



DEEP TRANSCRANIAL MAGNETIC STIMULATION IN TREATMENT OF MAJOR DEPRESSIVE DISORDER (MDD): A CASE REPORT

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ABSTRACT

Deep transcranial magnetic stimulation is the emerging treatment option for major depressive disorder and anxiety disorder using H1 coil (FDA approved). The case presents a 26 years old female with a diagnosis of major depressive disorder who underwent deep transcranial magnetic stimulation, from our centre at Manan Hospital and Deep TMS Centre Anand, Gujarat. Her improvement was significant with magnetic stimulation and pharmacotherapy. This report along with other studies can support the evidence and effects of Deep TMS on patients with MDD.

KEYWORDS : Deep TMS, Depression, H1 Coil, HDRS, Neuromodulation, Neuroplasticity, Dorsolateral Prefrontal Cortex

INTRODUCTION

MDD is a syndrome characterized by mood disturbances, impaired attentional control is increasingly recognized as a cardinal feature of depression and is included in the diagnostic criteria of MDD as "an impaired ability to think or concentrate". (1)

Deep Transcranial Magnetic Stimulation (Deep TMS) is a non-invasive technique for stimulation of distinct brain regions. (2)

Research suggests that the Deep TMS H1 coil has neuro-stimulating effects on the Left Dorsolateral Prefrontal Cortex (DLPFC). Which is affected in MDD for mood regulation and cognitive functions. (3)

The above is a case of severe depression which was treated by protocol of MDD with non-invasive brain stimulation. Over the course of 6 weeks she went through 20 sessions, 5 sessions/week. Before treatment her HDRS score (Hamilton Depression Rating Scale) (4) was 24, which is categorized as severe depression. Post treatment HDRS was 5, which is a significant improvement. Along with her score her cognition, mood, social engagement and overall functions were improved. Although her treatment was a combination of pharmacology and brain stimulation, we believe TMS was a major contributor in her improvement. However, it limited our observation of isolated Deep TMS effects on her condition, and yet to discover the long-term effects or the lasting effects of the treatment.

Clinical Presentation

A 26-year-old presented with symptoms of major depressive disorder, persistent low mood, anhedonia, social withdrawal, sleep disturbances, thoughts of death and reduced appetite. With significant work impairment and lack of concentration. The severity of these symptoms developed over the course of six months, initially with low mood and negative thoughts. Later, she started avoiding work and was less social in her daily activities.

Mental Status Examination

- Appearance: Mismatched clothing, minimal effort in grooming.
- Behaviour: Dormant, passive, limited interaction.
- Speech: Low-toned, lacking spontaneity and descriptiveness.
- Mood and Affect: Sad mood with a restricted affect.
- Thought Process: Logical but slow in response.
- Insight and Judgment: Good insight into her condition.
- Orientation: Fully oriented to time, place, and person.
- Past psychiatric history: none
- Past medical history: none
- Family history: nothing relevant
- Menstrual history: LMP – 14/09/2023, 28 days cycle

Her condition was further assessed by Hamilton Depression Rating Scale (4)

Treatment

A combination of pharmacology and Deep TMS was opted, and she was prescribed olanzapine and escitalopram and clonazepam combination. Brainsway FDA approved H1 coil with standard MDD protocol of was recommended, during the course of 6 weeks 5 sessions per week were given.

Parameters of Protocol:

- Frequency: 18 Hz
- Pulse train duration: 2 seconds
- Inter-train interval: 20 seconds
- Session duration: Approximately 18 minutes
- Total sessions: 30

Alongside Deep TMS, she was prescribed pharmacotherapy including:

- Olanzapine 5 mg
- Escitalopram 10 mg + Clonazepam 0.5 mg (Combination therapy)

Side Effects: she initially experienced headaches and pain in scalp, which was untreated and later she got adjusted to it.

Follow up: During and post treatment her cognitive and vegetative symptoms were significantly improved and her HDRS was 5, which was 79% of improvement. During her first week of treatment, she started sleeping well and her appetite was better. Post third week she was more interactive and her negative thoughts were reduced, she started having new ideas and her overall cognition progressed. She also decided to rejoin work and felt excited about it.

DISCUSSION

Deep TMS is getting recognition as the new and upcoming non-invasive intervention treatment for various psychiatric and neurological disorders. It stimulates the prefrontal cortex with specific intensity of electromagnetic stimulation, 18 Hz frequency is approved by FDA for MDD[3], DLPFC is implicated as the pathophysiology of MDD, enhancing the synaptic activity and improving neuroplasticity of the area[2]. The remission rates are promising in improving depression and increased cognition and overall mood is elevated. The concurrent use of pharmacotherapy is presented as a limitation to conclude the independent effect of Deep TMS[5].

Limitations

Long-term follow-up will be more helpful, to know the lasting effects of the treatment. Independent use of magnetic stimulation is yet to understand as the case had combined, pharmacological and Deep TMS approach.

Conclusion

The case highlights the potential of FDA approved H1 coil in case of MDD, the non-invasive treatment reduces symptoms and enhances functional recovery, leading to quick remission. Further studies with independent use of Deep TMS are

needed. Also, more understanding of neurological changes with non-invasive brain stimulation will be helpful in treatment of various psychiatric disorders and neurological conditions.

Scope for Future Study

Future studies will be helpful with more controlled trials in clinical practice. We are still yet to discover the effects different frequencies can have, also the lasting treatment and long-term results are still in research. Theta burst is another treatment protocol, interestingly it uses low and high frequency combination over the specific areas of the brain[6]. Scope is limitless with brain stimulation, but we need better understanding, and to widen our knowledge with its impact on neurological changes and synaptic activities.

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Weblinks

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