Deep TMS in treatment-resistant depression with previous ECT and repetitive TMS treatments

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Background

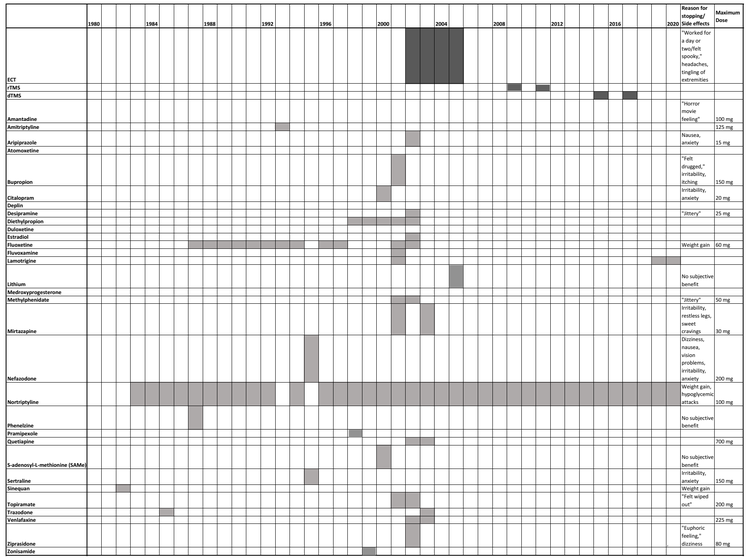
- Transcranial magnetic stimulation (TMS) is a non-invasive form of brain stimulation that was developed in 1985 for use in the diagnostics of neuromuscular disorders, after which its use expanded to treatment-resistant MDD.
- TMS involves an electric current passing through a coil positioned on the scalp which generates a magnetic field and a secondary electric current causing the depolarization of cortical neurons and producing action potentials in the underlying region of the human brain. [4]
- Deep TMS uses an H-shaped coil, which differs from traditional rTMS that uses a figure-8 coil. dTMS is able to cover a larger area of the brain and provide a stronger treatment that can access deeper parts of the brain.
- A head to head randomized control trial studying the efficacy of rTMS and dTMS in patients with a diagnosis of treatment-resistant MDD showed both dTMS and rTMS to be significantly superior to standard pharmacotherapy, with the endpoint change in HAMD-17 (Hamilton Depression Rating Scale) favoring dTMS over rTMS. [2]
- Our report aims to describe and evaluate the case of an individual with MDD who experienced remission of her depressive symptoms with dTMS after failing several medication trials, ECT trials, and rTMS trials.
- Our case adds to the literature because there still seems to be a lack of understanding of the differences between rTMS and deep TMS in the medical and insurance community as well as how deep TMS can be effective even in the most severe cases of depression. Our patient in particular has been denied insurance coverage for her dTMS treatments as it is not viewed as a different therapy than rTMS. Despite legal recommendation for insurance to cover her dTMS treatments, she continues to fight for access to affordable and effective treatment for her depression.

Case Presentation

- **HPI**: 58 y/o white woman who presents for psychiatric consultation for deep TMS. She endorses feeling depressed her whole life, and even as an adolescent in school when she found it difficult to leave home. She meets criteria for a Major depressive disorder and reports depressed mood every day most of the day that lasted more than 2 weeks anhedonia, difficulty sleeping, decreased self-esteem, decreased concentration, decreased energy, and suicidal ideation. She is currently on a medication regimen of nortriptyline 75mg QD, lamotrigine 200mg QD, buprenorphine 2mg BID, and levothyroxine 100mcg QD. Her Beck Anxiety Inventory score and Beck Depression Inventory score on this current evaluation is 21 and 46 respectively. She denies history of mania/hypomania, auditory or visual hallucinations, history of trauma, and current substance use.
- **PMHx**: The patient has a past medical history of breast cancer status/post chemotherapy and radiation, psoriasis, diabetes mellitus type 2, melanoma, and migraine.
- **Family Psychiatric Hx**: Family history is significant for depression in her father and there is no history of any completed suicides in her family.

Case Presentation

- **Past Psychiatric Hx**:
  - She says she was diagnosed with opiate use disorder and treated successfully with suboxone 2mg SL BID after becoming dependent on opioid pain medications initially prescribed for treatment of shingles.
  - She states that she was first diagnosed with depression at age 13 y/o, and that her depression as a child was interpreted as her being “shy.” She expresses feeling depressed for at least 2 weeks at that time in addition to anhedonia, difficulty sleeping, decreased self-esteem, decreased concentration, and decreased energy.
  - The patient has a prior diagnosis of MDD, and she had been treated with several psychotropics, including venlafaxine, fluoxetine, sertraline, citalopram, fluvoxamine, nortriptyline, amitriptyline, desipramine, mirtazapine, bupropion, methylphenidate, topiramate, lamotrigine, lithium, ziprasidone, quetiapine, aripiprazole, ECT, and rTMS.
  - The patient has failed multiple medication trials, repetitive TMS, and ECT and had minimal to no remission of her symptoms. She had some relief from her symptoms after ECT for one or two days.
  - The only time she experienced fairly consistent remission of her depressive symptoms was after she received deep TMS.
    - Our patient experienced her first consistent remission in 2015 after receiving deep TMS treatment. After the first set of treatments, she no longer had her daily extreme panic/anxiety attacks or feelings of “the world coming to an end.” Eventually when she lost remission, she started experiencing those daily terrors again although less frequently.
    - Her second consistent remission was in January 2017 after receiving deep TMS treatment when she was able to engage in more social activity compared to before. When she lost the remission, her social outing decreased although she continued going to some of her previous outings.
    - Her third consistent remission was in October 2017 after receiving deep TMS treatments and manifested in increased social activity compared to the prior remission. She was now able to talk more easily with new people.
- Our patient states “dTMS is central to my life. I have been trying to get better in every way I know how. dTMS has allowed me to succeed.” She describes her remission as “waking up from a long sleep.” dTMS made her feel like her life was an adventure worth living; she felt hopeful and curious. She further describes her remission as follows: “remission is not about being happy or sad, but it’s about having the ability to feel any of those and it not be overwhelming.” Since the onset of her depressive symptoms, she has never had any remission of her symptoms except through deep TMS.



Discussion

- The patient presented in this study is an adult who was diagnosed with depression as an adolescent. In order to treat her symptoms, she underwent medication trials consisting of medications in following classes: selective serotonin reuptake inhibitors, serotonin-norepinephrine reuptake inhibitors, tricyclic antidepressants, monoamine oxidase inhibitors, tetracyclic antidepressants, stimulants, antiepileptics, and antipsychotics. After failure of medication trials, ECT and repetitive TMS were used which lead to minimal remission of symptoms. The patient only experienced longer-lasting remission of her depressive symptoms after she received deep TMS treatment.
- Our case report attempts to detail the case of an individual with major depression who was resistant to rTMS, ECT, and traditional medications but benefited greatly from dTMS. Hence, dTMS may be considered especially in patients who have failed rTMS or ECT. It would perhaps be suitable to consider dTMS prior to single pulse TMS, ppTMS, and rTMS in a certain subset of patients deemed appropriate.
- Deep TMS has the potential to be superior than traditional TMS, especially in patients with depression that is resistant to other traditional treatment modalities.
- Further avenues for research could involve studying pathologies or patient subpopulations in which it would be more beneficial to use dTMS before other traditional TMS modalities or ECT to target psychiatric symptoms.
- It is important to note that her medical insurance refused multiple times to pay for her dTMS treatments and she had to pay out of pocket. Her insurance was persistently recommending ECT treatments, even though she had already received ECT treatments in the last 2 years with side effects of memory loss and no lasting benefit. An appeal had to be made for reimbursement to be provided for the dTMS treatments. Despite legal recommendation for insurance to cover her dTMS treatments, she continues to fight for access to affordable and effective treatment for her depression.
- Given that insurance often dictates how healthcare reaches the masses, it becomes important that insurance providers are able to recognize the utility of using dTMS as a separate modality in patients who may have already had trials of other TMS modalities without penalizing the patients who are in such difficult situations. After all, what benefit are novel treatment modalities if they are not able to reach the ones most in need in a reasonably accessible fashion.

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