



Controversies around Orthodontic Treatment and TMD Etiologies

Nakul Nandakishor Mude¹, Swapnil Nagnath Dhond², Komal Rajendra Khedkar³, Tejaspreet Kaur⁴, Mohd Faisal⁵ and Ritik Kashwani^{6*}

¹Department of Orthodontics and Dentofacial Orthopedics, ESIC Dental college and Hospital, India

²Department of Oral and Maxillofacial Surgery, Ymt Dental College and Hospital, India

³Department of Oral Medicine and Radiology, MA Rangoonwala dental college, India

⁴Tejaspreet Kaur, BDS, SKSS Dental College, Sarabha, Ludhiana, India

⁵Private Practitioner, MDS in Orthodontics, India

⁶BDS, Private Practitioner, School of Dental Sciences, Sharda University, India

***Corresponding author:** Ritik Kashwani, BDS, Private Practitioner, School of Dental Sciences, Sharda University, Greater Noida, India, Orcid: 0009-0008-8922-7522; Email: docritikkashwani@yahoo.com

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Abstract

The relationship between orthodontic treatment—braces or aligners—and Temporomandibular Disorder (TMD), an excruciating disorder affecting a joint within the jaw and associated muscles, is much debated. Commonly, this causes symptoms such as jaw pain, headaches, and difficulty chewing, leading some to believe that orthodontic treatment might cause or exacerbate such problems. The worry is that this intervention, which changes the alignment of teeth and jaws, could interfere with the natural function of the jaw, perhaps inducing TMD symptoms.

On the other hand, several dentists believe that TMD is not directly associated with orthodontics. Instead, it could be simply triggered by stress, injury, genetics, or even poor posture and not so much by orthodontic treatment. Furthermore, some orthodontic experts and specialists argue that orthodontic care can even help improve jaw function and reduce TMD symptoms by aligning the teeth and correcting problems with the bite.

Many patients need clarification on whether orthodontic treatment is safe or could lead to jaw problems. Research continues without credible results regarding any connection between orthodontic procedures and TMDs. This understanding could help patients and dental professionals make informed decisions on such treatment options for improving dental health without risking jaw problems.

Keywords: Aligners; Dental; Jaw; Orthodontic; Temporomandibular

Introduction

Temporomandibular Disease refers to a group of conditions affecting the temporomandibular joint (TMJ), the muscles

that help in the movement of the jaw, and related structures. The TMJ is the hinge joint that connects your jawbone to your skull and enables movements like chewing, speaking, yawning, and any type of jaw movement.

Some patients and practitioners believe that orthodontic procedures may trigger or exacerbate TMD [1]. According to them, significant movement of the position of the teeth or the jaws could disrupt the natural bite or alignment between the lower and upper jaws, causing overstimulation of the jaw muscles and strain on the joints. Some orthodontic adjustments may unintentionally alter the fragile harmony of the jaw with pain or dysfunction [2].

Instead, many dentists suggest that there is insufficient evidence to support the notion that orthodontic treatment directly causes TMD [3]. These experts point out that TMD is a complex condition with many possible causes, including genetics, stress, trauma, or other conditions, such as clenching. Within this vein of thought, orthodontic treatment may correct some bite-related problems that, in turn, could lower the risk of developing TMD [4]. For example, aligning the teeth and correcting an overbite or underbite could improve jaw function, preventing stress on the jaw muscles and joints [5].

The controversy arises from the cause that cannot be isolated or defined. Since the exact cause of TMD is unclear, some studies concluded that orthodontic treatment may influence the development of TMD, while others found no direct connection between them [6]. Due to the variability of TMD symptoms and their variation, established by multiple influencing factors, a single reason could hardly be assigned to it. Moreover, individual responses to orthodontic treatment differ since some individuals experience no issues at all, while in others, the symptoms appear after the treatment [7].

As a result of this lack of certainty, many patients are worried and confused about the safety of orthodontic care, especially if they already have some painful or irritating condition within their jaw. Some patients even decide not to undergo orthodontic treatment, fearing it may exacerbate their symptoms. For this reason, increased research has clarified the relationship between orthodontics and TMD [8]. Understanding this connection could help dental professionals provide more precise recommendations for patients with existing jaw problems, ensuring that treatment options address cosmetic and functional concerns without causing more harm.

Methodology

This narrative review explores the controversial relationship between orthodontic treatment and Temporomandibular Disorder (TMD), synthesizing existing literature to understand whether orthodontics exacerbates or alleviates TMD symptoms. The review adopts a flexible approach,

focusing on key themes derived from diverse studies, including the potential of orthodontics to cause TMD through changes in bite alignment or, conversely, its role in alleviating symptoms by correcting misalignments. The review also considers other contributing factors to TMD, such as genetics, stress, trauma, and teeth grinding, which may complicate the direct link between orthodontics and TMD.

The review is an extensive search of peer-reviewed articles, case studies, and expert opinions from databases like PubMed, Google Scholar, and Scopus. A thematic synthesis will be used to analyze the literature, grouping findings into categories such as orthodontics as a potential cause or solution for TMD and recognizing its multifactorial nature.

The review aims to provide valuable insights for patients and dental professionals, offering guidance on approaching orthodontic treatment for individuals with TMD. It will emphasize the need for further research, mainly longitudinal studies, to clarify the exact role of orthodontics in the development or treatment of TMD.

Review

TMD refers to a variety of problems affecting the jaw joint and the muscles surrounding it. Common signs and symptoms include Jaw pain or tenderness, Headache, Clicking and popping sounds during jaw movement, and Trouble chewing or opening the mouth wide. The cause of TMD is unknown, but it is believed to be caused by numerous factors, including jaw misalignment, stress, injury, teeth grinding, and genetics [9].

To understand the controversy any further, look at the temporomandibular joint:

Bones Involved: Mandible (Jawbone): The lower jaw that moves during the opening and closing of the mouth.

Temporal Bone: The part of the skull that houses the socket for the TMJ. **Cartilage Disc:** A soft cartilage disc cushions the joint, preventing the bones from rubbing against each other and enabling smooth movement.

Muscles: Include the masseter, temporalis, and pterygoid muscles, which help with chewing and jaw movement.

Ligaments: Provide stability and guide joint movements.

Prognosis: TMDs are predominantly asymptomatic, and of those that do cause discomfort, the vast majority can be effectively managed conservatively. In severe, persistent,

complicated forms of pathology, a dentist frequently needs the help of various specialists, such as a physiotherapist and a pain management specialist.

Prevention: Avoid excessive jaw movements such as wide yawning and chewing gum, employ support about posture to minimize neck and jaw pain, reduce stress through relaxation procedures, and if you grind your teeth at night, wear a nightguard.

Since TMD often involves bite issues or misalignment of teeth and jaw, orthodontic treatment can help with TMD treatment. However, its usefulness is due to symptoms varying with different individuals, depending on TMD's vardependinguses. Occasionally, TMD symptoms worsen during orthodontic treatment because of stress on the teeth and joints caused by initial orthodontic movements [10] (Table 1).

Perspective	Argument	Impact on TMD
Orthodontics as a Potential Cause	Some believe shifting the teeth or jaw during treatment can cause bite misalignment.	It may lead to jaw strain, muscle discomfort, and worsen TMD symptoms.
Orthodontics as a Solution	Others argue that correcting bite issues (e.g., overbite, underbite) can improve jaw function.	It may reduce stress on the jaw and prevent or alleviate TMD symptoms.
Other Causes of TMD	TMD may be caused by factors such as stress, trauma, or teeth grinding, not orthodontics.	TMD can develop regardless of orthodontic treatment due to factors like genetics or habits.

Table 1: The following table summarizes the two primary perspectives on this issue.

Improper bite can force the jaw to move in unnatural ways and hence can cause strain, Stress and muscle tension: Stress triggers teeth grinding or jaw clenching, which may cause or exacerbate TMD. Trauma or injury: Previous jaw injuries

or accidents can contribute to TMD symptoms. Genetics: In some people, there is a predisposition to developing TMD due to family history [11] (Table 2).

Factor	Role in TMD
Misaligned teeth or bite	It can cause an uneven load on the jaw, leading to strain on the jaw joints and muscles.
Stress and muscle tension	This leads to jaw clenching or teeth grinding, which can cause TMD or worsen symptoms.
Jaw trauma and injury	Past accidents or injuries to the jaw can contribute to the development of TMD symptoms.
Genetics	Some individuals may have a genetic predisposition to developing TMD, regardless of orthodontic treatment.

Table 2: The following table summarises important factors related to TMD.

Is Orthodontic Treatment Safe for Patients Diagnosed with TMD?

Patients who already have a problem with TMD often find it difficult to decide whether to undergo orthodontic treatment. They worry that correcting their teeth or jaw alignment will exacerbate the condition. However, some dentists believe that even adjusting orthodontic and orthopedic treatments could yield better outcomes, allowing the jaw to be aligned perfectly without long-term problems.

For instance, treating issues like an overbite or underbite through orthodontics might relieve some of the strain on the jaw, ultimately reducing TMD symptoms [12]. However, this approach must be carefully planned, as drastic bite or jaw position changes could cause discomfort.

We further need to take a look at why these controversies exist.

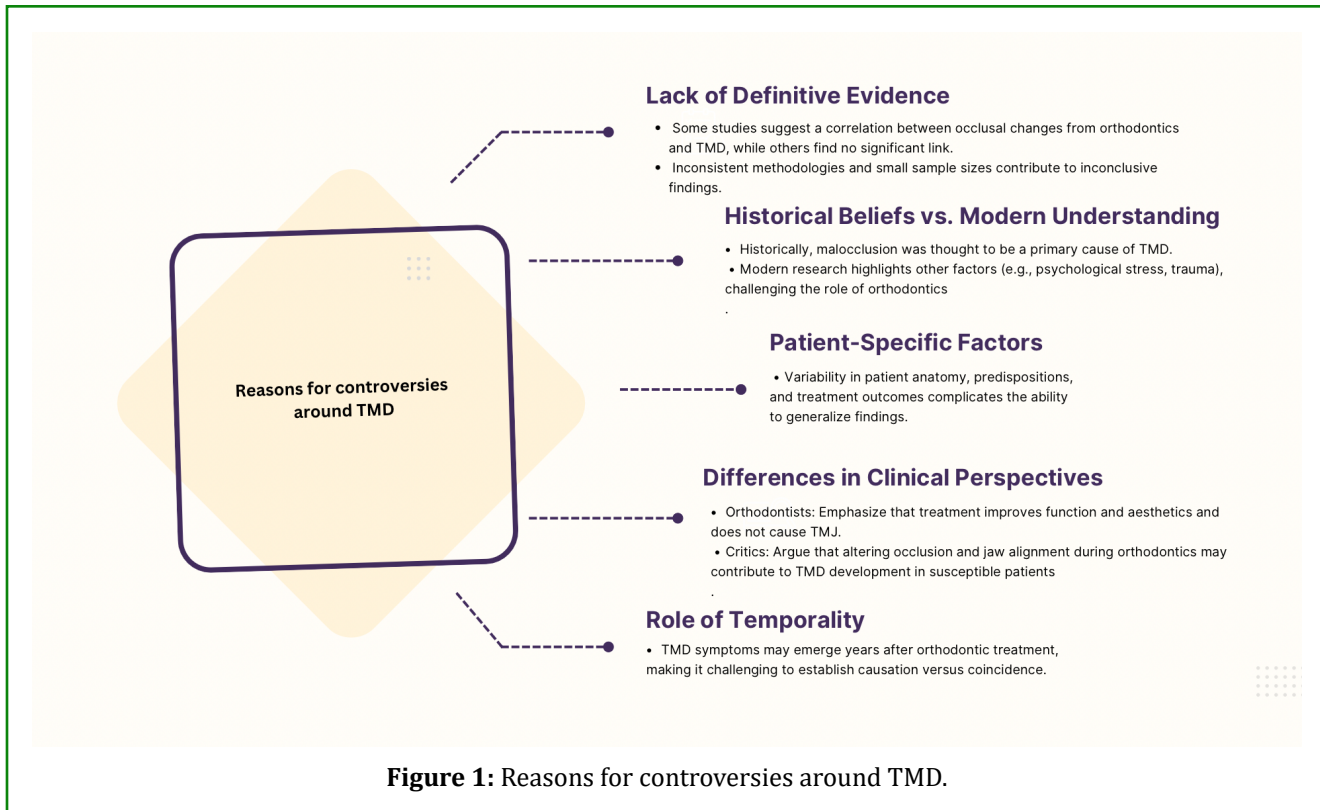


Figure 1: Reasons for controversies around TMD.

Discussion

Orthodontics is a sub-branch of dentistry that deals with diagnosing, preventing, and treating dental and facial abnormalities resulting from improper positioning of teeth or jaws. This consists of Braces, Aligners, and Retainers, which correct the position of teeth, facial aesthetics, and functions. Orthodontics has a preventive function that helps to prevent various diseases of the teeth, gums, and jaws associated with violation of occlusion.

Orthodontic treatment has been the subject of much controversy concerning the etiology of Temporomandibular Disorder (TMD). TMD refers to disorders of the mandibular joint that cause pain, clicking, decreased range of mouth opening, and headaches. Orthodontics is a branch of dentistry whose purpose is to straighten teeth and correct bite relationships.

Some people believe that orthodontic treatment contributes to TMD. They thought orthodontic treatment would disrupt the natural setting of the jaw because it alters the setting of the dentition and the bites during the treatment processes. For example, drastic movement of the teeth could force the jaw into an unnatural setting, leading to discomfort and pain in the jaw. This theory suggests that a carelessly planned orthodontic treatment could trigger or facilitate the start of TM disorders [13]. Others assume that orthodontics can

minimize TMD because correcting milder bite problems, such as an overbite or underbite, can relieve undue stress from the jaw. With the realignment of teeth and jaw, orthodontics may even prevent the transmission of strain in the jaw and reduce some already-established symptoms of TMD.

The controversy exists because TMD has many possible causes. Although some studies suggest orthodontic treatment may lead to developing TMD, others reported no direct link between the variables. Other TMD-related factors include stress, injury, teeth grinding, and genetics. For example, depending on stress-related habits such as clenching or grinding can lead to TMD irrespective of orthodontic treatment.

Overall, there is no definitive answer, but most experts agree that further research is necessary to determine whether orthodontics and TMD are exactly related. In the meantime, patients should discuss jaw pain or concerns with an orthodontist so that treatments can be planned to best suit their individual needs.

Conclusion

The relationship between orthodontic treatment and Temporomandibular Disorder (TMD) has been a debatable one. While some may think that orthodontics causes TMD by altering the bite and putting strain on the jaw, others

consider orthodontics a reliever of TMD by correcting misalignments that cause jaw stress. However, TMD has multifactorial causes, such as genetics, stress, injuries, etc., making orthodontics not the sole cause.

Ultimately, there is little to no clear consensus over whether orthodontic treatment causes or cures TMD. It is only through further research that this relationship can be fully understood. Meanwhile, patients who are concerned about TMD must discuss their symptoms and treatment options with their orthodontist or dentist for the most personalized approach to solving their needs.

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