
https://doi.org/10.1016/j.jcms.2013.07.010
PMid:23994055

30. Machoň V, Šedý J, Klíma K, Hirjak D, Foltán R. Arthroscopic lysis and lavage in patients with temporomandibular anterior disc displacement without reduction. International journal of oral and maxillofacial surgery. 2012 Jan 1;41(1):109-13.
https://doi.org/10.1016/j.ijom.2011.07.907
PMid:21885248

31. EMSHOFF R. Clinical factors affecting the outcome of occlusal splint therapy of temporomandibular joint disorders. Journal of oral rehabilitation. 2006 Jun;33(6):393-401.
https://doi.org/10.1111/j.1365-2842.2005.01584.x
PMid:16671984

32. Murakami K, Hosaka H, Moriya Y, Segami N, Iizuka T. Short-term treatment outcome study for the management of temporomandibular joint closed lock: a comparison of arthrocentesis to nonsurgical therapy and arthroscopic lysis and lavage. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology. 1995 Sep 1;80(3):253-7.
https://doi.org/10.1016/S1079-2104(05)80379-8
PMid:7489265

33. EMSHOFF R. Clinical factors affecting the outcome of occlusal splint therapy of temporomandibular joint disorders. Journal of oral rehabilitation. 2006 Jun;33(6):393-401.
https://doi.org/10.1111/j.1365-2842.2005.01584.x
PMid:16671984

34. Tatli U, Benlidayi ME, Ekren O, Salimov F. Comparison of the effectiveness of three different treatment methods for temporomandibular joint disc displacement without reduction. International journal of oral and maxillofacial surgery. 2017 May 1;46(5):603-9.
https://doi.org/10.1016/j.ijom.2017.01.018
PMid:28222947