

Repetitive Transcranial Magnetic Stimulation in Resistant Visual Hallucinations in a Woman With Schizophrenia: A Case Report

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Received 2015 January 04; Revised 2015 July 14; Accepted 2015 September 05.

Abstract

A 29-year-old woman with schizophrenia introduced for application of repetitive transcranial magnetic stimulation for refractory visual hallucinations. Following inhibitory rTMS on visual cortex she reported significant reduction in severity and simplification of complexity of hallucinations, which lasted for three months. rTMS can be considered as a possibly potent treatment for visual hallucinations.

Keywords: rTMS, Schizophrenia, Visual Hallucination

1. Introduction

Visual hallucinations influence the lives of millions of people affected by different disorders. Schizophrenia and other different types of psychosis are the most frequent disorders, which may be accompanied by visual hallucinations (1). Visual hallucinations have been reported in 16% to 72% of patients with schizophrenia or schizoaffective disorders and it is one of the diagnostic criteria of schizophrenia (2-4) and its presence is related to the severity of illness (5).

Nowadays ant dopaminergic antipsychotics and serotonin-dopamine antagonists are the only therapeutic choices and recently anti-acetyl cholinesterase agents have been suggested (6). Despite all these treatments, patients may have refractory hallucinations. Transcranial magnetic stimulation (rTMS) is a technique using magnetic field for stimulation of brain. In July 2011, the FDA introduced rTMS system as Class II (special controls) in the federal register by the phrase of: "in order to provide a reasonable assurance of safety and effectiveness of these devices" (7). rTMS could be a promising therapeutic method for visual hallucinations, due to the theories which suggest cortical hyperactivity as a probable mechanism for unreal visual sensations (8-10).

We could find three case reports reporting the effects of rTMS on visual hallucinations. Firstly, a 52-year-old patient who lost his vision partially follows a myocardial infarction. His hallucinations were multi-colored round lights, humanoid corps and faces. Merabet et al. (11) at Har-

vard medical school reported immediate remission lasting for a week following stimulating the visual cortex (2 cm above the patient'sinion, 1 Hz, 10 minutes), which had not been induced by sham stimuli given previously. The researchers suggested that probably the reduction of increased cortical excitability is the mechanism of responsiveness.

The second case was a 32-year-old patient with refractory paranoid schizophrenia affected by complex hallucinations involving auditory, visual and olfactory systems. Jardri et al. (8) in France conducted a functional neuroimaging with electrical source reconstruction and considered Occipito-Temporal Sulcus as the target of stimulation. In 2009, the team reported that 10 sessions of low frequency (1 Hz), suppressed hallucinations significantly leaving minimum residues including tinnitus and phosphine.

The third case was a 50-year-old woman experiencing visual sensations including changing colors and lights since loss of her vision bilaterally, suggestive of the Charles Bonnet syndrome. Functional MRI showed hyperactivity in extra-striate visual area V5/MT and the fusiform gyrus (V4) related to visual sensations, where Meppelink et al. (12) selected them as target of rTMS. The premier sham stimulation on V5 could not make any change, but later session of real rTMS by frequency of 1 Hz at V5/MT and V1 led to almost complete suppression of a part of hallucinations for two days. Three extra sessions of stimulation after two months could cause infinitesimal relief.

2. Case Presentation

The patient was a 29-year-old woman who had received psychiatric treatments since the age of 19, following talking to herself, grandiosity and persecutory delusions, irritability and aggressiveness. The diagnosis of schizophrenia confirmed by SCID-I interview based of DSM-IV-TR, when the visual hallucinations commenced without symptoms of any mood disorder. Electroencephalography and brain magnetic resonance imaging did not reveal any abnormality, as well as laboratory results. The content of hallucinations was strange persons with threatening facial expressions.

At the time of introduction to neurotherapy unit of Rasoul-Akram hospital in December 2013, she took 400 milligram of clozapine per day, but she still had refractory visual hallucinations. She had insight that these persons are not real, but they still made her anxious. She had experienced a wide variety of classical and atypical agents with full therapeutic dosage and for enough duration that just resulted in few periods of transient partial remission. The team decided to perform inhibitory stimulation on her brain hoping to diminish hallucinations.

The patient received 12 sessions of rTMS, 5 times per week (1 Hz frequency, for 20 minutes, 100% of the motor threshold, Magventure; Mag Machine pro ×100) on O₂, continuing the medications as before. Before the fifth session, she reported decrease in the frequency of hallucinations as low as 5, considering 10 for description of the pre-treatment situation using analog visual scale. At the end of therapeutic course, she reported that the frequency and severity limited to 2.5. She described those persons appear less than before and less frightening. Her mother and her psychiatrist also confirmed improvement in her symptoms, mood and irritability. She did not report any immediate or delayed adverse effect. At follow-up interview after three months, she was still satisfied with the outcomes and hallucinations were limited to rare appearances of humanoid features.

3. Discussion

This result supports our hypothesis about effectiveness of rTMS in treatment of visual hallucinations and is compatible with the cortical hyperexcitability theory about its pathogenesis. As it can be concluded of the Dr Jardri's case report, functional neuroimaging may be beneficial in localizing a specific target for stimulation and may prevent wasting time and cost on targets, which are less possible to be involved in the pathogenesis (8). Although this combination seems to be efficacious, it may not be possible everywhere. Existing evidence suggests in the absence of func-

tional imaging that Occipital area is a promising target, because of probable role of the occipital cortex in the chain of pathogenesis of visual hallucination (13).

rTMS can be investigated as a method for the treatment of visual hallucinations, especially for refractory types. We suggest basic studies by functional imaging on visual hallucination (both in refractory and responsive cases). Priority of basic localizing studies may prevent bias in the results of studies to ineffectiveness due to targeting irrelevant points, and leads to acceleration in achievement of a consensus on efficiency of rTMS on visual hallucinations.

Footnotes

Authors' Contributions: Atefeh Ghanbari Jolfaei designed the intervention's protocol and made the evaluations. Borzooyeh Naji drafted the manuscript. Atefeh Ghanbari Jolfaei and Borzooyeh Naji contributed in performing the intervention and reviewing the literature. Borzooyeh Naji revised the draft. Mehdi Nasr Esfehiani introduced the patient for intervention and made pre and post intervention evaluations. All authors read and approved the final version.

Declaration of Interests: None.

References

1. Teeple BS, Jason PC, Theodore AS. Visual Hallucinations: Differential Diagnosis and Treatment. *J Clin Psychiatry*. 2011;**11**(1).
2. Tasman A. Schizophrenia and other psychotic disorders. In: DSM-IV-TR Mental Disorders: Diagnosis, Etiology, and Treatment. San Francisco: Wiley; 2004. pp. 640-9.
3. Mueser KT, Bellack AS, Brady EU. Hallucinations in schizophrenia. *Acta Psychiatr Scand*. 1990;**82**(1):26-9. [PubMed: 2399817].
4. Small IF, Small JG, Andersen JM. Clinical characteristics of hallucinations of schizophrenia. *Dis Nerv Syst*. 1966;**27**(5):349-53. [PubMed: 5327470].
5. Leucht S, Cipriani A, Spineli L, Mavridis D, Orey D, Richter F, et al. Comparative efficacy and tolerability of 15 antipsychotic drugs in schizophrenia: a multiple-treatments meta-analysis. *Lancet*. 2013;**382**(9896):951-62. doi: 10.1016/S0140-6736(13)60733-3. [PubMed: 23810019].
6. Abad NH, Doulatabad NS, Mohammadi A, Srazi HR. Treatment of Visual Hallucinations in Schizophrenia by Acetylcholinesterase Inhibitors: a case report. *Iran J Psychiatry*. 2011;**6**(4):161-3. [PubMed: 22952543].
7. Stade NK, Medical D. USA: United States Government Printing Office; 2011. Deputy Director for Policy, Center for Devices and Radiological Health, Food and Drug Administration, United States Department of Health and Human Services;.
8. Jardri R, Pins D, Bubrovsky M, Lucas B, Lethuc V, Delmaire C, et al. Neural functional organization of hallucinations in schizophrenia: Multisensory dissolution of pathological emergence in consciousness. *Cons Cog J*. 2009;**18**(2):449-57. doi: 10.1016/j.concog.2008.12.009.
9. Oertel V, Rotarska-Jagiela A, van de Ven VG, Haenschel C, Maurer K, Linden DE. Visual hallucinations in schizophrenia investigated with functional magnetic resonance imaging. *Psyc Res J*. 2007;**156**(3):269-273.

10. Maeda F, Keenan JP, Tormos JM, Topka H, Pascual-Leone A. Modulation of corticospinal excitability by repetitive transcranial magnetic stimulation. *Clin Neurophysiol.* 2000;**111**(5):800-5. [PubMed: [10802449](#)].
11. Merabet LB, Kobayashi M, Barton J, Pascual-Leone A. Suppression of complex visual hallucinatory experiences by occipital transcranial magnetic stimulation: a case report. *Neurocase.* 2003;**9**(5):436-40. doi: [10.1076/neur.9.5.436.16557](#). [PubMed: [14972758](#)].
12. Meppelink AM, de Jong BM, van der Hoeven JH, van Laar T. Lasting visual hallucinations in visual deprivation; fMRI correlates and the influence of rTMS. *J Neurol Neurosurg Psychiatry.* 2010;**81**(11):1295-6. doi: [10.1136/jnnp.2009.183087](#). [PubMed: [20547615](#)].
13. Holroyd S, Shepherd ML, Downs III JH. Occipital atrophy is associated with visual hallucinations in Alzheimer's disease. *J Neuropsychiatry Clin Neurosci.* 2000;**12**(1):25-8. doi: [10.1176/jnp.12.1.25](#). [PubMed: [10678508](#)].

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