Ultrasound-guided Inferior Alveolar Nerve Block for Trismus in Temporomandibular Disorders: A Case Report

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Case report

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Abstract

Background: Temporomandibular disorder (TMD) is a broad term that encompasses pain and/or dysfunction of the masticatory musculature and TM joints (TMJs). Its most important feature is pain, followed by limited jaw movement, and joint sounds. When it progresses to a chronic condition, the symptoms are extremely difficult to manage, often requiring multiple interventions.

Case presentation: Our patient, a woman in her 50s, developed TMD after a traffic accident that occurred 30 years previously. The patient presented with severe trismus due to TMJ pain (maximum mouth opening was 20 mm). She was scheduled to undergo extraction of a right lower molar and three upper anterior teeth owing to progressing caries. However, it was anticipated that the treatment would be difficult since the patient could not open her mouth adequately. Therefore, we considered relieving the trismus to facilitate dental treatment. Based on the findings, the cause of the TMD was considered to be pain in the masticatory muscles during mouth opening. Ultrasound-guided inferior alveolar nerve block (IANB) was performed on both sides using ropivacaine. Three minutes after the IANB, the pain during mouth opening disappeared and the maximum mouth opening improved to 40 mm. Dental treatment could be performed without difficulty, and the patient could maintain the mouth open throughout the treatment.

Conclusions: Treatment methods for chronic TMD are limited and it is necessary to consider the exact aetiology before deciding upon a treatment option. In our case, ultrasound-guided IANB proved to be an effective modality for relieving TMD-related trismus.

Background

Temporomandibular disorder (TMD) is a broad term that encompasses pain and/or dysfunction of the masticatory musculature and TM joints (TMJs).[1] The most important feature of TMD is pain, followed by limited jaw movement, and joint sounds.[1] Although TMD is not life-threatening, its symptoms can greatly affect a person's quality of life (QOL), and when it progresses to a chronic condition, the symptoms are extremely difficult to manage, often requiring multiple interventions.

The TMJ connects the mandible with the temporal bone.[2] The joint functions with the aid of the muscles and ligaments attached to the joint capsule, condylar neck, and mandibular body.[3] The nerve supply to the TMJ is provided via the mandibular branch (V3) of the trigeminal nerve. It provides motor nerve supply to the masticatory muscles, while its auriculotemporal and masseteric branches provide sensory innervation to the joint.[4]

The common symptoms of TMD are pain in the face, jaw, neck, and shoulders, along with restricted jaw movements, headache, difficulty eating, bruxism, clenching, otalgia, and joint sounds.[2] Restricted jaw movement causes trismus, which leads to difficulty in eating and getting dental treatment. Therefore, treatment of TMDs associated with trismus can significantly improve patients' QOL.[1, 4]

In the present case, the patient developed TMD after a traffic accident. The patient presented with severe trismus due to TMJ pain, because of which she was unable to undergo dental treatment. Herein, we report on the utility of ultrasound-guided inferior alveolar nerve block (IANB) to relieve trismus owing to severe TMD.

Case Presentation

The patient was a woman in her 50 s with a medical history of generalised loss of muscle strength induced by post-traumatic stress disorder. At 27 years of age, the patient was involved in a traffic accident that resulted in cervical and lumbar disc herniation. Although spine surgery was performed, the weakness in the left half of her body did not improve. Moreover, it gradually progressed to loss of muscle strength, resulting in uterine and bladder prolapse, and she was diagnosed with disuse syndrome. She was diagnosed with diabetes at 39 years of age and was treated with oral medications (Metformin, Riobel); her HbA1c level was 6.6% on admission. She started developing asthma at 47 years of age and has mild attacks approximately twice per month. Her regular therapy included theophylline and budesonide/formoterol inhalation. During an attack, she used Meptin inhaler; however, she started using oral steroids when inhalers failed to control the symptoms. The patient developed ventricular extrasystoles at 53 years of age and was treated with oral disopyramide. She also had a history of anaphylactic shock, loss of consciousness, and respiratory arrest with amoxicillin administration.

The patient was scheduled to undergo extraction of a right lower molar and three upper anterior teeth owing to progressing caries. However, it was anticipated that the treatment would be difficult since she could not open her mouth adequately. Therefore, we considered relieving the trismus to facilitate dental treatment. Diagnostic imaging revealed no abnormality of the TMJs. Palpation of the temporalis and masseter muscles revealed tenderness. Hence, the cause of the TMD was considered to be pain in the masticatory muscles during mouth opening. Hence, it was expected that mouth opening would improve if the pain was relieved.

The mouth opening was measured before starting the treatment. The maximum mouth opening was 20 mm from the upper alveolar crest to the lower anterior incisor apex (Fig. 1). Opening caused severe pain (visual analogue scale pain score 100/100) and was difficult to maintain. The patient was seated in the dental chair, and monitoring was started (blood pressure, oxygen saturation, and electrocardiogram). After confirming that her vital signs were normal, ultrasound-guided IANB was performed on both sides using 6 ml of 0.375% ropivacaine on each side. Three minutes after the IANB, the pain during mouth opening disappeared. The mouth opening after analgesia improved to 40 mm (Fig. 2), and the visual analogue scale pain score reduced to 10–11/100. Dental treatment could be performed without difficulty, and the patient could maintain the mouth open throughout the treatment. The treatment course and the patient’s recovery were unremarkable. No palsy or hypoaesthesia was noted after the block. The patient informed us that the improvement in trismus lasted for 3 days after the IANB.

Discussion

Our patient developed TMD owing to injury and had what can be considered a typical example of severe TMD.[4] Treatment should have been performed sooner since it became difficult with disease progression. Ultrasound-guided IANB was able to improve the trismus caused by TMD in this case. In a recent study, Kumita et al. suggested that ultrasound-guided IANB was highly effective for perioperative analgesia in cases of gnathoplasty.[5] Another recent study found that ultrasound-guided IANB was useful in the perioperative management of patients undergoing mandibular sequestrectomy for medication-related osteonecrosis of the jaw.[6] Our results demonstrate that IANB provided effective pain control for 72 hours. Furthermore, IANB was not associated with adverse events or prolonged hospitalisation. These results also suggest that IANB provides effective postoperative analgesia after mandibular surgery. In the present case, the improvement in mouth opening lasted for 3 days after the procedure, which is consistent with previously reported effect of IANB. It is unclear as to why the analgesic effect persisted longer than the duration of action of the local anaesthetic. Ultrasound-guided IANB is easy to perform, has no adverse effects, and it might be useful for diagnostic purpose. This implies that the inability of a patient to open his/her mouth even after an IANB is performed, points towards a disorder of the joint disc or deformation of the joint itself.

The OPPERA study (Orofacial Pain: Prospective Evaluation and Risk Assessment), which began in 2006, was designed to identify risk factors for TMD. The results of this study over a period of 10 years revealed evidence of certain contributing factors,[7–11] such as history of significant psychological stress, including perceived stress or previous traumatic life events, and previous jaw injury.[7] Some studies have suggested that early intervention is successful in preventing an acute TMD from developing into a chronic TMD.[10,12,13]

It is possible that central sensitisation, attributed to injury, in individuals with chronic painful TMD contributes to the increased pain sensitivity. It is also possible that individuals with chronic painful TMD undergo muscle changes caused by loss of normal elasticity, which makes the TMJs more vulnerable to injury from jaw movements and parafunction.[14] In addition, chronic pain has long been associated with poor overall health. Furthermore, there is evidence associating TMD with other chronic pain conditions/disorders, such as fibromyalgia, chronic widespread pain, irritable bowel syndrome, lower back pain, migraine, chronic regional pain syndrome, chronic fatigue syndrome, tension-type headache, chronic pelvic pain, post-surgical, and neuropathic pain.[15] However, treatment methods for chronic TMD are limited, making the treatment of this condition a real challenge for clinicians.

The reason for delayed treatment for TMD in our patient was that treatment for other diseases was prioritised over that for TMD. Since there are various causes of TMD, it is necessary to consider the exact aetiology before deciding upon a treatment option; however, in our case IANB proved to be an effective modality.

In the future, it would be advisable to identify TMD cases for which IANB can prove effective. Conducting studies on epidemiology, on appropriate drug dosage for anaesthetic administration, and on accurate

assessment of duration of action of such agents will all guide clinical decision making in treating patients with trismus due to TMD.

List Of Abbreviations

IANB, inferior alveolar nerve block; QOL, quality of life; TMD, temporomandibular disorder; TMJ, temporomandibular joint.

Declarations

Ethics approval and consent to participate

Not applicable.

Consent for publication

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

Availability of data and materials

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

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Figures

Figure 1

A facial photo before the nerve block was performed. The mouth opening was 20 mm. Pain at the time of opening was severe and it was difficult to maintain the mouth open. The visual analogue scale pain score was 100/100.

Figure 2

A facial photo after the nerve block was performed. The mouth opening was 40 mm. Pain at the time of opening disappeared, and the patient could maintain the mouth open without difficulty. The visual analogue scale pain score was 10–11/100.