



# *Botulinum Toxin an Injection and Painful TMJ Click: Reviewing the Impact on Lateral Pterygoid Muscle*

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**ABSTRACT:** Temporomandibular disorders (TMDs) cause chronic jaw pain and other symptoms, leading people to seek medical help. Recently, botulinum toxin (BTX) has become popular for TMD treatment. This review aims to assess the effectiveness of BTX in managing TMD symptoms and pain.

The review analysed studies that used BTX injections in the lateral pterygoid muscle, a common target for treatment. Despite variations in dosage and injection methods, BTX injections showed effectiveness in reducing click sounds, pain, and TMJ-related muscle disorders.

**Keywords:** Temporomandibular joint, Botulinum toxin, Lateral pterygoid muscle, Temporomandibular disorders

## 1. INTRODUCTION

Botulinum toxin (BTX) has emerged as a promising therapeutic option for the management of temporomandibular disorders (TMDs) due to its ability to provide pain relief and reduce muscle activity [1]. TMDs encompass chronic orofacial pains involving the temporomandibular joint (TMJ) and masticatory muscles, with intraarticular TMDs, particularly articular disc displacement [2]. Despite the prevalence and impact of TMDs, a relatively small percentage of affected individuals seek treatment [3].

Current non-surgical treatment approaches for TMDs include physical therapy, low level laser therapy, oral appliances and medication but they often lack specificity in targeting affected muscles [4]. BTX, specifically BTX-A, acts by temporarily paralyzing muscles through its action on inactivating calcium channels and acetylcholine production [5].

It has shown efficacy in various conditions, including TMDs, and injections into the lateral pterygoid muscle, an important muscle involved in mandibular movements, have demonstrated positive effects in relieving TMDs symptoms. Emara et al. observed a substantial improvement in the elimination of joint sound and disc position following the administration of BTX injection specifically targeted at the LP muscle. The findings suggest that this treatment approach could be beneficial for individuals experiencing issues related to their temporomandibular joint (TMJ). BTX injections may offer a promising therapeutic option for addressing certain temporomandibular joint disorders (TMD) and related symptoms. However, further research and clinical trials are needed to confirm and better understand the full extent of its efficacy and safety in managing TMJ-related conditions [6, 4].

This review article aims to explore the potential of BTX as a treatment modality for TMDs, focusing on its mechanisms of action, clinical applications, and evidence supporting its use in addressing the complex nature of TMD-related pain and dysfunction.

## MATERIAL AND METHODS

A comprehensive literature research was conducted In BMC Research Gate, and Journal of Dentistry published in English. The search terms used included MeSH phrases such as "Temporomandibular Joint Disorders," "Botulinum Toxins, Type A," "Pain," and "Clinical Trials" to retrieve articles related to the effects of botulinum toxin A injection on relieving TMJ pain. Additionally, the Science Direct database was searched for relevant systemic reviews.

## DISCUSSION

Botulinum toxin type A (BTX-A) is a potent neurotoxin that blocks the release of acetylcholine, a chemical messenger involved in muscle contraction, at the neuromuscular junction. The FDA has approved BTX-A for various medical conditions, including involuntary eyelid spasms, crossed eyes, neck muscle contractions, frown lines, and excessive sweating [7]. While BTX-A is not firmly approved for the treatment of masticatory muscle spasm, researchers have explored its potential benefits in treating pain and tonicity changes associated with temporomandibular joint disorder (TMD) [8].

Although there is a lack of sufficient research specifically addressing BTX-A injections for masticatory muscle spasm, studies have shown promise in using BTX-A injections in the lateral pterygoid (LP) muscle to decrease TMD symptoms and muscle dystonia [4]. The inappropriate tone in the LP muscle and its connection with the articular disc may contribute to the click sounds associated with TMJ dysfunction [9-12]. Relaxing and normalizing muscle tone through BTX-A injections may help alleviate these symptoms [6, 18].

Previous studies have demonstrated the effectiveness of BTX-A in various maxillofacial applications, including dental implant surgeries, correcting gummy smiles, managing muscle hypertrophy and spasms, and alleviating headaches and trigeminal neuralgia [13]. When injected into the masseter muscle, BTX-A has shown promise in TMD treatment by temporarily reducing muscle strength and mastication force, with normal function typically returning after the toxin's effects wear off [13].

Evidence-based reviews have evaluated the therapeutic effects of BTX-A in relieving chronic facial pain [14]. Some temporary adverse effects, such as muscle paralysis and difficulty swallowing (dysphagia), have been observed in a few patients. Overall, about 91% of patients have experienced improvement in facial pain after four weeks of BTX-A treatment [14].

Conservative treatments, including warm compresses, behavioural therapy, oral appliances, and medication such as anti-inflammatories and muscle relaxants, are recommended as the first line of therapy for TMD. BTX-A injections are suggested for patients who do not respond to conservative treatments. The recommended dose of BTX-A for TMD treatment is typically 7.5-10 units for the LP muscle in cases of sub-maxillary pain, jaw deviation, or habits like bruxism [4].

Studies have reported positive outcomes with BTX-A injections in the LP muscle for reducing joint clicking in TMD patients. In most cases, these injections effectively eliminated the click sound, with only a few experiencing recurrences after several months. Other studies have focused on using BTX-A injections to reduce maxillofacial muscle pain associated with TMJ dysfunction [15, 20].

### The injection method

The injection method for LP muscle can be a bit more challenging compared to other muscles involved in mastication. To ensure accuracy, electromyography (EMG) is used to determine the precise location for needle insertion. The needle is typically inserted at an angle of 45° either extra-orally (outside the mouth) anterior to the condylar neck or intra-orally (inside the mouth) posterior to the maxillary tuberosity. This technique allows for targeted delivery of the botulinum toxin to the LP muscle [6, 16-17].

## Frequency and dose of injection

In most reviewed studies, a single injection was given, and some patients (17%) received a second injection. The effects of a single dose lasted until the end of the follow-up period [6, 18, 19]. Additional booster injections were sometimes administered after 2-6 months. The dose of the injection varied across studies, ranging from 12.5 to 200 units per muscle. The specific dose used depended on the desired treatment outcome and the severity of the condition [6, 18, 19].

## ADVERSE EFFECT

Botox injections may cause temporary side effects like drooping eyelid, sagging eyebrow, and double vision. However, in the reviewed studies, these effects were minor. Temporary symptoms such as difficulty swallowing, speech issues, muscle weakness, and flu-like symptoms were observed [6, 18, 19]. Bruising and tenderness were minor complications. These side effects do not contraindicate Botox use for TMD [7].

## CONCLUSION

In conclusion, botulinum toxin (BTX) injections, specifically BTX-A, show promise in managing symptoms and improving function in patients with temporomandibular disorders (TMDs). BTX-A injections in the lateral pterygoid muscle have been found to reduce pain severity and improve TMJ-related dysfunction. While more research is needed to establish standardized protocols and long-term effects, BTX injections offer a minimally invasive and potentially effective treatment option for non-cosmetic TMD conditions. Conservative treatments remain the first line of therapy, but BTX-A injections can be considered for patients who do not respond to conservative approaches. Further studies are necessary to optimize the use of BTX in TMD management and explore its potential in combination with other therapies.

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