

# EVALUATION OF THE ROLE OF BOTOX IN THE MANAGEMENT OF TMJ DISORDERS, LITERATURE REVIEW

Abdulaziz Fahad K Alsharari<sup>1\*</sup>, Mayyada Ibrahim Faraj<sup>2</sup>, Nour Mohammed Almarshadi<sup>2</sup>, Shahad Ahmed Alenazi<sup>2</sup>, Muath Majed Hakami<sup>3</sup>, Hamad Hamdan Almaerek<sup>4</sup>, Rayan Khaled Almutairi<sup>5</sup>, Abdulrahman Mohammed Alamri<sup>6</sup>, Saja Abdullah Alnajem<sup>7</sup>, Omar Mutair Alshammari<sup>8</sup>

<sup>1</sup>Department of Dentistry, Dr. Sultan Medical Centre, Qurayyat, KSA. aatts567890@gmail.com

<sup>2</sup>Faculty of Dentistry, Vision University, Riyadh, KSA.

<sup>3</sup>Department of Dentistry, Umluj General Hospital, Umluj, KSA.

<sup>4</sup>Department of Dentistry, Dental Centre King Salman Hospital, Riyadh, KSA.

<sup>5</sup>Faculty of Dentistry, Mustaqbal University, Qassim, KSA.

<sup>6</sup>Department of Dentistry, North Riyadh Dental Centre, Riyadh, KSA.

<sup>7</sup>Faculty of Dentistry, Princess Nourah Bint Abdulrahman University, Riyadh, KSA.

<sup>8</sup>Department of Oral and Maxillofacial Surgery, King Abdulaziz Medical City, National Guard, Riyadh, KSA.

<https://doi.org/10.51847/CG9NS725Ly>

## ABSTRACT

Temporomandibular joint disorders are a group of conditions that affect a large portion of the general public. It is characterized by orofacial pain that increases in intensity with jaw movement. The diagnosis is purely clinical. Self-care and NSAIDs have been a huge part of the management of this condition. In addition, due to the musculoskeletal nature of the condition, Botulinum injection has been theorized to have a role in the management of this condition. We aimed to review the literature reviewing temporomandibular joint disorders' epidemiology, clinical manifestation, diagnosis, and management. We also looked into the recent studies showing the efficacy of Botox injection in the management of this condition. PubMed database was used for articles selection, and papers were obtained and reviewed. TMD is associated with high morbidity. Thus, proper management is key whenever physicians encounter this condition. Self-care techniques, along with pain relief with NSAIDs, have been the mainstay of therapy for this condition. Other options include muscles relaxants and Botox injection for persistent cases. However, due to the subjectivity of pain, most of the published research into the efficacy of Botox resulted in inconclusive data. Further studies are required before considering Botox as first-line therapy.

**Key words:** Temporomandibular joint, Temporomandibular joint disorders, Botox injection, Botulinum injection.

## Introduction

Temporomandibular disorders (TMD), sometimes called temporomandibular joint (TMJ) syndrome, are a group of musculoskeletal and neuromuscular conditions affecting the TMJ and the surrounding muscles and bones [1-3]. The most common symptoms are pain and functional disturbance of the joint [4]. These disorders fall into three distinct categories: Myofascial pain dysfunction syndrome, internal derangement, and degenerative joint disease [3, 5]. In recent years, Botox injection has been viewed as a therapeutic choice for TMDs, particularly myofascial pain dysfunction syndrome. Thus, we will limit our discussion to myofascial pain dysfunction syndrome and the role of Botox injection in the management of this disorder.

## Materials and Methods

To select articles, PubMed database was used and the following keys; (((temporomandibular joint disorders) OR (TMD)) AND (Botox injection)) OR (Botulinum Injection) were used in the search. In regards to the inclusion criteria, one of the following topics were considered for selecting the articles; temporomandibular joint disorders, myofascial

pain, Botox injection. All other articles that did not have one of these topics as their primary endpoint were the exclusion criteria.

## Anatomy

The temporomandibular joint is a hinged joint articulating between the mandibular condyle and the glenoid fossa of the temporal bone [6, 7]. The muscles responsible for the movement of this joint are the muscles of mastication, including the masseter, temporalis, and pterygoid muscles [6]. Innervation of these muscles is provided by branches of the motor division of the trigeminal nerve [7].

## Epidemiology

TMD are common presentations. Depending on the study, the prevalence ranges between 15-25% of adults, with a peak incidence at 20-40 years of age [3, 8]. Also, it reduces the quality of life and is associated with substantial morbidity. It has been estimated that in the US for every 100 million working adults, TMD contributes to 17.8 million lost workdays annually [9]. The etiology of TMD includes other pain conditions, such as chronic headache; autoimmune disorders; psychiatric illnesses; and sleep apnea [8-11]. It might also be associated with repetitive jaw motions and

some jaw positions. However, high-quality evidence is still lacking in linking these activities with TMD [12].

#### *Classification*

In 2013, the International Research Diagnostic Criteria for Temporomandibular Dysfunction Consortium Network published a classification system for TMD [13]. It can be categorized into intra-articular (within the joint) and extra-articular (involving the muscles surrounding the joint). By far, extra-articular conditions are the most common causes of TMD, accounting for at least 50% of cases [8, 9, 13].

#### *Clinical manifestations*

The most common symptom in TMD is acute or chronic pain [14]. The pain is classically described as dull, unilateral facial pain with changing intensity. The pain is aggravated by jaw motion, hence why most patients experience an “attack” after eating and may radiate to the posterior neck, angle of the mandible, and the ear [8, 9]. The second most common symptom is otologic in nature, ranging from ear fullness to sharp stabbing pain in the ear. Ear pain can be a sign of internal derangement rather than of musculoskeletal origin [10]. Patients may also present with headaches, either unilateral or bilateral. Classically, the headache is worse in the morning [3].

#### *Diagnosis*

According to the diagnostic criteria published by the International Research Diagnostic Criteria for Temporomandibular Dysfunction Consortium Network, myofascial pain can be diagnosed based on a patient’s history and physical examination [13]. As for history, the pain must be in the jaw, temple, in the ear, or front of it; and the pain is modified by jaw movement or function. Regarding physical examination, the pain must be confirmed to be within the temporalis or masseter muscles, the patient must report a familiar pain when palpating those muscles, and reporting that the pain is spreading beyond the site of palpation but still confined within the boundaries of the muscles [13]. All these signs must be positive to diagnose myofascial pain. If the pain is spreading beyond the boundaries of the muscles, then it is termed myofascial pain with the referral [13].

Generally, there is no role for imaging in the diagnosis of TMD. However, if symptoms are severe or persist despite optimal medical management, a head CT can be obtained to rule out other pathologies and to visualize internal joint structures [3, 13].

#### *Management*

All patients with TMD must be educated and taught self-care measures, this includes optimal head posture, jaw exercises, and proper sleep hygiene [6]. However, the data on the efficacy of self-care measures are limited, but due to the lack of harm in these measures they are generally suggested. As for pharmacological therapy, NSAIDs are the mainstay treatment for acute attacks of pain [15]. Nonetheless,

NSAIDs are notorious for their gastrointestinal and renal side effects. Thus, patients must be educated not to rely on NSAIDs as a form of daily pain relief. Another option is skeletal muscle relaxants such as cyclobenzaprine and metaxalone. They are effective if taken as a scheduled dose rather than as needed [4, 6, 15]. For patients whose management failed to alleviate symptoms, Botulinum injection might be beneficial [16, 17].

#### *Role of botox in TMD*

Despite years of clinical practice, there has not been a consensus on the beneficial role of Botox injection in the treatment of TMD. While patients may report short-term relief after receiving Botox injection [14, 18], the data is still lacking regarding its efficacy. This effect can be explained by the fact that pain is a subjective symptom and cannot be standardized to assess the efficacy of Botox, leading to inconclusive study results [19]. Further studies are needed regarding the efficacy of Botox in the treatment of TMD before it can be used as first-line therapy [20].

#### *Prognosis*

TMD is usually a self-limiting condition in the general public. Furthermore, most patients respond well to NSAIDs and muscle relaxants. However, a small subtype of patients may go on to develop chronic TMD, for which Botox may offer temporary relief [15, 16, 21].

### **Conclusion**

Temporomandibular joint disorders can be characterized by orofacial pain that is associated with high morbidity. This condition affects a large number of adults and the incidence can be as high as 25%. Other symptoms may include ear pain, ear fullness, and headache. The diagnosis is primarily clinical. Self-care is a huge part of the management of this condition. Pharmacological intervention may play a role in reducing pain during high-intensity attacks. As we stand today, the role of Botox in the treatment of TMD is still unclear. While many patients may report an improvement, the data suggested by recent studies are inconclusive. Thus, we need a high-quality RCT taking into account the different types of TMD to show the beneficial role of Botulinum infection.

**Acknowledgments:** The authors are grateful to all support and guidance of Dr. Abdulaziz Fahad K Alsharari.

**Conflict of interest:** None

**Financial support:** None

**Ethics statement:** None

### **References**

1. Amiri F, Attari SG, Karimi YA, Motamedzadeh M, Karami M, Moghadam RH, et al. Examination of work-related musculoskeletal disorders and their related factors among farmers of Asadabad city in 2015. *Pharmacophore*. 2020;11(1):52-7.
2. Alanazi AM, Alotaibi HD, Alahmari SA, Almutairi AK, Babakr SA, Abdrabalnabi HA, et al. Hip bone fracture diagnosis and management. *Arch Pharm Pract*. 2019;10(4):29-32.
3. Gauer RL, Semidey MJ. Diagnosis and treatment of temporomandibular disorders. *Am Fam Physician*. 2015;91(6):378-86.
4. De Rossi SS, Greenberg MS, Liu F, Steinkeler A. Temporomandibular disorders: evaluation and management. *Med Clin North Am*. 2014;98(6):1353-84.
5. de Kanter R, Battistuzzi P, Truin GJ. Temporomandibular disorders: "occlusion" matters! *Pain Res Manag*. 2018;2018:8746858.
6. Murphy MK, MacBarb RF, Wong ME, Athanasiou KA. Temporomandibular disorders: a review of etiology, clinical management, and tissue engineering strategies. *Int J Oral Maxillofac Implants*. 2013;28(6):e393-414.
7. Alomar X, Medrano J, Cabratosa J, Clavero JA, Lorente M, Serra I. Anatomy of the temporomandibular joint. *Semin Ultrasound CT MR*. 2007;28(3):170-83.
8. Liu F, Steinkeler A. Epidemiology, diagnosis, and treatment of temporomandibular disorders. *Dent Clin North Am*. 2013;57(3):465-79.
9. Maixner W, Diatchenko L, Dubner R, Fillingim RB, Greenspan JD, Knott C. Orofacial pain prospective evaluation and risk assessment study--the OPPERA study. *J Pain*. 2011;12(11):T4-11.
10. Mortazavi N, Babaei M, Babae N, Kazemi HH, Mortazavi R, Mostafazadeh A. Evaluation of the prevalence of temporomandibular joint involvement in rheumatoid arthritis using research diagnostic criteria for temporomandibular disorders. *J Dent (Tehran)*. 2018;15(6):332-8.
11. Manfredini D, Lobbezoo F. Relationship between bruxism and temporomandibular disorders: a systematic review of literature from 1998 to 2008. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2010;109(6):e26-50.
12. Scriver SJ, Keith DA, Kaban LB. Temporomandibular disorders. *N Engl J Med*. 2008;359(25):2693-705.
13. Schiffman E, Ohrbach R, Truelove E, Look J, Anderson G, Goulet JP. Diagnostic criteria for temporomandibular disorders (DC/TMD) for clinical and research applications: recommendations of the international RDC/TMD consortium network\* and orofacial pain special interest group dagger. *J Oral Facial Pain Headache*. 2014;28(1):6-27.
14. Guarda-Nardini L, Stecco A, Stecco C, Masiero S, Manfredini D. Myofascial pain of the jaw muscles: comparison of short-term effectiveness of botulinum toxin injections and fascial manipulation technique. *Cranio*. 2012;30(2):95-102.
15. Mujakperuo HR, Watson M, Morrison R, Macfarlane TV. Pharmacological interventions for pain in patients with temporomandibular disorders. *Cochrane Database Syst Rev*. 2010(10):CD004715.
16. Awan KH. The therapeutic usage of botulinum toxin (Botox) in non-cosmetic head and neck conditions - An evidence-based review. *Saudi Pharm J*. 2017;25(1):18-24.
17. Sipahi Calis A, Colakoglu Z, Gunbay S. The use of botulinum toxin-a in the treatment of muscular temporomandibular joint disorders. *J Stomatol Oral Maxillofac Surg*. 2019;120(4):322-5.
18. Malgorzata P, Piotr C, Edward K. The mechanism of the beneficial effect of botulinum toxin type a used in the treatment of temporomandibular joints dysfunction. *Mini Rev Med Chem*. 2017;17(5):445-50.
19. Connelly ST, Myung J, Gupta R, Tartaglia GM, Gizdulich A, Yang J. Clinical outcomes of Botox injections for chronic temporomandibular disorders: do we understand how Botox works on muscle, pain, and the brain? *Int J Oral Maxillofac Surg*. 2017;46(3):322-7.
20. Thambar S, Kulkarni S, Armstrong S, Nikolarakos D. Botulinum toxin in the management of temporomandibular disorders: a systematic review. *Br J Oral Maxillofac Surg*. 2020;58(5):508-19.
21. Dimitroulis G. Management of temporomandibular joint disorders: A surgeon's perspective. *Aust Dent J*. 2018;63(1):S79-S90.