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Case Report

Healing joints with precision: The role of prolotherapy in treating TMD's

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ABSTRACT

Temporomandibular disorders (TMD) affect the masticatory muscles and temporomandibular joints, causing pain and functional issues. This case report describes a 41-year-old female with chronic severe degenerative arthropathy of the left TMJ, who initially responded to conservative treatments but later received prolotherapy for persistent symptoms. Following prolotherapy, her pain score decreased from 7 to 3, and her mouth opening improved from 25 mm to 44 mm over three months. This case highlights prolotherapy's potential as an effective alternative for TMD treatment, complementing traditional conservative methods.

1. Introduction

According to a systematic review, temporomandibular disorders (TMD) affect approximately 31 percent of adults and 11 percent of children, highlighting their common occurrence.[1] Temporomandibular disorders (TMD) encompass a spectrum of musculoskeletal conditions characterized by pain and/or functional impairment in the masticatory muscles, temporomandibular joints (TMJ), and related anatomical structures.[2] Temporomandibular disorder often serves as a primary etiological or exacerbating factor in prevalent symptoms such as tension headache, migraine, facial pain, ear pain, and tinnitus; however, achieving efficacious treatment can be challenging.[3] Constant and repetitive mechanical stresses make the temporomandibular joint susceptible to degenerative changes and pathologies like those observed in other synovial joints.[4] The management of this condition involves a range of conservative and surgical methods, including intracapsular sclerosing solution injections, intramuscular botulinum toxin type A injections, partial or complete myotomy of the lateral pterygoid muscle, temporalis tendon scarification, eminectomy, autologous blood injections, augmentation of the articular eminence using bone grafts or miniplates, and open condylotomy.[5] The standard approach for managing patients with temporomandibular disorder typically involves conservative modalities such as dietary adjustments, pharmacotherapy, occlusal splint therapy, and physiotherapy.[6] Because surgery is typically viewed as a final option for treating TMD, many patients seek alternative treatments. One such option is prolotherapy, also referred to as regenerative injection therapy.[7]

This report presents a case of chronic severe degenerative arthropathy of the left temporomandibular joint (TMJ) managed conservatively, highlighting the potential of prolotherapy as an effective alternative for treating chronic, severe temporomandibular disorders (TMD). The case underscores prolotherapy as a promising option for patients with refractory symptoms and contributes to ongoing

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research in this field.

2. Case Presentation

A 41-year-old female presented to our Department of Oral and Maxillofacial Surgery, reporting pain on the left side of her face and ear region that has been occurring when she opens and closes her jaw over the last 4 months. The patient reported that she underwent arthrocentesis two years ago, which resulted in significant symptomatic relief. She also mentioned that the condition had started with a clicking sound, which became painful and progressively worsened over time. During the extraoral examination, the patient presents with a mesocephalic facial profile with no facial abnormality detected. On examination, the patient experienced limited mouth opening, unable to exceed 25 mm without pain and reaching 35 mm of maximum mouth opening with discomfort localized in the left temporomandibular joint region. (Figure 1). Additionally, palpation revealed tenderness in the left masseter muscle and the left TMJ area. While performing the pain assessment using the Visual Analogue Scale, the patient rated her pain as severe, scoring 7.

In the roentgenographic examination, the coronal section of the cone-beam computed tomography (CBCT) revealed osteophytic lipping of the condyle, which presented a shelf-like appearance (Figure 2). In the sagittal view, there was evidence of condylar erosion and flattening (Figure 3). Following clinical and radiographic examinations, a conclusive diagnosis of chronic severe degenerative arthropathy of the left temporomandibular joint (TMJ) was established.

2.1. Management

1. Conservative management for the condition was started with pharmacological therapy which includes muscle relaxants for relieving pain.
2. Furthermore, an occlusal splint was fabricated to aid in jaw realignment and reduce muscle tension (Figure 4). An impression of the upper arch was taken using alginate and poured with dental stone to create an accurate model of the patient's maxillary arch. The splint was fabricated using a clear and rigid thermoplastic sheet of 1.5 mm thickness using a vacuum forming machine. Cold cure acrylic was added anteriorly and posteriorly for bite deprogramming. The splint was trimmed, smoothed, and polished for a comfortable finish. The fit and comfort of the splint were checked in the patient's mouth. Instructions were given to the patient to wear the splint for a minimum of 12 hours daily, particularly at night.
3. Prolotherapy procedure
   A 12.5% dextrose solution was prepared by diluting 0.75 ml of 50% dextrose solution with 1.5 ml of 2% lidocaine solution. Following this, 0.75 ml of bacteriostatic water was added to the mixture. The final volume of the 12.5% dextrose solution was achieved, totaling 3 ml. Subsequently, a 30-gauge needle was loaded with this prepared solution.
   The anatomical points around the TMJ area were marked using a surgical skin marker according to the Hemwall-Hackett method (Figure 5).

   (a) Point A- The primary goal was to locate the posterior joint space. The focal point was the depression anterior to the tragus, positioned approximately 5 mm from the midpoint of the tragus along the ala tragal line. This depression resulted from the forward and downward movement of the condyle following mouth opening. A bite block was inserted between the patient's anterior teeth. The injection needle was then inserted through the skin at the designated site, directed anteromedially to avoid inadvertent penetration into the ear canal. Subsequently, 1 ml of prolotherapy solution was administered.
   (b) Point B-The anterior disc attachment, where it connected to the lateral pterygoid muscle, was the second target area. Identification of this point was accomplished by noting a slight depression anterior to the condyle in the closed-mouth position. The bite block was removed, and the patient was instructed to close their mouth, aiming to guide the condyle of the mandible glides back into the fossa. Finally, the needle was inserted in a medial and slightly anterior direction, and 1 ml of prolotherapy solution was delivered following aspiration.
   (c) Point C- By asking the patient to clench their teeth, the third injection site was identified as the most tender point of attachment of the masseter muscle to the inferior border of the zygomatic arch. And finally, 1 ml of the solution is injected into this area.

The injections were repeated at an interval of 2, 4, and 6 weeks over 12 weeks. Following the completion of the procedure, the patient was instructed to adhere to a soft diet. The patient was scheduled for follow-up visits one month and three months after her last prolotherapy session.

3. Results

Pre-operatively, the patient rated her pain as severe, with a score of 7 on the visual analogue scale. Following the third session of prolotherapy, the pain intensity decreased to a moderate level, with a score of 3. By the 3-month follow-up, clicking could no longer be detected through clinical palpation. Also, at the 3-month follow-up, the

mouth opening had increased to 44 mm when compared with the preoperative measurement of 25 mm (Figure 6).

Figure 1: Pre-operative mouth opening of 25 mm

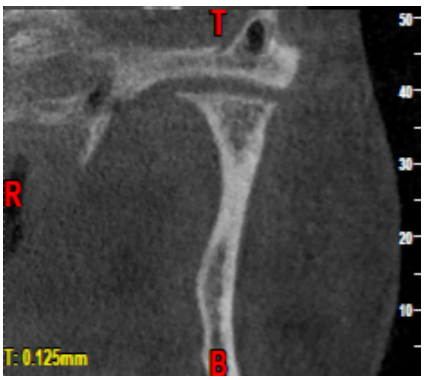

Figure 2: Coronal view of CBCT demonstrating the osteophytic lipping of condyle

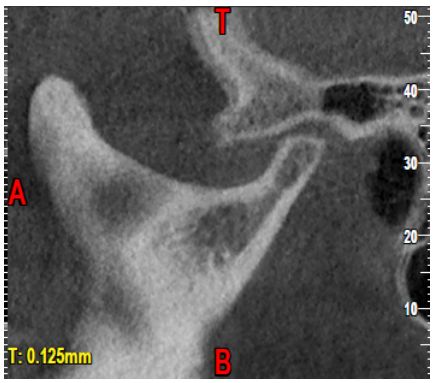

Figure 3: Sagittal view of CBCT revealing flattening of condyle

Figure 4: Fabricated occlusal splint

Figure 5: Marking of anatomical points around TMJ

Figure 6: Mouth opening of 44mm at 3^{rd} month follow-up period

4. Discussion

Prolotherapy, a treatment with a history spanning over 80 years in clinical practice, has been utilized to manage chronic musculoskeletal conditions. Dr. George Hackett established this approach in the 1950s, solidifying it as an effective method for treating conditions such as ligamentous laxity, along with associated musculoskeletal and arthritic conditions.[8] The term "prolotherapy" originates from the Latin word "proli," meaning "offspring," giving rise to "proliferate," which means "to grow rapidly".[9] Prolotherapy, according to Webster's New Collegiate Dictionary, is "the rehabilitation of an incompetent structure, such as a ligament or tendon, by inducing the proliferation of cells." In 2007, Reeves proposed a definition of prolotherapy as "an injection of growth factors or growth factor production stimulants to grow normal cells or tissue."[10] Prolotherapy operates on the principle that chronic musculoskeletal pain is frequently caused by laxity in ligaments and tendons. It involves injecting an inflammatory substance to trigger a controlled inflammatory response within the joint. This process aims to stimulate the proliferation of fibroblasts, thereby promoting the healing and strengthening of the affected tendons and ligaments.[11] Dextrose is widely employed in clinical settings as the primary prolotherapy agent ranging from 12.5 to 25% dextrose. In the context of prolotherapy, multiple types of injectates are utilized, including substances like phenol-glucose-glycerin (P2G) and sodium morrhuate. P2G functions through the process of protein alkylation on cell surfaces, resulting in direct cellular damage or triggering an antigenic response, which subsequently recruits nearby granulocytes. On the other hand, Sodium morrhuate, containing precursors to prostaglandins and leukotrienes, is believed to act as a chemotactic agent, enhancing the recruitment of inflammatory cells to the local site.[12] Dextrose acts by creating a hypertonic environment, which can lead to cell rupture, while simultaneously upregulating the expression of platelet-derived growth factors.[13] It has been established through research that the introduction of a hyperosmolar solution with an osmolarity greater than 1000 mOsm/l can induce the separation of myelin lamellae in myelinated nerve fibers and cause the destruction of unmyelinated nerve fibers. Consequently, such solutions are recognized for their neurolytic properties. And hence, hypertonic dextrose possesses pharmacological characteristics that induce both neurolytic and inflammatory responses within biological system.[14] A systematic review and meta-analysis by Regina Wing-Shan Sit et al. evaluated hypertonic dextrose prolotherapy (DPT) for temporomandibular disorders (TMDs) across 10 RCTs with 336 participants. The findings showed that DPT significantly reduced TMJ pain at 12 weeks with a moderate effect size and low heterogeneity.[15] Among the array of treatment options documented, including occlusal splints, counselling, physiotherapy, pharmacotherapy, surgical intervention, and their combinations, occlusal splint therapy emerges as the prevailing choice, supported by extensive evidence and practice.[16] Splint therapy involves the establishment of neuromuscular harmony within the masticatory system and the creation of a mechanical disadvantage against parafunctional forces using removable appliances. A well-designed splint facilitates optimal biomechanical integration among the muscles of mastication, temporomandibular joint (TMJ) disk assemblies, ligaments, osseous structures, dentition, and tendons.Splints play a crucial role in dental care by fulfilling multiple functions. They are designed to relax muscles, allowing for the proper seating of the condyle in centric relation (CR), which is essential for jaw alignment and function. Additionally, splints provide valuable diagnostic information to dental professionals. They act as a protective barrier, safeguarding teeth and associated structures from the damaging effects of bruxism, or teeth grinding. Moreover, splints help mitigate the sensitivity of the periodontal ligament, which can improve overall dental comfort. Another significant function of splints is their ability to reduce cellular hypoxia levels, thereby promoting better tissue health in the oral cavity.[17]

5. Conclusion

This case report illustrates the effectiveness of prolotherapy in managing chronic severe degenerative arthropathy of the temporomandibular joint (TMJ). The significant pain reduction and improved jaw function highlight prolotherapy as a viable alternative to traditional treatments. This suggests that prolotherapy could be integrated into TMD management protocols, providing a promising option for patients with refractory symptoms. Further studies are necessary to confirm these findings and optimize treatment strategies.

6. Source of Funding

None.

7. Conflict of Interest

None.

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