CASE STUDY

MISSED SEIZURE DURING ELECTROCONVULSIVE THERAPY

MUHAMMAD AYUB[1] AND MUHAMMAD IQBAL AFRIDI[2]

[1,2]Pak International Hospital, Karachi, Pakistan

CORRESPONDENCE: **DR. MUHAMMAD AYUB** E-mail: Akrb1988@gmail.com

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ABSTRACT

Here, the authors reported two cases of Electroconvulsive Therapy with a missed seizure and presented a literature review to explore the plausible reasons and recommendations. To date, most authorities agree that seizure duration correlates to the effectiveness of the Electroconvulsive therapy (ECT), and a reason to a minimum of 25 seconds duration of seizure is defined as a good seizure. Many aspects of the seizures during the ECT are researched thoroughly and lots of data is available about the possible modifiers of seizures, indicators of an effective seizure, and ways to monitor an effective seizure but very few data reported missed seizures and strategies to follow in the events of no fits. In this case series, we described two cases of missed seizures, which were identified and addressed appropriately with subsequent successful ECT sessions. We also presented the literature regarding the strategies to follow immediately post-event.

CASES

CASE 1: A 42-year-old married lady with a diagnosis of bipolar type I disorder, current episode manic, with psychotic symptoms (6A60.1) according to the World Health Organization (WHO) Eleventh Revision of the International Classification of Diseases (ICD-11).
CASE 2: A middle-aged male with a diagnosis of severe depressive episodes with psychotic symptoms (ICD-11 6A70.4).
Both cases had missed seizures during the 3rd session of the electroconvulsive therapy.

CONCLUSION

Studies have shown that the phenomena of missed seizures are common but less reported and could be due to many factors, which include individual factors, the ECT technical parameters as well as concurrent use of pharmacological treatment and anesthetic agent which should be considered before every ECT session. There is a paucity of literature on the strategies to follow immediately after an event of no fits. Therefore, we tried to summarize some recommendations which need to be personalized according to a case-to-case basis.

KEYWORDS

Missed Seizure, Brief Seizure, ECT, Electroconvulsive therapy, Psycho-stimulation, Physical treatment

INTRODUCTION

The discovery of electroconvulsive therapy has a rich past, as it was first used by Meduna, using camphor in 1934.

In 1938, Cerletti and Bini reported the use of psych stimulation by using electricity to induce seizures and to highlight its therapeutic benefit for psychiatric disorders. The Electroconvulsive therapy (ECT) methods have been extensively rectified by the addition of muscle relaxants and general anesthesia which makes this lifesaving treatment more effective and acceptable. But if these rectifiers are not used appropriately, then this may lead to missed or brief seizures; a contributor to the treatment failure.[1]

The current National Institute of Clinical Excellence guideline for ECT recommended ECT use to achieve rapid psychiatric improvement for severe symptoms if an adequate trial of other treatment options has proved inefficient and/or when the condition is life-threatening as in people with severe depression, mania, and catatonia, considering it a life-saving treatment.[2]

Initially, clinicians have no effective tool to measure the effectiveness of electroconvulsive therapy based on seizure parameters while deciding whether a particular induced seizure is effective. At the time, a few thought that piloerection or pupillary dilatation predicted a clinically effective seizure, but these physiological indicators were difficult to measure and were also subjected to certain pathophysiological modifiers.3 Failure to observe a seizure during an ECT session may be due to inattention, absence of seizure activity, or excessive muscle relaxation therefore, electroencephalography (EEG) and 'cuff' methods are useful to determine the occurrence of a cerebral seizure and excessive muscle relaxation, respectively. Today, most scientific authorities agreed seizure duration correlates to the effectiveness of the ECT. A study on the duration of the seizure in unilateral and bilateral ECT showed that a minimum of 25 seconds is defined as a good seizure.[4]

Other studies on the effectiveness of electroconvulsive therapy recognized that the induction of a generalized tonic-clonic seizure is necessary to achieve a therapeutic benefit and similar studies also showed that administration of an electrical stimulus that fails to induce a seizure and very short-duration of seizure negatively correlates to the clinical improvement.[5]

MISSED SEIZURE

An adequate electrical dose manifests as a generalised tonic-clonic activity of skeletal muscle, owing to a typical seizure pattern on an electroencephalogram (EEG). The absence of both is what we called a missed seizure. Missed seizures may be due to inattention, absence of seizure activity, excessive muscle relaxation, faulty technique leading to insufficient stimulus dose, excess impedance, or shorter duration of the stimulus, and importantly, individual patient factors such as electrolyte abnormality, dehydration and increase carbon dioxide in the blood can also lead to the phenomena of missed seizures. A common reason is the administration of a high dose

of an anesthetic induction agent or concomitantly used medications with a propensity to raise the seizure threshold. During the course of electroconvulsive therapy seizure threshold usually increases and this may lead to missed seizures. In addition to poor response, missed seizures are also associated with a greater burden of post-ECT side effects, such as irritability and restlessness. By paying attention to the seizure duration during the course of ECT, missed seizures could be anticipated in a simple and cost-effective way to prevent treatment failure and morbidity.[6]

Case 1

A 42-year-old married lady was admitted to our psychiatric facility following a history of acutely violent behavior, paranoia, excessive talk, and excessive religious practice with loss of sleep for over a couple of weeks. The mental state examination was consistent with irritability, persecutory delusion, and absent insight. The examination of the patient, including both general physical and systemic, was normal and the laboratory investigations were also reported as normal. Further, there was no previous psychiatric disorder, no comorbid physical illness, and a negative history of psychoactive substance use.

Based on the above information, she was diagnosed with a case of Bipolar type I disorder, current episode manic, with psychotic symptoms (6A60.1) according to the ICD-11 diagnostic and classification system.[7]

Her inpatient medication included, Injection Haloperidol 10mg I/M, Injection Diazepam 10mg slow I/V to de-escalate the patient pharmacologically, followed by an Injection of Zuclopenthixol Acetate 100mg I/M stat. On the second day of the admission, she was put on oral medicine, which included risperidone 4 milligrams daily, clonazepam 4 milligrams at night, and procyclidine 5 mg twice a day.

On the 3rd day of admission, during the electroconvulsive therapy, the patient did not develop seizures (Missed Seizure) although the machine was working normally. Therefore, her medications were reviewed before the second session of the ECT by holding the clonazepam. Fortunately, our patient in the subsequent ECT sessions had a good seizure. In this case, a thorough investigation revealed that the seizure was missed due to excessive sedation, muscle relaxation, and the general propensity of benzodiazepine to raise the seizure threshold.

Case 2

A middle-aged male with the diagnosis of severe depression during the 3rd session of ECT, the seizures were not observed. Medications of the patient included a course of antidepressant sertraline, and bupropion, with low-dose quetiapine for sleep.

On inquiry, the patient reported that he had undergone a tooth extraction procedure 12 hours prior to the ECT session. In this case, the local anesthetic agent given during the tooth extraction most probably contributed to the missed seizure. The patient was advised to refrain from any additional elective tooth extraction which might interfere with ECT Treatment.

DISCUSSION

This case report is an attempt to highlight common but less reported phenomena during ECT, the missed seizures, and to provide some recommendations on how to respond to the situation effectively.

All members of the ECT team expect a seizure while placing the electrode, but no one anticipated a missed seizure. Yes, this is an actual phenomenon that needs clear recommendations and guidelines.

There was no previous case report or any other study locally on missed seizure but, according to Pippard's audit of ECT, 22% of ECT treatments, there was either no seizure or a brief seizure. Despite being common, literature to date has no clear recommendation on how to tackle the situation. Therefore, we agreed to bring this common but rarely reported clinical situation to the attention of mental health professionals via this case series.

Literature about the procedure in the event of no fits showed that all but one trainee reported that in the event of no seizure at all, they would re-stimulate. Only 63% reported that they would increase the dose of electricity before doing so, the remainder stating that they would use the same settings. All reported that they would discontinue the procedure if a second stimulation failed and four volunteered to come up with additional suggestions such as checking the machine, checking the drug chart for sedatives and hypnotics such as benzodiazepines, and discussing the anesthesia drug with the anesthetist. Some other studies also quoted that inducing hyperventilate and re-applying ECT after 20 seconds is also an effective way to deal with the situation.[8]

CONCLUSION

Studies have shown that the phenomena of missed seizures are common but less reported and are caused by many factors, including personal observation errors, individual factors, the ECT technical parameters as well as concurrent use of pharmacological treatment and anesthetic agents. Therefore, the electroconvulsive therapist should be adequately trained to consider the above-mentioned factors before and during every ECT session. There is a paucity of literature on the strategies to follow immediately after an event of no fits. Therefore, we tried to summarize some recommendations which need to be personalized according to a case-to-case basis.

Further, more research is needed on the phenomena of missed seizures and the likely reasons for developing well-sophisticated and helpful strategies to follow in the event of no fits.

REFERENCES

1. Raheem Suleman, M.D. A Brief History of Electroconvulsive Therapy. 10 Sep 2020https://doi.org/10.1176/appi.ajp-rj.2020.160103
2. Overview: Guidance on the use of electroconvulsive therapy: Guidance [Internet]. NICE. [cited 15th November 2022]. Available from: https://www.nice.org.uk/guidance/ta59
3. Fink M, Abrams R, 1998. EEG Monitoring in ECT: A Guide toTreatment Efficacy Psychiatric Times, 1998;15(5), 70–72.
4. Duddu V. Use of the cuff method in electroconvulsive therapy – a response. Psychiatric Bulletin. 2001;25(2):75–6.
5. Sackeim HA, Prudic J, Devanand DP, et al. Effects of stimulus intensity and electrode placement on the efficacy and cognitive effects of electroconvulsive therapy. N Engl J Med. 1993;328(12):839-846. doi:10.1056/NEJM199303253281204
6. Seshadri M, Mazi-Kotwal NZ. Response Predictors in ECT: A discussion about Seizure Threshold. BJMP 2011;4(2):a424
7. ICD-11 for Mortality and Morbidity Statistics (ICD-11 MMS) [Internet]. World Health Organization. World Health Organization; 2022 [cited 15th November 2022]. Available from: https://icd.who.int/browse11/l-m/en
8. Ramsay N, McPhillips MA. Training and supervision of electroconvulsive treatment in a psychiatric training rotation. Psychiatric Bulletin. 1993;17(12):716–8. doi:10.1192/pb.17.12.716