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(REVIEW ARTICLE)

Rehabilitation of prosthodontic and orthodontic in cases of temporomandibular disorder

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Abstract

A collection of diverse disorders known as temporomandibular disorder (TMD) impacts the mastication muscle, the temporomandibular joint (TMJ), and the surrounding tissue structure. The etiology of TMD is complex and may involve a combination of neural, structural, systemic, psychological, genetic, traumatic, hormonal, and facial morphological issues. Orthodontic and prosthodontic rehabilitation are two options for treating TMD. The purpose of this literature review is to gain an understanding of the temporomandibular disorder and the treatment that orthodontics and prosthodontics provide for TMD patients.

Keywords: Temporomandibular disorder; Prosthodontics; Orthodontics; Treatment

1. Introduction

Patients with symptoms of Temporomandibular Disorder (TMD) or with severe bruxism symptoms are usually accompanied by indications for prosthetic treatments such as partial dentures, poor aesthetics, or functional problems. Temporomandibular disorder is a set of heterogeneous conditions that affect the temporomandibular joint (TMJ), the mastication muscle, and the structure of the surrounding tissue [1]. Temporomandibular disorder is caused by many factors and can be an interaction between systemic, psychosocial, genetic, traumatic, hormonal, neurological, anatomical, and facial morphological problems [2]. There are various alternative treatments for patients with TMD, including orthodontic and prosthodontic rehabilitation.

TMD is a common condition that a dentist may encounter during a clinical examination before treatment, during treatment procedures, or during orthodontic retention. Every dentist should have a basic understanding of this musculoskeletal disorder to respond to the needs of patients with the disorder. Orthodontic rehabilitation in TMD treatment aims to develop or maintain orthopedic stability in the mastication system [3].

2. Materials and Methods

The systematic search was carried out using data from Pubmed with the keywords temporomandibular disorder, TMD, prosthodontic, and orthodontic. The articles obtained are then selected through the following stages: selection of the relevant article title, duplicate removal, and selection of relevant abstract content. This literature review aims to

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understand the temporomandibular disorder and how orthodontic and prosthodontic treatment in TMD patients is managed.

3. Results and Discussion

TMD indicates symptoms of a wide range of clinical conditions with characteristics such as pain in the preauricular area, temporomandibular joint (TMJ), or mastication muscles; deviation or restriction of mandible movement; and noise in the TMJ (clicking, popping, and crepitus) at the time the mandible is functioning. Patient complaints are generally headaches, pain in the neck, face, and ears, and other grievances such as tinnitus, ear fullness, and hearing loss [4]. Communicating with patients about their TMD problems is the first step in effectively managing this condition. These actions are crucial in lowering their anxiety, enhancing their commitment to therapy, and in certain situations, curing their symptoms on their own without professional care. A few ways to achieve this include promoting their jaw function, restricting their jaw movement, soft meals, massages, relaxation techniques, stress management, and the use of medications that reduce discomfort or inflammation [3].

3.1. TMD and Prosthodontic

Vertical occlusion dimensions (VDO) show the distance between two anatomical points at the maximum intercuspal position. It is believed that changes in the vertical dimension of occlusion (VDO) can affect TMD. Unfavorable TMJ loading on retrodiscal tissue may be caused by the mandible being guided apically along the lingual concavity of the maxillary anterior teeth due to the loss of occlusal vertical dimension, which can be caused by restorations with different rates of wear or under-contoured posterior restorations. On the other hand, increasing VDO higher than the clinical rest position results in headaches, clenching, grinding, and muscular pain (myalgia) when, for instance, creating porcelain fused to metal crowns for short clinical crowns or with complete dentures. A moderately equal bilateral posterior vertical support and a suitable anterior guidance angle are critical for good outcomes while increasing VDO [5]. The American College of Prosthodontists provides guidelines for determining treatment in patients with a history of or currently having TMD conditions and requiring prosthetic rehabilitation as follows:

- It is necessary to evaluate the articulator condition (articulation/TMJ) before, when, and after the prosthetics therapy with an imaging technique.
- Additional pharmacological, behavioral, and physical therapies should be continued during or after prosthetic treatment.
- It is important to be cautious not to change the treatment position. When it comes to fixed reconstruction, it is best carried out with a provisional restoration finished in a segmented manner in order to assess the response of the patient.
- The final fixed restoration needs to be temporarily cemented for an appropriate amount of time to allow for reexamination [5].

The Occlusal splint is one of the treatments in patients with TMD, mainly those caused by mastication muscles. The Occlusal stabilization splint with a rigid type of acrylic resin, a full-coverage canine guide, is most often used and studied. Splint stabilization is beneficial for reducing pain in patients with masticated muscle myalgia compared to non-treatment [6]. Bruxism is defined as repetitive jaw muscle activity characterized by clenching or grinding on the tooth and/or bracing or advancing the mandibula. Bruxism can occur during sleep (indicated as sleep bruxism) or in a state of consciousness (awake bruxism) [7]. The association between bruxism and the repair of the implant support is more closely related to mechanical issues than biological issues (loss of marginal bone attachment). Examples of mechanical issues include loose screws, fractures or chipping on ceramic restorations, and fractions on the abutment. Clinical strategies can be applied to reduce mechanical trauma, such as reducing cusp steepness, expanding the contact area, and making the occlusion area under contact. The clinic needs to adopt a safe and careful approach in patients with bruxism that requires prosthetic treatment to reduce the adverse effects of bruxism [2].

3.2. TMD dan Orthodontic

Orthodontic treatment, whether with or without extraction, does not cause TMD. Orthodontic therapy is not associated with the development of TMD because malocclusion is a risk factor for TMD [8,9]. The factors associated with TMJ vary in different classes of malocclusion; it emphasizes that malocclusion influences TMD. The location and frequency of dental-loss can impact the occurrence and features of TMD. Symptoms of TMD, including arthralgia, disc dislocation, myofascial pain, and muscular disorders, can be linked to bruxism [10]. According to a 2022 study by Trivedi et al., there is a higher chance of getting TMD in situations of Class II, Class III, anterior open bite, deep bite, increased overjet, mandibular deficit, and crossbite than in cases of Class I malocclusion with normal occlusion [11,12].

Correlations between functional and morphological malocclusion with signs and symptoms of TMD, with some exceptions, were assessed as weak or nonexistent. However, there are some indications that large saggital distances between the RCP and the ICP, as well as lateral shifts between these positions, can increase the risk of developing TMD, so this functional malocclusion should be treated orthodontically if possible [13]. Achieving gnatologically optimal occlusions and condyles relationships is necessary for orthodontic therapy. Angle's classification and the six keys of occlusions are used to adjust the optimal static occlusions. The following are the gnatological goals:

- Reaching a stable canine occlusion
- Reach a point where the posterior-superior centric condyle position and the patient's centric occlusion (maximum intercuspal) are compatible.
- Comparing the occlusal and centric relation positions of the patients after a specific bite record is obtained, then installing an articulator on the dental research model [13].

When the goal of the gnathologist is not achieved with orthodontic treatment then the patient will be prone to developing TMD. According to the thought, then the orthodontist can reduce and cure the symptoms of TMD by correcting the existing malocclusion as well as the associated functional disharmony and inappropriate centric relations position [13]. The use of occlusal splints for patients with mastication muscle disorders can be used to stabilize the TMJ structure before starting orthodontic treatment. TMJ stabilization is a therapeutic process that allows the dentist to identify the actual mandibular position and contribute to the development of accurate orthodontic diagnosis. The biomechanics of the tooth movement associated with orthodontic treatment also need to be observed to prevent the structure of the TMJ from being affected by excessive mechanical loads. The use of TSAD during orthodontic treatment can help patients with TMD to the goal of orthodontist treatment, which is to improve the function of TMJ and facial aesthetics [3,12].

If TMD symptoms with pain or functional disorders occur during the phase of active orthodontic treatment then it is recommended to modify treatment, reduce strength, or even stop it for a while. The occlusion should also be checked for any major disturbance and any distortion should be eliminated by selective occlusal grinding [8]. If TMD symptoms appear during active orthodontic treatment, it is recommended to immediately discontinue active orthodontic treatment. Treatment can be resumed once the symptoms can be managed and stabilized. If TMD symptoms begin to appear during or shortly after the retention phase, it is recommended to re-evaluate the final retention and occlusion devices [3,8].

In severe cases of TMD involving condyles malposition, orthognatic surgery is not the primary treatment option that can be used to deal with TMD. Malocclusion correction that requires orthognetic surgery can lead to the risk of condyles malposition. Condylus misposition is not a factor causing TMD in patients undergoing orthognatic surgery. However excessive condyles malposition can cause the recurrence of symptoms of TMD post-orthognostic surgery and requires evaluation and therapy to minimize this [14].

An occlusal splint, mouth guard, or Invisalign is effective in some TMD patients and can reduce TMD symptoms during orthodontic treatment, especially in patients with bruxism. The key to effective occlusal splint treatment is short-term use and night use rather than 24-hour use. In addition, there are no irreversible occlusal changes or changes in the TMJ relationship that occur after the use of the appliance [12,15].

4. Conclusion

Treatment of TMD patients can be managed through orthodontic and prosthodontic approaches. The emergence of TMD symptoms like tinnitus aurium may be influenced by long-term tooth loss, the location and frequency of tooth loss, or extended denture wear. Proper VDO search in TMD patients and measures to minimize mechanical trauma in bruxism patients can be applied to prosthodontic rehabilitation for TMD treatment. Another important aspect of treating TMD patients is progressively making dentures using temporary dentures. TMD therapy with Orthodontic rehabilitation is done by correcting existing malocclusion as well as associated functional disharmony and inappropriate centric relations position. The use of occlusal splints can be done to stabilize the TMJ structure before starting orthodontic treatment. Treatment modification, strength reduction, or discontinuation of active orthodontic therapy is preferable when TMD symptoms occur during the phase of active orthodontic treatment. If TMD symptoms begin to appear during or shortly after the retention phase, it is recommended that the final retention and occlusion devices be re-evaluated.

Compliance with ethical standards

Disclosure of conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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