Deep Repetitive Transcranial Magnetic Stimulation (dTMS) Treatment of Chronic Neuropathic Back Pain: Case Series

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INTRODUCTION

Back pain is a leading cause of physician visits and results in work loss exceeding $100 billion a year in the United States. Over eighty percent of adults will experience severe low back pain at one point in their lives. Approximately five percent of the patients account for seventy five percent of the costs, because ninety percent of patients improve in the first month[1]. Chronic back pain is defined as pain lasting over three months. These patients generally have neuropathic back pain. Neuropathic pain is chronic pain resulting from injury or dysfunction to the central or peripheral nervous systems [2]. It is associated with plastic functional and structural changes in the somatosensory nervous system by which non-noxious stimuli are interpreted as painful, and non-tissue damage is interpreted as damage[3]. Conventional repetitive transcranial magnetic stimulation (rTMS) over the motor cortex has been successful in suppressing neuropathic pain of various etiologies, particularly trigeminal neuralgia[2]. dTMS over the motor cortex with the sagittal HMCCPCn coil has been successfully used to reduce symptoms in patients with diabetic neuropathic foot pain[1].

OBJECTIVE

We utilized dTMS over the motor cortex with the HMPCCC coil, a more coronal H coil, in two patients with chronic neuropathic back pain that failed current pain management interventions and multiple pharmacotherapies.

METHODS

dTMS was administered daily over the motor cortex for three weeks using the HMPCCC coil 20HZ 100%MT of the leg, 2.5sec train, 30 sec intertrain interval, 30 trains, 1500 total pulses. Patients were administered a comparative pain scale (CPS) daily before and after each treatment and during weekly evaluations with the physician [4].

RESULTS

The first patient was a 63-year-old man with constant vibration and pain in his lower back going down into his legs with failed back syndrome (four previous back surgeries), failed injections, rhizotomies, spinal cord stimulator and pharmacotherapy. His starting CPS was consistently a 5. His CPS dropped to a 2 and at four months it remains at a 3 with no vibrations. At five months his pain score escalated to a 6 but the vibrations never returned.

The second patient was a 60-year old woman with cervicalgia for fourteen years from herniated and degenerative cervical discs. She failed nerve blocks, trigger point injections, epidural steroid injections and pharmacotherapy. Her CPS decreased from a 7-5-3-0 where she remains at six weeks.

DISCUSSION

The mechanisms underlying neuropathic pain can be divided into ectopic nerve activity and central sensitization. Frequently ectopic nerve activity in damaged and neighboring neurons leads to peripheral, central and eventually supraspinal sensitization. The mechanism of motor cortex dTMS induced analgesia is thought to be through activation of inhibitory pain pathways from the motor cortex into the thalamus and into the spine and has been demonstrated by the attenuation of the nociceptive flexion reflex. Patients with chronic neuropathic back pain, particularly those with evident structural injuries to the spinal cord on multiple levels, have repeated characteristic inflammation and ectopic nerve activity and eventual spinal and supraspinal sensitization. They interpret non-noxious stimuli as painful, have comorbid depression and sleep eludes them because of pain difficulties and high incidence of restless legs syndrome. The H-coil is a particularly useful tool because of its ability to reach 4cm below the skull and easily stimulate the legs without causing significant discomfort to the patient. Its more diffuse stimulation allows a single coil placement to capture the legs and the back bilaterally.

CONCLUSIONS

This is the first report using dTMS in the treatment of neuropathic back pain, demonstrating efficacy and durability.

KEY MESSAGE

dTMS over the motor cortex using the HMPCCC coil is effective in treating chronic neuropathic back pain, and warrants further study.

REFERENCES