Use of modified bilateral electroconvulsive therapy during pregnancy: A case series

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ABSTRACT

There is limited literature on the use of electroconvulsive therapy (ECT) during pregnancy. ECT is considered as a treatment of last resort during pregnancy. In this case series, we present the data of five patients who were administered ECT during pregnancy. The use of ECT required multidisciplinary approach involving psychiatrist, gynecologist, anesthetist and neonatologist. Two patients received ECT during the second trimester and three patients received ECT during the third trimester. In all the patients, ECT was administered by placing the patients in the left lateral position, glycopyrrolate was used for premedication, thiopentone was used for induction, and succinylcholine was used for muscle relaxation. Patients who were administered ECT close to the full-term were given injection betamethasone 12 mg intramuscularly on two consecutive days before starting of first ECT to promote fetal lung maturity. In all the five cases, no adverse maternal and fetal outcomes were encountered except for possible precipitation of labor in one case.

Key words: Effectiveness, electroconvulsive therapy, pregnancy, safety

INTRODUCTION

Electroconvulsive therapy (ECT) is possibly the most controversial psychiatric treatment, since its being in use. However, it is possibly the only treatment in psychiatry which has survived and has evolved over the last eight decades or so and it still has its place in the management of various severe mental disorders.

Because of the associated controversies, ECT is judiciously used in special population, i.e., children and adolescents, elderly and pregnant women. Although some data are available on the use of ECT in these special populations, the data are limited, especially in pregnancy. In general, ECT during pregnancy is considered as the treatment of the last resort.

Historically, pregnancy was considered as a contraindication for use of ECT. Interestingly in the first published report of use of shock therapy in a pregnant woman, seizures were induced using insulin or metrazol therapy in a case because the pregnancy was misdiagnosed as uterine fibroid.[1] After this, many authors have reported information on the use of ECT in pregnancy. Most of the available data are in the form of case reports or case series. Some of the authors have reviewed the available literature on the use of ECT in pregnancy.[2,3]

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Anderson and Reti[2] reviewed the available literature from 1942 to 2007 and reported that there were 57 publications between 1942 and 2007, which included 339 patients. However, in many of the reports, complete data were not available for all the parameters. Data from this review suggested that ECT was effective in at least 60% of cases, in which it was used.

In a recent review, authors reported that data on the use of ECT among pregnant women is available only for 169 patients, as documented in 67 published reports.[3] The number of cases included in this report was lower than the previous review, possibly because of difference in the inclusion criteria of the two reviews. Leiknes et al.[3] excluded reports which did not provide clear evidence of the use of ECT in pregnancy. Leiknes et al.[3] reported that two-third (63%) of the reports were published between 1970 and 2013 and one-third (37%) of the reports were published during 1942–1970. As per the authors, the data emerged from all the continents of the globe. The mean numbers of ECTs administered during pregnancy were 9.4 (standard deviation [SD] 6.4). The age of the patients who received ECT varied from 16.5 to 48 years with a mean age of 28.9 (SD – 6.2) years. Both unilateral and bilateral ECT has been used, with thiopentone being the most commonly used anesthetic agent. During 1970–2013, in about two-third (63%) of cases ECT was used for the management of depression/bipolar disorder, with or without psychotic symptoms. However, during the years 1942–1970, in about half (54%) of the cases, ECT was used for the management of schizophrenia and other diagnoses such as obsessive-compulsive disorder, generalized anxiety with panic attacks, and neuroleptic malignant syndrome. In this review, authors reported that in most of the cases ECT was administered to primipara women. In terms of trimester of pregnancy, in which ECT was started, data were available for 72% of cases and for which information was available, it was seen that ECT was administered during the second trimester in about half of the cases (53%). Further, in this review, the authors reported that data on fetus-related outcome was missing for 12% of cases and information on ECT parameters was limited. It is suggested that more than one-fourth (29%) of the cases, use of ECT was associated with fetus-related adverse outcomes such as fetal heart rate deceleration, uterine contractions, premature labor, and cesarean section. In occasional cases, the use of ECT in mothers was associated with status epilepticus in fetus. In a small proportion of cases (7.1%), use of ECT during pregnancy has been linked to mortality of the fetus/newborn. In none of the reports, the use of ECT was associated with maternal death.[3] Since the publication of this review few more case studies has emerged in the literature. A recent meta-review[4] included data from four systematic reviews[2,3,5,6] and brought out the strengths and weaknesses of the available reviews. The authors concluded that the review of Leiknes et al.[3] was superior to other reviews; however, the authors of meta-review pointed out that, Leiknes et al.[3] possibly over-implicated ECT in terms of adverse outcomes, whereas the data does not suggest that ECT had a causal role in many of the adverse outcomes.

Due to ethical reasons, it is not possible to conduct controlled trials in pregnant women. Hence, we have to rely on the spontaneously reported data on the use of ECT during pregnancy. The review by Leiknes et al.[3] could locate only one report from India,[7] in which authors reported the use of ECT in two patients. We too could not find any other report from India. In this background, we present the data five patients who received ECT during pregnancy.

CASE REPORTS

Case 1
A 32-year-old female with 28 weeks of pregnancy was referred to psychiatry outpatient setting by her attending gynecologist for not cooperating for clinical examination and requesting for termination of pregnancy. On evaluation, it was evident that the patient was suffering from recurrent depressive disorder, current episode severe depression without psychotic symptoms. She had been treated with lithium, sertraline, and mirtazapine during the second trimester of pregnancy, without much improvement. Due to severe anxiety, she had been abusing clonazepam to overcome her symptoms without much relief. Due to the distress of her symptoms, she was very restless, would not eat anything, would demand for the termination of pregnancy and blame her’ to be born child’ for all her suffering. She was admitted to the inpatient unit. Initial attempt to rationalize pharmacotherapy was not beneficial. Following this, she was offered ECT. Her pre-ECT evaluation in the form of hemogram, serum electrolytes, liver function test, renal function test, electrocardiogram, and fasting blood glucose levels did not reveal any abnormality. Her fundus examination did not reveal any evidence of papilloedema. She was started on ECT after the 29th completed weeks. She received six ECTs with which there was significant improvement in her symptoms of depression [Table 1]. Following the completion of ECT, she was started on cognitive behavior therapy along with the continuation of pharmacotherapy. At 35th week (i.e., after 3 weeks of completion of ECT), she developed pregnancy-induced hypertension, following which she underwent a cesarean section and delivered a healthy female child.

Case 2
A 25-year-old female, suffering from paranoid schizophrenia, since the age of 15 years, was referred by her treating gynecologists at 30th week, for not being cooperative for examination, poor weight gain during pregnancy, and refusal to eat. On examination, the patient was found to have florid positive symptoms in the form of bizarre delusions, persecutory delusions, hallucinatory behavior, negative symptoms, poor self-care, and poor oral
Table 1: Details of electroconvulsive therapy of patients who received electroconvulsive therapy during pregnancy

| Case-1 | Case-2 | Case-3 | Case-4 | Case-5 |
|--------|--------|--------|--------|--------|
| **Age of the patient** | 32 years | 25 years | 40 years | 28 years | 42 years |
| **Primary diagnosis** | Recurrent depressive disorder, current episode severe depression without psychotic symptoms | Paranoid schizophrenia | Undifferentiated schizophrenia | Bipolar affective disorder, current episode mania with psychotic symptoms | Recurrent depressive disorder, current episode severe depression without psychotic symptoms |
| **Indication for ECT** | Severe depression, Treatment resistant depression, suicidal thoughts, poor oral intake, marked anxiety | Poor oral intake, poor fetal growth, poor care of self and pregnancy, lack of concern about pregnancy | Uncooperative, unaware of pregnancy, lack of concern about pregnancy | Uncooperative, attempt to harm the fetus, lack of concern about pregnancy | Severe depression, psychotic symptoms, suicidal ideations, severe distress |
| **Medications at the time of ECT** | Tablet lithium 900 mg/day | Haloperidol 5-10 mg/day | Olanzapine 20 mg/day | Haloperidol 5-10 mg/day | Tab mirtazapine 15-30 mg/day |
| **Baseline severity of psychopathology** | PANSS: P 28, N 21, G 41 | PANSS: P 14, N 28, G 46 | YMRS 32 | YMRS 32 | Cap venlafaxine 75-150 mg/day |
| **Number of pregnancy** | Primipara | Primipara | Second pregnancy | None | G2 P1 L1 |
| **Pre-ECT fetal status** | Ultrasound showed: Healthy fetus, no congenital anomalies, 1000 g, appropriate to gestational age | Physical examination: Small for the gestational age, did not cooperate for ultrasound abdomen | Ultrasound abdomen: Single-live fetus, no congenital anomalies, weight 1990 g | None | Physical examination: Small for the gestational age, did not cooperate for ultrasound abdomen |
| **Interventions done before ECT** | Injection betamethasone 12 mg IM was given on 2 consecutive days to promote fetal lung maturity | Injection betamethasone 12 mg IM was given on 2 consecutive days to promote fetal lung maturity | Injection progesterone 250 mg was given half an hour before every ECT to promote uterine relaxation | Injection betamethasone 12 mg IM was given on 2 consecutive days to promote fetal lung maturity | None |
| **Week of pregnancy at which ECT was started** | 29 completed weeks | 34+2 weeks | 22 weeks | 35 weeks+5 days | 23 weeks |
| **Type of ECT** | Bilateral-modified | Bilateral-modified | Bilateral-modified | Bilateral-modified | Bilateral-modified |
| **Place of administration of ECT** | Operation theater | Operation theater | Routine ECT suit | Operation theater | Operation theater |
| **Position in which ECT was given** | Left lateral position | Left lateral position | Left lateral position | Left lateral position | Left lateral position |
| **ECT medications** | Glycopyrrolate, thioptene, succinylcholine | Glycopyrrolate, thioptene, succinylcholine | Glycopyrrolate, thioptene, succinylcholine | Glycopyrrolate, thioptene, succinylcholine | Glycopyrrolate, thioptene, succinylcholine |
| **Total number of ECTs** | 6 | 13 | 13 | 8 | 6 |
| **Total number of ECTs during pregnancy** | 6 | 6 | 7 | 5 | 6 |
| **Total number of ECTs after delivery** | 0 | 0 | 0 | 3 | 0 |
| **Efficacy of ECT** | Reduction in HDRS: 65.7% | Reduction in HDRS: 65% | Reduction in PANSS: 65% | Reduction in YMRS: 81.2% (achieved remission) | Reduction in HDRS: 78.6% (achieved remission) |

Contd...
intake. She also refused that she was pregnant. Abdominal examination revealed small for gestational age fetus. She was admitted to the inpatient unit, and initially, she was managed with tablet haloperidol, without much benefit. In view of poor oral intake and positive symptoms, she was considered for ECT. Pre-ECT evaluation (as done for the above-described patient) did not reveal any abnormality. Following this, she was treated with ECT, and she received six ECTs during the antenatal period [Table 1]. With ECT, she showed significant improvement in her psychopathology, started accepting that she was pregnant. About a day after the sixth ECT, she developed uterine contractions; however, labor did not progress, even after waiting for 36 h. Following this, she underwent cesarean section and gave birth to a healthy female baby. However, in the immediate postpartum, she had relapse of symptoms, which led to reinstitution of ECT.

Case 3

A 40-year-old female, presented with disorganized behavior, formal thought disorder, delusion of persecution, and poor self-care. Routine ultrasound abdomen revealed that she was pregnant with pregnancy of about 20 weeks duration. The patient was unaware of pregnancy and did not show any concern about pregnancy. In view of the severe psychopathology, poor social support, history of poor compliance to medication and poor oral intake, she was considered for ECT after thorough evaluation. She received seven ECTs, along with the continuation of olanzapine. She showed marked improvement, remained compliant with medications after the completion of ECT and gave birth to a healthy boy at full term by normal vaginal delivery.

Case 4

A 28-year-old female presented to emergency with bipolar affective disorder, current episode mania with psychotic symptoms along with pregnancy of 33 weeks. Initially, she was managed with antipsychotics. However, her symptoms continued unabated and required admission to the psychiatric inpatient unit. She was very much agitated, disruptive, and would threaten to harm her fetus. Following this, she was considered for ECT. She received five ECTs during the antepartum period and three additional ECTs during the postpartum period. She developed spontaneous labor during the 38th week and delivered a male child.

Case 5

A 42-year-old female presented during the second trimester with severe depressive episode without psychotic symptoms. The depressive episode did not respond to adequate trials of psychotropics and patient became suicidal. Following this, she was admitted to the inpatient unit and managed with six ECTs, started during the 24th week of pregnancy, with which she should significant improvement. She maintained
well for later half of pregnancy and gave birth to a healthy male baby at term.

All these patients were administered brief pulse, bilateral modified ECT, two to three times per week, by using an indigenously manufactured brief-pulse, constant-energy machine (Medicaid Systems, Chandigarh, India). For all these patients, the frequency was fixed at 70 Hz, and the pulse width was fixed at 1 s. Initial current stimulus varied from 0.4 to 0.6 s with initial charge of 48–72 coulombs. All patients received proton pump blockers to reduce the chances of gastric reflux. Premedication for ECT involved the use of glycopyrrolate (0.2–0.3 mg), and induction was done using thiopental sodium (100–300 mg) and succinylcholine was used for muscle relaxation. All patients received intravenous fluid in the form of saline before and during the ECT procedures. All the patients were properly preoxygenated with 100% oxygen before administration of stimulus. Seizure duration was estimated using cuff method, and a motoric seizure lasting for at least 15 s was considered as an indicator of an effective ECT. In three of the five cases, in which ECT was used during the third trimester, patients were given injection betamethasone 12 mg intramuscular on two consecutive days before starting of the first ECT to promote fetal lung maturity. Injection progesterone 250 mg was given 30 min before every ECT to promote uterine relaxation. The three cases, in which ECT was administered during the third trimester, the procedures were done in the operation theater with multidisciplinary teams involving psychiatrist, gynecologist, anesthetist, and neonatologist. In all the cases, patients were monitored for uterine contractions before and after the ECTs. In all the cases, ECT was given by placing the patients in the left lateral position. Patients were intubated after the procedure as per the requirement.

**DISCUSSION**

Data on the use of ECT during pregnancy is limited, and the available literature is marked by insufficient details in terms of ECT procedure, pre-ECT evaluations, ECT-related complications, etc., Hence, there is a need to expand the literature. We could find only one report from India, which included description of 2 cases, in which ECT was used during 24–26 weeks of pregnancy. However, this report mainly focused on anesthetic procedures and did not provide much detail about other ECT details and psychiatric status.[7]

In the current case series, five patients were safely given ECT, without any adverse maternal and fetal outcomes. The American Psychiatric Association Task Force on ECT[8] recommends that ECT should be used when there is a need for rapid and definitive response, risk of other treatments outweighs the risks of ECT, poor medication response, good response to ECT in one or more previous episodes of illness, and patient’s preference. In the current case series, in all the cases, ECT was considered because of need for rapid and definitive response. Patients who received ECT during the third trimester, had risk factors for poor fetal outcomes, i.e., poor oral intake, poor weight gain during pregnancy, threat to harm the fetus.

Available evidence suggests that in recent times (1970–2013), ECT has mostly been used during pregnancy to manage patients with Depression/Bipolar disorder, with or without psychotic symptoms.[3] In our case series too, 2 out of the 5 patients were suffering from depressive episodes, and one patient had mania with psychotic symptoms. In all the patients, ECT was administered by multidisciplinary teams comprising of psychiatrists, gynecologist, anesthetist, and neonatologist. The multidisciplinary approach helped in decision-making, and all the specialists facilitated the ECT treatment for possible better fetal outcomes. Accordingly, it can be said that centers providing perinatal psychiatric care must form multidisciplinary teams to improve the outcome of pregnancies in patients with mental illnesses.

During the ECT procedure, all the patients were oxygenated properly, and premedication involved used of glycopyrrolate because it is suggested to have lower placental transfer rate when compared to atropine.[8] In general, most of the previous reports are silent about the use of steroids close to the term. In the present case series, we used betamethasone on two consecutive days to promote fetal lung maturity. This was done as a preparation for unwanted outcome such as precipitation of labor. This possibly helped in better fetal outcome in all the three cases, in which ECT was used close to full-term. Many anesthetic agents such as thiopentone, propofol, and methohexitone have been used for induction during the ECT procedure. Among these agents, methohexitone is not available in India, and use of propofol during pregnancy is not approved. Accordingly, thiopentone was safely used in the present case series. In most of the earlier reports too, thiopentone was the most commonly used anesthetic agent. In all the patients, ECT was administered by placing the patients in the left lateral position to avoid compression of abdominal aorta and vena cava. All patients were intubated after the procedure to reduce the chances of aspiration. These precautions were followed as per the recommendations of the available guidelines[8] and good maternal and fetal outcome in the present case series could also be due to the same.

ECT-induced seizures are known to cause rise in oxytocin levels, which increases the uterine contractions and induce preterm labor.[6] In the current series, such eventuality was possibly seen only in one patient (case – 2), who ultimately required caesarean section due to nonprogression of labor. Hence, it is important to monitor all the patients for uterine contractions before, during and after ECT.
In the present case series, all the patients received 5–7 ECTs during pregnancy, which is lower than the mean numbers of 9.4 ECTs reported in the literature; however, the number of ECT treatment are within the reported range of 1–35 ECTs.[2,3] As per the available literature, the age of the patients who received ECT varied from 16.5 to 48 years with a mean age of 28.9 (SD – 6.2)years.[3] In the present case series, the age range of the patients was from 28 to 42 years. In the available literature, both unilateral and bilateral ECT has been used; however, in the current series, all patients received bilateral ECT.

In the current series, the level of symptom reduction among patients varied from 65% to 81.2%, with two patients achieving clinical remission. The effectiveness of ECT in patients with schizophrenia was 65%–70%. Available literature suggests that ECT during pregnancy is effective in more than 80% of patients with affective disorders and the effectiveness in patients with psychosis is 61%–66.7%.[3] Findings of the present case series support the effectiveness of ECT during pregnancy and suggests that whenever there is a need for an effective treatment for the management of acute symptoms, ECT must be considered as a useful option.[2]

The present case series adds to the limited literature and provides evidence for safe use of ECT during pregnancy.

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Conflicts of interest
There are no conflicts of interest.

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