



Transcranial direct current stimulation efficacy in trigeminal neuralgia

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Abstract

Trigeminal neuralgia is a severe, disabling pain and its deafferentation remains a challenge for health providers. Transcranial direct current stimulation is a non-invasive stimulation technique which finds new utility in managing pain. Therefore, the introduction of alternative, non-invasive, safe, and effective methods should be considered in treating patients with trigeminal neuralgia unresponsive to conventional treatment.

Key Words: Trigeminal neuralgia; Patient-controlled intravenous analgesia; Neuro-modulation; Transcranial direct current stimulation

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Core Tip: Various drugs and surgical procedures have been utilized for the treatment of trigeminal neuralgia. The side effects of conventional treatments alongside with the refractoriness of the condition render numerous available approaches unsatisfactory. Mounting evidence suggest alternative, non-invasive, and safe methods such as patient-controlled intravenous analgesia with esketamine and transcranial direct current stimulation effective instruments in treating patients with trigeminal neuralgia unresponsive to conventional treatment.

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TO THE EDITOR

We read with interest a case report by Tao *et al*[1], who presented one patient with herpetic neuralgia after herpes zoster ophthalmicus who was treated with patient-controlled intravenous analgesia (PCIA) with esketamine. The procedure resulted in a significant pain relief without adverse reactions.

We support authors' statement that primary trigeminal neuralgia can achieve satisfactory curative effects through medical treatment and interventions like radiofrequency. However, people who suffer from side effects to oral medication or more complicated cases (such as neuralgia caused by varicella-zoster virus infection of the trigeminal nerve) are not satisfactorily managed and require more aggressive surgical treatments. Deep brain stimulation and motor cortex stimulation are off label, "last treatment option" techniques which may offer relief to trigeminal neuralgia that is otherwise refractory to pharmacological management and surgery[2,3]. Nevertheless, (PCIA) with esketamine could be an alternative, non-invasive, safe, and effective method.

We would like to suggest transcranial direct current stimulation (tDCS) as an additional potential effective method which could offer relief in intractable trigeminal neuralgia. A 51-year-old woman with idiopathic trigeminal neuralgia, was hospitalized towards modifying the therapeutic strategy and ameliorating the adverse events of medical treatment. She presented daily paroxysmal attacks with a mean duration of 1.5-2 h, reoccurring patterns of few minutes (up to 3-4 min) that created intense, needle-like pain on the dental, submental, and periocular areas of the right side of the face. Refractory period was not established, and she also reported night awakening with instant feeling of intense pain. She scored 9 in the visual analogue scale (VAS)[4]. Her medical history was unremarkable. Physical examination, imaging and laboratory investigations were normal. Peros medication (including carbamazepine) proved to be ineffective and was not tolerated.

Relying on current literature, we decided to apply tDCS[5,6]. The placement of the electrodes followed the Electroencephalography System 10-20 with the anode (+) occurring at the motor cortex and the cathode (-) at contralateral motor area-cortex and at the contralateral mastoid bone. The Sooma™ tDCS device was used, with the intensity settings for the active tDCS being at 2mA, lasting 30 min per session, with 30 s ramp up and down, for a total of 10 d (2 wk). The electrical conduction took place through 2 electrodes 5 cm × 5 cm (contact surface 25 cm²). No severe adverse events were reported. Anodal tDCS for 10 d ameliorated the intensity of pain (the VAS score reduced from 9 to 2). During the post-stimulation period, the sleep and the quality of life were improved, as they were reflected in Short-Form (36) Health Survey (SF-36), Athens Insomnia Scale (AIS) (the SF-36 and the AIS scores changed from 32 to 60 and from 17 to 5, respectively)[7,8]. The patient displayed sustained efficacy with this management for 3 months.

A number of studies have demonstrated that anodal tDCS modulates the cortical excitability of the motor cortex. However, the effects of tDCS on cortical excitability can spread to distant cortical areas. The main mechanism of action of tDCS is the modulation of the membrane potential of neurons in the stimulated cortical area, mediated by N-methyl-D-aspartate receptors (NMDA-R). Nonetheless, it has been shown that the modulation of nicotinic receptors, BDNF polymorphisms and sex hormonal variations also affect brain plasticity[5].

The results described may provide additional evidence for the effectiveness of tDCS as a therapeutic instrument in treating patients with trigeminal neuralgia unresponsive to conventional treatment. The three-month efficacy reported is positive, however, studies with longer-term follow-up data to assess the sustainability of the tDCS intervention should be scheduled.

FOOTNOTES

Author contributions: Alexoudi A and Gatzonis S designed research; Fasilis T performed research; Alexoudi A and Fasilis T analyzed data; Alexoudi A wrote the letter; Korfias S and Patrikelis P, revised the letter.

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