Bifrontal ECT for drug-induced psychosis in Parkinson’s disease

Muralidharan K., Thimmaiah R., Chakraborty V., Jain S.
Department of Psychiatry, National Institute of Mental Health and Neurosciences (NIMHANS), Bangalore, Karnataka, India

ABSTRACT
Psychosis has been documented to occur spontaneously in the course of Parkinson’s disease (PD). This case report describes an elderly male who developed psychosis during the course of treatment for idiopathic PD. He was treated with clozapine but experienced significant adverse effects without clinical improvement. He was prescribed bifrontal electroconvulsive therapy (BF-ECT). Here, we report the efficacy of BF-ECT in treating psychosis and motor symptoms in PD, without producing cognitive side effects in an elderly male.

Key words: Bifrontal ECT, cognitive functions, drug-induced psychosis, electroconvulsive therapy, Parkinson’s disease

INTRODUCTION
Psychotic symptoms have been documented to occur spontaneously in the course of Parkinson’s disease (PD), but are more likely to be induced by antiparkinsonian drugs. The mechanism underlying psychosis in PD is not clearly understood, though dopaminergic and serotonergic systems have been implicated. Though most studies have used electroconvulsive therapy (ECT) to treat depression in PD, it has also been used to treat drug-induced psychosis. A double-blind study of real versus sham ECT in PD found that real and not sham ECT increased the on time of antiparkinsonian drugs and the authors postulate that changes in dopamine receptor response may have been responsible for this. There are other reports of ECT being useful in drug-resistant psychosis in PD. There is one report on the use of maintenance ECT for 6 years in a 78-year-old female with PD. ECT has also been shown to improve motor function in PD.

Since cognitive deterioration is a documented side effect of ECT, Inglis (1970) proposed that anterior electrode placements would spare the verbal and non-verbal cognitive functions but would still maintain the therapeutic efficacy, similar to bitemporal placement. Available evidence suggests that bifrontal ECT (BF-ECT) has superior or equal efficacy and less cognitive side effects than bitemporal ECT for psychiatric disorders like depression and mania.

We did not come across any report on the use of BF-ECT in PD. Since PD is known to be associated with deterioration of cognitive functions, we decided to try BF-ECT as it may spare cognitive functions while treating psychosis.

CASE REPORT
Mr. A, a 72-year-old male, was admitted in January 2008 with history of insomnia, persecutory delusions, visual and third person auditory hallucinations of 2 months duration, without any mood symptoms. He has been on treatment for idiopathic PD since 7 years. He was referred for the management of psychosis. At admission, he was on Levodopa 100 mg + Carbidopa 10 mg (330 mg/day) three times a day, and Propranolol 40 mg/day. Physical examination revealed mask like facies, stooped posture, festinant gait, resting tremors of hands, bradykinesia, micrographia and rigidity. His cognitive functions were intact with a Mini Mental State...
Examination (MMSE)\textsuperscript{[13]} score of 29/30. He was started on clozapine 25 mg/day but showed no improvement over 2 weeks. He had significant drooling of saliva and drowsiness, so clozapine had to be withdrawn. We then prescribed ECT, after obtaining written informed consent from the patient and caregiver.

Prior to ECT, he was rated on the Unified Rating Scale for Parkinsonism (URSP)\textsuperscript{[14]} and Positive and Negative Syndrome Scale for Schizophrenia (PANSS).\textsuperscript{[15]} He scored 67 on URSP and 82 on PANSS. He also underwent a pre-ECT evaluation by an anaesthetist, in view of his age and as he was on treatment with propranolol.

ECT was administered thrice weekly, once every alternate day. NIVIQURE ECT machine with EEG monitoring was used (Technonivilac, Bangalore, India). Brief-pulse stimulation with constant current at 800 mA, 125 pulses/second frequency and pulse width of 1.5 ms was administered. Anaesthetic modification included thiopentone 2–4 mg/kg, Succinylcholine 0.5–1 mg/kg and 0.6 mg of atropine IV. For BF-ECT, electrodes were placed 5 cm above the outer angle of each orbit.\textsuperscript{[14]} During the first session, seizure threshold was determined by titration method and was found to be 30 mC. From the next session, he received ECTs with stimuli at 1.5 times the seizure threshold (standard operating procedure in the institute).\textsuperscript{[17]} By the ninth ECT, his seizure threshold had increased to 270 mC. EEG and motor seizure duration, heart rate and blood pressure were monitored in all sessions. He did not report any ECT related adverse effects.

ECT was terminated after nine sessions as the patient had improved significantly. After nine ECTs, his URSP score had decreased to 41 and his PANSS score to 40; his repeat MMSE score remained 29/30. His psychotic symptoms were adequately controlled with ECT and he did not require antipsychotics. The antiparkinsonian drugs were continued at the same dose. He maintained the improvement for 1 month and was lost to follow-up.

**DISCUSSION**

In this patient, drug-induced psychosis was observed following treatment of PD with Levodopa. Clozapine was initially prescribed to treat psychosis, but the patient developed significant adverse effects with small doses. So, clozapine was withdrawn. Since the psychotic symptoms were distressing, he was prescribed ECT.

ECT treatment of drug-induced psychosis in PD has been reported previously,\textsuperscript{[11,16,7]} However, we did not come across the use of BF-ECT in PD. Since the available literature suggests superior efficacy of BF-ECT over conventional electrode placements and lesser effects on cognitive functions,\textsuperscript{[11,20]} we decided to try BF-ECT in our patient. Our patient showed significant improvement in psychosis and motor symptoms and did not suffer from any cognitive side effects with BF-ECT.

The mechanism of action of BF-ECT in PD is unclear. Earlier studies have reported that frontal origin of the electrical waves is probably associated with better generalisation of seizure in primary epilepsy\textsuperscript{[18]} and better generalisation is associated with better outcome.\textsuperscript{[19]} We hypothesise that the good response in our patient was probably due to better seizure generalisation with BF-ECT. A randomised double-blind controlled trial of BT-ECT versus BF-ECT in schizophrenia done at our institute showed significantly more improvement in psychotic symptoms in patients receiving BF-ECT.\textsuperscript{[20]} BF-ECT probably has better efficacy in treating psychotic symptoms. The improvement in motor symptoms could be due to increased availability of levodopa to the brain resulting from increased permeability of the blood-brain barrier following ECT.\textsuperscript{[10]} The cognitive side effects generally reported with bitemporal ECT are related to memory and new-learning, possibly due to temporal lobe dysfunction, consequent to concentration of electrical energy on the temporal lobes.\textsuperscript{[21]} We have probably been able to circumvent these effects by bifrontal stimulation.

Our previous experience with BF-ECT showed improvement in frontal lobe functions\textsuperscript{[20]} and no frontal deficits despite frontal administration of ECT.\textsuperscript{[11]}

The patient was lost to follow-up and therefore we are unable to comment on the long-term efficacy of ECT in treating psychosis in PD. This remains a limitation of our report. The highlight of our report is the efficacy of BF-ECT in treating psychosis and preventing cognitive deficits in an elderly male with PD. However, controlled trials are required before BF-ECT can be routinely recommended for treating psychosis in PD.

**ACKNOWLEDGMENT**

The authors wish to thank Dr. Jagadisha Thirthalli for his valuable inputs in preparing this manuscript.

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Source of Support: Nil, Conflict of Interest: None declared

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