Diagnostic Criteria and Main Treatment Methods for Temporomandibular Joint Disorder Syndrome

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DOI: 10.32629/jcmr.v5i4.3137

Abstract: Temporomandibular joint disorder (TMD) is a common oral and maxillofacial disease, with joint pain, snapping, and limited mouth opening as the main manifestations, which has a great impact on the patient's life. In recent years, with the deepening of medical research, the diagnostic criteria and treatment methods of TMD have been more deeply understood. At present, the internationally recognized DC/TMD diagnostic criteria divide TMD into two categories: painful diseases and joint diseases, providing clear guidance for diagnosis. Treatment methods mainly include physical therapy, chemotherapy, biological therapy, etc. Treatment decisions need to be made based on the patient's specific symptoms, signs and their impact on the quality of life. This article aims to systematically sort out and evaluate the diagnostic criteria, treatment methods, principles and indications of TMD through a literature review.
***Keywords*:** temporomandibular joint disorder syndrome, diagnosis, treatment, indications

1. Introduction

Temporomandibular Disorder (TMD) is a common oral and maxillofacial disease, mainly manifested by pain in the joint area, snapping, limited mouth opening, etc. In severe cases, it may even develop into maxillofacial deformity in adolescents. TMD is a chronic progressive disease. Once the patient is diagnosed with the disease, he or she will suffer from pain for a long time and is prone to psychological disorders such as tension, anxiety, fear, and depression. In addition, its high prevalence has a great impact on people's lives[1,2].

2. Diagnostic criteria for TMD

Temporomandibular Disorder (TMD) is a common oral and maxillofacial disease, mainly manifested by pain in the joint area, snapping, limited mouth opening, etc. In severe cases, it may even develop into maxillofacial deformity in adolescents. TMD is a chronic progressive disease. Once the patient is diagnosed with the disease, he or she will suffer from pain for a long time and is prone to psychological disorders such as tension, anxiety, fear, and depression. In addition, its high prevalence has a great impact on people's lives[3]. In July 2008, the International RDC/TMD Alliance Network hosted a workshop at the International Association for Dental Research (IADR) meeting in Toronto entitled “Validation Studies of RDC/TMD: Progress Towards Version 2.” 30 The principal investigators of the validation project presented the revised RDC/TMD Axis I diagnostic algorithm and Axis II results, which were subsequently criticized by researchers in the fields of radiology, neurology, pain psychology, TMD, and oral-facial pain[4-6]. From 2009 to 2013, the International Association for Dental Research held several special workshops aimed at revising RDC/TMD, and finally released the diagnostic criteria for the most common temporomandibular disorders based on symptom questionnaires and clinical examinations in 2014, namely the DC/TMD diagnostic criteria (diagnostic criteria for temporomandibular disorders). DC/TMD divides the most common TMD diseases into two categories. Category I, painful diseases, includes (1) muscle pain (sensitivity 0.90, specificity 0.99); (2) joint pain (sensitivity 0.89, specificity 0.98); (3) TMD headache (sensitivity 0.89, specificity 0.87). Class II, joint diseases, including: (1) reducible disc displacement (sensitivity 0.34, specificity 0.92); (2) reducible disc displacement with locking (sensitivity 0.38, specificity 0.98); (3) irreducible disc displacement with limited opening (sensitivity 0.80, specificity 0.97); (4) irreducible disc displacement without limited opening (sensitivity 0.54, specificity 0.79); (5) degenerative joint disease (sensitivity 0.55, specificity 0.61); (6) joint subluxation (sensitivity 0.98, specificity 1.00) [4].

In 2021, Andrew Young et al.[5] developed a diagnostic tool in the form of a checklist to evaluate the speed and accuracy of the user interface of the Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) checklist and compared it with the existing diagnostic tool, the DC/TMD diagnostic decision tree. Both types of tools used DC/TMD and were tested by dental students, interns, and residents in the United States and Japan to diagnose hypothetical patients. These comparisons were conducted in a randomized, crossover, controlled, double-blind trial. It was found that the subjects who used the

experimental tool answered 25% more correct diagnoses (P<0.01) and missed diagnoses by 27% (P<0.1). They were also able to complete the diagnosis faster than those who used the control tool, taking 16% less time than those who used the control tool (P<0.05). The difference in accuracy was more obvious in complex cases, while the difference in speed was more obvious in simple cases, greatly improving the accuracy of DC/TMD diagnosis.

3. Treatment of TMD

There are many treatments for temporomandibular joint disorder syndrome, mainly including physical therapy, chemotherapy, biological therapy, psychotherapy and surgical treatment. Among them, physical therapy, chemotherapy and biological therapy include a variety of methods. These treatments have their own characteristics, and usually require personalized treatment plans based on the patient's specific condition and cause.

3.1 Physical therapy

Manual therapy is a physical therapy technique that involves performing a variety of exercises and is widely used because it is self-managed, effective, and low-cost. This treatment method can improve muscle strength, mobility, and coordination, and help relieve pain. It can treat posture, muscle spasm, and cervical and facial pain, and also involves the release of facial trigger points and joint manipulation[6]. In addition, acupuncture, laser, and therapeutic exercises (such as those used in manual therapy) can also help reduce inflammation of the involved tissues, thereby helping to relieve neuromusculoskeletal pain, improve patient symptoms, and improve function, biomechanics, and quality of life. Occlusal splints are devices made for each patient that help to reduce load (stress) on the temporomandibular joint, change the position of the condyle and articular disc in the mandibular fossa, and temporarily reduce neuromuscular reflexes. This treatment is considered reversible, conservative, and low-cost, and is often the first choice of treatment for patients diagnosed with bruxism.

Among them, Castro et al[7]. analyzed 231 articles in Bireme, BVS, Lilacs, MedLine, PEDro, Pubmed and Scielo databases. From these, they selected 30 articles for detailed analysis, 6 for qualitative synthesis, and included studies from the PEDro database. The selected studies consist of controlled clinical trials of high methodological quality and clinical relevance. These studies use consistent assessment measures, including the of visual analog scale (VAS), pressure pain threshold (PPT), and maximum mouth opening (MMO). Only one systematic review evaluated the effectiveness of manual therapy in the treatment of TMD using treatment techniques that compare a control group with a placebo. These studies show that VAS, PPT, and MMO have a positive therapeutic effect on pain; however, these results vary significantly depending on the technique. Myofascial release has strong long-term efficacy in reducing acute pain symptoms but does not show clinically significant changes in mouth opening range and MMO. There are obvious changes in exercise/manipulation in MMO, which significantly improve the effectiveness of oral range of motion in treating short-term pain symptoms, but cannot be maintained long-term. Galvão et al. also conducted similar research, but in different directions[6]. They adopted a randomized clinical trial method and divided 48 patients into stable jaw pad treatment (PO therapy) and preemptive therapy (F therapy), among which (PO; N=23), (F; N=25), all patients TMD was diagnosed according to the 1st axis of RDC/TMD (Research Diagnostic Criteria for Temporomandibular Disorders), and the way and width of mouth opening were evaluated. The collected data were evaluated using the SPSS program using Wilcoxon, KruskalWallis and Fisher's ExactXSquare tests. The results showed that Po and F performed similarly in their mouth opening patterns and maintained the same mouth opening pattern as the patient during treatment (P=0.003). In terms of maximum mouth opening amplitude, both treatments showed significant improvement in amplitude increase at the initial time and after 1 month of treatment (P=0.002), and this was maintained until the 3rd month, but there was no significant improvement, indicating that PO and F Showed similar performance in treating TMD.

3.2 Chemotherapy

From 2012 to 2022, more and more researchers have discovered that therapeutic ozone can be used to treat temporomandibular joint disorder syndrome. Therapeutic ozone is a mixture of oxygen (O2) and ozone (O3) that can be used in the treatment of temporomandibular joint disorder syndrome. generated in the generator. There are several modes of administration including absorption through the skin[8], intra-articular administration[9] and rectal administration[10]. The study on the route of administration through skin absorption was carried out in clinical studies where the administration concentration, sample size and type of control group were changed; the results showed that whether it was 30% concentration of therapeutic ozone or 60% concentration of therapeutic ozone, laser treatment, drugs Treatment (ketoprofen tablets), bite splint group, and placebo group showed improvements in palpation pain and mandibular movement in the experimental group; drug concentrations were the same via intra-articular route of administration, with two studies having a control group

In another study, the control group was lactated Ringer's test solution. Patients in the experimental group usually experienced significant improvement in pain levels and maximum mouth opening after 3 months and 6 months; another study was a therapeutic Ozone combined with conventional treatment was compared with conventional treatment alone. The former can reduce the pain intensity of patients.

In addition to ozone, more and more studies have found that estrogen is not only involved in the modulation of pain in polycystic ovary syndrome (PCOS), but also affects the remodeling activity of the extracellular matrix, thereby causing degenerative joint changes, affecting bones and articular cartilage, and developing inflammatory responses, leading to internal collapse of the TMJ, thereby affecting TMD. This is also a new direction for future research[11].

3.3 Biological treatment

With the continuous improvement of clinical practice and the exploration of more effective treatments, botulinum toxin type A has been shown in recent studies to be useful for the treatment of temporomandibular joint disorder syndrome. It can directly relieve the pain associated with TMD without the need for complex invasive procedures. It is an effective option for the treatment of patients with myofascial pain, difficulty opening the mouth, and bruxism, especially when previous treatments have failed. It is a very good option[12].

4. Treatment principles and indications for TMD

During the treatment of TMD, it is necessary to develop personalized treatment for each individual based on the symptoms, etiology and physical condition of each patient. At the same time, conservative treatment is given priority, and reversible, non-surgical treatments are first considered, such as changing diet, physical therapy, and drug therapy, to relieve symptoms and improve joint function. When conservative treatment is ineffective or symptoms are severe, minimally invasive surgical treatments such as joint cavity lavage and arthroscopic surgery can be considered, but unnecessary irreversible treatments should be avoided as much as possible. Regardless of the treatment period, bio-psycho-social factors should be considered comprehensively. TMD patients often have psychological problems such as anxiety and depression[1]. Therefore, during treatment, attention should be paid not only to physiological symptoms, but also to the patient's psychological state, and psychological counseling and treatment should be provided when necessary. The ultimate treatment outcome should be aimed at improving the patient's quality of life, including pain relief, restoration of joint function, and improvement of psychological state.

Treatment decisions for TMJ disorder syndrome are based primarily on the patient's specific symptoms and signs and how these symptoms affect their quality of daily life. The following are several key treatment indications: 1. When patients experience pain in the temporomandibular joint or face, accompanied by obvious tenderness, especially when the pain lasts for more than three months and the tenderness is significant, treatment should be considered treat. Pain, as a core symptom of TMD, often causes significant trouble to patients' daily life. 2. Joint snapping is also a common manifestation of TMD. When this snapping phenomenon causes joint locking, which affects the patient's chewing, speech and other daily functions, the need for treatment becomes apparent. 3. Limitation of mouth opening is also an important indication of TMD. Especially when the patient's opening is less than 35mm, or when the patient's opening is between 35-40mm but accompanied by obvious pain when opening the mouth, treatment should be performed. This situation not only affects the patient's eating, but may also affect his ability to communicate verbally[13].

Of course, treatment indications are not set in stone, but require individualized assessment based on the specific circumstances of each patient. When choosing a treatment plan, doctors should consider the patient's symptoms, signs, psychological state, and the expected effects and potential risks of different treatments to develop the most suitable treatment plan for the patient. At the same time, patients should also actively participate in the treatment process, maintain good communication with doctors, and jointly promote the recovery process of the disease.

5. Discussion

This article discusses that many treatment methods are single-condition studies on the treatment of temporomandibular disorders, and the research on biological treatment methods is poor. In future studies, research in the biological field and cross-treatment with multiple methods can be expanded, such as natural plant extracts combined with acupuncture or natural plant extracts combined with ozone to treat temporomandibular joint disorder syndrome.

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