Physiotherapy Approach in Treatment of Trigeminal Neuralgia: A Case Report

Sahar Zamani[a], **Farshad Okhovatian**[a*]

[a] Physiotherapy Research Center, School of Rehabilitation Sciences, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Corresponding Author: Farshad Okhovatian, Physiotherapy Research Center, School of Rehabilitation Sciences, Shahid Beheshti Medical University, Damavand St, Imam Hossein SQ, Tehran, Iran. ***Tel:*** +98-21 77561407; ***E-mail:*** farshadokhovatian1965@gmail.com

Submitted: 2017-05-09; **Accepted**: 2017-10-03

Abstract

This study deals with the assessment and treatment of a 45-year-old female suffering from trigeminal neuralgia (TN). The neuralgic pain was recurrent lancinating right-sided facial, which run along mandibular branch of trigeminal nerve, shooting from the corner of the mouth to the angle of the jaw. The patient's main complaint was sudden neural pain along with persistent fatigue in the face that developed following talking and remained after the attacks. Patient's neurologist prescribed carbamazepine and referred the patient to the physiotherapy center. Physiotherapy approach included electrotherapy [transcutaneous electrical nerve stimulation (TENS), ultrasound (US), low-level laser therapy, and superficial moist heat], manual therapy, exercise therapy, and self-massage education. The patient was treated in 15 sessions, and final examinations indicated a significant decrease in frequency of neural attacks, reduction in the durability of facial fatigue following the neural attacks, and improvement in initiation time of facial fatigue while talking. We suggest that physiotherapy approach along with medication can be effective in relieving symptoms in patient suffering from TN. Sharing the experiences of physiotherapist and neurologist can make this belief that physiotherapy can be effective in such complicated cases where medication alone is not effective.

Please cite this paper as: Zamani S, Okhovatian F. Physiotherapy Approach in Treatment of Trigeminal Neuralgia: A Case Report. J ClinPhysio Res. 2018; 3(1): 42-47.

Introduction

Trigeminal neuralgia (TN) is a disease characterized by severe stabbing pain, with a brief recurrent episode, and usually unilateral with the distribution of one or more branches of the trigeminal nerve felt deep in the face. Pain occurs in a sudden attack (paroxysms); duration of attack varies from a few seconds to a few minutes. The frequency of the pain attacks also differs from a few to hundreds of attacks a day (1). It may take months to years for remission, but each attack tends to shorten in the next remission period (2).

The annual incidence of TN is 4 to 5 in 100,000 in United States (3) and lifetime prevalence of TN was estimated to be 0.3% (4). TN is more prevalent in women, and also right-sided symptoms are more predominant (5).

In some cases, TN may be caused by an identified structural abnormality including multiple sclerosis, tumors, and abnormalities of the skull base (symptomatic TN). However, in some patients, symptoms are generates from morphologic changes in the trigeminal nerve root due to vascular compression without an established etiology (classic TN) (3). Only, routine imaging may be helpful in identifying the symptomatic TN. However, the diagnosis of classic TN is based on the history of patient and characteristic features of pain (6)

The first step of treatment of TN is medical therapy. Carbamazepine is offered as effective drug aimed to suppress the pain. Oxcarbazepine, baclofen, lamotrigine, and pimozide may also be prescribed (1, 7).

In some cases, where symptoms are not controlled by medication, surgical procedures are necessary. These procedures include percutaneous procedures on the Gasserian ganglion, gamma knife, use of a tentorial sling, and micro vascular decompression (8, 9).

It has also been proposed that peripheral nerve treatments such as cryotherapy, alcohol injection, phenol injection, peripheral acupuncture, radiofrequency, thermocoagulation, and laser therapy are effective in relieving symptoms of TN (3).

Case history

In June 2017, a 45-year-old female who was suffering from a recurrent, lancinating, right-dominant facial pain was referred to a physical therapy clinic. The pain ran along mandibular branch of trigeminal nerve, which was shooting from the corner of the mouth to the angle of the jaw. She reported onset of a dull persistent pain and fatigue (pretrigeminal neuralgia) almost 4 years ago without any causes. Early diagnosis was teeth grinding. The neurologist had prescribed baclofen as a muscle relaxant and night guard. Symptoms went down for a while until two years ago, which reappeared suddenly with a brief, stabbing, electric shock-like, severe pain attacks in the facial area. The frequency of neural attacks varied from 5 a day to less than 2 attacks in a month. Duration of each attack lasted 20 seconds or less. There were no facial autonomic symptoms (including lacrimation, ptosis, and nasal congestion) during neural attacks. The patient claimed that pain was triggered by mechanical stimuli such as brushing teeth, rubbing the face, chewing, even sometimes while smiling or talking, especially exposed to ice or cold wind. The location of the evoked pain was in the triggered site or sometimes radiated to another area.

Patient's main complaint was sudden neural pain along with persistent fatigue in the face that lasted after the attacks also. Patient's neurologist had diagnosed TN, prescribed the carbamazepine, and referred the patient to the physiotherapy clinic to reduce pain and other complications of the disease.

Primary examination

The primary physical examination performed by the physiotherapist manifested a hyperesthesia in cheek and jaw. Palpation of internal and external pterygoid muscles, and temporalis and masseter muscles were painful and sensitive.

Physical assessments revealed that mandibular elevation and depression (opening and closing the mouth) in full range was intact; however, the end range of mouth opening (mandibular depression) was negligibly painful. Moreover, jaw movements including retraction, protrusion, and lateral deviations were performed in full range. Notably, the end range of protraction and right/left deviation movements were painful. Location of pain in the end range of movements was reported exactly in temporomandibular joint and also in the cheek, deep in the face. During the jaw and mouth movements, there was no crepitation in the temporomandibular joint.

To measure the mandibular depression (opening the mouth), patient opened the mouth wide open so that the distance between tips of right maxillary and mandibular central incisors could be measured with a standard ruler.

To measure the mandibular lateral deviation, the patient was asked to move mandible laterally in the horizontal plane. As the patient laterally moved the jaw, the distance from maxillary central incisors to mandibular central incisors was measured with a standard ruler.

Application of resistance to the mouth and jaw movements, mandibular elevation/depression, jaw protrusion/retrusion, and lateral jaw deviation indicated that the movements are powerful. However, the resistive movements were a little painful.

To measure the mandibular protrusion, patient slightly opened the mouth and moved the lower jaw anteriorly across the upper teeth (protrusion of mandible). The tip of the ruler was inserted into the mouth, then the distance between the tips of right maxillary and mandibular central incisors was measured while mandible was protruded (10).

To apply resistance to the jaw opening movement, the patient was asked to keep her mouth wide open. The examiner cupped under the chin with one hand; the other hand was placed on the top of the head for stabilization. Resistance was applied in vertically upward direction.

To apply resistance to the jaw closure, the patient was asked to clench jaws tightly. The examiner grasped the chin of the patient between the thumb and index finger and held firmly in the thumb web. The other hand was placed on the top of the head for stability. Resistance was applied vertically downward.

To apply resistance to the lateral jaw deviation, the patient was asked to deviate jaw (right or left).

The examiner placed one hand with the palmar side of the fingers against the jaw. The other hand was placed against the opposite temple to stabilize the head. Resistance was applied in a lateral direction to move the jaw toward the midline.

To apply resistance to the jaw protrusion, the patient was asked to protrude jaw. The examiner placed one hand behind the head to stabilize the head. Another hand cupped the chin, and resistance was applied horizontally backward (11). Table 1 shows the results of the assessment of face and mandibular movements.

Next step was the assessment of pain and fatigue levels. The patient was asked to report her pain by marking a line on the visual analog scale (VAS). The VAS is a 10-cm horizontal line divides into 10 equal parts; from 0=no pain to 10=maximum pain ever felt (12). A previous study revealed that the reliability of VAS is quite high (ICC=0.96-0.98) (13). The patient reported pain score of 1 on a VAS in the end range of mouth and jaw movements (opening the mouth and lateral deviation). The severity of pain during the neural attack was reported to be 10 on a VAS. To assess the facial fatigue, the patient was asked to indicate the period of durability of fatigue after neural attacks and estimate the average time for which fatigue was felt following the talking. The patient reported that average duration of fatigue following neural attacks was almost 9-10 hours. The patient also estimated that she experienced a feeling of fatigue 10-12 minutes after she started talking.

The sense of the face was quite intact. There was no change in the patient's sense of smell and taste. The number of neural attacks was 12-13 during last 1 month.

Table1.Assessment of mouth and mandibular movements

Movement	ROM	Resistive movement
Opening the mouth	Full	*powerful
Left deviation	Full	Powerful
Right deviation	Full	Powerful
protrusion	Full	powerful

**Power full means grad 5 in oxford method*

Treatment

Treatment protocol was provided based on the clinical findings of the patient. The goals of treatment include pain relief, decrease pain frequency and severity of attacks, eliminate perpetual fatigue, lessen psychological distress, improve the ability to perform normalactivities, and improve quality of life.

Electrotherapy treatment was performed in 15 sessions. According to the neurologist's prescription, in every session, different electrotherapy modalities including transcutaneous electrical nerve stimulation (TENS), ultrasound (US), low-level laser therapy, and superficial moist heat were conducted. Manual therapy, exercise therapy, and self-massage education for facial muscles were also performed.

Electrotherapy agents:

1. Conventional TENS was used for 20 minutes with frequency of 150 Hz and pulse width of 20 μs (the intensity exclusively set at the subject's sensory threshold) (14).Self-adhesiveelectrodepads were used on both sides of the face at the site of pain to transmit the electrical current.
2. 8 minutes of US (pulse ratio: 50%, intensity: 0.5 w/cm^2, frequency: 1 MHz) (15) was applied on the anterior to the opening of ear canal where the nerve is superficial and divided into three branches (16).

   The low-level laser was performed on the anterior to the opening of ear canal. Gallium Arsenide (Ga_As) diode laser (890 nm) (Mustang 2000+, Russia), with a frequency of 1500 Hz, dose of 2 J/cm^2/point, pulse duration of 180 μs, and pulse frequency of 3000 Hz was applied (17, 18).
3. Superficial moist heat (hot pack) was used to reduce muscular tension in cervical and shoulder muscles, especially in trapezius muscle for 10 minutes.

Manual Therapy

Manual techniques were used to decrease tenderness and make relaxation in involved muscles, which include trapezius, scalens, sternocleidomastoid masseter, temporalis, andpterygoid muscles.

To massage the trapezius muscle (supine position), the therapist stood over the head of the patient, griped the muscle bulk with thumb and index finger, and slightly pressed against each other.

To access the sternocleidomastoid (SCM) muscle (supine position), the therapist rotated the patient's head contra lateral side and slightly massaged the prominence balk of the muscle along the length of muscle with thumb and index finger.

To access the scalene muscle, asked the patient to lay supine, therapist slightly pulled the SCM muscle laterally then pressed the muscle against the neck to release the muscle.

To palpate the masseter (supine position), the therapist placed the fingers just below the zygomatic arch, at the upper part of muscle and slightly pressed the fingers inward. Then glided the fingers and moved them slightly downward along the length of muscle to the mandible. Massage continued till any barrier felt to release the muscle tension.

Temporalis muscle is palpate superior and lateral to eyebrow, top of the ear canal. To massage the temporalis muscle (supine position), the therapist placed the fingertips at the top of anterior part of muscle. Then pressed the finger firmly and glided them inferiorly toward zygomatic arch. The massage was continued by placing the finger more posteriorly on head.

Pterygoids are palpable externally between the maxilla and mandible anterior to the TMJ, and also along the medial surface of the mandible on the lateral aspect of the face.

To perform massage on pterygoid muscle, the therapist used two different procedures:

1. Use of the thumb to find the space just anterior to the TMJ (site of muscle), then press the finger upward, downward, and forward to release the muscle tension.
2. Place the thumb or two fingertips just under the angle of the mandible, then press the fingers superiorly and into the medial surface of the mandible and glide the finger slightly (19).
3. The duration of massage therapy was 15-20 minutes in each session.

Self-massage education

The patient was recommended to apply moist heat on the cervical and shoulder muscles after the neural attacks, then massage the facial, cervical, and shoulder muscles as per instructions to alleviate muscular spasm and pain.

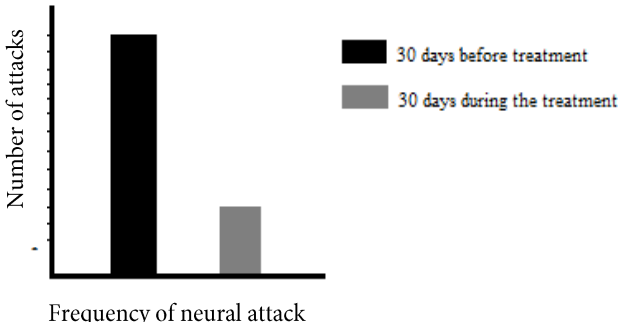

Figure 1. Frequency of neural attacks: comparison between 1month before the treatment and 1 month during the treatment.

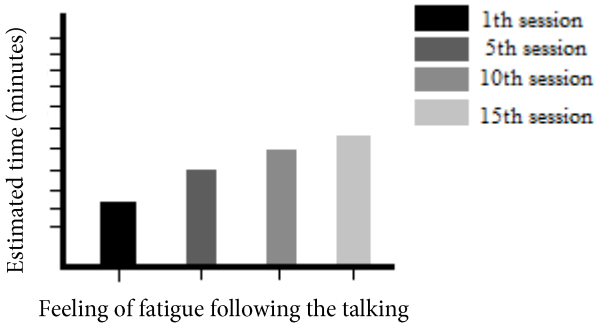

Figure 3. Comparison between feelings of fatigue following the talking in first, fifth, tenth, and fifteenth sessions.

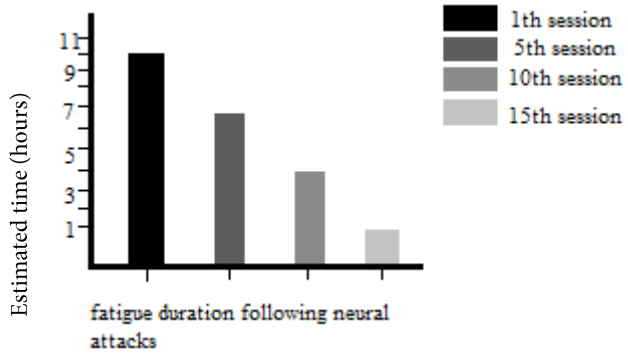

Figure 1. Differences of durability of fatigue after neural attacks in first, fifth, tenth, and last sessions

Exercise

The most appropriate exercises in TN patients are stretching exercises. Stretching exercises were demonstrated in the first session, and the patient was suggested to do those exercises regularly at home.

Stretching exercises were performed for trapezius, scalene, SCM, cervical flexors, and extensor muscles. Gradual training was also given for strengthening exercises. The first step was isometric exercises, and then progressed to the resistive exercises. According to the limited duration of treatment, most of the resistive training exercises were educated to the patient to do at home. These exercises begin following the end of treatment session in order to strengthening and preparation of patient. The exercises were carried out three times a day with 10 repetitions in each set.

Final examination

Since the major complaint of the patient was pain and fatigue, most parts of the examination of the patient were objective. Assessment was performed on fifthand tenth sessions to ensure the accuracy of the treatment process. At the last visit, a complete evaluation was performed again. The results of assessments revealed that the hyperesthesia in cheek and jaw was almost relieved. Palpation of involved muscles including external pterygoid muscles, temporalis, and masseter muscles was not sensitive. Comparison of results showed that the frequency of neural attacks significantly decreased during the treatment process. During the treatment period (30 days) the attacks occurred only 3 times. Figure 1 indicates the improvement in frequency of neural attacks. Further, the average of fatigue durability following neural attacks significantly decreased. The patient reported that average of fatigue durability following neural attacks was almost 1-2 hours. Figure 2 shows the differences of fatigue duration in first, fifth, tenth, and last sessions. Moreover, the feeling of fatigue while talking notably improved as estimated by the patient. She reported that manifestation of fatigue lasted for more than 30 minutes after she started talking. Figure 3 reveals the comparison between feelings of fatigue following the talking during the 30 days of treatment period the meaning of sentence was changed. The score of pain on a VAS during attack was the 10 though. Resistive movements improved. Applying resistance was concomitant with no pain.

Discussion

The results of our case study revealed that physiotherapy approach can be effective in relieving symptoms and eliminating the side effects and discomforts associated with the TN. The use

of electrotherapy modalities, exercises along with manual therapy could greatly reduce the burden of symptoms of the patient.

The analgesic mechanism of TENS composes of physiological block (reducing pain through nociceptive inhibition at the presynaptic level in the dorsal horn), endogenous pain inhibitory system (increasing beta endorphin and met-encephalin), and gate control theory (preventing the central transmission of the nociceptive information to the cortex by stimulation of large diameter afferents).

Nonthermal effect of ultrasound, which is related to pulsed wave exposure, could elicit anti-inflammatory and tissue stimulating effects, through cavitation and acoustic streaming effects (15).

Low-level laser therapy also has anti-inflammatory effects as it increases cell proliferation and collagen production, and reduces prostaglandin E2(PGE2) and cyclooxygenase-2 (COX-2) levels in cell cultures (18).

Previous studies indicated that manual therapy in patients with TN could significantly reduce pain in the cervical spine area, and improve the symptom related to TN. Relaxation oriented manual technique can cause pain relief by reducing muscle tension (20).

A moderate exercise may relieve pain symptoms in TN by releasing the pain inhibition factors such as endorphin. Moreover, exercise can relieve stress, and improve mood and sleep which are disturbed in these patients. Therefore, exercise therapy is not only limited to the facial and shoulder girdle trainings but running on a treadmill can also be an option.

Due to the perpetual tension in facial muscles, it seems that biofeedback training makes the patient aware of the abnormal activities of the facial muscles. This insight and relaxation programs help the patient eliminate abnormal behavior patterns. It also reduces the tension and related perpetual fatigue. However, due to the lack of this modality in the neurologist's prescription, we could not use this. We suggest the use of this modality in future case studies to determine its effectiveness.

A patient with TN is one of the rare cases referred to physiotherapy clinics. Therefore, the experience of physiotherapists about TN is limited. Neurologists' distrust and their unfamiliarity with the skills of physiotherapists in improving the symptoms of diseases have led to a very low number of referrals for these patients.

On the other hand, a patient referred to physiotherapy clinic with a pre-prepared prescription containing a list of physiotherapy agents. According to this, the patient's perceived idea was any treatment other than that the neurologist prescribed may hurt her. Therefore, the patient refused to receive a massage at first treatment session. However, with time she confessed that massage therapy was more effective in reducing facial pain and fatigue.

Unfortunately, the flawed system of health insurance has prevented physiotherapists from acting freely as they do not implement their optimal treatment protocols planned according to the initial examination and evaluation. In this instance, electrotherapy was performed as recommended by the neurologist in the insurance prescription. However, excluding the prescribed treatment protocol, some treatments such as massage and exercise therapy were also performed and the patient was satisfied with those treatments. According to patient's opinion, the effects of manual therapy were much greater than the physiotherapy modalities in reducing pain.

Conclusion

Our findings show that physiotherapy interventions could be used as a non-invasive treatment in relieving the burden of symptoms in patient suffering from TN. Effect of medication may be temporary and eliminate the symptoms only for a short period. On the other hand, invasive procedures like surgery have a lot of side effects. In addition, we must consider that the cost of operation is not affordable to all patients. Our study suggests that physiotherapy approach along with medication can be effective in lessening the burden of symptoms of TN in these patients. It is recommended that neurologists also take advantage of the experience of physiotherapists in treatment of their patients, since the use of medication only is not always be effective.

Acknowledgment

We would like to thank the Physiotherapy Research Cenetr, Shahid Beheshti university of Iran for their help on this project.

Conflict of interest:
None

Funding support:
This project had supported financially by Sina trauma and surgery research center, Tehran University of Medical Sciences.

Authors' contributions:
All authors made substantial contributions to conception, design, acquisition, analysis and interpretation of data.

References

1. Maarbjerg S, Gozalov A, Olesen J, Bendtsen L. Trigeminal neuralgia–a prospective systematic study of clinical characteristics in 158 patients. Headache: The Journal of Head and Face Pain. 2014;54(10):1574-82.
2. Love S, Coakham HB. Trigeminal neuralgia: pathology and pathogenesis. Brain. 2001;124(12):2347-60.
3. Gronseth G, Cruccu G, Alksne J, Argoff C, Brainin M, Burchiel K, et al. Practice Parameter: The diagnostic evaluation and treatment of trigeminal neuralgia (an evidence-based review) Report of the Quality Standards Subcommittee of the American Academy of Neurology and the European Federation of Neurological Societies. Neurology. 2008;71(15):1183-90.
4. Mueller D, Obermann M, Yoon M-S, Poitz F, Hansen N, Slomke M-A, et al. Prevalence of trigeminal neuralgia and persistent idiopathic facial pain: a population-based study. Cephalalgia. 2011;31(15):1542-8.
5. Bangash TH. Trigeminal neuralgia: frequency of occurrence in different nerve branches. Anesthesiology and pain medicine. 2011;1(2):70.
6. Bowsher D. Trigeminal neuralgia: a symptomatic study of 126 successive patients with and without previous interventions. The Pain Clinic. 2000;12(2):93-101.
7. Karol EA, Karol MN. A multiarray electrode mapping method for percutaneous thermocoagulation as treatment of trigeminal neuralgia. Technical note on a series of 178 consecutive procedures. Surgical neurology. 2009;71(1):11-7.
8. Zakrzewska JM, Linskey ME. Trigeminal neuralgia. Bmj. 2014;348(9):g474.
9. Steinberg JA, Sack J, Wilson B, Carter B, Alksne J. Use of a Tentorial Sling for Microvascular Decompression of the Trigeminal Nerve in Patients with Trigeminal Neuralgia: A Novel Operative Technique and Report of Clinical Outcomes. Journal of Neurological Surgery Part B: Skull Base. 2017;78(S 01):A138.
10. Reese NB, Bandy WD. Joint range of motion and muscle length testing: Elsevier Health Sciences; 2002.
11. Hislop H, Avers D, Brown M. Daniels and Worthingham's Muscle Testing-E-Book: Techniques of Manual Examination and Performance Testing: Elsevier Health Sciences; 2013.
12. Okhovatian F, Mehdikhani R. Comparison between the immediate effect of manual pressure release and strain/counterstrain techniques on latent trigger point of upper trapezius muscle. Clinical Chiropractic. 2012;15(2):55-61.
13. Bijur PE, Silver W, Gallagher EJ. Reliability of the visual analog scale for measurement of acute pain. Academic emergency medicine. 2001;8(12):1153-7.
14. Sluka KA, Walsh D. Transcutaneous electrical nerve stimulation: basic science mechanisms and clinical effectiveness. The Journal of pain. 2003;4(3):109-21.
15. Baker KG, Robertson VJ, Duck FA. A review of therapeutic ultrasound: biophysical effects. Physical therapy. 2001;81(7):1351-8.
16. Premkumar K. The massage connection: anatomy and physiology: Lippincott Williams & Wilkins; 2004.
17. Pinheiro AL, CavalcantI ET, Pinheiro TI, Alves MJ, Manzi CT. Low-level laser therapy in the management of disorders of the maxillofacial region. Journal of clinical laser medicine & surgery. 1997;15(4):181-3.
18. Bjordal JM, Couppé C, Chow RT, Tunér J, Ljunggren EA. A systematic review of low level laser therapy with location-specific doses for pain from chronic joint disorders. Australian Journal of Physiotherapy. 2003;49(2):107-16.
19. Clay JH. Basic clinical massage therapy: integrating anatomy and treatment: Lippincott Williams & Wilkins; 2008.
20. GRGIĆ V. Influence of manual therapy of cervical spine on typical trigeminal neuralgia: a case report. Liječnički vjesnik. 2010;132(1-2):21-4.