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Repetitive Transcranial Magnetic Stimulation (rTMS) Treatment of Depression and Anxiety in a Patient with Anorexia Nervosa

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Data Interpretation D
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Anorexia nervosa (AN) is characterized by restricted eating, emaciation, and distorted body image and tends to be a chronic and deadly disorder with a high risk of developing a relapsing course described as a severe and enduring anorexia. This case study reports a patient with AN with comorbid depression and anxiety who was treated by repetitive transcranial magnetic stimulation (rTMS).

Our patient's first hospitalization in our ED clinic was at the age of 25 in 2012. Her anorexia symptoms have been developing over 1.5 years. The body mass index (BMI) at admission was 12.21 kg/m².





She was stimulated by use of a MAGSTIM Super Rapid 2 device, every Monday through Friday (5 days a week) with the frequency 10 Hz, 15 trains/day, 100 pulses/train, intertrain interval 107 s for 10 days. The specific spot of stimulation was over the left DLPFC. The therapy was evaluated, both by the team and by the patient, as ineffective. Shortly after the therapy was finished, the patient was discharged with final weight of 46 kg and BMI 13.15 kg/m².

We showed, that despite our positive clinical experiences with rTMS therapy in depression and anxiety, the treatment of AN and comorbid depressive disorder with anxious distress, our patient's anorexic, anxious, and depressive symptoms remained unaffected. In this case, only invasive medical intervention helped the patient to reach normal weight, but without any significant changes in her psychology.

This case study shows the need for further investigation of the influence that body weight might have and whether the number of sessions has an effect on rTMS efficacy.

MeSH Keywords: **Anxiety • Depression • Eating Disorders • Transcranial Magnetic Stimulation**

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Background

This case study reports a case of a patient with anorexia nervosa (AN) with comorbid depression and anxiety, who was treated by repetitive transcranial magnetic stimulation (rTMS). Anorexia nervosa is characterized by restricted eating, emaciation, and distorted body image and tends to be a chronic and deadly disorder with a high risk (approximately 50%) of developing a relapsing course described as a severe and enduring anorexia (SE-AN). To date, there is no proven psychological treatment or medication to reverse the severe course of this illness [1].

Current treatment options of AN may benefit from neurobiological research on common neural circuitry, which is showing new indications for trans-diagnostic treatment strategies. Functional neuroimaging studies of AN patients using symptoms-provocation paradigms have proposed either aberrant functioning of ‘top-down’ prefrontal regions (executive control) and/or subcortical regions promoting ‘bottom-up’ (stimulus-driven) responses, anxiety-related mesolimbic circuits, reward-related regions (e.g., the striatum), and parietal somatosensory regions [2].

AN patients with most common mood, anxiety, and abuse disorder comorbidities are reported to have more severe symptoms and outcomes of eating disorder (ED) [3].

rTMS, a non-invasive technique targeting the dorsolateral prefrontal cortex (DLPFC), has been shown to have some efficacy across disorders by reducing cravings and consumption in substance dependence, decreasing compulsion and obsession, as well as reducing anxiety and potentially the urge to exercise in AN patients [4]. It has also been demonstrated that rTMS reduces the main symptoms of eating disorders such as food craving, feeling fat or full [4], and even decreases comorbid depression [5].

Material and Methods

Our patient's first hospitalization in our ED clinic was at the age of 25 in 2012. She is now age 29. Her anorexia symptoms had been developing over a period of 1.5 years. The body mass index (BMI) at admission was 12.21 kg/m². No psychiatric family history was described, but, as observed during the visits on the ward, her sister was also underweight. At the time, our patient did not have any other serious medical illness. She had recently graduated from university and lived in a functional, long-term partnership.

She associated the onset of her problems with the death of her grandmother. After her grandmother's death, our patient

suffered from anxiety and worried about her loved ones. The problems began with reduction of meal portions and then she gradually started to closely observe the food caloric values as well as her own weight. Besides her continuously worsening disordered eating pattern, she developed severe anxiety, depression, obsessive compulsive symptoms (obsessively cleaning her room or the kitchen on the ward), and emotional lability.

In the time span of 2012–2014, she was hospitalized 5 times at the ED unit. Despite several AN-adequate medication trials (sertraline, venlafaxine, escitalopram, quetiapine, and olanzapine), intense psychotherapy, and regime approach (realimentation with food supplementation and sipping, cognitive behavior therapy, cognitive remediation, and relaxation), her psychological status and weight remained unchanged. During these years she experienced substantial deterioration of her close relations and socioeconomic status. During her fourth hospitalization (after 300 days of hospitalization with persistent resistance to standard therapy), the therapeutic team, inspired by the literature showing its positive effect on AN [4] and comorbid anxiety and depressive symptomatology [5], offered her rTMS therapy.

At this point, the patient's weight was 41.9 kg and BMI was 11.98 kg/m². She was medicated by olanzapine (5 mg) and escitalopram (15 mg) and agreed to participate in this new additional treatment by signing informed consent.

Results

She was stimulated by use of a MAGSTIM Super Rapid 2 device, every Monday through Friday (5 times a week) with the frequency 10Hz, 15 trains/day, 100 pulses/train, intertrain interval 107 s for 10 days. The specific spot of stimulation was over the left DLPFC. Stimulation intensity was determined as 100% motor threshold and the individual patient's motor threshold was set at 87%. We were inspired by the methodology used by Kamolz [5]. Our patient perceived rTMS therapy as painful, yet she decided to complete all 10 planned sessions. At the end of rTMS, none of the expected changes were present in her medical state, and her anxious and depressive symptoms remained. Weight gain was negligible (BMI 12.13 kg/m²), and the Zung self-rating scale (a 20-item self-report questionnaire) showed no change (70 points before and after completion of the stimulation, indicating above severely depressed). There was no change, even in questions focused on eating behavior (# 5 and 7). The therapy was evaluated, both by the team and the patient, as ineffective (both in anorexic and depressive symptoms). Shortly after the therapy, the patient was discharged with final weight of 46 kg and BMI 13.15 kg/m².

Discussion

The most recent follow-up interview (2 years after rTMS therapy) showed that shortly after discharge from our unit, our patient was repeatedly hospitalized at an intensive metabolic care unit because of her life-threatening underweight. Due to non-cooperation, she was tube-fed by percutaneous endoscopic gastrostomy (PEG) over the year and has gradually reached normal weight. Her weight is now 80 kg, BMI 22.9 kg/m². She is trying to eat normally, but still wants to lose weight. Besides persisting anorectic symptoms, HB reports obsessive thoughts and compulsive behavior, with excessive exercising. She is still in intensive outpatient psychotherapeutic care and according to her own words: "I am still fighting".

This case report shows that despite our past positive clinical experiences with rTMS therapy in depression and anxiety and new literature showing its efficacy, in the present patient we found that treatment of AN and comorbid depressive disorder using rTMS therapy failed to improve her anorexia, anxiety, and depression. To the best of our knowledge, there has been no description of rTMS treatment in resistant comorbid

AN patients with long-term follow-up. In comparison with previously published reports of successful rTMS treatment of AN, we used 10 sessions therapeutic mode instead of 20, and our patient was more severely underweight (14.5–18.5 kg/m²) and this could have influenced our results [4].

Conclusions

The present case study demonstrates the need for further longitudinal studies and follow-up on patients that receive rTMS. In our patient's resistant comorbid AN, the rTMS approach did not succeed. Future studies need to investigate the influence of body weight and number of sessions on rTMS efficacy. In our case, only invasive medical intervention helped the patient to reach normal weight, but without any significant changes in her psychology. This further proves that there is still a lack of effective psychological treatment.

Conflict of interest

None.

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