

Efficacy of Transcutaneous Electrical Nerve Stimulation and its different modes in patients with Trigeminal Neuralgia

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Abstract

Objective: To see the efficacy of Transcutaneous Electrical Nerve Stimulation therapy and its different modes in trigeminal neuralgia, refractory or partially responsive to drug therapy and to find out the comparative effectiveness of different modes of TENS therapy in these cases.

Methods: This was a prospective analytical study, conducted at Rabia Moon Institute of Neurological Sciences over a period of one year. Thirty one patients diagnosed as suffering from trigeminal neuralgia according to International Headache Society Criteria, either Classic Trigeminal Neuralgia (CTN) or Symptomatic Trigeminal Neuralgia (STN) were randomly subjected to two different modes of Transcutaneous Electrical Nerve Stimulation (TENS) therapy. Severity of pain was assessed on visual analogue scale prior to treatment and fifteen days after therapy and results were than compared.

Results: Out of 31 patients, 20 females and 11 males, with a mean age of 50.1±11 years, 26 (83.7%) improved significantly with application of TENS, only 5 (16.3%) patients remained unresponsive to this form of therapy. Study also showed a better efficacy of constant mode of therapy over burst mode.

Conclusion: Transcutaneous electrical nerve stimulation is an effective, easy to use therapy with minimal side effects in patients suffering from trigeminal neuralgia not responding to conventional treatment. Constant mode of this therapy was a slightly better option than burst mode therapy.

Keywords: Treigeminal Neuralgia, Transcutaneous electrical stimulation (JPMA 61:437; 2011).

Introduction

Trigeminal neuralgia is an extremely painful disorder involving the face. It occurs in paroxysms, triggered by touch, chewing and shaving. Predominantly it involves the maxillary and mandibular division of the trigeminal nerve, is usually unilateral, characterized by exacerbations and remissions. Its occurs at all ages usually around the age of 50 years¹ and more in females with the ratio of 1:2 - 2:3.^{2,3} The annual incidence is 4 - 5/100000.³

According to practice parameters recommended by Quality Standards Subcommittee of the American Academy of Neurology and the European Federation of Neurological Societies,⁴ to control pain in patients with TN: carbamazepine should be offered and oxcarbazepine, baclofen, lamotrigine, and pimizide may be considered. For patients with TN refractory to medical therapy: early surgical therapy, percutaneous procedures on the Gasserian ganglion, gamma knife, and microvascular decompression may be considered. Mention has not been made of

complementary therapies because of absence of evidence in controlled studies supporting their use, including TENS therapy.⁵

Prolonged transcutaneous electrical nerve stimulation (TENS) is widely used to induce hypoalgesia and pain relief for more than 25 years.^{6,7} It is effective in reducing both acute and chronic pain, like in muscle and connective tissue disorder such as arthritis, backache, cervical pain, bursitis and in neurological conditions like causalgia, carpal tunnel syndrome, peripheral neuropathy and other miscellaneous disorders, according to medical literature.

TENS produces eletro-analgesia probably by one or of the following mechanisms: Presynaptic inhibition in the dorsal horn of the spinal cord, endogenous pain control (via endorphins, enkephalins, and dynorphins), direct inhibition of an abnormally excited nerve and restoration of afferent input.⁸

The rationale to carry out this study was that although pharmacotherapy may reduce intensity of pain in

neuropathic disorders, its role in improving quality of life and emotional and physical functions is less consistent. Drug-related adverse effects are common in the treatment of neuropathic pain, not only because of the specific medications used but also because many patients with this condition are older, take other medications, and have comorbid illnesses. Despite that, nonpharmacologic treatments have received little study in patients with neuropathic pain although these may provide an additional benefit beyond that obtained from pharmacologic treatment alone. Also TENS is inexpensive, non-invasive and safe with no major side effects and can be self administered by patients following simple training.

Hardly any studies are reported which have specifically used or recommended the use of TENS in treatment of trigeminal neuralgia.

This study was undertaken to observe the efficacy of TENS in Trigeminal Neuralgia patients who were refractory or partially responsive to drug therapy.

Methodology

This study was conducted at Rabia Moon Institute of Neurological Sciences over a period of one year. Thirty one patients were diagnosed as suffering from trigeminal neuralgia according to International Headache Society Criteria, either Classic Trigeminal Neuralgia (CTN) or Symptomatic Trigeminal Neuralgia (STN). Written informed consent for inclusion in the study was obtained from all patients.

Patients were assigned to age groups <30, 30-40, 41-50, and >50 years.

Patients refractory or partially responsive to medical therapy were identified. There is insufficient evidence to allow conclusions as to when surgery or other treatment modalities should be offered.⁴ We could not find studies dealing specifically with the definition of refractory trigeminal neuralgia in the existing literature. Because treatment duration in most clinical trials of neuropathic pain had typically been 8 weeks or less, we considered patients taking adequate dose of carbamazepine, or oxcarbazepine or gabapentine or pregabalin or any combinations of these

for more than 8 weeks were considered as "refractory." Patients not tolerating medical therapy either due to side effects or due to their co-morbid conditions were also included.

These patients were randomly assigned to two groups in an alternating sequence. Patients presenting with odd serial numbers were included in group A and those with even serial numbers to group B. In Group A, constant mode was tried for 16 (51.6%) and in the Group B 15 (48.3%) patients were subjected to burst mode of trans-cutaneous electrical stimulation. Therapy was continued for three weeks for each patient.

Intensity of the impulse depended on the patients' tolerance, whereas frequency, pulse width and duration were fixed. Two hundred and fifty hertz frequency was used with a pulse of 120µ. It was applied for duration of thirty minutes. One electrode was placed just before the ear, the other one at the end of the respective nerve. However, placement was adapted to pain referral and to effectiveness whenever necessary, as multiple patterns may be tested in the average patient and there is no "cookbook" approach to electrode placement.⁹

Severity of pain was assessed on visual analogue scale prior to treatment and fifteen days after therapy. A score of zero indicated no pain, 1-3 mild pain, 4-6 moderate pain and 7-10 severe pain.^{10,11}

The results were analyzed using SPSS 15.

Results

Thirty one patients included 20 (64.5%) females and 11 (35.5%) males. Their ages ranged from 30-75 years with a mean age of 50.1±11 years. The maximum number of patients was within the age range of > 50 years, n=12 (38.7%).

Results after 3 weeks of TENS therapy, and with two different modes of this modality are shown in Table.

Results clearly show the benefit of TENS therapy in patients with refractory or partially responsive trigeminal neuralgia. Better efficacy of constant mode therapy is also shown over the burst mode therapy.

Table: Results after three weeks of burst and constant mode tens therapy.

Pain	Burst Mode Therapy		Constant Mode Therapy		Total	
	Before	After 3 weeks	Before	After 3 weeks	Before	After 3 weeks
Severe	13 (41.9%)	5 (16.3%)	14 (45.1%)	0	27 (87.09%)	5 (16.3%)
Moderate	2 (6.4%)	8 (25.8%)	2 (6.4%)	3 (9.6%)	4 (12.9%)	11 (35.4%)
Mild		2 (6.4%)		10 (32.2%)	0	12 (38.7%)
No pain				3 (9.6%)		3 (9.6%)
P value	0.002	0.000				

Discussion

The Cochrane Database of Systematic Reviews analyzed the efficacy of transcutaneous electrical nerve stimulation in both chronic and acute neuropathic pain. Although they concluded that published literature on the subject "lacks the methodological rigour or robust reporting needed to make confident assessments of the role of TENS" in chronic pain management, they reported overall in 13 of 22 inactive control studies, there was a positive analgesic outcome in favour of active TENS treatments. The need for large multi-centre RCTs of TENS in chronic pain was stressed.¹³

RCTs have also demonstrated effects for a range of other chronic pain conditions including localized muscle pain, post-herpetic neuralgia, trigeminal neuralgia, phantom limb and stump pain and diabetic neuropathies.¹⁴ RCTs suggest that TENS is effective for acute orofacial pain, painful dental procedures, fractured ribs and acute lower back pain.¹⁵

Extrapolating from the success of TENS therapy in diabetic neuropathy¹⁶ and post-herpetic neuralgia,⁸ we decided to use this modality in the treatment of patients with severe or resistant trigeminal neuralgia, although Thorsen and Lumsden have recommended its use even as initial treatment.¹⁷

Sensory changes induced by TENS have been studied by various methods. Zoppi et al measured sensory thresholds in the distribution area of the stimulated nerve and in all four limbs. They found that trains of constant current square waves in the distribution area of the stimulated nerve (local thresholds) and in other areas (general thresholds) reduced the local threshold and also affected the general thresholds elsewhere in the body. They also noticed that in case of hyperalgesia on one side TENS reduced the threshold difference between the two sides of the body ("lateralisation"). As a consequence, patients' thresholds became more similar to those of the normal subjects. Pain relief induced by TENS may be related to this fact,¹² which we observed in our patients where only 5 (16.3%) patients remained unresponsive to TENS and the majority 26 (83.7%) improved.

Also the constant mode therapy, which was found to be better than burst mode may be utilized more frequently in the management of patients with resistant trigeminal neuralgia. None of the existing studies so far had discussed or

compared the two modes of therapy.

Conclusion

Transcutaneous electrical nerve stimulation is an effective, easy to use and with minimal side effects in patients suffering from trigeminal neuralgia not responding to conventional therapy. Constant mode of this therapy was slightly a better option than burst mode therapy.

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