

Low Frequency (1 Hz) rTMS Application in the Treatment of Resistant Auditory Hallucinations: A case presentation

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ABSTRACT

Low frequency (1 Hz) rTMS application in the treatment of resistant auditory hallucinations: a case presentation

Auditory hallucinations are clinically important symptoms which are seen in psychotic disorders. They are associated with low social functionality, increased tendency of violence and suicidality. Some of these cases can just partially respond to medical treatment. Recently, there have been a marked increase in the studies showing an effectiveness of repetitive transcranial magnetic stimulation (rTMS) use in the treatment of auditory hallucinations. In this case presentation, the effect of low frequency rTMS use on resistant auditory hallucinations will be discussed.

Key words: Auditory hallucinations, rTMS, schizophrenia

ÖZET

Dirençli işitsel varsanların tedavisinde düşük frekanslı (1 Hz) rTMS uygulaması: Bir olgu sunumu

İşitsel varsanlar psikotik bozukluklarda görülen, belirgin klinik öneme sahip karakteristik belirtilerdendir. İşitsel varsanlar sosyal işlevsellikte bozulma, şiddet eylemleri ve intihar riskinde artış ile ilişkilidir. Olguların bir kısmında ilaç tedavisine en fazla kısmi yanıt alınabilmektedir. Son yıllarda düşük frekanslı tekrarlayan transkranyal manyetik stimülasyon (rTMS) uygulamasının dirençli işitsel varsanların tedavisinde etkin olduğuna dair kanıtlar elde edilmiştir. Bu yazıda, bir olgu üzerinden düşük frekanslı rTMS uygulamasının dirençli işitsel varsanlar üzerindeki etkisi tartışılacaktır.

Anahtar kelimeler: İşitsel varsanlar, rTMS, şizofreni



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INTRODUCTION

Auditory hallucinations are observed in 50-70% of schizophrenia patients. In most patients, these auditory hallucinations can be discomfoting and disturbing in nature. Auditory hallucinations adversely affect the social functioning of patients and increase the incidence of suicide attempts and violent acts (1). A partial response to medical treatment is observed in approximately 25% of cases (2).

Repetitive transcranial magnetic stimulation (rTMS) is a noninvasive method that leads to functional changes in certain cortical regions of the brain through the depolarization of neuronal membranes. The effectiveness of rTMS depends on the area that is stimulated, the frequency of stimulation, and the

strength of the magnetic field. Low frequency rTMS (≤ 1 Hz) leads to a local weakening of neuronal transmissions in the area of application (3).

Brain imaging studies have demonstrated increased neuronal activation in the right and left superior temporal cortex, the Broca's area, and the left temporoparietal cortex of patients with auditory hallucinations. Among these regions that are involved in the perception of speech, the left temporoparietal region is particularly important in that it permits the easy application of rTMS procedures.

CASE

L.A. was a 19-year-old women and homemaker with secondary school education. She had been married

for two years, and had one child. She lived in the county with her husband and child. Three years ago, she began to experience persecutory delusions and commanding auditory hallucinations, and started to display aggressive behavior. The patient was taken to a psychiatrist by her relatives, and received inpatient treatment for one month for a diagnosis of atypical psychotic disorder. It was learned that her auditory hallucinations continued after her discharge, although her persecutory delusions decreased in severity and frequency. Six months after her discharge, the patient had a suicide attempt secondary to her continuing auditory hallucinations. Following this attempt, the patient received inpatient treatment with 20 mg/day haloperidol and 30 mg/day olanzapine. Following discharge, the patient's treatment was continued with zuclopenthixol decanoate depot once every 15 days and 30 mg/day olanzapine. However, the patient soon began to experience complaints of persecutory delusions along with auditory hallucinations involving conversing voices. The patient's treatment was then changed to risperidone 4 mg/day and quetiapine 300 mg/day. However, the patient's auditory hallucinations persisted, and the patient began to experience intense feelings of guilt and significant impairment in functionality after starting her latest treatment. Two months after the latest change in her treatment, the patient was brought by her relatives to the Şişli Etfal Training and Research Hospital and hospitalized. The patient was evaluated with the SCID-I (The Structured Clinical Interview for DSM-IV Axis I Disorders), and diagnosed with paranoid type schizophrenia according to the DSM-IV (Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition) diagnosis criteria. No pathology was identified in her clinical chemistry tests, Electroencephalography, or cranial MRI. The patient's PANSS (Positive and Negative Syndrome Scale) score at admission was 124 (Positive: 26, Negative: 31, General: 57). The patient was started on paliperidone 12 mg/day, and this treatment was continued for four weeks. As the auditory hallucinations persisted despite antipsychotic treatment, nine sessions of bilateral electroconvulsive therapy (ECT) was administered to the patient after the written consent of her relatives had been taken. The patient's

PANSS score following antipsychotic treatment and ECT was 109 (Positive: 25, Negative: 31, General: 52). As the patient's auditory hallucination persisted without any changes despite ECT, low frequency (1 Hz) rTMS to the left temporoparietal region was administered to the patient for ten minutes a day after the written consent of her relatives had been taken. Following rTMS, the patient's PANSS score was 45 (Positive: 7, Negative: 16, General: 22), and her auditory hallucinations disappeared completely.

DISCUSSION

In schizophrenia patients, delusions and hallucinations are designated as positive symptoms. Hallucinations are frequently auditory and visual in nature. Auditory hallucinations are generally in the form of voices speaking about the patient himself. Untreated auditory hallucinations are a significant cause of social isolation and serious suicide attempts (5).

Although the underlying biochemical mechanisms of auditory hallucinations are not known, certain brain imaging studies have identified changes in the activity of cortical regions associated with hearing and speech perception. The increase in the activity of the left and right upper temporal cortex, the Broca's area, and the left temporoparietal cortex are the best known examples of these changes (6).

In recent years, rTMS began to be used as a new method for the treatment of auditory hallucinations. Aspects of rTMS that are superior to ECT include the fact that it is based on the formation of motor convulsions, the fact that it requires no anesthesia protocol, and the fact that it has a lower side effect profile. There are also less cognitive side effects following the procedure in comparison to ECT (7). However, in clinical practice and studies, ECT is still described as being more effective than rTMS. It has been demonstrated that ECT is particularly more effective than rTMS in the treatment of patients with major depression accompanied by psychotic symptoms (8).

The first report on the use of rTMS treatment for patients with auditory hallucinations was prepared by Hoffman et al. (9). In this study Hoffman et al. (9) applied

low frequency (1 Hz) rTMS to the left temporoparietal cortex of three patients, and demonstrated a decrease in the intensity of auditory hallucinations in these patients. Later, d'Alfonso et al. (10) demonstrated that the application of low frequency (1 Hz) rTMS to the left temporal cortex of nine patients for 10 sessions led to a decrease in the intensity of auditory hallucinations. Bagati et al. (11) performed a comparison between schizophrenia patients treated with antipsychotic medication and patients who received 10 sessions of low frequency rTMS to the left temporoparietal region in addition to their antipsychotic treatment. They observed that patients receiving rTMS experienced a significant improvement with regards to their auditory hallucinations compared to the patients treated only with antipsychotics (11). Rosenberg et al. (12) applied low frequency rTMS to eight schizophrenia patients with persistent auditory hallucinations, and observed significant improvement with regards to their auditory hallucinations.

Our case also had persisting auditory hallucinations despite the administration of both typical and atypical antipsychotic medication at optimal doses and for optimal periods. Commanding and persecutory voices were led to a suicide attempt previously in our case. By taking previous studies into account, rTMS was applied to the left temporoparietal region of the patient at a frequency of 1 Hz and at 90% of the motor threshold

(actual motor threshold was identified as 77%); rTMS application was performed for 10 sessions. Auditory hallucinations had nearly disappeared by the fifth session, and completely disappeared by the tenth session. The patient's delusions had subsided, and there were no thoughts of suicide.

CONCLUSION

Auditory hallucinations are the most frequently observed type of hallucinations in schizophrenia patients. These hallucinations significantly affect the functionality of patients. Previous studies have shown that the application of low frequency rTMS to the left temporoparietal region led to a significant improvement in the intensity of auditory hallucinations. By taking previous study models into account, we also applied low frequency (1 Hz) rTMS to the left temporoparietal region, and observed that the patients' auditory hallucinations disappeared completely. However, as our patient lived in another city, we were not able to perform the patient's follow-up; therefore, no observations could be made regarding to the long-term effects of this procedure.

As information in the literature is limited to the use of rTMS for the treatment of acute episodes, there is a need for further studies regarding the use of this procedure as a continuous treatment.

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