

Myofascial Pain Dysfunction Syndrome : An Overview

(Part II : Clinical Management)

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Abstract

Myofascial Pain Dysfunction Syndrome (MPDS) is a disorder characterised by pain and dysfunction of the masticatory and associated muscles and was first defined clinically by Janet Travell and later by David Simons.^{1,2} A growing number of individuals in our ageing population have musculoskeletal pain that affects their daily activities and function. It has a significant impact on their quality of life. If left undiagnosed and untreated, it may develop into chronic pain with overlying psychosocial and functional problems.³ This may lead to further distress, anxiety and even depression. Its early diagnosis and treatment may help to reduce overlying psychosocial complications and the attending financial burden of chronic pain syndrome. American Academy of Cranio-mandibular disorders classified MPDS under craniomandibular disorders of non organic (functional) origin. We reviewed the epidemiology, history, etiologic factors, clinical features and the diagnosis of this syndrome in the first part of this article. This part will deal solely with the various treatment modalities available for management of the same.

Key Words: Myofascial Pain Dysfunction Syndrome; Trigger Points; Referred Pain; Myofascial Pain; Treatment.

Introduction

MPDS is a disorder characterized by pain and dysfunction of the masticatory and associated muscles and the development of trigger zones.^{4,6} A trigger zone is a palpable focus of hyperirritability in a tissue that when compressed is locally tender and if sufficiently hypersensitive, gives rise to referred pain and tenderness, which can be attributed to multiple etiologic factors viz: occlusal disharmony, psychogenic influence like stress, strain, trauma, habits like bruxism. Trigger points (TrPs) are evoked by the abnormal depolarization of motor end plates.⁷ Presynaptic, synaptic and postsynaptic mechanisms of abnormal depolarization (i.e. excessive release of acetylcholine (ACh), defects of acetylcholinesterase and upregulation of nicotinic ACh-receptor activity, respectively) have also been proposed as the possible etiologic mechanisms.⁸ The most common signs and symptoms of MPDS are: temporomandibular joint sounds, impaired movement of the mandible, limitation in mouth opening, preauricular pain, facial pain, headaches and jaw tenderness on function.^{9,10} The exact treatment for each patient suffering from this syndrome depends upon the etiologic factors present.¹¹ Some of the patients require

treatment for the cause of the problem and while others for the symptoms. This review will focus on the management of MPDS which is a major cause of chronic pain in modern society.

Management of MPDS

Like many musculoskeletal disorders, MPDS can be managed but is difficult to completely cure. Majority of patients with MPDS achieve good relief of symptoms with conservative treatment.¹² Management of MPDS is divided into two groups-

- I. Non Surgical Management.
- II. Surgical Management.

I. Non Surgical Management

i) Initial Therapy : It aims to bring the joint back to its normal healthy condition.

(a) Reassurance: The simplest form of management starts with offering explanation to the patient about the nature and prognosis of the disorder. The patient must be reassured that there is no serious disease and that the present symptoms do not herald the onset of a crippling disorder which may affect other joints.

(b) Diet: Elimination of hard and chewy food helps to reduce loading forces on the joints and to rest hypertonic jaw muscles. Soft diet is one of the most simple and often the most important aspect of non surgical management. When pain is most severe the patient should be instructed to use a blender to liquify food as much as possible. Travell and Simons recommended a diet adequate in vitamins and minerals for the prevention of TrPs.¹³

(c) Rest: Each patient should be made aware of the relationship between stress and muscle tension. Resting the jaw is possible by making the patient aware of their unconscious postural, swallowing, clenching or grinding habits.

(d) Thermotherapy: It utilizes heat as a prime mechanism and is based on the premise that heat increases circulation to the applied area. Moist heat appears to be more effective than dry heat. Surface heat is applied by laying a hot moist towel, hydrocollator or electric heating pad over the symptomatic area. A hot water bottle over the towel will help maintain the heat. This combination should remain in place for 10 to 15 minutes.

(ii) Supportive Therapy: It is directed toward altering the patient's symptoms and often has no effect on the etiology of the disorder. There are two types of supportive therapies-

(A) Those directed towards the relief of pain. (a) Pharmacologic Therapy, (b) Physical Therapy

(B) Those directed toward the relief of dysfunction.

(a) Pharmacological Therapy:

Pharmacologic intervention is an important adjunct to other modalities. There are five general types of medications used in the management of MPDS-

Analgesics: Opioid analgesics produce relief of pain with depression of central nervous system resulting in sleep, whereas non-opioid analgesics do not interact with receptors and relieve pain without depression of the central nervous system. The various useful analgesics are Morphine, Pethidine, Codeine, Pentazocine, Salicylates and Paracetamol.

Anti Inflammatory Agents: prevent the release of arachidonic acid, interrupting the inflammatory process. Commonly used are Salicylates (aspirin), Propionic acid (ibuprofen), Acetic acid (Indomethacin), Fenamic acid (Mefenamic acid), Pyrazolones (Phenylbutazone), Oxicam (Piroxicam) and Aryl-acetic acid derivatives (Diclofenac Sodium).

The role of corticosteroids in MPDS management is controversial as although effective in reducing pain, they suppress the hypothalamic pituitary adrenal axis and depending on the dosage, can also produce significant side effects. Osteoporosis as the result of chronic steroid administration is considered a significant risk in the patient with a MPDS, as it can predispose the condyle to destructive change by reducing its ability to withstand stress.

Anxiolytic Agents: Tranquilizing agents do not eliminate stress but merely alter the patient's perception or reaction to the stress. Use of tranquilizers therefore is a supportive therapy. The commonly used benzodiazepines are Alprazolam, Diazepam, Lorazepam and Oxazepam.

Local Anaesthetics: They are used for two reasons: First, it eliminates the immediate pain, allowing full painless stretching of the muscle. Second, it is diagnostic; in other words, once a trigger zone is anesthetized, not only the local pain but also the referred pain is eliminated and thus the clinician can gain valuable information regarding the source of referred pain. They can be applied topically, as solutions, sprays, ointments and lozenges or injected with or without a vasoconstrictive agent. Most common drugs for this purpose are 2% lidocaine and 3% mepivacaine (Carbocaine).¹⁴ For muscle injections a solution without a vasoconstrictor should be used. Bupivacaine should not be injected into muscle tissue because of its myotoxicity.

Muscle Relaxants: Commonly used are Carisoprodol, Chlorzoxazone, Meprobamate, Methocarbamol and Cyclobenzaprine.

Herbal Medicines: 50% of patients with long-term musculoskeletal pain take herbal remedies.¹⁵ Recommended medicines include lavender, lemon balm, rosemary, kava kava, skullcap, passionflower, rose and valerian.¹⁶ Nearly all of these herbs contain linalool, a monoterpene compound that inhibits end plate activity by reducing ACh release (a presynaptic mechanism) and by modifying nAChRs (a postsynaptic mechanism).¹⁷

b) Physical Therapy : It represents a group of supportive actions that are usually instituted in conjunction with definitive treatment. Massage is the most frequently tried therapy by the patients and is one of the most satisfactory and helpful therapies too.¹⁸ Most physical therapy fit into one of the following categories-

Sensory Stimulation: It can be divided into several categories according to the issue and mode of stimulation-

- i. Cutaneous Stimulation Therapy
- ii. Electrical Stimulation Therapy

i) Cutaneous Stimulation Therapy:

There are many forms of cutaneous stimulation that effectively attenuate pain. Perhaps the oldest and most natural is pressing or rubbing the skin over the site of injury. This effect occurs through stimulation of thick myelinated cutaneous afferents, A-beta neurons chiefly.

Superficial Massage: Massage with a stimulating substance such as alcohol or menthol ointment is more effective than heat alone; and a firm, heavy, friction type of massage is more effective than the stroking or kneading types.

Stripping Massage: It is a specific stroking massage applied slowly and deeply. The skin is lubricated, and the thumbs and fingers of both hands are placed at the distal end of the muscle and then slowly slide along the length of the muscle toward the trigger point (TrP), so that the muscle is milked of its fluid content. The digits progress much more slowly, 8mm/sec, than the usual massage rate of 18cm/sec. Pressure is light on the first pass. As the pressure increases on successive passes, a sense of nodular obstruction is encountered at the TrP. It feels like a lump, which could be due to damming of blood and other tissue fluids by obstructed blood flow the region of the TrP. The sliding movement continues smoothly over the TrP and through the clear area beyond. Repeated strokes with increasing pressure gradually reduced the bumpiness at the TrP. By then, the procedure has inactivated the TrP, which has become non-tender and no longer refers pain. This technique probably produces ischemia followed by reactive hyperemia behind the massaging fingers.

Ice Massage: Is applied by two very different techniques. One is the intermittent use of ice in lieu of the vapocoolant spray as a variation of stretch and spray. The other technique is a non-specific application of cold stimuli for pain relief. Cold application is effective because it stimulates the large A-delta (temperature sensitive) nerve fibres, which inhibit pain input from the small C fibres. Cold application can take the form of ice or reusable cold packs.

Periosteal Therapy: It is a rhythmic massage technique applied to bony prominences of the body. Waves of pressure are applied for 2-4 minutes; each half-wave of increasing or decreasing pressure lasts 4-10 seconds. The finger, thumb or knuckle pressure is applied to the periosteum near painful areas. Pressure is applied in small circles of 5mm diameter. The pressure massage progresses from the periphery toward the centre of periosteal tenderness. The mechanism of pain relief is thought to be due to vasomotor reflex changes.

Muscle Injections and Trigger Points:

Trigger-point injection is believed to reduce muscle pain and contracture by several mechanisms.^{5-6,14,19} The needle may mechanically disrupt contractile elements or neural feedback loops sustaining dysfunction. Local vasodilation that results from injection of a local anaesthetic may increase circulation and help remove a local collection of pain-producing metabolic substances.²⁰

Dry Needling : Alone occasionally accomplishes similar excellent therapeutic results.²¹⁻²² The needle may act by releasing intracellular potassium, which in turn blocks nerve conduction temporarily. The needle may serve to break up fibrous adhesions.

Hydrotherapy: It is another form of cutaneous stimulation, especially for neck and back pains of muscle origin and has therapeutic effect and gives considerable relief.

ii) Electrical Stimulation Therapy

It is generally divided into two types-

- Electro Galvanic Stimulation
- Trans Cutaneous Stimulation

Electro Galvanic Stimulation (EGS): utilizes the principle that electrical stimulation of a muscle causes it to contract. A rhythmic electrical impulse is applied to the muscle, creating repeated involuntary contractions and relaxations. This helps to break up myospasms as well as increases blood flow to the muscles. Both effects lead to a reduction of pain in compromised muscle tissue.

Trans Cutaneous Stimulation: Trans-Cutaneous Electrical Nerve Stimulation (TENS) uses an electric current that is applied to the skin to provide pain relief and its effectiveness is accomplished by stimulating large peripheral A-delta nerve fibres with the TENS unit, thus closing the 'gate' and preventing pain input from small C-fibres. TENS has been reported to be successful in a significant number of patients and is advocated as a useful adjunct to conventional treatment.²³⁻²⁴

Acupuncture: Another technique of modulating pain, acupuncture, uses the body's own anti-nociceptive system to reduce the levels of pain.^{18,23,25-26} Stimulation of certain areas (or acupuncture points) appears to cause the release of endorphins, which reduce painful sensations by flooding the afferent interneurons with subthreshold stimuli. These effectively block the transmission of noxious impulses and thus reduce the sensations of pain. The following are the acupuncture points used (Lao Lixing

et al).²⁷

- Hegu (L14)
- Jiache (St 6)
- Xiaguan (St 7)
- Yifeng (SJ 17)

Ultrasound: High-Power Pain Threshold Ultra Sound (HPPTUS) therapy can be used as an effective alternative to TrP injection.²⁸ During ultrasound therapy, cell membrane permeability is increased by altering sodium and potassium ion gradients. This increased permeability improves gas exchange and promote healing. It decreases inflammation, increases vasodilation and waste removal, accelerates lymph flow and stimulates metabolism. The heating effect impairs conductivity of an ionated nerve and thus decreases the sensation of pain. It causes alternating compression and dilation of ionated tissue. It has been tried in conjunction with massage, trigger point injections and neck-stretching exercises.²⁹⁻³⁰

Iontophoresis: Iontophoresis is a process for delivering medications to tissues by means of a low amperage direct current without affecting any other organs. In this, the medication is placed in a pad which is placed over the involved joint. Then a low electrical current is passed through the pad driving the medication into the tissue.

Cold or Soft Laser: It is thought that cold laser accelerates collagen synthesis, increases vascularity of healing tissue and decreases the number of microorganisms and pain.

ii B. Supportive Therapy for Dysfunction

Divided into two types-

1. Restrictive use
2. Exercises.

1. Restrictive Use: Painful movements should be avoided to prevent further damage to structure. The patient is encouraged to eat softer foods, take smaller bites, to chew slowly and is instructed to allow the mandible to hang loosely below the maxillary teeth when not involved in speaking, chewing or swallowing.

2. Exercises: Exercise is an important aspect of nonsurgical management.³¹ Physiotherapy can be regarded as first choice in select cases.³² All exercise programs involve the stretching of hypertonic muscles.

a. Active Exercises: It consists of asking the patient to open the mouth wide.

Assisted stretching exercises are used when there is a need to regain muscle length. The patient is required to stretch the mouth open for 5 to 6 seconds, to rest, then to repeat the movement 5 to 6 times. The exercise is repeated 5 to 10 times a day.

Clenching exercises can decrease nocturnal parafunctional activity. In this, the patient clenches for five seconds, relaxes, and repeats ten times. The sequence is performed six times each day. The effectiveness of this treatment is based on the concept of reactive inhibition.

b. Passive Exercise: The patient's or therapist's hand moves the jaw. The thumb is placed on the anterior teeth of one arch and the forefinger is placed on the anterior teeth of the opposite arch. Pushing the fingers apart will open the jaw. An effective method for lateral movement is placing a cotton roll between the maxillary and mandibular

incisors and then rolling the mandible from side to side on the roll.

c. Isometric Exercises: Isometric Open: The patients try to open the mouth. The hand supporting the chin provides resistance to opening and the masseter should be flaccid on resisted opening.

Isometric Lateral: This is similar to the isometric open exercise. The patient provides resistance in the lateral movement. This is particularly useful in post surgical management.

Active Protrusive Stretch: It requires the contraction of the lateral pterygoid muscles which requires the translation of the condyle, therefore is important in regaining joint mobility. Jutting the jaw forward and holding this position for 5 to 6 seconds is sufficient.

Alternative Treatment Therapy

The most effective treatment for MPDS is to stretch the trigger zone which can be accomplished by one of the several techniques:

a. Spray and Stretch Techniques: A mixture of fluorocarbons is used as the vapocoolant (fluori-methane). While the muscle is moderately stretched just short of pain, the vapocoolant is applied by using parallel sweeps in one direction, in repeated sweeping movements, traveling towards the reference area. The nozzle is held 15 to 18 inches away from the skin and the stream is directed at an acute angle of about 30 degrees. The sweeps are made at the rate of about 4 min/sec. After the spray and stretch exercise is completed, the area is reheated by applying moist heat.

b. Ischemic Compression/ Trigger Point Pressure Release: It applies sustained pressure to the trigger point with sufficient force and for a long enough time to inactivate it. A thumb is pressed directly on the trigger point to create tolerable painful, sustained pressure. As the discomfort tends to abate, pressure is gradually increased by adding a thumb or finger from the other hand for reinforcement. This process is continued up to 1 min with as much as 20 or 30 lb of pressure.

c. Relaxation Therapy: Jacobson's technique teaches the patient to become aware of a particular muscle, usually by contracting it. The patient is then taught to relax the muscle. Following types of relaxation therapy can be instituted to reduce levels of emotional stress:

Substitutive Relaxation Therapy: It is behavioural modification. Patients are encouraged when possible to remove themselves from stressors by means of suitable activities that they enjoyed - such as allowing more time for sports, hobbies or recreational activities.

Active Relaxation Therapy: Directly reduces the muscle activity. Hyperactive muscle often become ischemic, leading to metabolic waste build up in the muscle tissues. When a patient is trained to relax symptomatic muscles voluntarily, blood flow to these tissues is encouraged and the

metabolic waste substances are removed which diminishes the pain.

Progressive Relaxation Therapy: In this the patient tenses the muscles and then relaxes until the relax stage can be felt and maintained. The patient is instructed to concentrate on relaxing the peripheral areas (hands and feet) and to move progressively centrally to the abdomen, chest and face.

Bio-feed Back Therapy: A non invasive technique, which has reduced bruxism by approximately 80%. It teaches the patient voluntary control over automatically regulated body functions. It provides the patients with instantaneous monitoring of physiologic parameters of stress. A portable biofeed back unit is used to disrupt nocturnal bruxism. Electrodes are attached to the masseter muscles, and activation of the facial muscles above a set threshold will produce sound through a speaker or ear phone. When bruxism begins, noise is produced, which wakes the subject and disrupts the bruxing cycle. This has limitations because bruxism usually returns when the feedback device is discontinued.

d. Occlusal Appliances

Splint Therapy: Splints refer to various appliances: bite plates, bite planes, bite appliances, occlusal appliances, mouth guards, night guards etc. Collectively they are usually acrylic devices that snap onto the dentition and disoccludes the jaws.³³ Their success rate is reported to be 70% to 90%. Özkan F et al have reported that trigger point injection therapy combined with splint therapy is effective in the management of myofascial pain.³⁴

Occlusal Correction: Occlusal correction should be performed to allow bilateral mastication. Failure to execute correct masticatory movement is due to dental pain, substandard restorations, a deficient occlusion and a habit. The first three are treated by routine dental procedures. The replacement of missing teeth should be by simple acrylic denture with occlusal onlays. Habits can be corrected by exercises.

Hawley Bite Plate: It is believed that an oscillating circle of nerve impulses that might have been triggered by faults in the occlusion or by other abnormalities or pain in the stomatognathic system may become self-perpetuating. Any type of bite plate might break this circle, resulting in the immediate relief of the symptoms. It allows the muscle of masticatory to function normally encouraging muscle relaxation. As muscle spasms are relieved, muscle fatigue and muscle pain will gradually disappear.

Occlusal Splints or Nightguards: The purpose of the night guard is to keep the teeth apart, relieve clenching, reduce muscle spasm and temporomandibular joint pain and tooth abrasion.³⁵⁻³⁶ They are best fabricated for the maxillary arch.

II. Surgical Management

Surgical intervention is seldom indicated and when performed, the long-term results are often disappointing. It should be considered only as a last resort. They are

listed below-

i. Condylotomy: It is a deliberate displacement of the head of the condyle, which moves slightly forwards and medially. It may be performed as a blind technique or as an open operation. Its chief merit is that the joint capsule and intracapsular structures remain undisturbed.

ii. High Condylectomy: Indicated only when all other conservative forms of therapy have failed and roentgenographic evidence indicates extensive proliferative changes or erosion of the condylar head. The rationale of the procedure is based on the surgical reduction of the height of the condylar head and elimination of condylar articular pathology, thereby relieving the persistent irritation and pressure on the nerve supply to the joint.

iii. Menisectomy: It is removal of the articular disc from the TMJ. Relief of symptoms is due to cutting the capsular nerve supply and tightening of the capsular ligaments by post operative fibrous scarring. Menisectomy is best considered when actual traumatic damage to the disc is present, either by direct inspection at the time of operation or by means of opaque arthrography studies.

iv. Myotomy: Selected myotomy of the masseter or temporalis muscle via an intra oral approach is beneficial in the management of the pain dysfunction syndrome.

v. Arthroscopy: It is a least invasive surgical technique and has the potential of successful surgical outcome with minimal sequelae. It includes lysis and lavage techniques resulting in increase in range of motion, improvement of joint function and reduction of pain.

vi. Botulinum toxin A (BtA) injections: another expensive and invasive means of treatment; may help when excessive muscle activity or dystonia is a major factor.³⁷ This method has been used successfully to treat both excessive clenching and recurrent TMJ dislocation. However, a literature review of BtA use in chronic facial pain suggested that it was no better than other treatments.³⁸

Conclusion

MPDS is self-remitting if etiological factors are removed. Management is mainly conservative. Initial management includes explanation and reassurance, rest, instructions to avoid loading, control of contributing factors such as clenching or bruxism, pain relief by anti-inflammatory analgesics medication and sometimes jaw exercises. Additional management includes splint therapy, physical therapy and injections. Surgical Management should be considered only after reasonable non surgical efforts, directed to symptom relief and tissue adaptation, have failed. In spite of all above efforts, research is still needed for the better management of the patient suffering from this syndrome.

References

References are available on request at editor@healtalkht.com