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Original Research Paper

Impact of Posterior Teeth Loss on the Development of Temporomandibular Joint Disk Displacement with Reduction

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ABSTRACT:
Temporomandibular joint displacement is an alteration in the attachment of the articular disc to the condyle lead to an abnormal relationship between the articular disc, the mandibular condyle and the mandibular fossa. Disc displacement with reduction considered one of the most common intra-articular disorders of the temporomandibular joint. It is characterized by the gradual displacement of the articular disc against the articular eminence and the mandibular condyle; it may also cause pain, clicking or crepitus sounds, and, in rare cases, a limitation in mandibular movement. **The aim of study**: To determine the impact of posterior teeth loss on the development of temporomandibular joint disk displacement with reduction. **Materials and Method**: The study included one hundred patients of both genders aged between 25-45 years. Half of them had normal posterior teeth in both jaws and the other half had no posterior teeth in one jaw or both for at least one year ago. The study included a one-year follow-up of those patients in terms of the presence of disk displacement with reduction. **Results**: The statistical analysis found a significant difference between the loss of posterior teeth and development of disk displacement with reduction; The Fisher exact test = 0.014 at $p < 0.05$. **Conclusion**: Long term loss of posterior teeth (loss of posterior occlusion) increase the possibility of the development of temporomandibular joint disk displacement with reduction.

Keywords: Posterior teeth, TMJ, Disk, Displacement, Reduction

INTRODUCTION:

Temporomandibular joint (TMJ) is thought to be one of the most intricate synovial articulations in the human body the Joint articular surfaces are in contact with the articular disc, a nonvascular structure and nourished by synovial fluid, a secretion of the synovial membrane, the internal layer of the articular capsule, and. Dense connective tissue makes up the flexible, biconcave articular disc, which is seen in sagittal view. It is typically situated between the anterior medial surface of the mandibular condyle and the posterior slope of the articular tubercle. Under normal circumstances, the TMJ is divided transversally into two separate compartments that are totally independent of one another. The articular disc can be divided into three distinct regions: the anterior band, which has an intermediate thickness, the posterior band, which is the thickest part, and the intermediate (central) band, which is the thinnest part. [1]

Any systemic disease affecting other joints may involve the TMJ, but the local change that has been seen is regarded as an internal derangement. So, any change in the form or location of the TMJ's constituent tissues is referred to as an internal derangement. [2,3–5] Examples of such changes include articular disc alterations such as adherences, adhesions, displacement, and dislocations, as well as degenerative articular conditions like osteoarthritis, inflammatory arthritis, and synovitis. [6]

The abnormal position of the articular disc with respect to the mandibular fossa and condyle is indicative of a disorder known as TMJ disc displacement. [2,6–8]

Temporomandibular disorders (TMDs) are a collection of conditions affecting the masticatory muscles, temporomandibular joint (TMJ), and related structures, according to the American Academy of Orofacial Pain.[9]

Pain-related and intra-articular disorders are the most common conditions affecting the TMJ. Two abnormal positional relationship between the disc and the condyle, articular eminence, and/or articular fossa is known as an intraarticular disorder of the TMJ. [10]

The disc can be displaced in any direction (i.e., anterior, posterior, lateral, or medial),[11] but the most common displacement seems to be the anterior direction, with posterior and sideways displacements appearing to be uncommon.[12] Range of motion is unrestricted following disc reduction during condylar translation; however, mandibular movements might not be as smooth as they would be in a normal condition due to the condyle's fast sliding on and off of the disc. [13] However, once the mouth opening position is reached, the condyle and disc

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of a joint with DDWR is almost similar exactly in the same place as a joint without displacement. [14]

Disc displacement with reduction and disc displacement without reduction are two categories of disc displacement. [15] In case of disc displacement with reduction, the shift is seen during mandibular elevation (mouth closure), and the lowering movement of the mandible (mouth opening) causes the disc to realign itself in relation to the mandibular fossa of the temporal bone and the mandibular condyle. The most commonly observed shapes in disc displacement with reduction are the biconcave disc and the sigmoid articular tubercle. [16]

According to some studies, disc displacement with reduction would be the initial phase of disc displacement before potentially developing into disc displacement without reduction. [4,17, 18] However, not all types of disc displacement with reduction and conditions will genuinely evolve to disc displacement with reduction. [19, 20] As long as there are no complaints about intermittent locking in the patient's medical history, disc displacement with reduction is regarded as stable. [21]

TMJ disc displacement without reduction is a particular type of temporomandibular disorder can result in limited mouth opening (painful locking), also known as a "closed lock," and TMJ pain. [22] Depending on how long the locking lasts, disc displacement without reduction can be either acute or chronic. [23, 24] An estimated 2% to 8% of TMD patients have disk displacement. [25,26]

Clinically, TMJ noise is associated with disc displacement with reduction.[27] The opening and closing click is a clicking, snapping, or popping sound that may be produced when the disc is moved onto and off [28]. One of the most frequent complaints from patients is clicking in the TMJ, which accounts for 26.2% of the clinical signs of TMD. [29]

MATERIALS AND METHODS:

The study included one hundred patients of both gender with an average age of 25-45 years. Fifty of these patients had normal posterior teeth in both jaws (normal occlusion) and the other fifty patients had no posterior teeth in one jaw or both for at least one year ago. The study included a one-year follow-up of those patients in terms of the presence of disk displacement with reduction. The patients who had joint problems or on treatment with TMJ disorders were excluded at the beginning of the study. The diagnosis of disk displacement with reduction made according to the following Diagnostic Criteria for the Temporomandibular Disorders RDC/TMD: [30]

1. No pain in the joint.
2. Reproducible click on an excursion with either opening or closing click.
3. With click on opening and closing (unless excursive click confirmed):

• Click on opening occurs at ≥ 5 mm interincisal distance than on closing
• Clicks eliminated by protrusive opening

Statistical Analysis:

Data were analyzed using (the Statistical Package for the Social Sciences software version 22). The relation between the loss of posterior teeth and development of disk displacement with reduction was analyzed by Fisher's exact test and the significance level set at 0.05 and a value of $P < 0.05$ is statistically significant.

RESULTS:

The results found disk displacement with reduction was developed in 30% of patients (n=15) who had posterior teeth. In addition, the results showed that the disk displacement with reduction was developed in 56% of patients (n=28) who had no posterior teeth. The statistical analysis showed a significant difference between the loss of posterior teeth and development of disk displacement with reduction; The Fisher exact test statistic value is 0.014 at $p < 0.05$. Table 1.

Table 1. Distribution of patients for **cases of normal TMJ and disk displacement with reduction**

Group *(n)*	Normal TMJ* (n) %	DDWR* (n) %
Patients with posterior teeth (50)	(35) 70%	(15) 30%
Patients without posterior teeth (50)	(22) 44%	(28) 56%

***DDWR: Disk displacement with reduction**
***TMJ: Temporomandibular Joint**

The Fisher exact test statistic value is 0.014. The result is significant at p < 0.05.

DISCUSSION:

Temporomandibular joint (TMJ) disc displacement is an aberrant relationship between the articular disc and the mandibular condyle and fossa, also is known as internal disc derangement which is accompanied by some symptoms such as limited range of motion in the jaw, clicking when moving the jaw, and pain at the TMJ that frequently radiates to the ear. The current study examined the relation between the loss of posterior teeth and development of disk displacement with reduction. The study included a one-year follow-up of patients in terms of the presence of disk displacement with reduction. The patients divided into two groups, the first group had posterior teeth in both jaws and the second group had no posterior teeth in one or both jaws.

The study found a significant effect between the loss of posterior teeth and development of disk displacement with reduction. The study may be considered unique in this regard.

Many studies also reported many possible causes lead to development of disk displacement include bruxism, mandible trauma stress, dental clenching, excessive mastication, para-functions, lack of lubrication, disc modifications, hyperactivity of the lateral pterygoid muscle, abnormal dental occlusion, ligament sprains, loss of posterior teeth, mandible hypoplasia, deflective dental occlusion, hypermobility, and, rarely, whiplash injury. [19, 31-35] On the other hand, other studies found that the shape and function of the articular tissues are altered by aberrant biomechanical forces applied to the mandibular condyle, which is one of the etiological factors for disc displacement with reduction. This generally results in articular noise during mouth opening and closure movements. [4, 6, 7, 36-38]

The current study found disk displacement with reduction was developed in 30% of patients who had posterior teeth and it developed in 56% of patients who had no posterior teeth.

Lundh et al [39] also observed reciprocal TMJ clicking, during a three-year follow-up without treatment and they found that reciprocal clicking remained unchanged in 71% of patients and disappeared in 29% of them. In addition, they found that 20% in whom clicking disappeared, attained normal mouth opening, whereas the locking was developed in 9% of patient. Another study evaluated the changes in TMJ clicking in patients with clicking or popping of the TMJ and myofascial pain dysfunction. The patients were originally treated by conservative, nonsurgical modalities that were not specifically directed to the problems of TMJ noise or disc derangement. The follow-up period ranged from 1 to 15 years. In terms of clicking status, 63% of patients reported cessation or improvement, and 36% of them were unchanged.[40]

CONCLUSION:

Long-term loss of posterior teeth (loss of posterior occlusion) increases the possibility of the development of temporomandibular joint disk displacement with reduction.

Ethical Policy: The research was carried out in compliance with the Helsinki Declaration of 1964 or similar guidelines.

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Conflicts of Interest: There are no conflicts of interest.

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