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MYOFACIAL PAIN DYSFUNCTION SYNDROME: A REVIEW

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ABSTRACT:

Myofascial Pain Dysfunction Syndrome (MPDS) is a prevalent pain disorder characterized by myofascial trigger points (TrPs) that lead to localized and referred pain, primarily affecting the masticatory muscles and temporomandibular joint (TMJ). The condition is often triggered by a combination of factors including physical trauma, repetitive strain, poor ergonomics, and emotional stress. Symptoms may include muscle stiffness, tenderness, and pain exacerbated by movement or posture. The pathophysiology involves complex interactions between psychological, anatomical, and physiological factors, resulting in muscle spasm and the formation of TrPs. Non-surgical management focuses on lifestyle modifications, pharmacological therapies, and stress reduction strategies. Interventions such as cold laser therapy, botulinum toxin injections, Transcutaneous Electric Nerve Stimulation (TENS), and Electrical Twitch Obtaining Intramuscular Stimulation (ETOIMS) have shown effectiveness in alleviating symptoms. Despite its commonality, MPDS often goes underdiagnosed, necessitating a multidisciplinary approach to enhance patient outcomes. This overview aims to shed light on the clinical features, etiology, pathophysiology, and management strategies for MPDS, highlighting the need for further research in understanding its epidemiology and effective treatment modalities.

Keywords: Myofascial Pain Dysfunction Syndrome, myofascial trigger points, temporomandibular joint, Surgical management

Introduction:

Myofacial Pain Dysfunction Syndrome (MPDS) is a complex pain condition that primarily affects the muscles and fascia—the connective tissues that surround muscles and organs. It is characterized by the presence of myofascial trigger points (TrPs), which are hyperirritable spots within taut bands of muscle that can lead to localized pain and referred pain in distant areas of the body. MPDS is often associated with a range of musculoskeletal complaints, making it a significant concern in both clinical and therapeutic settings. Patients suffering from MPDS typically present with a variety of symptoms, including muscle stiffness, tenderness, and pain that may be exacerbated by specific movements or postures. This condition can be triggered by a combination of factors, including physical trauma, repetitive strain, poor ergonomics, and emotional stress. 2 The interplay of these elements can lead to muscle dysfunction and the development of trigger points, further perpetuating the pain cycle. MPDS can manifest in both acute and chronic forms. While acute episodes may resolve with conservative treatments such as rest, physical therapy, or pain management strategies, chronic MPDS often requires more comprehensive interventions, including physical therapy, trigger point injections, and lifestyle modifications.³ Research has since demonstrated a significant relationship between dental occlusion and MPDS, indicating that symptoms of MPDS can adversely affect the mechanics of the chewing system. This relationship underscores the connection between occlusion and central nervous system (CNS) function. MPDS is recognized not only in dentistry but also in other medical fields as a term for orofacial chronic pain. It is considered a functional disease involving masticatory muscles, neural structures, and temporomandibular joint (TMJ) components. Patients with MPDS often experience debilitating pain in the facial and head areas, significantly limiting their ability to move their mandible.⁴ The epidemiological data surrounding MPDS highlights its significant prevalence among individuals suffering from musculoskeletal pain, affecting a substantial portion of the population, particularly those aged 27 to 50 years. Despite its commonality, the precise incidence and gender distribution of MPDS remain ambiguous in existing literature, indicating a need for further research in this area. The chronic nature of MPDS can significantly impact a patient's quality of life, necessitating a multidisciplinary approach to treatment.⁵ This article gives an overview of Myofacial Pain Dysfunction Syndrome.

Review of literature:

In Lychko's case report, a patient developed myofascial pain dysfunction syndrome (MPDS) following a SARS-CoV-2 infection, presenting with masticatory muscle stiffness, dental issues, and trigger points. Treatment with dry needling provided about 30% immediate relief. The report highlights the importance of prompt diagnosis and multidisciplinary management of MPDS to enhance patient outcomes. In Leandro Díez-Suárez's case report, a 15-year-old female patient presented with bilateral clicking, masseter muscle pain, and discomfort in the left ear, neck, upper back, and shoulders. A CT scan revealed active degenerative changes in the mandibular condyles, and a diagnostic mounting showed a shift from Class I to Class II occlusion. Treatment involved the use of a gnathologic guard with multiple contacts and anterior guidance, leading to complete symptom resolution within two months, without the need for pharmacologic intervention. The CT scan post-treatment confirmed halted degeneration and recorticalization of the condyles. In Hoda Rizk's study, 210 patients with myofascial pain dysfunction (MPD) were analyzed, with 103 experiencing only MPD symptoms and 107 having additional pathological issues in neighboring anatomical structures. All patients were prescribed stress avoidance and other treatments. Results

showed complete recovery in patients with both MPDS and neighboring pathological problems, while 10 of the 103 patients with only MPDS did not recover and developed TMJ dysfunction. However, the remaining 93 patients fully recovered. The study concludes that proper MPD management can prevent the progression to TMJ dysfunction.⁸

ETIOLOGY AND PATHOPHYSIOLOGY

Myofascial Pain Dysfunction Syndrome (MPDS) is influenced by multiple etiological factors, with a prominent role played by psychophysiological and emotional components. Muscle spasm, often triggered by emotional factors such as stress, is a major contributor to the development of MPDS. Various other factors, including occlusal disturbances, intracapsular disorders, trauma (both direct and indirect), spine pathology, and psychogenic influences like stress and bruxism, also play a significant role in its onset. One of the most important characteristics of MPDS is the development of myofascial trigger points, which are small, exquisitely tender areas within the muscle that can cause referred pain to distant regions, known as Referred Pain Zones. These trigger points are often activated by factors such as pressure, movement, changes in barometric pressure, and emotional or physical tension. Unlike tender spots, which cause localized pain, trigger points refer pain to other areas. Additionally, prolonged dental procedures or dental extractions, particularly of mandibular third molars, can also trigger the onset of MPDS symptoms. 1.2.9

The pathophysiology of MPDS involves a complex interplay of factors. According to Lermank's unifying concept, psychological stress leads to increased activity in the masticatory muscles, while other factors such as occlusal and anatomical irregularities contribute to selective muscle overactivity. Simons' integrated hypothesis further explains the development of trigger points, suggesting that the abnormal release of acetylcholine leads to increased muscle fiber tension, forming the taut band characteristic of myofascial trigger points. This taut band restricts blood flow, causing local hypoxia, which disrupts mitochondrial energy metabolism and depletes ATP, resulting in tissue distress and the release of pain-sensitizing substances. The activation of nociceptors, or pain receptors, exacerbates the pain and contributes to autonomic modulation, perpetuating the abnormal acetylcholine release in a feed-forward cycle. Pathophysiological changes also include injury to muscle fibers, metabolic distress at the motor end plates, and transmission of pain signals to the central nervous system (CNS). Thus, MPDS is a multifactorial condition that arises from the complex interaction between physiological, anatomical, emotional, and psychological factors, with trigger points playing a key role in the manifestation and propagation of pain.

Clinical features

Myofascial Pain Dysfunction Syndrome (MPDS) is characterized by a range of clinical features that primarily affect the temporomandibular joint (TMJ) and surrounding musculature. Common clinical signs include sounds emanating from the TMJ during movement, such as clicking or popping noises, as well as impaired or irregular mandibular movement, which often leads to limitations in mouth opening. Patients frequently experience preauricular pain (pain located in front of the ear), along with facial pain, headaches, and tenderness in the jaw during functional activities like chewing or speaking.^{2,4} According to Laskin's diagnostic criteria for MPDS, four cardinal signs define the condition: unilateral pain, muscle tenderness, clicking or popping sounds in the TMJ, and restricted jaw movement. Notably, MPDS is also characterized by the absence of certain findings, such as no radiographic evidence of TMJ abnormalities and no tenderness in the TMJ area upon palpation through the external auditory meatus. Differentiating MPDS from other conditions is essential, as it shares symptoms with various disorders, including cluster headaches, which cause severe, recurring headaches; migraine headaches, marked by intense pain and sensitivity to light or sound; postherpetic neuralgia, a nerve pain resulting from herpes zoster virus reactivation; temporal arteritis, an inflammatory disease affecting blood vessels; trigeminal neuralgia, a chronic pain condition involving the trigeminal nerve; and middle ear infections, which cause pain and inflammation behind the eardrum. Pain in MPDS is often unilateral but can occasionally be bilateral, though it need not be symmetrical. The nature of the pain experienced by patients is generally classified into three categories: dull and aching (Category I), sharp and shooting with a burning sensation (Category II), or a tight, drawing sensation (Category III). Given its diverse symptomatology and overlap with other conditions, a thorough clinical examination and consideration of the patient's

Non-surgical management

Non-surgical management of Myofascial Pain Dysfunction Syndrome (MPDS) primarily focuses on lifestyle changes, patient education, and pharmacological therapies to alleviate symptoms and reduce stress on the temporomandibular joints (TMJ) and muscles. A crucial aspect of managing MPDS involves dietary modifications, particularly the elimination of hard and chewy foods. This dietary change helps reduce the excessive loading forces exerted on the joints and allows the hypertonic jaw muscles to rest. Equally important is the emphasis on patient education regarding the link between stress and muscle tension, making them aware of how stress exacerbates their symptoms. Patients are encouraged to consciously rest their jaws and avoid habits such as clenching, grinding, or adopting improper postures during swallowing. ^{12,13} Medications like carisoprodol, chlorzoxazone, meprobamate, methocarbamol, and cyclobenzaprine are often prescribed to alleviate muscle tension and relax the hyperactive jaw muscles. Some patients may find relief through natural remedies like lavender, lemon balm, rosemary, kava kava, and skullcap. These herbs are known for their calming properties and can assist in reducing anxiety and muscle tension. Pain relief is another critical component of non-surgical management. Opioid analgesics such as morphine, pethidine, and codeine act by depressing the central nervous system (CNS), although their use is limited due to dependency risks. Non-opioid analgesics, such as salicylates (aspirin) and paracetamol, offer pain relief without depressing the CNS. Non-steroidal anti-inflammatory drugs (NSAIDs) like ibuprofen, indomethacin, diclofenac sodium, and other agents from propionic acid, fenamic acid, and oxicam groups are frequently used to reduce inflammation around the TMJ and alleviate pain. Anxiolytics like benzodiazepines (alprazolam, diazepam, lorazepam, and oxazepam) are used to manage the psychological stress component associated with MPDS. ¹⁴ These medications alter the patient's perception of st

disorders often linked with MPDS. Gabapentin and pregabalin are anticonvulsants that are also used to manage chronic pain conditions by stabilizing neuronal hyperexcitability, thus reducing muscle tension and discomfort.¹⁵

Lasers in management

Cold laser therapy, also known as low-level laser therapy (LLLT), has demonstrated significant efficacy in treating generalized myofascial disorders and relieving facial pain. This form of treatment involves the application of lasers, such as Ga-Al-As (Endolaser) with a wavelength of 780 nm, over the course of 4–6 weeks. Before beginning therapy, a thorough clinical examination is essential to identify the affected muscles, which guides the formulation of a personalized treatment plan. The pain reduction mechanism in LLLT is thought to involve the hyperpolarization of neuronal cell membranes, which raises the pain threshold. Additionally, LLLT promotes the secretion of morphine-like substances such as encephalin and endorphin, both of which possess analgesic and anti-inflammatory properties. Since myofascial trigger points are often of inflammatory nature, laser therapy proves beneficial in reducing pain and inflammation. By inhibiting inflammatory mediators such as prostaglandin (PGE2), prostacyclins, histamine, and kinin, LLLT helps alleviate local edema and inflammation, thereby mitigating the discomfort associated with myofascial pain dysfunction syndrome (MPDS). This dual effect—raising the pain threshold and directly addressing inflammation—makes cold laser therapy an effective non-invasive treatment option for managing chronic musculoskeletal and myofascial pain conditions.^{3,16}

Botulinum toxin injections in Management

Botulinum toxin injections are used to improve blood flow and enhance vascularity in the affected muscles, which helps to release the taut muscle fibers caused by abnormal muscle contractions. These injections have also been found to stimulate the release of endogenous endorphins, particularly through the process of needle insertion into trigger points. This increase in endorphin secretion contributes to pain relief and muscle relaxation. However, it is important to note that between 3% to 10% of patients may develop neutralizing antibodies over time, leading to potential long-term adverse effects, including muscle atrophy. The preparation of the injection solution involves dissolving 100 units (IU) of botulinum toxin in 1.0 mL of sterile saline solution (0.9%). This mixture must be prepared at room temperature and administered immediately after preparation to ensure its effectiveness. The injection is typically administered using an insulin syringe with a fine hypodermic needle, allowing for precise delivery. Small amounts of the botulinum toxin solution are injected into specific trigger points in different muscles, targeting areas of tension and spasm. By addressing these trigger points, the treatment aims to alleviate muscle pain, improve muscle function, and reduce the discomfort associated with myofascial pain dysfunction syndrome (MPDS). Despite the potential benefits, the risk of side effects, particularly in long-term use, highlights the need for careful patient selection and monitoring.³

Transcutaneous Electric Nerve Stimulation (TENS)

Transcutaneous Electric Nerve Stimulation (TENS) is a non-invasive therapeutic technique used to relieve pain by delivering low-voltage electrical currents through the skin. This method targets nerve fibers and works by stimulating sensory nerves, which helps to block pain signals from reaching the brain, offering relief from chronic pain conditions such as Myofascial Pain Dysfunction Syndrome (MPDS). TENS units consist of electrodes placed on the skin near the area of discomfort. The electrical impulses generated promote the release of endorphins, the body's natural painkillers, while also improving blood flow, reducing muscle spasms, and decreasing inflammation. This therapy can be adjusted in terms of intensity, frequency, and duration to tailor the treatment according to the patient's pain threshold and response. TENS is widely regarded for its ease of use and minimal side effects, making it a common adjunct in pain management protocols.¹⁷

Electrical Twitch Obtaining Intramuscular Stimulation (ETOIMS)

Electrical Twitch Obtaining Intramuscular Stimulation (ETOIMS) is a specialized form of electrical stimulation therapy used to address deep muscle pain and myofascial trigger points, which are often associated with conditions like MPDS. Unlike TENS, which targets surface nerves, ETOIMS uses deeper electrical impulses to induce muscle twitches in affected areas. By doing so, it helps in relieving muscle tightness, reducing inflammation, and improving overall muscle function. The aim is to elicit a muscle twitch response from the deeper muscle fibers, which in turn helps to deactivate painful trigger points and promote tissue healing. The process involves the use of a probe to deliver electrical currents directly into the muscles, triggering involuntary contractions that enhance circulation and alleviate pain. ETOIMS is particularly beneficial for patients with chronic muscle pain, and it offers a long-term solution for musculoskeletal issues by improving muscle strength and flexibility. [18]

Magnetic Stimulation (MS)

Magnetic Stimulation (MS), also known as Transcranial Magnetic Stimulation (TMS) when applied to the brain, is an emerging therapy that uses magnetic fields to stimulate nerve cells. In the context of MPDS and other musculoskeletal disorders, Magnetic Stimulation is applied locally to enhance neuromuscular function. By generating a pulsed magnetic field, this technique stimulates the peripheral nerves and muscles, promoting pain relief and improving muscle control. Magnetic Stimulation works by influencing the electrical activity of the nervous system, helping to restore normal muscle tone and reduce chronic pain. It is a non-invasive and painless procedure, often employed when other therapies have not provided sufficient relief. MS has been shown to be effective in decreasing muscle stiffness, increasing blood circulation, and reducing inflammation. Additionally, it has been explored in treating conditions like migraines, depression, and neuropathic pain, making it a versatile tool in pain management and rehabilitation strategies.¹⁹

Dry Needling

Dry needling is a therapeutic technique that involves inserting a very thin needle into the skin to stimulate specific trigger points (MTrPs) in the muscle tissue. The goal of dry needling is to relieve pain and improve muscle function by deactivating these trigger points, which are often responsible for referred pain and muscle tightness. The insertion of the needle can provoke a local twitch response, helping to release muscle tension and improve circulation in the affected area. This technique is often used in conjunction with other treatment modalities, such as physical therapy or exercise, to enhance overall recovery from myofascial pain syndromes. It is particularly effective for conditions characterized by chronic muscle pain, tension, and limited range of motion.²⁰

Manual Therapy

This hands-on approach includes various techniques such as deep-pressure massage, which focuses on applying sustained pressure to tense areas to promote relaxation and increase blood flow. Stretch therapy with spray, where a taut muscle band is stretched immediately after applying a cold spray to numb the area, helps reduce discomfort and facilitate deeper stretching. Additionally, superficial heat can be applied to relax muscles before therapy, and myofascial release techniques focus on alleviating restrictions in the fascia surrounding the muscles. These manual techniques aim to restore normal muscle function, reduce pain, and enhance the overall range of motion, providing significant relief for patients suffering from MPDS.²¹

Surgical Management

When conservative treatments fail to provide adequate relief, surgical management may be considered for myofascial pain and associated disorders. Several surgical options are available, including: ^{23,24,25}

• Condylotomy:	 This surgical procedure involves making a controlled fracture (osteotomy) through the condylar neck or vertical mandibular ramus. It is typically performed to relieve pain and improve jaw function in patients with temporomandibular joint disorders (TMD).
High Condylectomy:	 This procedure entails the surgical removal of a portion of the condylar head, often indicated in cases of severe degenerative changes or structural abnormalities in the temporomandibular joint.
Meniscectomy:	 Meniscectomy involves the surgical removal of all or part of a torn meniscus, particularly in cases where the meniscus is contributing to joint pain or dysfunction.
• Myotomy:	 Myotomy refers to a surgical procedure in which specific muscles are cut to alleviate excessive tension or spasms. This technique can provide relief in cases where muscle overactivity contributes to pain.
• Arthroscopy:	 Arthroscopy is a minimally invasive surgical procedure used by orthopedic surgeons to visualize, diagnose, and treat issues within a joint. It involves inserting a small camera and surgical instruments through tiny incisions, allowing for precise intervention in cases of joint dysfunction.

Conclusion :

In conclusion, long-term management strategies are vital for enhancing the quality of life of patients suffering from Myofascial Pain Dysfunction Syndrome (MPDS). Despite the challenges in diagnosing MPDS due to its overlapping symptoms with other conditions, a comprehensive understanding of its underlying mechanisms, coupled with a tailored treatment plan, can significantly improve patient outcomes. By addressing both the physical and psychological aspects of the condition, healthcare providers can facilitate more effective interventions and better support the overall well-being of their patients.

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