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Case Report

Electroconvulsive Therapy (ECT) In a Patient with Bipolar Affective Disorder, Corpus Callosal Dysgenesis and Multiple Co-Morbidities

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ABSTRACT

Dysgenesis of Corpus callosum is a frequent anomaly associated with neurological and psychiatric disorders. The incidence of seizures is high in these patients, which is an additional limiting factor for electroconvulsive therapy (ECT). Here, we present a patient with bipolar affective Disorder, who had adverse reactions to most of the prescribed medications, multiple comorbidities and was successfully treated with ECT.

Keywords: Corpus Callosal Dysgenesis, Bipolar affective disorder, Adverse reactions, ECT

INTRODUCTION

Corpus Callosum (CC) is a major interhemispheric white matter pathway consisting of about 200 million axons. Maturation of CC begins in childhood and continues into early adulthood. [(1)] Extensive bilateral projections of callosal fibres provide a unique pathway for interhemispheric transfer. [(1)]

Agenesis (ACC) and Dysgenesis (DCC) of the corpus callosum is a frequent anomaly which presents with a spectrum of clinical features and exhibits variable findings in neurological studies. [(2)] The associated clinical signs and symptoms have been attributed to the cerebral and extracerebral malformations associated with DCC. ACC can occur as an isolated anomaly or maybe syndromic as a part of more extensive malformations, metabolic and genetic disorders. [(2)]

The incidence of ACC is reported to be 0.05 -0.7% among the general population, with a male predominance. [(3)] ACC is commonly associated with seizures, developmental delays in motor and language skills, and sensory impairment. [(3)] Psychiatric disorders associated with ACC are heterogenous and includes depression, schizophrenia, bipolar disorder and conversion symptoms. [(3,4)] The alternative pathways developed for interhemispheric transfer in the absence of corpus callosum may be susceptible to misconnection, producing psychotic symptoms. [(4)] The structural abnormalities of the limbic system associated with ACC has been noticed to be responsible for psychiatric disorders. [(3)]

CASE ILLUSTRATION

A 40year old male, married but separated, educated up to fifth standard, hailing from a nuclear family in a rural area in south India, handyman by occupation, presented to the Psychiatry Out Patient Department with a history of decreased

sleep, abusive, assaultive and disruptive behaviour, increased self-esteem, increased libido and increased in nicotine use for 2months. On mental state examination, he was conscious and distractible. Over familiarity was present along with increased psychomotor activity. Speech was increased in volume and tone and decreased in reaction time. Affect was irritable and labile. Delusion of Grandeur was present. Cognitive assessment could not be successfully carried out due to actively interfering psychopathology. However, detailed history taking and clinical assessment revealed below average intelligence. His insight was grade 0/0-5. On General physical examination, his vitals were stable and no minor physical anomalies were present. Systemic examination was within normal limits.

On further exploration, we found that patient had an episodic psychiatric illness from the age of 25. The index episode was depressive in picture followed by three manic episodes, which were treated with pharmacotherapy. Each of his episode was severe enough requiring hospital admission. The details of the treatment were not available and patient had stopped his medications six years ago, following discharge from the hospital following his last manic episode. The inter-morbid period was uneventful and patient's socio-occupational functioning was adequate. He got married during this period but experienced significant interpersonal problems, and subsequently got separated from his wife. He would consume about 2-3quarters of alcohol once a fortnight, post his separation and had gradually increased it to once a week. He had a history of road traffic accident under intoxication six months back without head injury. He was subsequently abstinent from alcohol until two months ago. Thereafter, he would consume about one quarter of alcohol once in ten days.

Patient also had poor scholastic performance and quit school after fifth standard. Family history of alcohol and nicotine dependence was present in his father.

A diagnosis of Bipolar affective disorder-current episode manic with psychotic symptoms, Nicotine dependence syndrome-currently using the substance and Alcohol-harmful use was made, as per ICD-10 diagnostic criteria. His baseline YMRS (Young's Mania Rating Scale) score was 45.Investigations were within normal limits. He was commenced on divalproate and olanzapine. However, he was noticed to have altered sensorium on day 8 on 1000mg of divalproate and investigations revealed hyperammonaemia. Divalproate was therefore tapered and stopped. Monotherapy with olanzapine30mg was continued. Neuroimaging was done to rule out CNS causes. This revealed corpus callosal dysgenesis with wildly spaced parallel lateral ventricles. He showed mild improvement and requested for discharge. However, he was readmitted in a week with similar symptoms and oxcarbazepine was added. On 600mg of oxcarbazepine(day 7), he reported giddiness and had nocturnal confusion. Investigations revealed hyponatremia and oxcarbazepine was stopped. His symptoms were noticed to worsen, with no significant improvement even on 30mg of olanzapine. He complained of pulling sensation in his legs and upper limbs, which was worse at night and decreased with movements. He would walk about in the ward most times of the night to relieve the unpleasant sensation. A diagnosis of olanzapine-induced restless leg syndrome was made and olanzapine was tapered and stopped. Quetiapine was initiated and he showed significant improvement at 500mg. He was eventually discharged and his YMRS score was 10 at that point of time.

Patient got readmitted again in two weeks, with similar symptoms. However, this time, his affect was elated and delusion of grandeur was persistent. We planned Electroconvulsive therapy (ECT) but deferred it in view of CT brain findings. He was commenced on lithium and risperidone

was added. He showed improvement on 10mg of risperidone and 1200mg of lithium. Mild tremors and rigidity were noticed and hence risperidone was tapered to 8mg. His serum lithium level at 1200mg was over 1.2meq/L. Lithium dose was therefore tapered to 900mg, which entailed in worsening of his symptoms. We then reconsidered the option of Electroconvulsive therapy. After obtaining clearance from neurology and anaesthesia, he received 6 modified ECTs in a period of two weeks. Seizures were recorded between 20secs to 50secs, with voltages between 180-360 millicoulombs.

His post procedure period was uneventful and he improved significantly. He was discharged on 8mg risperidone, 900mg lithium and 500mg of quetiapine. Post discharge, he reached his premorbid level of functioning in a period of two months.

DISCUSSION

Seizures induced in the brain have been found to be effective in patients with psychiatric disorders. ECT brings about various neuro-physiological as well as neuro-chemical changes in the macro- and micro-environment of the brain. Diverse changes involving expression of genes, functional connectivity, neurochemicals, permeability of blood-brain-barrier, alteration in the immune system have been implicated for the therapeutic effects of ECT. [(5)] The benefits of ECT in our case could be attributed to the stabilization of imbalanced neurotransmitter distribution seen in patients with Bipolar affective disorder.

Corpus callosum has an inhibitory role and hence patients with DCC are vulnerable to develop seizures. [(4)] Our patient had no prior history of seizures and hence neurology clearance was obtained for ECT. Our patient had clinical symptoms suggestive of mild mental retardation. Patients with mental retardation have been noticed to have severe and prolonged course of bipolar illness and susceptible to adverse effects with psychotropics, which was also seen in our case. [(5)] ECT administered in mentally retarded patients with complex psychiatric disorders has shown excellent response. The adverse effects were minimal and transitory. [(6)]

In addition to this, our patient was using substances, which decreases the efficacy of medications. The polycyclic aromatic hydrocarbons in tobacco smoke can induce the activity of hepatic enzymes especially CYP1A2, thereby decreasing the drug plasma levels and requirement of higher doses of medications. [(7)] Smoking also affects metabolism of alcohol by inducing CYP2E1. Alcohol induces CYP3A4, which increases the rate of metabolism of drugs such as risperidone, quetiapine, and valproate potentially leading to therapeutic failure. Therefore, close monitoring of plasma levels, clinical progress and adverse effect severity is of utmost importance. [(7)]

Neuroimaging studies in patients with bipolar affective disorder have revealed reduction in the posterior parts of the CC: the posterior midbody, isthmus and splenium, when compared to controls. [(1)] Patients with a positive history of psychotic features were noticed to have an increased area of the CC rostrum compared with patients who never experienced psychotic symptoms during illness phases. [(1)] Studies have also demonstrated ECT to trigger changes in volume of whole brain as well as its components such as grey matter, white matter and other brain structures. ECT brings about neuroplastic changes at synapse (synaptogenesis), neurons (neurogenesis), dendrites (dendrogenesis), vasculature (angiogenesis), as well as glial cells and their processes (gliogenesis). [(5)]

We administered Modified Bitemporal ECT in our patient. A previous case report of a patient with corpus callosum aplasia and severe therapy-resistant catatonia, treated with a series of unilateral ECTs showed considerable improvement and the electroencephalographic recordings during

ECT showed a complete inter hemispheric synchronicity due to regular anterior and posterior commissural fibres. [(8)]

ECT has been proven to be a safe and powerful tool in our case. However, the severity of brain malformation made it necessary to include additional pharmacotherapy. A combination of medication and ECT has been noticed to be more effective than a monotherapeutic approach in patients with similar clinical profiles as our patient. [(9)]

CONCLUSION

This case report demonstrates the effectiveness of ECT in a patient with Bipolar affective Disorder (BPAD) who experienced adverse events with medications and had co-morbid DCC, Nicotine dependence syndrome, Alcohol harmful use and Mental subnormality. ECT can therefore be recommended as an effective therapeutic option in patients with corpus callosal damage presenting with acute manic symptoms.

Declaration of Patient Consent:

The authors certify that they have obtained all required patient consent forms. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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