

Review Article

Non Invasive Treatment of Temporomandibular Joint Disorders: A Review

Praval Pratap Singh¹, Kartika U.K.¹, Hina Handa², Mrinal Satpathy³, Nitin Awasthi⁴

Department of ¹Prosthodontics, Crown & Bridge and Implantology, ²Oral Medicine and Radiology, ³Oral and Maxillofacial Surgery, ⁴Oral and Maxillofacial Pathology, People's Dental Academy, Bhopal

Corresponding Author:

Dr. Kartika U. K.

Address: 'Saideepam', B-209,

Shahpura, Bhopal, M.P. 462016

Email:kartikapurple@yahoo.co.in

Received: 02-07-2014

Revised: 12-07-2014

Accepted: 16-07-2014

ABSTRACT:

The temporomandibular joint (TMJ) is a complex structure both anatomically and functionally and is multifactorial in origin. It may be affected by inflammatory, traumatic, infectious, congenital, developmental, and neoplastic diseases, as seen in other joints. Because of its complex anatomy and associated structures the diagnosis and management is very difficult for the clinician and is the most challenging diseases of modern society. Treatment protocol may range from non invasive to surgical therapies. Noninvasive therapies should be attempted before pursuing invasive, permanent, or semipermanent treatments that have the potential to cause irreparable harm. The current article reviews the management of TMD by different methods with great emphasis laid on the non invasive method of treating the joint. Combined treatments seem to provide more benefit than a single treatment.

Key words: TMD, Temporomandibular disorders, Management, Occlusal splint.

This article may be cited as: Singh PP, UK Kartika, Handa H, Satpathy M, Awasthi N. Non Invasive Treatment of Temporomandibular Joint Disorders: A Review. J Adv Med Dent Scie Res 2014;2(3):17-23.

Introduction

Temporomandibular disorder (TMD) is a musculoskeletal disorder within the masticatory system. Temporomandibular Joint Disorders (TMJD) is a collective term used to describe a number signs and symptoms involving the temporomandibular joints, masticatory muscles, and associated structures. Approximately 60–70% of the general population has at least one sign of a temporomandibular disorder which include limited mouth opening, clicking, and locking.¹The diagnostic process for temporomandibular disorders (TMD) is

complicated by the multifactorial etiology and multiplicity of clinical signs and symptoms characterizing such disorders. However, proper diagnosis and management or referral of patients with these disorders as speedily as possible to the appropriate therapist is an important aspect of the quality of care provided by health care professionals. Currently, a number of treatment modalities of temporomandibular disorders have been suggested. This article reviews the non surgical management of TMDS.

Etiology

The etiology of TMJ disorders remains unclear, but it is likely multifactorial. Capsule inflammation or damage and muscle pain or spasm may be caused by abnormal occlusion, parafunctional habits (e.g., bruxism, teeth grinding], teeth clenching, lip biting), stress, anxiety, or abnormalities of the intra-articular disk. In recent years, many of the theories about the development of TMJ disorders have been questioned. Abnormal dental occlusion appears to be equally common in persons with and without TMJ symptoms.² Gross trauma, such as a blow to the chin, can alter the ligamentous structures of the TMJ, which leads to joint sounds.³ There is some evidence to suggest that anxiety, stress, and other emotional disturbances may exacerbate TMJ disorders, especially in patients who experience chronic pain. As many as 75 percent of patients with TMJ disorders have a significant psychological abnormality.² Recognition and treatment of concomitant mental illness is important in the overall approach to management of chronic pain, including pain caused by TMJ disorders.

Diagnostic Evaluation

A detailed history, head and neck evaluation, and general physical examination when indicated, along with Imaging of the temporomandibular joints and associated structures is necessary to establish the presence or absence of pathology and stage of disease in order to select the appropriate treatment, assist in prognosis, and assess patient response to therapy. Radiographs which can provide this information include plain films, panoramic films, and tomograms (frontal and lateral) along with MRI is used to assess soft tissues, bone marrow changes, disc position, morphology, mobility, and joint effusion along with Computed tomography (CT) is very useful to assess bone abnormalities such as ankylosis, dysplasias, growth abnormalities, fractures,

and osseous tumors along with other modalities such as USG and arthrography. Laboratory studies are rarely indicated for ID/OA. In other suspected conditions of the TMJ, for example rheumatoid arthritis, the appropriate tests should be ordered.⁴

Management of TMJ Disorders

Management of TMJD aim to reduce pain, restore normal jaw movements and restore normal life style functioning, restore normal jaw function. Treatment of TMJD can be divided into two main groups. The first is the non-surgical therapy and it includes treatments such as relaxation techniques, counselling, physiotherapy, pharmacotherapy, hypnosis and occlusal splint therapy

Self-Care Practices

There are steps you can take that may be helpful in easing symptoms, such as:

- Soft diet
- Applying ice packs,
- Avoid extreme jaw movements (such as wide yawning, loud singing, and gum chewing),
- Gentle jaw stretching and relaxing exercises that may help increase jaw movement.

Pharmacologic Intervention

Most patients who have TMD experience a remission of symptoms over time (usually 2 to 4 weeks), and, therefore, these patients can be treated conservatively. TMJ pain caused by stress factors can be treated with antidepressant medication, NSAIDs, and counseling. Acetaminophen with codeine can be used in conjunction with an NSAID. Acetaminophen and non-steroidal anti-inflammatory drugs can help with acute and chronic pain.⁵ Pharmacologic interventions similar to those for other musculoskeletal disorders are a treatment option. For muscle spasm and chronic bruxism, muscle relaxants or benzodiazepines may be necessary if conservative relaxation techniques fail.

Tricyclic anti-depressants may help with pain, including pain from nighttime bruxism.

Dental Occlusion Therapy

Dental occlusal splinting and permanent occlusal adjustment have been the mainstays of TMJ disorder treatment for years, although there is no clear evidence that malocclusion of the upper and lower teeth causes TMJ pain.⁶ (Figure 1)



Figure 1: Occlusal Splint

Two basic types of occlusal splints are permissive and directive. Permissive splints are designed to eliminate noxious occlusal contacts and promote harmonious masticatory muscle function. The primary function of these splints is to alter the occlusion so that teeth do not interfere with complete seating of the condyles and to control muscle forces. These represent the flat-plane appliances. The two classic designs of permissive splints are anterior midpoint contact splints and full contact splints. Anterior midpoint contact permissive splints are designed to disengage all teeth except the incisors. This accomplishes several objectives:

- It removes occlusal interferences to complete joint seating on closure.
- Simultaneously, it allows freedom for full seating of the mandibular condyles when the elevator muscles contract on closure.
- It encourages release of the lateral pterygoid and anterior neck positioning muscles on closure.

Other examples of anterior midpoint contact permissive splints include the Lucia jig

(Great Lakes Orthodontics, LTD, Tonawanda, NY) and the B splint. Full contact permissive splints are designed to create an idealized occlusion in a reversible manner. Uniform contacts are established on all teeth when the joints are fully seated by the elevator muscles or manually by the clinician. It is critically important that the joints be fully seated to harmonize the occlusion properly in this border position of mandibular function. Attention to this one detail is often the key for maximizing therapeutic outcomes with full-contact splints. In excursive movements, only the anterior teeth touch, so as to reduce elevator muscle activity. A smooth, shallow cuspid-to-cuspid ramp is designed to provide anterior guidance, which provides horizontal freedom of movement as well as immediate disclusion of all posterior teeth. The benefits of full contact permissive splints include:

- elimination of discrepancies between seated joints and seated occlusion (CR = MI)
- a large surface area of shared biting force
- reduced joint loading
- idealized functional occlusion
- the opportunity to observe for occlusal and joint stability over time

Full contact permissive splints can be made on the upper or lower arch. Lower splints have certain advantages that make them a favorite for many experienced clinicians. These advantages include:

- fewer speech changes (compared with upper splints)
- lower visibility in social settings
- shallower anterior ramps
- less tooth soreness when retention is gained exclusively on the lingual of the lower posterior teeth
- better patient compliance when instructed to wear their splints during the day as well as at bedtime.

Directive splints guide the mandibular condyles away from the fully seated joint

position when a painful joint problem is present. Whereas permissive splints clear the occlusion to allow the condyles to be fully seated superiorly/anteriorly by the elevator muscles, directive splints prevent full seating of the joints by guiding the mandible into a forward posture on closure into the occlusal splint. Anterior repositioning directive splints are useful in two scenarios of joint management: severe trauma with retrodiscal edema and chronic, painful disc displacement disorders.

Injections

Injections of tender muscles, trigger areas, and/or joint spaces with local anesthetic solution is used for diagnosis and relief of symptoms. Corticosteroid injection can be effective in reducing capsulitis.⁸ Kurtoglu and his colleagues evaluated the effects of BTX-A injection in a group of non-bruxers with myofascial pain. Pain intensity and electromyography were measured. The results revealed a significant reduction in pain as well as improvement in patients psychological status⁹ (Figure 2)



Figure 2: Botox injections

In a study conducted by Kopp and Wenneberg conducted a 2-year parallel study on patients who had tenderness on palpation of the TMJ. Fifteen patients were treated with combined intraarticular steroid and local anaesthesia injections once a week for three weeks while 18 patients were treated with occlusal therapy. A more effective means of improving maximum mouth opening was found in the group treated with the injection

than the group treated with occlusal therapy. The least improvement after steroid injection was found in patients who had abnormalities of shape (remodelling) of the condyle on radiographic findings or systemic disturbance such as rheumatoid arthritis.¹⁰

Physical Therapy

Physical therapy in conjunction with other methods of treatment is used to relieve musculoskeletal pain and improve range of motion Range of motion exercises, whether guided by a physical therapist or the surgeon, is a valuable adjunct after joint surgery.¹¹

Psychotherapy

The main idea of psychotherapeutic intervention for TMD patients is to help the patient to solve his or her problems by translating the somatic symptoms into their psychological and interpersonal equivalents. The patients' care needs to be undertaken by a mental health professional. Those TMD patients who have experienced multiple treatment failures with longstanding pain may particularly need to be evaluated for a psychological treatment need.¹³

Ultrasound

Gray et al as mentioned in the section of thermal treatment, ultrasound at 0.25 W/cm² 2-1,2 pulse for 2 minutes treating patients 3 times weekly for 4 weeks produced the significantly larger number of patients who recovered from TMD pain at a 3-month review in comparison with the placebo group. Comparing the ultrasound group with the other treatments in this study namely short wave diathermy, Megapulse and 904 nm Gallium Arsenide low intensity laser, there was no statistically significant difference in the number of patients who had a clinical improvement among the groups.¹³

TENS (Transcutaneous electric nerve stimulation)

Rodrigues D in 2004 stated that at rest, muscular TMD patients have higher myoelectric activity of jaw elevator muscles

as compared to control groups, being more evident in the anterior portion of the temporal muscle.¹⁴ Kruger LR in 1998 stated that TENS application has promoted pain relief with simultaneous decrease of myoelectric activity in the anterior portion of these muscles at rest. It was stated that increased electromyographic amplitude of jaw elevator muscles at rest is probably due to sensorymotor interactions of the craniofacial segment which may modify action potentials generation and, finally, myoelectric activity amplitude. TENS treatment has shown mixed results in the treatment of myofascial pain.¹⁵ One single-blinded study compared TENS with sham TENS in 10 patients for the treatment of myofascial pain and found no benefit for pain reduction; however, the study used subthreshold TENS parameters.¹⁵ By comparison, Graff-Radford and coworkers compared four different TENS settings with a no-stimulation control in a double-blind study and found that high-frequency, high-intensity TENS reduced myofascial pain.¹⁶(Figure 3)

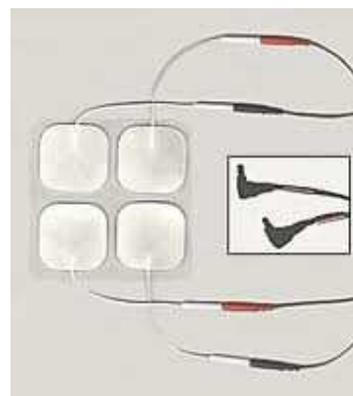


Figure 3: TENS

Radford et al reported a significant pain reduction in a group treated with TENS at 100 Hz, 250 msec stimulation followed by 100 Hz, 50 msec compared with other regimes and control.

However, a significant difference of pressure pain threshold was not found among the groups.¹⁶ Other treatment options in the management of TMD have been summarized in Table 1.

Table 1: Various other modalities of TMJD management.¹²

Alternative therapies	Psychological interventions
Acupressure	Cognitive behavior therapy
Acupuncture	Relaxation techniques
Hypnosis	Stress management
Massage	
Pharmacologic treatment	Dental procedures
	Temporary occlusal therapy
Acetaminophen	Physical therapy
Anxiolytics	Biofeedback
Benzodiazepines	Iontophoresis
Muscle relaxants	Phonophoresis
Nonsteroidal anti-inflammatory drugs	Superficial or deep heat
Tricyclic antidepressant	Therapeutic exercise
Intra-articular corticosteroid or anesthetic injection	Lateral jaw movement
Myofascial trigger-point injection	Protrusive jaw movement
	Resisted closing
	Resisted opening
	Tongue-up exercise
	Transcutaneous electrical nerve stimulation

Conclusion

In the above review of management for TMD, conservative treatments or non-invasive and reversible techniques are considered to be the first treatment choices for TMD. Interventions that change the anatomy of the joint, invade the integrity of the joint space, or manipulate the jaw have the potential to cause harm and have not been shown to improve symptoms. Surgical treatment is reserved for the patients who have failed to respond to conservative treatments. Some approaches to understanding the basic causes of these conditions may prove to be promising, as much of the fundamental pathophysiology remains poorly understood. Substantial improvements have been made in our diagnostic and imaging capabilities, and some treatment advances have been helpful in the long-term management of these common disorders. Therefore, self-care and noninvasive treatments are good options and should be attempted before invasive or permanent therapies, such as orthodontics or surgery, are recommended. Future efforts in the fields of providing more focused and effective treatment strategies must be done to manage the TMJ disorders.

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Source of support: Nil

Conflict of interest: None declared

