IJMS
Vol 34, No 4, December 2009

Case Report

Dramatic Response of Resistant Obsessive Compulsive Disorder to Repeated Transcranial Magnetic Stimulation on Right Supplementary Motor Area

Ali Talaei[1], Mohammad Morteza-Nia[1], Morteza Jafar-Zadeh[1], Ali Saghebi[1], Amir Rezaei Ardani[1]

Abstract

The response rate to the treatment of obsessive compulsive disorder (OCD) is 21.6% to 61.3%, which shows a relative resistance to current treatments and a need for novel therapeutic approaches. Here we report a case of resistant OCD with fast and dramatic response to a relatively new method of repeated transcranial magnetic stimulation. In this method a pulse magnetic field emits from a coil over the surface of the scalp to induce a localized electrical current in the cortex below. Cortical activity can then be either inhibited or stimulated. The patient was a 40-year-old woman with severe OCD who admitted to our psychiatric hospital. She was treated with 10 sessions of rTMS (110% intensity, 1 Hz frequency and duration of 30 minutes per day / a total of 1200 pulses per day) on right supplementary motor area. Her improvement evaluated serially with Yale Brown Scale. By the end of the 2nd day she reported a major improvement of symptoms. Dramatic improvement was observed in her obsessive and compulsive behaviors, and avoidance recovered completely. She also reported significant improvement in ability to control obsessive thoughts and impulses, and anxiety symptoms. Since repeated transcranial magnetic stimulation is a low risk method with almost no interaction with the common medications, as well as the faster response obtained by using this method, it can be used as an add-on treatment in resistant cases of OCD and even in the initial stages of this disorder.

Iran J Med Sci 2009; 34(4): 295-298.

Keywords ● Obsessive compulsive disorder ● transcranial magnetic stimulation ● treatment ● motor cortex

[1]Department of Psychiatry,
Ibn-e-Sina Psychiatric Hospital,
Mashhad University of Medical Sciences,
Mashhad, Iran.

Correspondence:
Ali Talaei MD,
Department of Psychiatry,
Ibn-e-Sina Psychiatric Hospital,
Mashhad University of Medical Sciences,
Mashhad, Iran.
Tel: +98 511 7112722
Fax: +98 511 7112723
Email: talaeia@mums.ac.ir
Received: 28 February 2009
Revised: 17 May 2009
Accepted: 23 July 2009

Introduction

Obsessive compulsive disorder (OCD) is a common anxiety disorder, represented by intrusive thoughts, images, and impulses that are very distressing to the affected person.[1] Obsessive thoughts and behaviors are time consuming and significantly diminish the quality of life.[1,2]

Because of fear or embarrassment of patients to disclose their symptoms, there is usually a long period -sometimes up to 17 years- between the onset of symptoms and establishment of treatment.[3] This long delay per se may account for the chronicity of this disorder. The estimated lifetime prevalence of OCD is 2-3%.[4] The best mode of

treatment is pharmacotherapy in combination with cognitive therapy. The drugs of choice are the selective serotonin reuptake inhibitors (SSRIs).[5] However, even once adequate treatment is applied the response rate is between 21.6% to 61.3%,[6] indicating the relative resistance to current treatments and the need for novel therapeutic approaches.

Systematic studies in the last two decades indicate that OCD is related to a disorder in the cortico-striato-thalamo-cortical neuro-pathways, especially in orbitofrontal and dorsolateral prefrontal cortex and caudate nucleus.[7] Recent meta-analysis of neuro-imaging studies in OCD have documented increased metabolism in orbitofrontal cortex and caudate nucleus.[8] Therefore, application of methods involving stimulation or inhibition of these pathways including deep brain stimulation and repeated transcranial magnetic stimulation (rTMS) are now considered as new treatments.

In rTMS a pulse magnetic field emits from a coil over the surface of the scalp which induces a localized electrical current in the cortex below. Cortical activity can then be inhibited or stimulated.[9] No significant adverse effects have been reported for this method.[10-12]

Here we report a resistant case of OCD who treated by this new method.

Case Report

A 40-year-old woman admitted to Mashhad Ibn-e-Sina Psychiatric Hospital with OCD based on Diagnostic and Statistical Manual of Mental Disorders 4th edition-Text Revision (DSM-IV-TR). As stated by the patient, her problems started after forced marriage at the age of 11. She had been a successful student before that, however, she had fallen short in education after the marriage. She used to sleep in a small and dark basement most days to avoid sleeping next to her husband whom she disliked or even hated.

At the age of 13 years, she had her wedding and moved in with her husband. At the first night of marriage she was forced to have her first sexual intercourse with her husband, eventhough she had been undressed against her will. Five years later, following her second delivery, while her husband was away on military service, she developed depressive symptoms accompanied by obsessive thoughts about the sanitation of her clothes. After 3 months, she was referred to a psychiatrist because of worsening of symptoms that were alleviated by prescription of medications and a change of her residence. Gradually, her obsessive thoughts intensified and resulted in obsessive symptoms. Since 13 years ago, her obsessive behaviors that were mainly about washing/sanitation issues worsened. Since 3 years ago, her obsessive thoughts switched to fitting of her underwear which made her stay in the restroom pulling up her underwear for hours. Her first hospital admission was in Tehran in 2006 with the diagnosis of OCD. Although she was prescribed medications, her signs and symptoms were resistant to the treatment. The second admission was in 2007 in the same hospital. This time she also recieved 20 sessions of electroconvulsive therapy (ECT) with no significant therapeutic effect. Consequently, pharmacotherapy was continued in combination with cognitive therapy in the outpatient setting, however, no appropriate response was achived.

About 10 months later, her daughter married and the patient decided to move to her mother's house in Mashhad with the hope of making a change in her life and improving her condition. In this period, her obsessive thoughts and behaviors became worse and intrusive thoughts with a religious theme were added and made her "curse the Satan" again and again to aliviate the thoughts.

She was admitted to Mashhad Ibn-e-Sina psychiatric hospital in spring 2008 because of the aggravation of symptoms. She was administered sertraline 300 mg, clomipramine 25 mg, olanzapine 10 mg, and buspirone 10 mg. Laboratory evaluation of complete blood count, blood urea nitrogen, creatinine, fasting blood sugar, sodium, potasium, calcium, serum glutamic pyruvic transminase (SGPT), serum glutamic oxaloacetic transminase (SGOT), triglyceride, cholesterol, erythrocyte sedimentation rate, C reactive protein, antinuclear antibody, and rheumatoid factor were within normal ranges. Brain computed tomography (CT) and electroencephalography (EEG) were conducted and the results were normal. During her admission, she complained of worsening symptoms including increased time spent in restroom. Before admission her stay in the restroom took 3 to 4 hours and amounted to up to 7 hours by the end of admission. The reason was the noise in the ward distracting her from counting and making her have to count again (She had to pull up her underwear 7 sets of 10 times to make sure of its right fitting). Her avoidance from going to the restroom because of her obsessive behavior was so serious that she did not go to the restroom for periods as long as 48-60 hours. As the outpatient combination of pharmacotherapy and cognitive therapy had

been performed before the current admission without significant effect. After one week of admission we decided to treat her with rTMS. Upon signing the informed consent, the patient was simultaneously treated with 20 sessions of rTMS on vertex with 50% intensity, 5 Hz frequency and duration of 10 minutes. After 25 days of combination pharmacotherapy and the end of her rTMS sessions with the mentioned setting, she continued to complain of increased obsessive and also anxiety symptoms and insisted to be discharged.

After failure of the first trial of rTMS and following thorough review of literature, a new rTMS protocol setting was designed and the patient accepted to participate in the trial. This time the patient was treated with 10 sessions of rTMS on right supplementary motor area (SMA) with 110% intensity, 1 Hz frequency and duration of 30 minutes per day (a total of 1200 pulses per day). Efficacy of the treatment was assessed with Yale-Brown obsessive compulsive scale (Y-BOCS) that is the gold standard in evaluating the severity of both obsessions and compulsions. Y-BOCS is a clinician-administered, semistructured interview that is divided into two subscales: the obsessions and the compulsions subscales. Each subscale scores ranges from 0-20 with total score ranging from 0-40 and higher scores indicate greater severity.[13] Y-BOCS was administered for the patient before the first rTMS session and after every session.

By the end of the 2nd day she reported a major improvement of symptoms and decrease of stay in the restroom to one hour. Her improvement was as dramatic as her stay in the restroom decreased to 20 minutes after discharge and her avoidance recovered completely. She also reported an improvement in ability to control obsessive thoughts and impulses. Her anxiety symptoms also decreased significantly. The Y-BOCS scores during application of rTMS on right SMA are shown in the table 1.

Disscusion

Considering the potency of rTMS in stimulation or inhibition of certain parts of the brain and also because it has few or no complications, different studies have been conducted on efficacy of rTMS on OCD and apart from few, others have failed to show a substantial efficacy.[9,14,15] A main difference between the research conducted worldwide is applying different settings for similar disorders. The correct setting is one of the most important issues in the application of rTMS and getting the optimal therapeutic response.

In a double-blind study performed in patients with OCD in Spain, the effect of right prefrontal cortex stimulation with rTMS was assessed. In this study 10 patients were treated with real rTMS for 20 minutes per day with a 1 Hz frequency and 110% intensity. Eight other patients were treated with fake rTMS (sham group) with an identical situation, but 20% intensity. Eventually, no significant changes were observed in the symptoms of the groups.[14]

In another double-blind study performed in Czech Republic in 2006, the efficacy of right dorsolateral prefrontal cortex stimulation with rTMS in facilitating the effects of antidepressants was studied in patients with OCD. The patients were divided into real and sham rTMS groups and treated with 2 weeks of rTMS with 1 Hz frequency and 110% intensity in right dorsolateral prefrontal cortex. Finally, no difference was seen in the response rate of the two groups to antidepressants.[9]

Based on evidences that motor and premotor cortical regions are hyperexcitable in OCD, a study was performed to test whether rTMS could normalize overactive motor cortical regions and improve symptoms. Patients with OCD or Tourette's syndrome were treated with daily sessions of rTMS with 1 Hz frequency, 100% intensity and a total of 1100 stimulations per day on supplementary motor area (SMA). At the end of the 1st week, clinical improvement was evident and by the end of the 2nd week there was a significant decrease in the scoring. Clinical improvement persisted in a 3-month follow-up.[15]

The latter study became the basis of our second therapeutic settings. As noted previously, no significant change was found with applying rTMS on vertex area and with 50% intensity, 5 Hz frequency and duration of 10 minutes each session and a total of 1000 stimulations per day. However, stimulating the right SMA with rTMS (110% intensity, 1 Hz frequency and duration of

Table 1: Yale-Brown Obsessive Compulsive Scale (YBOCS) scores of the patient with resistant obsessive compulsive disorder during treatment with repeated transcranial magnetic stimulation on the right supplementary motor area

YBOCS score	Before the 1st session	After the 3rd session	After the 5th session	After the 8th session	After the last session
Obsessive thoughts	20	14	12	8	5
Obsessive behaviors	18	11	9	7	4

30 minutes each session and a total of 1200 pulses per day) was accompanied by a significant decrease in compulsive behaviors. This dramatic response could not be better accounted by pharmacotherapy the patient received, as the medications were administered to her for a long time prior to admision to the hospital (for more than 6 month continuously). In addition, treatment response to appropriate medications is usually obtained gradually and not dramatically.

A limitation of our report was that we could not use magnetic resonance imaging (MRI) for the patient and her previous medical records were not available.

Although there was a dramatic response by applying repeated magnetic stimulation on the right supplementary motor area in this case, more clinical interventional controlled studies should be performed to determine both the efficacy and appropriate setting for the best response to rTMS in different psychiatric disorders including OCD.

Acknowledgment

This work was supported by Ibn-e-Sina Psychiatric hospital, Mashhad University of Medical Sciences, Iran.

Conflict of Interest: None declared

References

1 First MB, ed. Obsessive-compulsive disorder. In: Diagnostic and Statistical Manual of Mental Disorders. 4th ed. Washington, DC: American Psychiatric Association; 1994. p. 417-23.
2 Norberg MM, Calamari JE, Cohen RJ, Riemann BC. Quality of life in obsessive-compulsive disorder: an evaluation of impairment and a preliminary analysis of the ameliorating effects of treatment. *Depress Anxiety* 2008; 25: 248-59.
3 Hollander E, Kwon JH, Stein DJ, et al. Obsessive-compulsive and spectrum disorders: overview and quality of life issues. *J Clin Psychiatry* 1996; 57: 3-6.
4 Rothenberg A. Diagnosis of obsessive-compulsive illness. *Psychiatr Clin North Am* 1998; 21: 791-801.
5 Greist JH. An integrated approach to treatment of obsessive compulsive disorder. *J Clin Psychiatry* 1992; 53: 38-41.
6 Piccinelli M, Pini S, Bellantuono C, Wilkinson G. Efficacy of drug treatment in obsessive-compulsive disorder. A meta-analytic review. *Br J Psychiatry* 1995; 166: 424-43.
7 Saxena S, Rauch SL: Functional neuroimaging and the neuroanatomy of obsessive-compulsive disorder. *Psychiatr Clin North Am* 2000; 23: 563-86.
8 George MS, Stalling LE, Speer AM, et al: Prefrontal repetitive transcranial magnetic stimulation (rTMS) changes relative perfusion locally and remotely. *Hum Psychopharmacol Clin Exp* 1999; 14: 161-70.
9 Prasko J, Pasková B, Záleský R,et al. The effect of repetitive transcranial magnetic stimulation (rTMS) on symptoms in obsessive compulsive disorder. A randomized, double blind, sham controlled study. *Neuro Endocrinol Lett* 2006; 27: 327-32.
10 Anderson B, Mishory A, Nahas Z, et al. Tolerability and safety of high daily doses of repetitive transcranial magnetic stimulation in healthy young men. J ECT 2006; 22: 49-53.
11 Bae EH, Schrader LM, Machii K, et al. Safety and tolerability of repetitive transcranial magnetic stimulation in patients with epilepsy: a review of the literature. *Epilepsy Behav* 2007; 10: 521-8.
12 Bridgers SL. The safety of transcranial magnetic stimulation reconsidered: evidence regarding cognitive and other cerebral effects. *Electroencephalogr Clin Neurophysiol Suppl* 1991; 43: 170-9.
13 Shear MK, Brown C, Clark DB: Anxiety Disorder Measures, in: Rush AJ, First MB, Blacker D. Handbook of Psychiatric Measures; 2nd ed. American Psychiatric Publishing; 2008. p. 547-9
14 Alonso P, Pujol J, Cardoner N, et al. Right prefrontal repetitive transcranial magnetic stimulation in obsessive-compulsive disorder: a double-blind, placebo-controlled study. *Am J Psychiatry* 2001; 158: 1143-5.
15 Mantovani A, Lisanby SH, Pieraccini F, et al Repetitive transcranial magnetic stimulation (rTMS) in the treatment of obsessive-compulsive disorder (OCD) and Tourette's syndrome (TS). *Int J Neuropsychopharmacol* 2006; 9: 95-100.