Long-term Psychosis after DBS placement in Anterior Nucleus of the Thalamus for Treatment-refractory Epilepsy - Case Report and Discussion

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Objectives

- Understand how deep brain stimulation of the anterior nucleus of the thalamus (ANT-DBS) is used in the treatment of refractory epilepsy.
- Explain the potential neuropsychiatric side effects of ANT-DBS placement.
- Explain the management of ANT-DBS psychiatric side effects.

Introduction

Deep brain stimulation in the anterior nucleus of the thalamus (ANT-DBS) for drug-resistant epilepsy provides a median seizure reduction at 25-month and 5-year follow-ups of 56% and 69% respectively.[1][2] Psychiatric side effect (PSE), of this procedure have included depression and suicidal ideation.[2] Järvenpää et al. in 2018 reported on two ANT-DBS patients who both developed paranoia, delusional thought content, and aggressive thoughts alleviated by adjusting DBS stimulation parameters.[3] In this case report, we present a patient who developed psychotic symptoms 1 month after ANT-DBS placement and the subsequent management.

Patient Description

The patient is a 50-year-old woman with intractable left hemisphere focal epilepsy due to biopsy proven multilobar cortical dysplasia. She had no prior history of psychiatric illness or substance use at her presentation.

Case Report continued:

- Weschler Adult Intelligence Scale in 2015 demonstrated a score of 68 in verbal comprehension index, 71 in perceptual organization, 65 in processing speed, and 69 in working memory.
- A vagus nerve stimulator was implanted in 2013 and was replaced in 2016.
- One month post DBS placement in June 2020, the patient developed severe confusion and visual hallucinations acutely after ANT-DBS voltage was increased on both electrodes from 2.0 V to 2.5 V, with resolution after several days. Within the month after increasing to 3.0 V, AH occurred only after listening to music, with persistence of songs over several hours.
- In September, 2020 she reported persistent spontaneous AH every day, mostly the voices of family members who lived in other countries or who had passed away; this was not in the setting of delirium.
- The patient began working with a psychiatrist in April 2021, olanzapine was started with an up-titration to 12.5 mg nightly originally and eventually to 25 mg nightly. Initial psychotropic treatment led to resolution of most symptoms besides the AH which she reported as "30% better."
- To address seizure control and minimize PSE's, the DBS voltage was adjusted between 3.5 and 4.0 V with stimulation moved to more proximal leads. After these setting changes, the patient had spontaneous resolution of AH with DBS parameters at 3.7 V stimulation frequency 145 Hz, pulse duration 90µsec, stimulation on time 45 sec and stimulation off time 3 min at leads 3 and 11.

Figure 1.

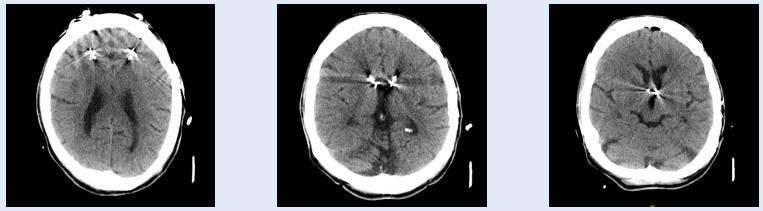

Figure 1. From left to right, The position of the DBS leads, on an Axial plane CT scan, approaching the ANT from superficial to the target location.

Conclusion

- PSE's after ANT-DBS placement should be a consideration when discussing this procedure with patients and families in the consent process
- Epileptologists and psychiatrists should work together in management of PSE's in order to both optimize seizure reduction and the side effect profile of this procedure.

References

1. Fisher R, Salanova V, Witt T, Worth R, Henry T, Gross R, et al. Electrical stimulation of the anterior nucleus of thalamus for treatment of refractory epilepsy: Deep Brain Stimulation of Anterior Thalamus for Epilepsy. Epilepsia. 2010 May;51(5):899–908.
2. Salanova V, Witt T, Worth R, Henry TR, Gross RE, Nazzaro JM, et al. Long-term efficacy and safety of thalamic stimulation for drug-resistant partial epilepsy. Neurology. 2015 Mar 10;84(10):1017–25.
3. Järvenpää S, Peltola J, Rainesalo S, Leinonen E, Lehtimäki K, Järventausta K. Reversible psychiatric adverse effects related to deep brain stimulation of the anterior thalamus in patients with refractory epilepsy. Epilepsy Behav. 2018 Nov;88:373–9.