



DEPARTMENT OF THE AIR FORCE
59TH MEDICAL WING (AETC)
JOINT BASE SAN ANTONIO - LACKLAND TEXAS



9 MAR 2017

MEMORANDUM FOR SGVT
ATTN: CAPT SHANE D. RIGGS

FROM: 59 MDW/SGVU

SUBJECT: Professional Presentation Approval

1. Your paper, entitled **Challenges in Diagnosis and Management of Serotonin Syndrome in A Patient With Schizophrenia Treated with A LAI Antipsychotic** presented at/published to **2017 American Psychiatric Association Annual Meeting, San Diego, CA, 20-24 May 2017** in accordance with MDWI 41-108, has been approved and assigned local file #**17065**.
2. Pertinent biographic information (name of author(s), title, etc.) has been entered into our computer file. Please advise us (by phone or mail) that your presentation was given. At that time, we will need the date (month, day and year) along with the location of your presentation. It is important to update this information so that we can provide quality support for you, your department, and the Medical Center commander. This information is used to document the scholarly activities of our professional staff and students, which is an essential component of Wilford Hall Ambulatory Surgical Center (WHASC) internship and residency programs.
3. Please know that if you are a Graduate Health Sciences Education student and your department has told you they cannot fund your publication, the 59th Clinical Research Division may pay for your basic journal publishing charges (to include costs for tables and black and white photos). We cannot pay for reprints. If you are a 59 MDW staff member, we can forward your request for funds to the designated Wing POC at the Chief Scientist's Office, Ms. Alice Houy, office phone: 210-292-8029; email address: alice.houy.civ@mail.mil.
4. Congratulations, and thank you for your efforts and time. Your contributions are vital to the medical mission. We look forward to assisting you in your future publication/presentation efforts.

Linda Steel-Goodwin

LINDA STEEL-GOODWIN, Col, USAF, BSC
Director, Clinical Investigations & Research Support

PROCESSING OF PROFESSIONAL MEDICAL RESEARCH/TECHNICAL PUBLICATIONS/PRESENTATIONS

INSTRUCTIONS

USE ONLY THE MOST CURRENT 59 MDW FORM 3039 LOCATED ON AF E-PUBLISHING

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6. TITLE OF MATERIAL TO BE PUBLISHED OR PRESENTED: Challenges in Diagnosis and Management of Serotonin Syndrome in a Patient With Schizophrenia Treated With a LAI Antipsychotic			
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Midline electroconvulsive therapy following left fronto-temporo-parietal craniectomy and cranioplasty:

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Abstract

We report on an interesting case of necessity using an innovative electrode placement in a 20-year-old female with major depressive disorder (MDD) who received two series of ECT treatments in 2014 and 2015. In 2013, following a suicide attempt by jumping out of a moving vehicle and sustaining severe cranial fractures, she underwent left fronto-temporo-parietal craniectomy and reconstruction cranioplasty with titanium mesh-plating. She was treated with midline electrode placement for ECT, as the mesh-plating barrier would affect traditional techniques. We found improvement in the patient following treatment with quality average EEG results over the course of treatment. We hypothesize that the cortical midline structures (CMS) could play an important role as targets of ECT treatment and improvement in this patient.

Case Presentation

This is a 20-year-old female with history of MDD and TBI in 2013 status post left fronto-temporo-parietal craniectomy and reconstruction cranioplasty with titanium mesh plating. The patient has an extensive history of depression with multiple suicide attempts including cutting her wrists. She has had multiple admissions for acute depressive episodes with suicidal ideations and/or suicidal behavior.

She has been treated with multiple pharmacological interventions over the years. Her most recent and critical suicide attempt was jumping out of a moving vehicle, in February 2013, during which she suffered multiple cranial injuries.

Following this incident the patient underwent several neurosurgical procedures including a right ventriculoperitoneal shunt placement, left fronto-temporo-parietal craniectomy and left fronto-temporo-parietal reconstruction cranioplasty with titanium mesh plating over the course of 8 months. CT imaging in figure 2 shows the extent of the cranioplasty performed.

The patient was admitted in January and March of 2014 for worsening depression and suicide attempts by cutting her wrists. She sustained multiple lacerations each time requiring sutures on bilateral wrists. She did not receive ECT treatments during those admissions and was managed medically. The patient presented to for inpatient admission in July 2014 for major depressive episode with suicidal ideations. She remained inpatient for 12 days and we history provided ECT treatment with midline electrode placement as shown in figure 1. This was clinical decision based on the patient's surgical history.

The patient was discharged and continued to receive 4 more treatments as an outpatient for a total of 15 sessions. We achieved good EEG readings based on the rhythm strip with average stimulus of 33%, average seizure duration of 90 seconds, average postictal suppression index (PSI) of 48%, average seizure energy index (ASEI) of 7365µV² and an average maximum sustained coherence (MSC) of 83%. The patient started treatment with a quick inventory of depressive symptomatology (QIDS) of 21 and throughout treatment, her score improved on the QIDS to a lowest score of 3. Self-reported memory difficulties were reported on a scale on 1-10, with 1 being minimal and 10 being significant difficulty. The patient's average score throughout treatment was 3.5. Self-reported score of ECT helping the patient's depressive symptoms was also scored on a scale of 1-10, with 1 being minimal help and 10 being significant improvement. The patient's average score throughout treatment was 5.9.

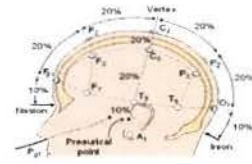


Figure 1. Midline ECT electrode placement at position Fp1 and O1 (adapted from Bioelectric magnetism chapter 13 - EEG)

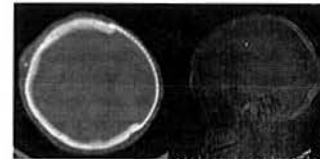


Figure 2. CT head imaging showing post-surgical left fronto-temporo-parietal cranioplasty and extent of titanium mesh plating.

The patient was in remission and remained functional for the next year, until she admitted again for a depressive episode with suicidal ideations in June 2015 for 10 days in which she received 4 ECT treatments with midline placement and 3 more treatments post-discharge. We achieved excellent EEG readings based on rhythm strip with average stimulus of 40%, average seizure duration of 106.3 seconds, average PSI of 41%, ASEI of 7606µV² and an average MSC of 93%. The patient started treatment with a QIDS score of 15 and throughout treatment, she improved on the QIDS to a lowest score of 4. Self-reported memory difficulties were reported on a scale on 1-10, with 1 being minimal and 10 being significant difficulty. The patient's average score throughout treatment was 4.5. Self-reported score of ECT helping the patient's depressive symptoms was also scored on a scale of 1-10, with 1 being minimal help and 10 being significant improvement. The patient's average score throughout treatment was 5.7.

The patient remitted with self-reported improvement in each round of treatment. The patient has continued to be in remission since that time. She is currently living with her grandmother, is planning to go back to school to complete a general education degree and is following her medication regimen with good outpatient follow up. She reported less irritability, improved self-worth, good sleep, good family relations and growing interest in daily activities to help her move on with her life.

Discussion

Ongoing efforts continue to elucidate optimal electrical stimulus parameters and electrode placement for ECT. Currently ultra-brief stimuli with right unilateral placement are increasingly viewed as favorable (1, 2). Our experience suggests that stimuli using a novel electrode placement may result in seizures with characteristic comparable to traditional ECT.

Because of the traumatic brain injury and subsequent neurosurgery our patient's skull and brain architecture were considerably altered. The extent of the titanium mesh over most of the left side of her skull precluded using a bilateral electrode position. We also considered the right unilateral electrode position however, opted for using a midline electrode position because of concerns about the residual brain damage and our belief that a midline network of brain locales is highly germane to the manifestation and alleviation of depressive symptoms. Reports have shown that cortical midline structures as well as self-referential processing do play an important role in the course and treatment of MDD (3).

Functional MRI studies have shown the neural network involved in manifesting depression extends from the inferior frontal midline structures including the subgenual cingulate region 25 to the precuneus. It also includes structures such as medial prefrontal, anterior cingulate cortices, dorsal lateral prefrontal cortex and the posterior cingulate gyrus in the posterior parietal area (3, 4). Initial fMRI studies have shown midline networks to be affected by ECT. However these studies have not found a strong relationship between the fMRI changes and patient outcomes (4, 5).

We believe that targeting these networks might be a strategy in treating MDD with ECT. It may be possible to position ECT electrode to have the stimulus pass through the presumed midline network of relevance yet bypass direct effects on the hippocampi and other structures mostly involved in memory processes. What continues to be unclear is to what extent a generalized seizure, in and of itself, is a necessary and sufficient basis for ECT response. The seminal report by Sackheim et al. in 1993 strongly suggested that all seizures are not equally efficacious given the inferior response of seizures induced by low dose unilateral stimuli (2). Induced seizures are regarded as a necessary but not sufficient phenomenon for ECT to effectively treat depression. Extreme divergent opinions range from proposing that seizure induction by any means to be effective to the passage of non-convulsive amounts of electric current being efficacious (6, 7).

We are aware of two prior reports using a similar electrode position referred to as frontomedial (8, 9). These reports position electrodes over the mid-frontal area and the vertex. We opted for a more posterior positioning of the latter in order for the stimulus to pass through the affective and default mode networks to a fuller extent. Animal studies and computer simulations have explored the path of the current stimulus and suggested that it may be possible to largely avoid memory relevant areas while affecting areas linked to depression (8).

In conclusion, we have presented a unique case of a patient that forced us to use our medical knowledge, expertise and literature reference to determine the course of treatment. We opted for midline electrode placement and did achieve good results. The basis for using a midline electrode position was highly speculative but we feel it is worthwhile to introduce it for further consideration and discussion.

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