
**EFFECT OF MANIPULATIVE PHYSIOTHERAPY AND REHABILITATION
APPROACHES AFTER TEMPOROMANDIBULAR JOINT DISLOCATION:
A CASE REPORT**

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Abstract

Background: Temporomandibular joint (TMJ) dislocation is among the Temporomandibular joint disorders (TMD). In addition to age, tooth structure, cause and duration of dislocation, the function of the masticatory muscles is also crucial in explaining the mechanism and treatment of TMJ dislocation. This dysfunction impairs chewing, swallowing, and speech, and the main symptoms are joint noises, decreased range of motion, and lower jaw deviation during TMJ function. The aim of this study is to prove that TMJ treatment should not be considered as just jaw treatment; a comprehensive treatment management should be created by taking into account the treatment covering the cervical spine and the entire craniomandibular system. Supporting this, the literature suggests that no single treatment method is effective for TMJ and multidisciplinary approach is required to completely reduce symptoms. In this study, 21-year-old case, which we treated from a holistic physiotherapy and rehabilitation perspective after TMJ dislocation, is presented. As a result of the treatment applied in this case, there was a decrease in neck and temporomandibular joint range of motion and pain. There was also a significant decrease in the severity of anxiety, depression and tinnitus. This case report shows that in TMD rehabilitation, a holistic evaluation of the patient, considering the TMJ and other contributing disorders, is vital importance.

Keywords: Temporomandibular joint; Temporomandibular disorder; Manipulative Physiotherapy; Exercise

**TEMPOROMANDİBULAR EKLEM ÇIKIĞI SONRASI MANİPÜLATİF
FİZYOTERAPİ VE REHABİLİTASYON YAKLAŞIMLARININ ETKİSİ:
OLGU SUNUMU**

Öz

Temporomandibular eklem (TME) dislokasyonu, temporomandibular eklem bozuklukları (TME) arasındadır. Yaş, diş yapısı, çıkığın nedeni ve süresinin yanı sıra çiğneme kaslarının fonksiyonu da TME dislokasyonunun mekanizmasını ve tedavisini açıklamada önemlidir. Bu disfonksiyon; çiğneme, yutma ve konuşmayı bozar. Başlıca semptomları; eklem sesleri, hareket açıklığının azalması ve TME fonksiyonu sırasında alt çene sapmasıdır. Bu çalışmanın amacı, TME tedavisinin sadece çene tedavisi

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olarak düşünülmemesi gerektiğini, servikal omurgayı ve tüm kraniomandibular sistemi kapsayan tedaviyi dikkate alarak kapsamlı bir tedavi yönetimi oluşturulması gerektiğini kanıtlamaktır. Bunu destekleyen literatür, TME için tek bir tedavi yönteminin etkili olmadığını ve semptomları tamamen azaltmak için multidisipliner bir yaklaşım gerektiğini ileri sürmektedir. Bu çalışmada, TME çıkığı sonrası holistik fizyoterapi ve rehabilitasyon perspektifinden tedavi ettiğimiz 21 yaşında bir olgu sunulmaktadır. Bu olguya uyguladığımız tedavi sonucunda boyun ve temporomandibular eklem hareket açıklığında ve ağrıda azalma meydana geldi. Ayrıca anksiyete, depresyon ve tinnitus şiddetinde de belirgin bir azalma meydana geldi. Bu olgu sunumu bize TME rehabilitasyonunda hastanın TME ve diğer katkıda bulunan bozukluklar göz önünde bulundurularak bütünsel olarak değerlendirilmesinin hayati önem taşıdığını göstermektedir.

Anahtar Kelimeler: Temporomandibular eklem, Temporomandibular bozukluk, Manipülatif Fizyoterapi, Egzersiz

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Introduction

The American Academy of Orofacial Pain defines temporomandibular disorders (TMD) as a collective term for clinical problems involving the masticatory muscles, TMJ and their associated structures, including the cervical spine.(Mallya et al., 2022) This dysfunction impairs chewing, swallowing, and speech, and the main symptoms may be joint noises, limited or painful jaw movement. Additionally, during TMJ function, mandibula deviation, tinnitus, head and neck pain, pain from trigger points in the craniocervical muscles, and referred pain to the face and scalp.(Walker et al., 1990)

TMJ dislocation mechanisms relate to TMJ structure and function and masticatory system dynamics. Factors like age, tooth structure, dislocation cause and duration, and chewing muscle function are crucial for understanding and treating TMJ dislocation.(Akinbami, 2011) Physiotherapy and rehabilitation are effective conservative treatment methods for reducing pain in TMD, improving joint mobility, repairing motor functions, and alleviating symptoms of temporomandibular dysfunction.(Wadhokar & Patil, 2022) It has been reported that the treatment of TMD should not be seen only as jaw treatment, but that comprehensive treatment management should be created by taking into account the treatment covering the cervical spine and the entire craniomandibular system.(Crăciun et al., 2022) A multidisciplinary approach is necessary, as no single treatment method suffices for recovery.(Wadhokar & Patil, 2022)

Case Report

TMJ dislocation occurred in a 21-year-old male patient his named I.O with a BMI of 27 kg/m² while yawning on February 3, 2021. The TMJ was repositioned by a dentist, and within a month, he transitioned from soft foods to normal nutrition without further TMD treatment.

On February 20, 2023, I.O. visited our clinic with complaints of TMJ dysfunction, widespread neck and jaw pain, jaw instability, muscle tension, and tinnitus. He came to us after being examined by an ear, nose, and throat specialist, a neurologist, and a psychiatrist. The ear, nose and throat specialist requested a temporal MRI examination for tinnitus in 2022. The MRI report indicate hat there was a moderate diploic appearance in the basal part of the left mastoid cells. Ear nose and throat specialist referred to dentist for tinnitus. He used a night occlusal splint prepared by his dentist to prevent malocclusion and clenching and to increase interocclusal distance. Despite this, his TMD symptoms, widespread pain, jaw instability, and tinnitus persisted. Additionally, I.O. had chronic migraine and anxiety disorder and was on medication.

Written informed consent was obtained from the patient to publish this case report.

Physical Examination

TMJ Examination: Clicking sound during jaw movement, left deviation during jaw depression, pain in masseter, lateral pterygoid, medial pterygoid, and temporalis muscles upon palpation.

Neck Examination: Muscle spasms and pain in the trapezius, suboccipitalis, and sternocleidomastoideus muscles.

Posture Analysis: Kypholordotic posture and cervical anterior tilt.

Assessments

The range of motion for TMJ depression, protrusion, and right and left lateral deviation was measured using a tape measure between the upper and lower incisors and canines. The range of motion for neck flexion, extension, right lateral deviation, left lateral deviation and rotations was measured using a ruler goniometer. Neck function was evaluated using the Neck Disability Index. (Sikka et al., 2020) Jaw and neck pain was evaluated with the visual analog scale (VAS) (0: none, 10: very severe). (de Oliveira-Souza et al., 2024) Tinnitus severity was evaluated with the Tinnitus Handicap Inventory. (Zhang et al., 2022) Anxiety and depression was evaluated with the Hospital Anxiety and Depression Scale (Table 1). (LoMartire et al., 2020)

In the patient's bilateral upper extremity neuromotor examination, no weakness was observed in the deltoideus, biceps, and triceps muscles.

I.O. was scheduled for an 8-week physiotherapy program, 3 days per week, and given a home exercise program for non-clinic days. The dentist was consulted before starting physiotherapy,

and I.O. continued using his night occlusal splint and medication for chronic migraines and anxiety disorder.

Treatment Program

Relaxation-Stretching-Mobilization Approaches

To increase relaxation and mobilization in the cervical region, stretching the trapezius, levator scapula and rhomboid muscles for 3 repetitions for 15 seconds each; (Lee & Kim, 2023) Among the manual therapy methods, upper cervical traction,(La Touche et al., 2009) cervical distraction in sitting position, C1-C2 rotations, and C1-C2 mobilization were applied.(Cherian et al., 2013) The patient's intraoral temporomandibular (masseter, lateral pterygoid, medial pterygoid, temporalis) and extraoral temporomandibular (masseter, medial pterygoid, temporalis) muscles were relaxed by grasping them with the thumb and index finger or by applying light compression and circular movements with the little finger (Figure 1).(Delgado De La Serna et al., 2020) Inferior, medial and lateral glide mobilizations were applied to the TMJ.(Sata, 2012) Finally, the muscles around the neck, namely the trapezius, sternocleidomastoideus and suboccipitalis muscles, were loosened with a classical massage and relaxation and mobilization practices were completed.(Cherian et al., 2013)



Figure 1: Relaxation-Stretching-Mobilization Techniques of TMJ (A): Medial pterygoid muscle relaxation technique (B): Masseter muscle relaxation technique (C): Distraction application to the left TMJ (D): Lateral and medial glide mobilization technique applied to the TMJ

Figure 1:

A: After placing the index finger of your hand in the mouth, it is directed along the tooth row to the angle of the mandible where it joins the medial pterygoid muscle. If possible, it is hooked behind the muscle cord. If this causes vomiting, it is also possible to apply gentle pressure to the muscle with the tip of the index finger without hooking the muscle. Pressure should be maintained until the muscle tone is felt to be released.(Kalamir et al., 2012)

B: The muscle relaxation technique was applied by rolling with pressure using the index, middle and ring fingers placed extraorally on the masseter region and the thumb placed intraorally.. (Michelotti et al., 2004)

C: In the patient's bedside position, the clinician's cranial hand stabilizes the head, with the distal thumb placed on the upper surface of the posterior teeth and the fingers placed along the mandible line. Caudal distraction force is applied mainly with the thumb.(Manske et al., 2018)

D: Medial glide: The clinician's cranial hand stabilizes the head, the distal thumb is placed on the upper surface of the posterior teeth, the second and third fingers are placed along the line of the mandible, and the head is fixed. Following downward distraction, force is applied medially from outside the mouth with the 2nd and 3rd fingers.

Lateral glide: The clinician's cranial hand stabilizes the head, the distal thumb is placed on the upper surface of the posterior teeth, the second and third fingers are placed along the line of the mandible, and the head is fixed. Following downward distraction, force is applied laterally from outside the mouth with the 2nd and 3rd fingers. (Manske et al., 2018)

Home Exercises Program

I.O. was given exercises to strengthen the muscles around the jaw. Rocabado exercises,(Shaffer et al., 2014) resistance exercises (Figure 2) and proprioceptive coordination exercises (Armijo-Olivo et al., 2016) applied to the TMJ and also added posture exercises to the program for patient's kypholordotic posture. It was checked whether the patient did the home exercises on the days he came to the session. The patient could not do the exercises on the days he was busy. The home exercise program is explained in Table 1.



Figure 2: Resistance exercises (A): Left lateral deviation resistance exercises (B): Right lateral deviation resistance exercises (C): Depression resistance exercises

Table 1: Home exercise program of the case

Rocabado exercises	Tongue in the resting position TMJ controlled rotation Rhythmic stabilization technique Cervical axial extension Shoulder retraction Stabilized head flexion (6 repetitions 6 times a day in the home program)
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Resistance Exercises	The patient open mouth slowly by lowering, left and right lateral deviation jaw while applying steady light pressure to the bottom of your chin with the fingers (Figure 2). (10 repetitions twice a day in the home program)
Proprioceptive coordination exercises	The patient applying proper jaw opening and closing exercises in front of the mirror for proprioceptive input. (10 repetitions twice a day in the home program)
Posture exercises	The patient applying exercises for kypholordotic posture (pectoral stretching, scapula retraction, chin tuck). (10 repetitions twice a day in the home program)

Post Treatment Assessment

The patient received a treatment program in the clinic 3 days a week for 8 weeks. Relaxation-Stretch-Mobilization Approaches were applied only in the clinic, and a home exercise program (Table 1) was created for the other days. At the end of 8 weeks, all parameters improved compared to the initial values (Table 2). During inspection, it was seen that the mandible opened more symmetrically and lateral excursion to the right could be made more easily (Figure 3). The patient stated that after the treatment, the feeling that his jaw was going to pop out (instability) and the clicking sounds coming from the jaw decreased. It was decided that the patient would continue treatment once a week to maintain his gains.

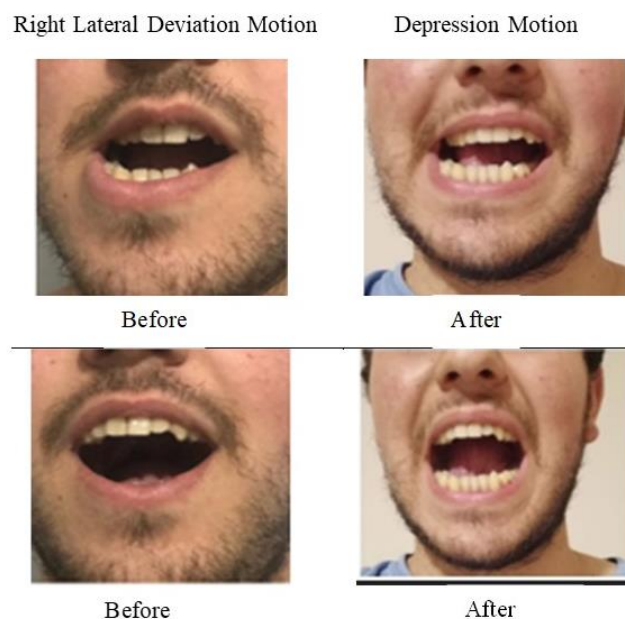


Figure 3: Pre- and post-treatment of Right Lateral Deviation Motion and Depression Motion

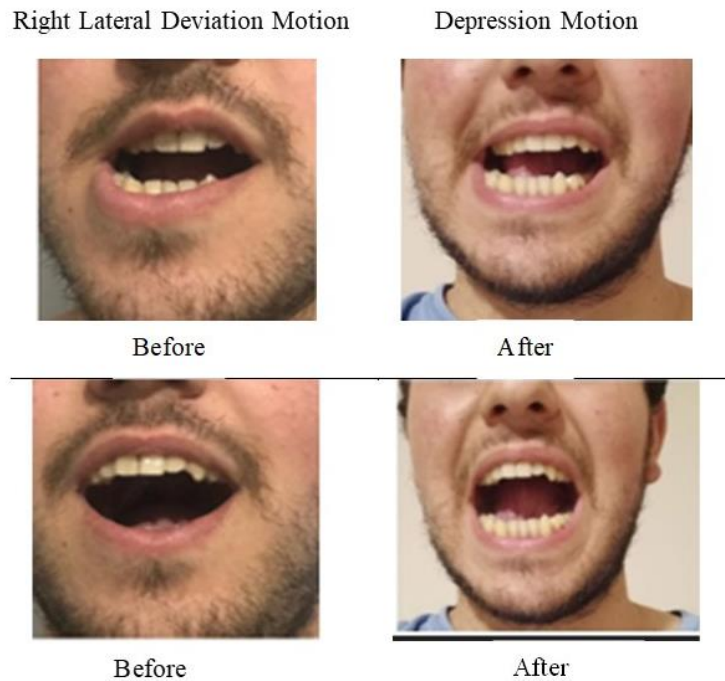


Figure 3: Pre- and post-treatment of Right Lateral Deviation Motion and Depression Motion

Table 2: Pre and post-treatment assessments of the patient with TMD

Assessments	Pre treatment	Post treatment
Active Depression-ROM	40 mm	43 mm
Active Protrusion-ROM	8 mm	9 mm
Active Right Lateral Deviation-ROM	6 mm	8 mm
Active Left Lateral Deviation-ROM	10 mm	9 mm
Active Neck Flexion-ROM	40°	45°
Active Neck Extension-ROM	35°	40°
Active Neck Right Flexion-ROM	25°	30°
Active Neck Left Flexion-ROM	30°	40°
Active Neck Right Rotation-ROM	40°	50°
Active Neck Left Rotation-ROM	45°	50°
VAS -Jaw(0-10)	9	6
VAS - Neck (0-10)	8	4
HAD-Anxiety	12	7
HAD-Depression	3	2

Neck Disability Index	23 (Moderate disability)	3 (No disability)
Tinnitus Handicap Inventory	94 (Disaster- felt all the time, disrupting sleep and causing difficulty with daily activities)	40 (Daily activities can still be done, although they may be noticeable in background noise)

HAD: Hospital Anxiety and Depression Scale; ROM: Range of Motion; TMD: Temporomandibular Joint Dysfunction; VAS: Visual Analogue Scale

Discussion

TMD treatment should be holistic, involving the cervical spine and the entire craniomandibular system.(Crăciun et al., 2022) A multidisciplinary approach is necessary, as no single treatment method is effective in reducing pain and symptoms. Physiotherapy has been shown to reduce pain, improve joint mobility, and relieve symptoms.(Wadhokar & Patil, 2022) In addition to TMD, our case also had a kypholordotic posture and many factors that contributed to the formation or worsening of TMD, such as spasms in the neck muscles, chronic migraine, anxiety disorder, and tinnitus. Thus, an integrative physiotherapy treatment program was planned to relieve symptoms and improve TMJ.

Pain is one of the most important factors that affects daily life and reduces the quality of life, and it is among the first reasons why patients apply to the clinic. Mobilizations to the TMJ and cervical region for TMD pain have been shown to reduce pain after 8 weeks(Rezaie et al., 2022) and, applying orofacial exercises together with cervical mobilization is more effective on pain.(Garrigós-Pedron et al., 2018) In our case, we applied mobilization techniques to the jaw and cervical region, as well as TMD-specific Rocabado 6x6 exercise program,(Mulet et al., 2007) which were created for jaw pathologies and whose effectiveness has been proven. Additionally, in our case, alignment exercises performed in front of a mirror and self-performed resistive exercises are used in the treatment after temporomandibular joint dislocation .(Anumula et al., 2017)

The patient also had kypholordotic posture, tinnitus, migraine, and anxiety. These conditions are interconnected; cervical region postural changes can lead to TMD by altering mandibular position and head direction.(Minervini et al., 2023) Somatic involvement of structures outside the TMJ and ear can cause tinnitus, which exacerbates anxiety and depression.(Hackenberg et al., 2023)

Conclusion

In our case of TMD following TMJ dislocation, treated with an 8-week manipulative physiotherapy and rehabilitation program (3 sessions per week), objective improvements were observed in all evaluation parameters, and mandibular movements became more symmetrical.

The patient reported a decrease in jaw clicking and instability. In our case, a noticeable improvement was achieved in the jaw ROM opening after the treatment. While the pain in the jaw and neck was severe enough before the treatment, it decreased to moderate levels after the treatment.

In conclusion, in rehabilitation of TMD a holistic evaluation of the patient is crucial, considering the TMJ and other contributing disorders. Our holistic physiotherapy and rehabilitation approach led to significant improvements in severe tinnitus, enhancing the patient's daily life. Despite no direct intervention for tinnitus and anxiety, treating TMD indirectly improved these conditions. Comprehensive patient anamnesis, thorough evaluations (posture evaluation - especially in the cervical region, psychological evaluation, presence of other diseases, etc), and a multidisciplinary rehabilitation program are essential. Treatment should involve a team including a dentist, physiotherapist, and psychotherapist/psychiatrist, centered around the patient. This holistic approach can break the vicious cycle of symptoms, as demonstrated by the improvements observed in our case through comprehensive rehabilitation.

Source of Finance

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

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1. Designing the study 2. Collecting the data 3. Analysis and interpretation of the data 4. Writing the manuscript 5. Critical revision			

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