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A cross sectional study showing association between Electroconvulsive therapy and memory loss

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Abstract

The most effective treatment of major depression with suicidal tendencies is Electroconvulsive therapy. Autobiographical memory loss and defects in new learning are the side effects of it. Although the side effects are transient, the physicians should be aware of this.

Materials and Methods: The study examines psychiatric patients diagnosed by ICD-10 criteria, after giving electroconvulsive therapy (ECT) with a sample size of 20 and is a cross sectional study. The study is conducted in Madurai Govt. Rajaji hospital Psychiatry ward ECT room and cognitive side effects are assessed both short and long term. Studies say new learning is immediately impaired post ECT with the mean scores return to base line of normal by 1 month. Evidence suggests that ECT causes defects in autobiographical memory for a short time.

Conclusion: There is definite correlation between acute side effects of memory loss and ECT. Clinicians should be well aware of these.

Keywords: ECT-memory, loss-short, term

Introduction

Background: ECT is the gold standard treatment for acute treatment of psychiatric disorders, where all medications take 3-4 weeks' time to act and also treatment of resistant disorders. The cognitive side effects are due to multiple factors such as type of ECT, electrode placement, dose, Pulse width, treatment frequency as well as individual patient factors. The ante-grade memory loss is significantly impaired in subacute (0-3days) post ECT and with short term (4-14 days) only slight impairment, but longer time (2 wks-2 yrs), no impairment in tests of memory and non-memory cognition. The only negative aspect is the use of older sine wave ECT machines are riskier.

Aims

1. To study the effects of ECT on short term and long term memory.
2. To study the duration of ECT effects in relation to cognitive deficits.

Tools used

1. A semi-structured proforma with details of socio-demographic profile, psychiatric diagnosis, duration of illness and previous H/o ECT.
2. MINI scale to assess and screen psychiatric illness.
3. Cognitive impairment and recovery assessed by Mini mental state examination (MMSE) and Montreal Cognitive assessment (MOCA) scale.

Review of literature

Electroconvulsive therapy is the gold standard treatment of Major depression and catatonia since its invention in 1934 by Cereletti and Bini, the diseases of which are resistant to psych pharmacotherapy. The common side effects reported by the patients include defects in orientation, short term memory function, attention, concentration, speech fluency and executive functions lasts from hours to months; while some studies report absence of many effects in memory and implicit learning ^[1]. Several others have shown diverse negative impacts across various domains of cognition including greatest global decline associated

with bitemporal ECT, with right unilateral ECT largest decline is in visual memory and defects in verbal memory seen in bifrontal ECT. Sasha S. Getty studied the potential immediate and short term adverse effects on cognitive functions with right unilateral ECT using digital ascending number tapping test (DANTT) in which they studied executive function, speed of processing and visual search between 36-76yrs, which recorded no demonstrable concentration impairment resulting from single or multiple ECT treatment. Studies by Charles H Kellner et al. [2] reviewed the basic and clinical science related to ECTs mechanism of action and clinical issues in the course of ECT including consent process. The mechanism of action of ECT include down regulation of Beta1 adrenergic receptors, upregulation of Serotonin 5HT2A receptors, increased opiod, GABA concentrations in the brain with all these contributing to antidepressant action. The EEG features are increased no of theta waves and electro cerebral silence.

There are two types of ECT machines, the older sine wave which has got alternate surge and decline in a wavy pattern, the current is not uniform, voltage fluctuations and cerebral damage are common. Other one is new brief pulse wave in which a uniform current is distributed in a short period of time and the current discharge and brain damage are minimal. The types of ECT include bitemporal, bifrontal, unilateral ECT depending on electrode placement. Regarding the no of ECT sittings divided into single, Conrads multiphasic ECT in which several ECTs are given in a single session. The normal ECT sittings is 6-8 sittings on alternative days per treatment. The normal voltage is 90-150 m. Coulombs given in 1 second.

The most common complication of ECT is Antegrade amnesia which is loss of memory for events just happened before. Retrograde amnesia often occurs which is loss of past memory. Individual studies show there was impairment on antegrade memory tests early in the course of ECT [3], but returned to baseline between 4-14 days after the end of ECT course [4]. Although often loss of autobiographical memory (loss of memory for events that the person has experienced), both episodic memory and semantic memory are affected. Retrograde amnesia for non-personal information has also been reported [5]. Further in studies where it is objectively measured for atleast 1 year [6], this loss has been found to persist. There is evidence that females and those receiving unilateral ECT are more at risk [7]. A recent review suggests that 60% of patients report memory problems with 40% reporting that these lasted from several weeks to several years [8]. Subjective assessment of cognitive problems following ECT assessed using detailed questionnaires such as Cognitive failures questionnaire [9] correlates poorly with objective deficits.

Materials and methods

Study design: Cross sectional study

The study is conducted in a sample of 20 ECT patients of Govt. Rajaji Hospital, Madurai from Oct 2021-Dec 2022

and all the patients screened by MINI scale and diagnosed by ICD-10 criteria for psychiatric diagnosis are included in the study.

1. Semi-structured proforma consisting of socio-demographic profile, duration of psychiatric diagnosis, short term and long term cognitive defects on memory scale including subacute stage are included.
2. MINI scale to diagnose and assess psychiatric patients.
3. MMSE (Mini mental state examination) scale for cognitive assessment.
4. Montreal cognitive assessment scale (MOCA) scale for accurate assessment of cognitive functions.

Statistical design

Non-parametric tests such as Chi square tests are employed in this study.

Results

Table 1: Showing the common psychiatric diagnosis in our sample for which ECT done

Total	Major Depression	Schizophrenia	Catatonia	Mania
N=20	10	5%	3%	2
0	50%	25%	15%	5%

Table 2: Showing various socio-demographic profile parameters and ECT use N=20

S. No	Variables	No	%
1	Age in yrs		
	20-40	14	70
	40-60	6	30
2	Sex		
	Male	12	60
	Female	8	40
3	Education		
	Illiterate	16	80
	Educated	4	20
4	Occupation		
	Semiskilled	15	75
	Professional	5	25
5	Marital status		
	Single	13	65
	Married	7	35
6	Domicile		
	Rural	12	60
	Urban	8	40
7	SES		
	Low	16	80
	Middle	4	20
8	Duration of Psychiatric Illness		
	<2yr	13	65
	>2yr	7	35
9	Previous H/OECT		
	Yes	14	70
	No	6	30

Table 3: Statistical comparison between the cognitive side effects of ECT assessed by rating scales on subacute, short and long term basis N=20 Amnesia

Rating scale	Subacute	Short-term	Long-term	Statistics Chi
MMSE	15	17	1	14.2*
Mild severe	5	3	0	
MOCA	16	18	2	17.5*
Mild severe	4	2	0	

Discussion

The most common indications for ECT are Major depression with suicidal tendencies, Psychotic depression and Catatonia which reflects in our study there are 10 cases of Major depression (50%) and Catatonia 3 cases (15%) whereas Schizophrenia accounts for 25% of cases.

When comparing the cognitive side effects (Subacute, short term, long term amnesia) and deficits in thinking with rating scales such as Mini mental status examination by using Chi-square test, the Chi value is 14.2 ($p < 0.05$) is statistically significant which shows with sub-acute(0-3d) and short term(4-14d) treatment there are mild cognitive deficits which disappears as time passes (>14d).

Upon comparison of the cognitive deficits(acute & long term) with Montreal Cognitive assessment scale by Chi-square test, the Chi is 17.3 ($p < 0.05$) which is also statistically significant which indicates that mild cognitive deficits are found in early stages(up to 2 weeks) and often disappears with time(months-years). There are no late complications in memory.

Conclusion

ECT use has only mild cognitive deficits in the acute stages up to 2 weeks and later it disappears. Upon weighing the benefits of ECT in acute management and treatment resistant cases, the cognitive side effects are negligible and would reversibly improve with time.

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