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A Narration of Myofacial Pain Syndrome, Etiology Diagnosis and Management: A Review Article

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Abstract

The aim of this article is to review the subject of myofacial pain syndrome (MPDS) in the literature and to highlight the etiology, diagnosis and the different approach for management. The author searched for the similar studies in the Google scholar, research gate and PubMed. The search depend on the study parameter using keywords like trigger points, mechanism of trigger point activation, diagnosis of myofacial pain and management of myofacial pain. Most data at literature reveal that myofacial pain syndrome (MPDS) is related to the myofacial trigger points (MTrPs). These myofacial trigger points (MTrPs) are mostly over all due to muscle overload and muscle disharmony which lead to increase at the peripheral and central sensitization. Management of myofacial pain syndrome (MPDS) is depending on identification of the etiological factors. It is drugs management, occlusal therapy and physical therapy. Drugs line include analgesic drugs like non steroidal anti inflammatory drugs (NSADs), muscle relaxants like Tizanidine, anticonvulsants for example Gabapentine, tricyclic antidepressant. Occlusal therapy is either splint, or occlusal correction surgical and non surgical. Physical therapy of myofacial pain syndrome (MPDS) is very variable it includes many techniques like deep massage, muscle relaxation by heat or ultra sound, dry needling, laser therapy, biofeedback, EMG feedback, magnetic therapy and transcutaneous electric nerve stimulation (TENS).

Introduction

The myofacial pain dysfunction syndrome (MPDS) defined as a regional pain began at hyper irritated spots located in taut bands of skeletal muscles. Those spots known as myofacial trigger points (MTrPs) and urged the start of myofacial pain [1]. There are a lot of predisposing episodes associated with (MPDS). The direct and indirect trauma to the tempromandibular joint (TMJ) is a possible factor for (MPDS), spinal diseases is another factor as well as posture dysfunction and physical deconditioning, the continuous and repetitive strain to the myofacial muscle would lead to (MPDS) as some chemicals accumulate at the active muscle and trigger pain [2]. The (MPDS) can be classified primary which not associated with other medical problem, it is more likely to be associated with local factors, and secondary which related to other medical condition for example chronic cervical neck pain, secondary frozen shoulder and non angina chest pain [3]. Regarding the management of the (MPDS) the identification of the underlying cause is the gold standard for diagnosis and treatment of the disease [3]. First of all history and examination is mandatory for the diagnosis [3]. Other diagnosis methods are computed tomography (CT), magnetic resonance imaging (MRI), elctromyography which include jaw tracking, vibratography and sonography [3]. The common care strategy of (MPDS) is: medications, splints and collar and physiotherapy [3]. This article is intended to examine the diagnosis and management of (MPDS) up to date.

Material and Method

The search of the literature was performed by searching in PubMed, Google scholar and ncbi. The key words which are used are myofacial pain, trigger point, diagnosis and management of myofacial pain, etiology of myofacial pain.

Discussion

Etiology

The mechanisms which are associated with arising of (MTrPs) have a great impact in diagnosis and management of (MPDS). In literature some authors claimed that hyperirritate spots mostly due to muscle overuse. There are several ways could be a reason of muscle overuse like submaximal sustain, eccentric overload and submaximal concentric contraction. Concentric contraction is a type of muscle activation that causes muscle to be shortens and generated enough force to move an object. The eccentric muscle contraction occurs when muscle lengthens because force apply to the muscle exceed the force produced by the muscle itself. These ways thought to be a common factor of local ischemia, accumulation of inflammatory mediators in the muscle. According to these sequences peripheral sensitization is inevitable, and as much as these stimuli persist central sensitization could occur and could develop the chronic pain. The (MTrPs) are either active which related with pain as compliant or latent which patient become with no symptoms but it tender on palpation [2].

Muscle metabolism during sustain muscle contraction mainly depend on oxygen and glucose. In the normal physiological mechanism capillary blood flow is obstructed by muscle contraction and immediately recovers after muscle relaxation. The mechanical muscle overuse occur when muscle contraction exceed the muscle capacity, at this point sustain contraction cause energy crisis and accordingly muscle shift to anaerobic glycolysis which consequently end with increasing intramuscular acidity. In some circumstances most of the acidic product washed out blood stream during exercise, but unfortunately in sustain and low level muscle contraction when the capillary flow restricted during sustain contraction the acidic product engaged inside the muscle. Researchers at US National Institute of health reveal that pH below 5 is environmental factor of active (MTrPs) as well as enough to excite muscle pain receptors. Additionally, the lack of energy associated with high intracellular Ca_{2+} , because the detached Ca_{2+} from troponin molecules is not able to actively pump the accumulated Ca_{2+} molecules and accordingly this end with sustain sacromere contraction and muscle damage [2].

In literature, dental occlusion has a great association with (MPDS). The masticatory movement regulated by stomatognathic complex neurological mechanism. Periodontal ligaments and pulp mechanoreceptors response to teeth contact during chewing. These receptors transmit information to the central nervous system (CNS) about magnitude of force acting on teeth, changing of teeth direction during chewing as well as the nature of the chewing substance itself. Lack of harmony and occlusal disturbances lead to muscle contractions, muscle spasms and damage to musculoskeletal system [4]. The majority of etiological factors of (MPDS) are associated with events include pain symptoms like fractures, muscle fatigue due to parafunctional habits, micro or macro muscular trauma, orthopedic disorders such as disk and malocclusion. There are some systemic factors mentioned in the literature for example certain antihypertensive drugs like calcium channel blockers, increase emotional tension, endocrine problems, sleep disorders, nutritional deficiency and viral infection [1].

Diagnosis

Proper history and examination are the key of spot diagnosis and good management. There are huge variations of clinical presentation of (MPDS). In literature essential diagnostic criteria of (MPDS) include: tender at taut band of skeletal muscle, patient realizes pain when he presses on some areas at his face, pain with some range of motions of the jaw. R.Bennett described the characteristic symptoms of (MPDS):

- a. A focal point of tenderness to palpation of muscle involved.
- b. Patient complaint from trigger point palpation.
- c. Palpation reveals an induration of the adjacent muscle.
- d. A restrict range of motion in muscle involved.
- e. Pain associated with pseudo-weakness of the muscle involved.
- f. Referred pain can result with continuous apply pressure on the trigger point that last approximately 5 seconds in duration [5].

The difference between (MPDS) and fibromyalgia has been described in the literature. The (MPDS) has been included in the 10th revision of international statistical classification of the diseases as a separate entity M 79.1. Harrison and Han in 1997 identify the different between the two entities. The (MPDS) is prone to be more localized than the fibromyalgia as well as fibromyalgia more likely to be associated with poor sleep [5].

The radiographical examination is a great value in the diagnosis of (MPDS). Plain radiographs, computed tomography (CT), magnetic resonance imaging (MRI) as well as sonography are essential to identify underlying cause of the (MPDS). Jaw tracking and occlusal analysis and occlusal adjustment are important clinical assessment for patient with (MFPS). In the near past dentists used mounting cast in articulators to adjust and asses the occlusion. There was no way to identify occlusal force contact between teeth. The development of computerized occlusal analysis (T-Scan) has a great value in accurate diagnosis and management of (MPDS). Before the innovation of (T-Scan) the dentist only able to assess the occlusal contacts, but now the clinician can follow occlusal force changes over time as the teeth contact during functioning in mandibular movement [3].

Management

The main intention of (MPDS) management is to control pain and preserve mouth opening within the normal range. The gold standard strategy is treating the underlying etiological problem, because if the clinician didn't achieve proper diagnosis of the predisposing factor the (MPDS) may persist [3].

Drugs

The use of nonsteroidal anti inflammatory (NSAIDs) is one of the most common drug strategies. They have both analgesic and anti inflammatory effect as well as they are available and have reasonable side effect. Surprisingly despite the widespread of using these drugs in management of (MPDS), there are no randomized controlled trials which evaluating oral (NSAIDs) for the management of (MPDS), therefore, there is no strong evidence regarding the role of (NSAIDs) in the treatment of (MPDS). Multiple studies reveal strong evidence consider (NSAIDs) in treatment of musculoskeletal (MSK) disorders especially low back pain. Authors realized the remarkable overlap between (MPDS) and (MSK) pain, could be a reliable reason to use (NSAIDs) in both disorders. The clinician should put in his mind the side effect due the long use of these drugs like gastrointestinal ulcers, renal and antiplatelet effect [6].

The role of muscle relaxant in treatment of (MPDS) could not be disregarded. Certain drugs like Tizanidine are alpha-2 adrenergic agonist which decreases muscle tightness and stiffness. There are some studies showed the remarkable effect of Tizanidine in decreases

pain intensity and improves muscle function as well, which give a great impact in patient morbidity. Benzodiazepines are muscle relaxant which depress presynaptic release of serotonin and increase the release of gamma aminobutyric acid which cause inhibition of the neurotransmission. There is no RCTs study for the efficacy of Benzodiazepines for (MPDS). These drugs show effectiveness in treatment of lower back pain, a study performed in 1997 showed this result. Another double blind RCT study compared cyclobenzaprine plus ibuprofen and placebo plus ibuprofen in patient with (MPDS). This study shows no recognized difference. This study indicated that cyclobenzaprine shows no great impact in the treatment of (MPDS). There is limited evidence in the efficiency of Thiocolchicoside in treatment of (MPDS). Thiocolchicoside is gamma-aminobutyric acid agonist and glycine agonist. It is anti inflammatory, analgesic as well as muscle relaxant. Double blind RCT study test the efficiency of Thiocolchicoside plus Tizanidine over placebo, the study reveal remarkable improvement in management lower back pain with these two medications. Regarding the (MPDS) there is no sufficient data to evaluate the role of Thiocolchicoside in management of this disease [6].

Some authors study anticonvulsants drugs for management of (MPDS), as they reduces the release of several neurochemicals, increasing the release of glutamate, nonadrenaline and substance P. in literature there is no RCTs of anticonvulsants in treatment of (MPDS). A Cochrane review found few data for uses of anticonvulsants in management of acute pain in compare of management of chronic pain. There was double blind RCT study compared use of pregabalin against placebo for treatment of fibromyalgia. This study reveal significant reduce in pain intensity among Pregabalin group [6]. Regarding Tricyclic antidepressants (TCAs) in the management of pain, they have been indicated for fibromyalgia, neuropathic pain as well as chronic pain. The conception of pain control is unclear, but some scientists believe that they work on serotonergic and nonadrenaline signals which affect the central pathway. Amitriptyline has been investigated for treatment of chronic tension headache in crosssectional study. The study showed that amitriptyline had a great impact in reduction of pain in compare with the placebo. Another study revealed significant reduction of pain in chronic tempromandibular pain disorder when use amitriptyline as a drug of choice. Duloxetine is a serotonin-norepinephrine reuptake inhibitor, is believed to be effective in management of painful (MSK) diseases. Some authors proved their effectiveness in neuropathic pain and mood disorders. Sumatriptan is peripheral 5-HT receptor agonist used for management of migraines. There was RCT study examined the effect of this drug in reducing myofascial pain. The study showed remarkable reduction of pain in patient with temporal muscle pain [6].

Physical Therapy

Deep massage of (MTrPs) is simple non invasive technique for treatment of (MPDS), but this technique depends on the precise set of the (MTrPs). The application of the massage at not the accurate place gives the patient instance improvement, but this not really manages the patient situation. The patient should have multiple massage therapy to show recovery. The role of deep massage across the (MTrPs) is to improve the blood to the affected area and at the same time remove the accumulated lymphatic waste and pain mediators [3]. Some researchers study the effect of Ultrasound therapy in the treatment of (MPDS). They claim that the application of Ultrasound therapy helps to heal scars and improve the circulation in the associated areas. Majlesi and Unalan published a study in 2004 urged to increase the degree of power of Ultrasound than the conventional Ultrasound in the management of (MPDS). Another study by Ay Al in 2011 evaluated the difference of the effectiveness between Ultrasound therapy and Phonophoresis. This study concluded that there is no remarkable different of impact of both techniques at the management of (MPDS) [3]. The electroanalgesia is a technique for management of (MPDS) by transcutaneous electric muscle stimulation (TENS). It involves application of electric energy to the muscle, which causes muscle excitation and relieves muscle tension. The role of this technique in management of (MPDS) is explained by gate control theory of pain which is published by Melzack and Wall in 1965. In 1993 Marchand et al. reveal that (TENS) has a great value in reduce pain severity but patients still complain of unpleasant sensation. This technique needs series of sessions to show improvement of the patient situation [3].

The application of low level laser therapy (LLLT) is a technique used in many musculoskeletal and soft tissue pain diseases. It relieves pain because it works at healing acceleration and reducing inflammation. Ozdemir et al guarantee that laser radiation decrease spasm of muscle, because it causes vasodilatation of small arterioles. This leads to increasing the flow of oxygen and maintain aerobic metabolism at the muscle [3]. Many studies in literature investigated dry needling and (MTrPs) injection as an effective method for management of (MPDS). A lot of studies revealed that dry needling is as effective as many techniques that associated with (MTrPs) injections regardless the nature of the injected substance which it typically local anesthetics. An RCT study was done to investigate how valuable the dry needling with and without lidocaine using, it conducted that both



method technique are worth to be included in management of (MPDS). Injection of corticosteroid is debatable, because there is no strong evidence that inflammation is one of predisposing fact with factors of (MPDS) [3].

The biofeedback is a method for management of (MPDS) which considers training for the patient to control certain involuntary body functions like heart rate, muscle tension, pain perception and skin temperature. This maintains improvement of morbidity for (MPDS) patients. There are many technique for biofeedback, for example (EMG) which maintain muscle tension, EEG which is a neurofeedback technique which measures brain waves activity, others methods include thermal biofeedback for the skin. In the literature there are many studies which put focus on biofeedback technique in management of (MPDS). In 1986 Dalen et al. study the muscle tension biofeedback technique to manage muscle tension for frontalis and masseter muscle in the treatment of myofacial pain. This study conducted that this technique showed considerable improvement of muscle relaxation and pain control. Turk et al. compared the use of intraoral appliance with biofeedback technique in management of (MPDS). Patient with intraoral appliance showed remarkable improvement but a relapse after a while, on the other hand patient with biofeedback slowly show improvement with time but with no recognition of any patient with relapse after time [3]. In literature some authors study the chiropractic method for treatment of (MPDS). The chiropractic includes noninvasive techniques like cryotherapy, exercises and life style counseling. The most common chiropractic is ischemic compression which known as Pennels technique. Other names are Nimmo technique, trigger point therapy and acupressure. There is few data about the role of chiropractic in management of (MPDS) [3].

Occlusal Therapy

The occlusal movement is controlled by central nervous system which has the alarm from excitation of peripheral nervous system. Continuous firing of peripheral nervous system cause long duration of muscle contraction and consequence muscular ischemia and pain. If the continues firing of peripheral nervous system has not been stopped the pain will not stop. The occlusal analysis is a crucial diagnostic criteria before applying the occlusal therapy. The old method for occlusal analysis was mounted cast and articulators; the problem was no accurate method to determine intraoral occlusal analysis as well as forces of contact between teeth. The diagnostic factor for intraoral occlusal analysis was the close relationship between the occlusal contact relationships and the condylar movement. The articulator method can be inaccurate, difficult and time consuming, therefore, the innovation of computerized occlusal analysis is remarkable technique nowadays. The earliest Tscan occlusal analysis system (T-scan I,II,III, Tscan Inc. Boston, MA, USA) was showed reliable data in the literature. It reveals accurate measurement in 256 variable relations of occlusal forces with 95% of force reproduction capability. Recently T-scan Novus system is innovative technology of occlusal forces and timing analyzer which could be very effective in management of many occlusal problems.

Occlusion problems are remarkable factor which has been consider in the literature as causative agent of (MPDS) Laskin et al. highlighted most of the patients who complain of (MPDS) showed improvement with applying splint therapy. There are variable choices for splint therapy: customs splint, prefabric splint, anterior jig, posterior splint, hard splint. The routine use of splint therapy breaks the neuromuscular cycle, and improves the establishment of muscular harmony, it allows muscle relaxation, protects teeth and jaws from parafunctional contact and normalizes periodontal ligament, and therefore, myofacial pain is regretted [4]. Robert B. Kerstien developed the disocclusion time reduction therapy which maintain less time for the posterior teeth engagement during excursion and accordingly stop the neural action potential from muscle overload and less effect at the periodontal ligaments. To achieve this engagement of the posterior teeth maintained at less than 0.4 seconds. The disocclusion time reduction could not be count accurately without computer based occlusal analysis that why computed based occlusal analysis is a crucial diagnostic technique [4].

Conclusion

The key factor for the etiology of (MPDS) and the (MTrPs) is the ischemia which associated with anaerobic metabolism and low pH level in the muscular cells. This most probably associated with muscle overuse and muscle disharmony that led to peripheral and central sensitization for pain centers. The proper treatment depends on successful identification of the specific etiological factor which associated with each case. The clinician is follow one of the three trial according to the diagnosis; it is drug management, physical management or occlusal therapy.

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