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### XIV. APPENDIX A: EFFICACY AND EFFECTIVENESS LITERATURE

	Title	Author(s)	Citation	Treatment Category (specific treatment)	Sample Size	Study Duration	Follow-up	Blinding	Statistical Significance From Baseline (for selected outcomes only)	Statistical Significance Between Groups	Sample Characteristics	Outcomes measures	Benefit of study
Randomized Controlled Trial	Physical self-regulation training for the management of temporomandibular disorders.	Carlson CR, Bertrand PM, Ehrlich AD, Maxwell AW, Burton RG	In press; Journal of Orofacial Pain	Behavior/Physical Therapy (Physical self-regulation; breathing, posture, proprioceptive re-education)	44	3 w	At 6 w and at 26 w	Single	For both groups, the interference from pain improved (p<0.001), perception of control (p<0.001), opening without pain (p<0.05).	Treatment group reported less pain (p<0.04), greater incisal opening (p<0.04 w/pain; p<0.01 w/o pain) than the control group	10 males/34 females; mean age 35 y; mean duration of pain 52.3 months; patients all had myofascial pain	Visual Analog Scale (VAS) and New Haven-Yale Multidimensional Pain Inventory (MPI) psychological measures (SCL-90R)	Findings support the use of physical self-regulation for the short- and long-term management of pain in the facial region.
	The pattern of splint usage in the management of two common temporomandibular disorders. Part I: The anterior repositioning splint in the treatment of disc displacement with reduction.	Davies SJ, Gray RJ	Br Dent J 1997; 183(8):199-203	Occlusion (Splint usage to treat clicking and treatment of disc positioning)	70	12 w	At 3 years (not yet published)	No	Yes, but values from baseline not reported.	The group wearing a splint for 24 hrs/day improved significantly over those wearing it only during the day or only at night (p<0.05).	15 males/55 females; age range 15-70 (mean 31y); duration of complaint 15-72 m (mean 44 m); patients with TMJ disc displacement w/ reduction	Clicking; subjective assessment of pain	Splints were shown to be appropriate for treatment of disc displacement with reduction though patients should wear the splint 24 hrs a day.
	The pattern of splint usage in the management of two common temporomandibular disorders. Part II: The stabilisation splint in the treatment of pain dysfunction syndrome.	Davies SJ, Gray RJ	Br Dent J 1997; 183(7):247-51	Occlusion (Splint usage to treat pain)	70	12 w	At 3 years (not yet published)	No	Not reported.	No statistical difference between groups.	9 males/61 females; age range 14-61 (mean 33y); patients with pain dysfunction syndrome	Degree of jaw opening; joint sounds; subjective assessment of pain	Patients treating TMD pain with a stabilization splint need wear the splint only at night.

Title	Author(s)	Citation	Treatment Category (specific treatment)	Sample Size	Study Duration	Follow-up	Blinding	Statistical Significance From Baseline (for selected outcomes only)	Statistical Significance Between Groups	Sample Characteristics	Outcomes measures	Benefit of study
Randomized Controlled Trial (continued)	DeNucci DJ, Sobiski C, Dionne RA	J Orofac Pain 1998; 12(2):118-23	Pharmacological Management (Triazolam)	20	2 w	No	Double	Yes, but values from baseline not reported.	Treatment group reported significant improvement in sleep quality ( $p < 0.05$ ) and time in Stage-2 sleep, but no significant difference was found between groups for pain.	1 male/18 females; age range 24-55 (mean age 39 y); mean duration of TMD pain 9.5 y; all patients diagnosed with painful TMD involving the muscles of mastication and/or the TMJ	Subjective report of sleep quality; duration in stage-2 sleep; subjective assessment of pain; facial muscle electromyographic activity	This study failed to support the hypothesized relationship between sleep disturbances and chronic orofacial pain.
	Erberg EC, Kopp S, Akerman S	Acta Odontol Scand 1998; 54(3):154-9	Pharmacological Management (Diclofenac sodium)	32	2 w	No	Double	Treatment group reported significant reduction in pain ( $p < 0.05$ ) at the third exam).	Only significant difference between groups was for one data point (tenderness at first exam, $p < 0.05$ ), though this diminished at later exams.	5 males/27 females; age range 27-82 (mean 47y); duration of complaint 17 m (mean); patients with localized TMJ pain	VAS pain, masticatory sensitivity, mandibular mobility	No evidence to show that diclofenac should be used as a primary treatment for TMD pain, but it could be used as a complement to other treatments of acute TMD pain.
	Erberg EC, Vallon D, Nilner M	Acta Odontol Scand 1998; 56(2):122-8	Occlusion (Occlusal appliance therapy)	60	10 w	No	Double	Both groups improved overall for subjective symptoms ( $p < 0.001$ ), for worst TMJ pain ( $p = 0.001$ treatment; $p = 0.0034$ control), and for pain ( $p = 0.0001$ treatment; $p = 0.003$ control).	The treatment group showed significant improvement over the control group for overall symptoms ( $p = 0.06$ ) and frequency of daily pain ( $p = 0.02$ ).	5 males/53 females; age range 13-76 (mean 30y); none had received previous TMD treatment; patients with TMD of arthrogenous origin	Subjective assessment of pain; frequency of daily or constant pain	Both the stabilization appliance and a control appliance reduced TMJ pain from baseline, though there was no significant difference between groups.

	Title	Author(s)	Citation	Treatment Category (specify treatment)	Sample Size	Study Duration	Follow-up	Blinding	Statistical Significance From Baseline (for selected outcomes only)	Statistical Significance Between Groups	Sample Characteristics	Outcomes measures	Benefit of study
Randomized Controlled Trial (continued)	Prospective comparison of arthroscopy and arthrocentesis for temporomandibular joint disorders.	Fridrich KL, Wise JM, Zeiler DL	J Oral Maxillofac Surg. 1996; 54(7):816-20; discussion 821.	Surgery (Arthroscopy and arthrocentesis)	19	NA	At 1 week, and 1, 3, 4, 12, and 26 months after surgery	No	Report "success rates" of 82% for the arthroscopy group and 75% for arthrocentesis.	No significant difference reported between groups.	19 females; mean age 31 yrs; all had internal derangement	VAS pain; maximal incisal opening; deviation of mouth opening or closing; tenderness on palpation	Therapeutic success was not significantly different for arthroscopy and arthrocentesis.
	Improvement of pain and function after arthroscopy and arthrocentesis of the temporomandibular joint: a comparative study.	Goudot P, Jaquinet AR, Hugonnet S, Heiligler W, Richter M	J Cranio-maxillofac Surg. 2000; 28(1):39-43	Surgery (Arthroscopy and arthrocentesis)	82	NA	At 1 year after surgery	No	For arthroscopy, improvement in function reported (p<0.0001) and pain (p<0.0001). For arthrocentesis, improvement in function reported (p<0.0001) and pain (p<0.0001).	Improvement in mouth opening was significantly better for the arthroscopy group (p<0.0005). No statistical difference was found between groups for pain improvement.	75% female; age range 16-72 (mean age 38 y); all had pain in the TMJ area; all had not responded to noninvasive treatment	Functional result and diminishing pain (VAS)	Arthroscopy showed better results for functional treatment, arthroscopy and arthrocentesis show similar results for pain control.
	Posture correction as part of behavioural therapy in treatment of myofascial pain with limited opening.	Komiyama O, Kawara M, Aral M, Asano T, Kobayashi K	J Oral Rehabil. 1999; 26(5):428-35	Behavior/ Physical Therapy (Posture correction)	51	52 w	Patients evaluated once a month for 12 months	No	Treatment 2 group improved in pain-free unassisted mouth opening at one month (p<0.05), treatment 1 group reached this point at 2 months (p<0.05), and the control group reached this point at 6 months (p<0.05).	The treatment groups had significantly greater improvements in pain free unassisted opening at 1 month (p<0.01), but no difference at any other point. No statistical difference was found between any of the groups at 12 months.	81% female; mean age 25; 93% completed high school; 84% in pain greater than 3 months; patients with myofascial pain and limited mouth opening	VAS pain intensity at maximum mouth opening; disturbance of daily life	Both treatment groups improved from baseline, but there was no significant difference between groups. Posture correction did not do better than no treatment.

Title	Author(s)	Citation	Treatment Category (specific treatment)	Sample Size	Study Duration	Follow-up	Blinding	Statistical Significance From Baseline (for selected outcomes only)	Statistical Significance Between Groups	Sample Characteristics	Outcomes measures	Benefit of study
Randomized Controlled Trial (continued)												
Therapeutic jaw exercises and interocclusal appliance therapy. A comparison between two common treatments of temporomandibular disorders.	Magnusson T, Syren M	Swed Dent J. 1999; 23(1):27-37	Occlusion (Occlusal appliance therapy)	20	24 w	At 4 years	No	No baseline analysis was conducted.	No statistical analysis was conducted.	Not stated.	Helkimo scale; behavior rating scale	No difference was found between groups in treatment success, but no statistical analysis was conducted.
Arthroscopic surgery of the temporomandibular joint: comparison of two successful techniques.	Miyamoto H, Sakashita H, Miyata M, Goss AN	Br J Oral Maxillofac Surg. 1998; 37(5):397-400	Surgery (Arthroscopic surgery)	101	NA	92 w	No	Both groups showed significant improvement from baseline for maximal incisal opening at all examinations (p<0.001).	Only significant difference between groups was at one month for mouth opening (p<0.01).	Mean age 28 y; all were stage III or above for TMJ internal derangement and had not responded to 3 months of non-surgical treatment	VAS pain; range of movements; diet; radiography; complications (if develop)	Recommend that unless early wide mouth-opening is required, the less invasive procedure of lysis and lavage should be chosen over surgery.
Temporomandibular joint luxation: a double-blind randomized clinical trial.	Schiffman EL, Braun BL, Lindgren BR	J Orofac Pain. 1998; 10(2):157-65	Pharmaceutical Management (loripphoresis of dexamethasone sodium phosphate and lidocaine hydrochloride)	27	Pre and post treatment	No	Double	A significant improvement was noted for the treatment group in the Dysfunction Index score (p<0.01).	Treatment group reported significantly improved TMJ functionality (p=.04); no other significant differences were found.	5 males/15 females; age range 16-81 (mean 45y); patients with diagnosis of TMJ capsulitis and disc displacement without reduction	Helkimo's Anamnesic Dysfunction Index; the Symptom Severity Index (SSI); maximal active mandibular opening; lateral excursion	Loripphoretic delivery of dexamethasone and lidocaine improved mandibular function, but did not reduce pain.
Effect of indomethacin on the relief of temporomandibular joint pain.	Shin SM, Choi JK	Cranio. 1997; 15(4):345-8.	Pharmaceutical Management (indomethacin, phenophoresis)	20	Pre and post treatment	No	Double	An improvement was reported for TMJ pain sensitivity in the indomethacin group (p<0.005).	No statistical difference between groups.	3 males/24 females; mean age 22; mean Body Mass Index 21; patients had TMJ pain and tenderness upon palpation	VAS and pressure pain threshold pain levels and pain sensitivity	Indomethacin phenophoresis provides pain relief of TMJ pain baseline compared to post-treatment.



	Title	Author(s)	Citation	Treatment Category (specify treatment)	Sample Size	Study Duration	Follow-up	Blinding	Statistical Significance From Baseline (for selected outcomes only)	Statistical Significance Between Groups	Sample Characteristics	Outcomes measures	Benefit of study
Randomized Controlled Trial (continued)	Dysfunctional patients with temporomandibular disorders: evaluating the efficacy of a tailored treatment protocol.	Turk DC, Rudy TE, Kubinski JA, Zaki HS, Greco CM	J Consult Clin Psychol. 1986; 64(1):139-46	Behavior/ Physical Therapy (Tailored treatment protocol)	41	Pre and post treatment	At 6 months	No	Both groups showed statistically significant improvement from baseline in several physical, psychosocial, and behavioral measures.	The cognitive therapy group showed significantly better outcomes for pain, depression, and medication use.	90% female; mean age 34; 82% high school graduate; 66% married; mean duration of pain 4.2 y; all patients had TMJ pain and limited opening for 3 months or more, no evidence of serious psychopathy, no history of TMJ surgeries, and were at least 18 yo	Exam based on Research Diagnostic Criteria; McGill Pain Questionnaire; Beck Depression Inventory; Multidimensional Pain Inventory (MPI); Oral Parafunctional Habits Scale	Cognitive therapy added to a tailored treatment regimen yielded significantly better results than did a regimen without cognitive therapy.
	Usefulness of posture training for patients with temporomandibular disorders.	Wright EF, Domenech MA, Fischer JR Jr	J Am Dent Assoc. 2000; 131(2):202-10	Behavior/ Physical Therapy (Posture training)	60	4 w	No	Single	Within the treatment group, significant correlations were found between improvement in TMD symptoms and neck symptoms ( $p < 0.005$ ).	The treatment group was found to have significantly greater pain free mouth opening than the control group ( $p < 0.05$ ).	9 males/51 females; age range 18-60 (mean 32 y); patients had TMD for at least 6 months; pain was of masticatory muscular origin	Modified symptom severity; maximum pain-free opening; pressure algometer threshold; subjective assessment of pain	Posture training plus TMD self-management may be more effective than TMD self-management alone for patients with a primary muscular disorder.

	Title	Author(s)	Citation	Treatment Category (specific treatment)	Sample Size	Study Duration	Follow-up	Blinding	Statistical Significance From Baseline (for selected outcomes only)	Statistical Significance Between Groups	Sample Characteristics	Outcomes measures	Benefit of study
Non-randomized trial with concurrent controls	Low level laser therapy in the treatment of temporomandibular disorders (TMD): A double-blind pilot study	Conti PC	Cranio 1997; 15(2):144-9	Behavior/ Physical Therapy (Low level laser therapy)	20	3 w	No	Double	Significant improvement from baseline was seen in all groups. Treatment resulted in improvement in pain symptoms in myogenous pain patients ( $p < 0.02$ ), and improvement in total vertical opening in arthrogenous pain patients.	No statistical difference between groups.	80% female; mean age 40; all patients had pain of either myogenous or arthrogenous origin	VAS pain; mandibular function (active range of motion)	This study found no significant difference between treatment and placebo groups.
	Efficacy of arthroscopic surgery and midlaser treatments for chronic temporomandibular joint articular disc derangement following motor vehicle accident.	McNamara DC, Rosenberg I, Jackson PA, Hogben J	Aust Dent J. 1998; 41(6):377-87	Surgery (Arthroscopic surgery and midlaser treatments)	20	52 w (non-surgery treatment) 12 w (surgery treatment)	At 3 years	No	Midlaser with TMJ/occlusal stabilization improved symptoms in both groups ( $p < 0.01$ ).	A statistical difference was found between groups for clinical dysfunction index and articular disc derangement at one session ( $p < 0.01$ for both endpoints); no long-term significance was found.	85% female; mean age 33; disc derangement from motor vehicle accident	Pain-discomfort; Clinical Dysfunction Index; disc derangement; maximal voluntary jaw opening	Conservative management reduced pain, arthroscopic surgery reduced disc derangement, and midlaser treatment with occlusal stabilization improved both.

	Title	Author(s)	Citation	Treatment Category (specific treatment)	Sample Size	Study Duration	Follow-up	Blinding	Statistical Significance From Baseline (for selected outcomes only)	Statistical Significance Between Groups	Sample Characteristics	Outcomes measures	Benefit of study
Case control or adjusted cohort study	Temporomandibular disorder: efficacy of an oral habit reversal treatment program	Gramling SE, Nablett J, Grayson R, Townsend D	J Behav Ther Exp Psychiatry. 1996; 27(3):245-55	Behavior/ Physical Therapy (Habit reversal treatment)	16	24 w	No	No	Significant improvement from baseline was reported for both groups for a number of outcomes.	Treatment group improved significantly compared to the control for facial pain localizations (p=0.010), peak intensity localizations (p=0.065), weekly pain rating (p=0.033), and the Multidimensional pain index (p=0.02).	Mean age 41 y; mean education 15; mean years in pain 6; all patients diagnosed with facial pain	Pain and psychological functioning	Findings suggest that habit reversal training may provide an efficacious and cost-effective intervention for facial pain patients.
Case Series	Intra-articular injection of hyaluronic acid reduces total amounts of leukotriene C <sub>4</sub> , 6-keto-prostaglandin F <sub>2</sub> alpha, prostaglandin E <sub>2</sub> alpha and interleukin-1beta in synovial fluid of patients with internal derangement in disorders of the temporomandibular joint	Hirota W	Br J Oral Maxillofac Surg. 1998; 38(1):35-9	Surgery (injection of hyaluronic acid)	15	2 w	No	No	Treatment significantly reduced the mean pain score (p<0.01), the noise score (p<0.05), and the degree of mouth opening (p<0.01).	This study did not include a control group.	4 males/11 females; age range 17-64 (mean age 33 y); all patients had unilateral internal derangement of the TMJ without radiological evidence of condylar degeneration	Pain, noise (clicking); degree of mouth opening possible without pain	Inflammation may play a role in internal derangement of the TMJ, and injection of an anti-inflammatory substance may be beneficial to patients with internal derangement of the TMJ.
Single case study or anecdote	Case Report KY: Functional analysis of a follow-up chin cup patient with TMJ pain	Deguchi T, Uematsu S, Mimura H	Angle Orthod. 1996; 68(5):425-30	Occlusion (Occlusal splint)	1	~520 w (10 years)	No	No	No statistical analyses reported.	No statistical analyses reported.	Female; 10 to 20 y; presence of anterior crossbite	Pain, jaw position	Spint therapy relieved TMJ pain and helped achieve more normal mandibular movement in this study.
	Phase II therapy for a chronic pain patient: a clinical report.	Dyfnia TJ	Cranio 1999; 17(2):126-31	Occlusion (Occlusal therapy)	1	-12 w	At 3 years	No	No statistical analyses reported.	No statistical analyses reported.	Female; 48 y; intense facial joint pain and headaches	Subjective assessment of pain	Patient was pain free at 3 years.

Title	Author(s)	Citation	Treatment Category (specific treatment)	Sample Size	Study Duration	Follow-up	Blinding	Statistical Significance From Baseline (for selected outcomes only)	Statistical Significance Between Groups	Sample Characteristics	Outcomes measures	Benefit of study
Single case study or anecdote (continued)												
Clinical and experimental study of TMJ distraction: preliminary results.	Festa F, Galluccio G	Crenio 1998; 16(1):28-34	Occlusion (Physiotherapy and appliance)	2	20 w (P1#1); 2 w (P1#2)	No	No	No statistical analyses reported.	No statistical analyses reported.	(P1#1) female; 20 yo; jaw lock, pain, limited opening; (P1#2) female 33 yo; locking; mandible shift	No outcomes reported; preliminary report only	No outcomes reported; preliminary report only
The hypomobile temporomandibular joint.	Friedman MH	Gen Dent. 1997; 45(3):282-5	Behavior/ Physical Therapy (TMJ manipulation and exercise)	1	~6 w	No	No	No statistical analyses reported.	No statistical analyses reported.	Male, 71 yo; trismus; limited jaw opening	Jaw opening; pain	The treatment produced lateral pterygoid muscle relaxation at full length, aiding in the restoration of pain-free opening.
Case report: Treatment for a patient with a history of TMJ disorder.	Grubbs J	Angle Orthod 1998; 68(3):210-3	Surgery (Occlusal split; osteotomy; post-surgical treatment)	1	~32 w	No	No	No statistical analyses reported.	No statistical analyses reported.	Female, 24 yo; patient "wanted" teeth to be aligned	Maxillo-mandibular relationship	After surgery, patient had "problematic" post-treatment management; she suffered from myofascial discomfort (the patient did not complain of pain before the treatment)
Worsening of pre-existing TMJ dysfunction following sagittal split osteotomy: a study of three cases.	Hori M, Okaue M, Hasegawa M, Harada D, Kamogawa D, Matsumoto M, Tanaka H	J Oral Sci. 1999; 41(3):133-9	Surgery (Orthodontic treatment (pre-surgical) and sagittal split osteotomy)	3	36 w (P1#1); 24 w (P1#2); 12 w (P1#3)	At 9 months (P1#1); at 3 months (P1#2); at 6 months (P1#3)	No	No statistical analyses reported.	No statistical analyses reported.	(P1#1) female 15 yo; malocclusion; mandibular protrusion; (P1#2) male 21 yo; malocclusion; mandibular protrusion; (P1#3) male 28 yo; chronic slight but frequent pain.	Mandibular movement; occlusion; pain; mouth opening	All patients' conditions worsened after sagittal split osteotomy surgery.

	Title	Author(s)	Citation	Treatment Category (specify treatment)	Sample Size	Study Duration	Follow-up	Blinding	Statistical Significance From Baseline (for selected outcomes only)	Statistical Significance Between Groups	Sample Characteristics	Outcomes measures	Benefit of study
Single case study or anecdote (continued)	Passive motion therapy in temporomandibular disorders: the use of a new hydraulic device and case reports.	Horroff BM, Vogel LD, Israel HA	Compend Contin Educ Dent 1997; 18(1):73-8, 78, 80 passim; quiz 88	Behavior/Physical Therapy (Passive motion therapy)	2	14+ w (PI#1); 12 w (PI#2)	PI#1 at 2y; PI#2 at 1 y	No	No statistical analyses reported.	No statistical analyses reported.	(PI#1) male, 2.5 yo; gunshot wound to face; (PI#2) female 14 yo; limited jaw opening; pain; clicking	Mouth opening	Passive motion therapy was successfully used in these cases for rehabilitation of TMJ function.
	The interdisciplinary approach to oral, facial and head pain.	Israel HA, Scrivani SJ	J Am Dent Assoc 2000; 131(7):919-26	Surgery (Conservative management; arthroscopy; arthroplasty/discoplasty with discal repositioning; psychiatric counseling)	1	-52 w	At 2 years (due to complication)	No	No statistical analyses reported.	No statistical analyses reported.	Female, 30 yo; jaw joint pain, headaches, jaw locking - had previously been in a motor vehicle accident	Pain; jaw opening	Case demonstrates physiological pathology complicated by psychiatric disease.
	Surgical orthodontic treatment of skeletal Class III malocclusion with anterior disc displacement without reduction (ADNR): a case report.	Itoh S, Nagata H, Murakami S, Ogura T, Nakagawa K, Takada K	Clin Orthod Res. 1999; 2(4):209-15	Surgery (Occlusal splint; arthroscopic irrigation; orthodontic surgery)	1	8 w	Monitored over 5 year period.	No	No statistical analyses reported.	No statistical analyses reported.	Female, 16 yo; skeletal problems; TMJ derangement	Facial esthetics; proper occlusion; "TMD symptoms"	The patient obtained stable facial esthetics and occlusion devoid of TMD symptoms.
	Long-term stability of mandibular orthopedic repositioning.	Joondeph DR	Angle Orthod 1989; 69(3):201-9	Occlusion (Occlusal splint)	1	64 w	At 3 years and at 7 years	No	No statistical analyses reported.	No statistical analyses reported.	Female, 26 yo; joint pain; intermittent locking	Jaw position	Complete relapse of the orthodontic treatment took place over time.
	Treatment of temporomandibular joint dysfunction with a visible light-cured resin overlay denture: a case report.	Keng SB	Quintessence Int 1996; 27(2):105-9	Occlusion (Occlusal splint and dentures)	1	104 w	At 2 years	No	No statistical analyses reported.	No statistical analyses reported.	Female, 40 yo; overclosure of mandible; clicking; pain	Jaw position; occlusal wear	Overlay partial denture technique may be appropriate in selected cases when limb constraints and financial reasons make it an alternative to conventional crown and bridgework.

Title	Author(s)	Citation	Treatment Category (specific treatment)	Sample Size	Study Duration	Follow-up	Blinding	Statistical Significance From Baseline (for selected outcomes only)	Statistical Significance Between Groups	Sample Characteristics	Outcomes measures	Benefit of study
Single case study of anecdotale (continued)	Kondo E, Aoba T J	Am J Orthod Dentofacial Orthop 1999; 116(5):481-83	Surgery (Orthodontics, orthopedic surgery, and physiotherapy)	2	456 weeks (by 10m) (PI#1); 456 w (PI#2)	(PI#1) No; (PI#2) No	No	No statistical analyses reported.	No statistical analyses reported.	(PI#1) female, 7 to 16 yo; maxillary protrusion and forward head posture; (PI#2) female, 10 to 19 yo; malocclusion and poor head posture	Occlusion, head position	Early (in development) occlusal improvement, combined with orthopedic surgery of the neck muscles, was found to be effective.
Regeneration ad integrum of the condyle head in a patient with temporomandibular disorders.	Learreta JA	Cranio 1998; 17(3):221-7	Occlusion (Electrical deprogramming of masticatory muscles using transcutaneous electrical neurostimulators and occlusal splint therapy)	1	~36 w	At one year	No	No statistical analyses reported.	No statistical analyses reported.	Female, 14 yo; had a streptococcus infection leading to TMD	Position of the articular disc and regeneration ad integrum of the condyle head	Results suggest the need for use of electronic elements in order to treat patients with TMD effectively.
Necrosis of the articular tubercle after repeated injections of sodium hyaluronate in the temporomandibular joint: a case report.	Iida K, Kurita K, Tange K, Yoshida K	Int J Orol Maxillofac Surg 1988; 27(4):278-9	Surgery (sequestrectomy)	1	12 w	At 1 month	No	No statistical analyses reported.	No statistical analyses reported.	Male, 46 yo; spontaneous pain and limited mouth opening; had previously received weekly intra-articular injections of sodium hyaluronate for 5 w	Pain, mouth opening	There is "a need for a gentle technique when carrying out TMJ arthroscopy or arthrocentesis."

	Title	Author(s)	Citation	Treatment Category (specific treatment)	Sample Size	Study Duration	Follow-up	Blinding	Statistical Significance From Baseline (for selected outcomes only)	Statistical Significance Between Groups	Sample Characteristics	Outcomes measures	Benefit of study
Single case study or anecdote (continued)	MRI study of a physiotherapeutic protocol in anterior disc displacement without reduction.	Martini G, Martini M, Carano A	Cranio. 1996; 14(3):218-24	Behavior/ Physical Therapy (Physical manipulation)	3	2 w (all three subjects)	No	No	No statistical analyses reported.	No statistical analyses reported.	(P1#1) male 19 yo; anterior disc displacement without reduction; locking; clicking (P1#2) female 56 yo; anterior disc displacement without reduction; locking; clicking; (P1#3) female 23 yo; anterior disc displacement without reduction; locking; clicking	Range of mandibular motion and disc-condyle relationship	In cases of anteriorly displaced discs, the disc was repositioned into a normal position relative to the fossa using the manipulation technique.
	Anterior mandibular repositioning in a patient with temporomandibular disorders: a clinical and tomographic follow-up case report.	Sato H, Fujii T, Uetani M, Kitamori H	Cranio. 1997; 15(1):84-8	Occlusion (Anterior mandibular repositioning with occlusal denture)	1	60 w	At 25 m	No	No statistical analyses reported.	No statistical analyses reported.	42 yo female; TMJ clicking; mandibular pain on movement; diagnosis of TMD	Tomographic imaging; patient report of symptoms	Results suggest that image analysis of the TMJ is beneficial; careful application of the occlusal device is recommended
	Chronic, progressive limitation of mouth opening.	Spinazze RP, Hefetz LB, Baya RA	J Oral Maxillofac Surg 1998; 56(10):1178-86	Surgery (Coronoidectomy and NSAIDs; surgery (bone excision) and gap arthroscopy)	1	8 w post-operatively	No	No	No statistical analyses reported.	No statistical analyses reported.	Male, 55 yo; lack of mouth opening; trismus	Mouth opening	Presents a complicated TMD case.
	Complex orthodontic problems: the orthognathic patient with temporomandibular disorders.	Thomas PM, Tucker MR	Semin Orthod 1998; 5(4):244-56	Surgery (Conservative treatment; occlusal splint; orthognathic surgery)	1	~280-312 w (5-6 years)	At 2 years (a letter from the patient)	No	No statistical analyses reported.	No statistical analyses reported.	Female, 15 to 20 yo; clicking and locking; joint pain; decreased mouth opening	Occlusion; pain	Elucidates principles that should be followed in treatment decision-making

	Title	Author(s)	Citation	Treatment Category (specific treatment)	Sample Size	Study Duration	Follow-up	Blinding	Statistical Significance From Baseline (for selected outcomes only)	Statistical Significance Between Groups	Sample Characteristics	Outcomes measures	Benefit of study
Single case study or anecdote (continued)	Rheumatoid arthritis-affected temporomandibular joint pain analgesia by linear polarized near infrared irradiation.	Yokoyama K, Oku T	Can J Anaesth 1989; 46(7):663-7	Behavior/ Physical Therapy (Linear polarized near infrared radiation)	4	-4 w	No	No	No statistical analyses reported.	No statistical analyses reported.	4 females; mean age 43 yr; all had rheumatoid arthritis	Mouth opening with/without pain, VAS pain	TMJ pain disappeared in only four treatments; application of linear polarized near infrared irradiation with RA-affected TMJ pain is an effective and non-invasive short-term treatment.
	Sliding plates on complete dentures as a treatment of temporomandibular disorder: a case report.	Zuccolotto MC, Nobilo KA, Nurasa L de J, Hotta TH	Cranio 1999; 17(4):289-92	Occlusion (Occlusal modified splint using dentures with a sliding plate)	1	12 w	No	No	No statistical analyses reported.	No statistical analyses reported.	Female, 62 yr; "signs and symptoms of TMD"; pain; reduction in the occlusal vertical dimension	Reestablishing the occlusal vertical dimension.	Sliding plates may be of great benefit to completely edentulous patients with painful symptoms that result from alterations in the occlusal vertical dimension and inappropriate condylar positioning.
Expert Opinion	Internal derangements of the temporomandibular joint: the role of arthroscopic surgery and arthrocentesis.	Barkin S, Weinberg S	J Can Dent Assoc. 2000; 66(4):198-203. Review.	Surgery (Arthroscopic surgery and arthrocentesis)	NA	NA	NA	NA	NA	NA	NA	NA	Short-term studies exist indicating that arthrocentesis and arthroscopic surgery are efficacious, but similar long-term studies are lacking.



Expert Opinion (continued)	Title	Author(s)	Citation	Treatment Category (specific treatment)	Sample Size	Study Duration	Follow-up	Blinding	Statistical Significance From Baseline (for selected outcomes only)	Statistical Significance Between Groups	Sample Characteristics	Outcomes measures	Benefit of study
	Behavioral and educational modalities.	Dworkin SF	Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 1997; 83(1):128-33. Review.	Behavioral/ Physical Therapy (Behavior adjustment and patient education)	NA	NA	NA	NA	NA	NA	NA	NA	Behavioral and educational treatment modalities constitute a component of virtually every established chronic pain treatment program. It has been shown that treatment of TMD has benefited from such modalities.
	Temporomandibular disorders and science: a response to the critics.	Greene CS, Mocht ND, McNeill C, Clark GT, Truelove EL	Am J Orthod Dentofacial Orthop. 1999; 116(4):430-1.	NA	NA	NA	NA	NA	NA	NA	NA	NA	Practitioners should understand TMD in a biopsychosocial framework, by treating patients with conservative and scientifically validated modalities.
	TMJ Orthodontics	Keller DC	Funct Orthod 1998; 13(3):4-8, 8-12, 14 passim	Occlusion (TMJ Orthodontics)	NA	NA	NA	NA	NA	NA	NA	Orthodontic positioning	This article is a discussion of the issues surrounding the use of orthodontics to treat TMD.

	Title	Author(s)	Citation	Treatment Category (specific treatment)	Sample Size	Study Duration	Follow-up	Blinding	Statistical Significance From Baseline (for selected outcomes only)	Statistical Significance Between Groups	Sample Characteristics	Outcomes measures	Benefit of study
Expert Opinion (continued)	Putting order into temporomandibular disorders.	Laskin MD	J Dent Assoc S Afr. 1997; 52(6):384-5.	NA	NA	NA	NA	NA	NA	NA	NA	NA	Draws a distinction between disorders of muscular origin and those of joint origin, and how the treatment should take this difference into account.
	Chewing over temporomandibular disorders.	Wilkinson TM	Med J Aust. 1997; 167(3):117-8	Various	NA	NA	NA	NA	NA	NA	NA	NA	Overview of TMD

## XV. APPENDIX B: PER-PATIENT COST LITERATURE

Title	Author(s)	Citation	Summary	Findings
Association between TMD treatment need, sick leaves, and use of health care services for adults.	Kuttia M, Kuttia S, Le Bell Y, Alanen P	J Orofac Pain. 1997; 11(3):242-8	The objective of this study was to analyze the relationship between need for treatment of temporomandibular disorders, sick leaves, and use of health care services in a study population of 441 adults. The findings indicated that these were strongly associated.	Subjects with temporomandibular disorders were significantly more often on sick leave, visited a physician more often, and had more physiotherapy and massage than subjects who did not need treatment for temporomandibular disorders.
Medical necessity of orthognathic surgery for the treatment of dentofacial deformities associated with temporomandibular disorders.	Moening JE, Bussard DA, Montielallo PM, Lapp TH, Garrison BT	Int J Adult Orthodon Orthognath Surg. 1997; 12(2):153-61.	This retrospective study assessed the medical necessity of orthognathic surgery for the treatment of dentofacial deformities associated with temporomandibular joint disorders from a perspective of cost effectiveness, myofascial and masticatory function, and quality of life.	On average, patients spent less money per month on costs associated with their orofacial problem after surgery, and there were fewer visits to the doctor postoperatively.
A common sense approach to TMJ and Implant imaging.	Scarfe WC	Ann R Australas Coll Dent Surg. 1998 Oct; 14:48-61. Review	The recent development of computer-controlled panoramic imaging has made available to us many special projections which are capable of producing hard tissue images of either the TMJ or a potential implant site in multiple dimensions at lower cost (both financially and in terms of X-ray dose) than the more advanced modalities. These projections can now be incorporated into a clinically determined patient-based protocol and thus provide the clinician with both an economical and common sense approach to diagnostic imaging.	NA
Health care utilization by patients with temporomandibular joint disorders.	Shimshak DG, DeFuria MC	Cranio. 1998 Jul; 16(3):185-93.	The claims data base of a large New England managed care organization was used to compare the health care utilization patterns of patients with TMJ disorders to non-TMJ subjects. Inpatient, outpatient and psychiatric claims data were examined over a wide range of diagnostic categories.	Age and sex adjusted results showed that, overall, patients with TMJ disorders were greater utilizers of health care services and had higher associated costs than non-TMJ subjects. For some of the major diagnostic categories, such as nervous, respiratory, circulatory, and digestive, the inpatient and outpatient claims differences in utilization and costs were as large as 3 to 1. For only one diagnostic category, pregnancy and childbirth, were utilization and costs greater for non-TMJ subjects than TMJ patients. The psychiatric claims for TMJ patients exhibited differences that were at least twice as large as those for the non-TMJ subjects.
Medical claims profiles of subjects with temporomandibular joint disorders.	Shimshak DG, Kent RL, DeFuria M	Cranio. 1997 Apr; 15(2):150-8.	The primary goal of this study was to evaluate the claims profiles of subjects with TMJ disorders relative to a control group without the disorders and to provide a characterization of the type of healthcare services received and the associated costs of healthcare for patients with TMJ disorders. The administrative data base of a major medical insurer was used to compare the claims history of 1,819 patients diagnosed with TMJ disorders to matched controls. The analysis was based only on medical claims.	The study found that total medical claim payments for the patients with TMJ disorders were double that of the subjects without TMJ disorders, and similarly, the utilization of institutional and professional care services was found to be approximately twice as high, though not uniformly distributed across all Major Diagnostic Categories, physician specialties or types of service.

Title	Author(s)	Citation	Summary	Findings
The TMJ Association 1988 Survey Results	The TMJ Association	Unpublished	A questionnaire was sent to patients that had previously contacted The TMJ Association. The questionnaire requested information on patient characteristics, the nature of the patient's treatment (i.e., surgical implant or not), and the patient's out-of-pocket costs and insurance status.	The survey results showed that the average out-of-pocket costs for non-implant patients was \$13,641, and \$68,370 for patients with implants. The average out-of-pocket costs for all patients questioned in the survey was \$40,184.
Health care utilization and cost among HMO members with temporomandibular disorders.	White AB, Williams LA, Leben JR	In press, J Oral Facial Pain	This paper compared the use and cost of medical and dental care services for TMD patients and matched comparison subjects. TMD cases were continuously enrolled members of Kaiser Permanente Northwest Division who had at least one TMD Clinic visit or TMD-related procedure between 1/1/80 and 12/31/86. An equal number of comparison subjects, identified electronically, were matched on 14 variables, including age and gender. Utilization and cost estimates were determined and compared for selected medical and dental services.	TMD cases used more of all types of services and had higher costs (approximately 1.6 times greater than non-TMD patients). A small proportion of the subjects accounted for a large proportion of the costs. Gender was an important factor in utilization and cost. Utilization and cost differences were consistent over a wide range of service categories and could not be explained by TMD alone.