

# The Use of Electroconvulsive Therapy in Pregnancy: A Review

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## ABSTRACT

Treating psychiatric disorders during pregnancy poses a challenge. Both medication and maternal illness may have adverse effect on the fetus and balancing the risks and benefits of symptoms and treatments is crucial. Medications may affect the fetus adversely, especially in the first trimester. Electroconvulsive therapy (ECT) is not known to have adverse fetal effects and therefore may be preferred. A review of the literature and our clinical experience highlight the role of ECT during pregnancy, sometimes offering advantages over pharmacotherapy.

## INTRODUCTION

Despite its well-established efficacy, ECT still remains the most controversial treatment in clinical psychiatry. The debate about use of ECT in special populations, as in young, pregnant, elderly or medically ill patients, is an important aspect. Despite more than 70 years of experience, there are many differences in ECT's indications, guidelines, and how to optimize outcomes. The controversial nature of professional and public attitudes has narrowed its use, mainly as a last resort in severely ill patients or in situations where other treatments have failed or carry greater risk.

Besides diagnosis, several other factors are taken into account in the decision to use ECT in treatment, such as prior treatment response, the severity of illness, the need for rapid response, the risks and benefits of ECT compared to other treatments, and the patient's preference. In this context, ECT in pregnancy is controversial

because it may be preferable in risk-benefit assessment, but still pregnancy is a period where associated risks may be substantially higher (1-4).

Treating psychiatric disorders during pregnancy poses a challenge. Both medication and maternal illness may have adverse effect on the fetus and balancing the risks and benefits of symptoms and treatments is crucial. The severity of the mental illness may increase during pregnancy. Malnutrition, substance abuse, aggression, appetite changes, despair and delirium are features that cause more injury to the fetus than to the patient herself.

The optimal treatment for depressive disorders in pregnancy remains controversial. Clinicians are often hesitant to prescribe pharmacological agents during pregnancy, especially in the first trimester. ECT has long been considered to have a role in the more severe cases of perinatal depressions. Partly due to issues of stigma and possibility of relapse it tends to be reserved for severe cases where there is poor nutritional intake, a high risk of suicide or a high level of tormenting thoughts. Recent evidence confirms ECT's effectiveness in perinatal mood disorders (1).

The morbidity from illness and the potential adverse effects of psychotropic drugs increase the attractiveness of ECT as a treatment option for pregnant patients. Greater experience with ECT in pregnancy has influenced our attitudes towards its more lenient use.

## INDICATIONS FOR ECT DURING PREGNANCY

In patients with previous psychiatric history, an exacerbation may occur in pregnancy although the risk is considerably more in the postpartum period (5, 6). Depression in pregnancy is frequent. At least one quarter of postnatal depressions have their onset during pregnancy (5 - 10). ECT is mostly used to treat depression and it is the fastest acting, the most acutely effective treatment available.

It is also at least as effective as drug treatment, if not superior (11, 12). All psychotropic drugs cross the placenta and may exert unwanted side effects on the fetus. Morphological teratogenicity, perinatal syndromes and behavioral teratogenicity are the main adverse effects of pharmacotherapy in pregnancy (13- 15).

ECT is effective in major depressive episodes in unipolar, bipolar and mixed cases (16). Acute suicidality, psychotic features, life threatening conditions as in rapidly deteriorating physical status due to poor oral intake, history of poor response to medications or good response to ECT, psychomotor retardation, stupor, and catatonia, patient preference and risks of standard antidepressant treatment outweighing risks of ECT are the main uses of ECT (17).

A case of twin gestation with severe psychotic depression was treated with ECT later in the course of pregnancy. No adverse fetal outcome was reported in this case (18). Another case of psychotic depression was treated with 13 sessions of ECT in the second trimester of pregnancy, followed by three monthly maintenance ECT's with no complications except pelvic pain and transient fetal arrhythmias. The baby born was healthy (19).

Particularly in major depression and acute mania, catatonia, certain acute schizophrenic exacerbations substantial clinical improvement often occurs soon after the start of ECT. ECT indications in first trimester are suicide risk, excitement, stupor, catatonia and aggression. When a rapid or a higher probability of response is needed, as when patients are severely medically ill or at risk to harm themselves or others, primary use of ECT should be considered in second trimester. Other considerations for the first-line use of ECT involve the patient's medical status, treatment history and treatment preference. The most common use of ECT in third trimester is in patients who have not responded to other treatments. During the course of pharmacotherapy, lack of clinical response, intolerance of side effects, deterioration in the psychiatric condition, or the appearance of suicidality are reasons to consider the use of ECT (2).

Recurrence in bipolar disorders is frequent in pregnancy (20). The rate of relapse during the first 40 weeks after lithium discontinuation in pregnant women is similar to non-pregnant women (21). ECT is effective also in mania. It is recommended in mania when there is acute suicidality, psychotic features, rapidly deteriorating physical status, history of good response to ECT/poor response to medications, patient's preference, risk of standard antimanic treatments outweighing risks of ECT,

catatonia, extreme and sustained agitation and delirium (16). ECT is a treatment option in patients with severe mania during pregnancy particularly when there is concern about the teratogenic effects of medications. ECT has an important role in the management of symptomatic pregnant women with severe mania (22, 23).

Although antipsychotics are the first-line treatment for schizophrenia, and teratogenicity potential for antipsychotics are reported to be relatively low, there is sparse data regarding the second generation antipsychotics. When there is concern about the teratogenicity and adverse effects of antipsychotics and anticholinergics, ECT may be preferred. ECT is also an option in treatment refractory cases (20).

In addition, ECT is indicated and administered in patients with neuroleptic malignant syndrome and malignant catatonia. When these conditions occur in pregnancy, ECT is a first-line treatment (24). A case of neuroleptic malignant syndrome was diagnosed at the seventh month of pregnancy. The syndrome did not respond to treatment with dantrolene. ECT was administered and the patient was discharged with clinical improvement (25).

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## A RISK-BENEFIT ANALYSIS

ECT is safe during all trimesters of pregnancy (16). Yet, treatments should be given in a hospital with facilities to manage a fetal emergency (26). An obstetric consultation should be considered in high-risk patients. External fetal cardiac monitoring during the procedure is not obligatory since generally no alteration in fetal heart rate has been observed. In high-risk cases, the presence of an obstetrician during the procedure is recommended (17, 27). In the third trimester, intubation is not a routine procedure but it is recommended to reduce the risk of pulmonary aspiration. Using intubation and fetal monitoring would limit the use of ECT to facilities where such procedures can be performed, thus weighing against the use of ECT (19).

During pregnancy, gastric emptying is prolonged, increasing the risk of aspiration of regurgitated gastric contents. Standard procedure requires the patient to take nothing by mouth after midnight the night preceding ECT. In the pregnant patient, however, this is often insufficient to prevent regurgitation (4, 28). In addition, administering a non-particulate antacid, such as sodium citrate, to raise gastric pH, may be considered as optional adjuvant therapy, but its usefulness is debated (29).

Later in pregnancy, as the uterus increases in size and weight, it may limit ventilation when the patient is in

the supine position; a common procedure is to elevate the patient's right hip, thereby preventing the movement of the uterus, relieving pressure on the diaphragm. Assuring hydration with adequate fluid intake or intravenous hydration with Ringer's lactate or normal saline before ECT treatment may reduce this risk of reduced placental perfusion (27).

Numerous reports show the efficacy of ECT in all three trimesters of pregnancy (26, 30-33). Many of the newer antidepressants and atypical antipsychotics lack this data. ECT is considered as a relatively safe and effective treatment (20). No controlled studies were found about the rate of complications of ECT compared to other treatments during pregnancy. Knowledge is based on case reports revealing favorable outcomes. Several early reviews of the effects of ECT during pregnancy did not reveal an increase in risk of labor and delivery complications (34).

The Collaborative Perinatal Project did not find an excess of malformations in fetuses exposed to methohexital, succinylcholine and atropine (33). No alterations of fetal heart rate, fetal movement or uterine tone during ECT have been reported (35, 36).

Because of the release of oxytocin by ECT-induced seizures and potential resultant stimulation of uterine contractions and induction of labor, the potential use of tocolytic therapy (with ritodrine or magnesium) has been suggested in patients developing persistent uterine contractions during or shortly after ECT (33). Rather than routine monitoring of mother and fetus during ECT, it is advised to reserve it for high risk pregnancies (36, 37). Besides tocolytic therapy, anesthesia with sevoflurane is also recommended in patients developing premature labor or uterine contractions in the third trimester (28, 38). *Premature labors* were not related to ECT treatment. Also, the temporal relationship between ECT and *miscarriages* was not identified. A miscarriage rate of 1.6 percent (26) is still not higher than such events in the untreated general population, indicating that ECT does not increase the risk of miscarriage.

Miller reviewed 300 cases of ECT in pregnancy between 1942 and 1991. In 14 (4.7%) of these cases ECT was used during the first trimester, in 36 (12%) it was started in the second trimester and in 31 (10.3%) in the third trimester. Complications were reported in 28 (9.3%) and most did not show any temporal relationship to the administration of ECT (26). The incidence of genetic malformations after ECT, in comparison to a historical control population, was lower (39, 40). No information on other potential teratogenic exposures

was included in five instances (1.6%) of *congenital abnormalities* (26). Based on the number and pattern of congenital anomalies in these cases, ECT does not appear to have an associated teratogenic risk.

In a 24-year-old patient with schizophrenia for whom pharmacotherapy was ineffective, ECT was administered, and at the third treatment uterine contractions refractory to tocolysis were observed for six minutes with accompanying fetal bradycardia. At the sixth treatment, general anesthesia was induced and the uterine contraction was reported to diminish and fetal heart rate remained constant during the procedure (38). The authors suggested inhalation anesthesia in later stages of pregnancy because of potential uterine relaxant effect of anesthetics (38, 41). In another 26-year-old patient, primigravida at 35 weeks of gestation in whom ECT was administered in the third trimester, following the second, third and sixth treatments, uterine contractions were experienced and tocolytic therapy was needed after the third treatment. Also after this treatment fetal heart variability and uterine contraction-related late cardiac deceleration was observed (42). Transient, benign and self-limited *cardiac effects* in ECT during pregnancy were hypothesized to have been in response to barbiturate anesthetic. The babies born were healthy (26). Another example of fetal arrhythmia resolved spontaneously during ECT in third trimester (43).

In a 36-year-old patient with a severe case of treatment refractory obsessive-compulsive disorder, ECT was administered. Late deceleration on the fetal cardiotocogram occurred during the second treatment and abnormal uterine contraction ceased with rapid IV ritodrine administration. Two courses of ECT diminished her symptoms markedly and the patient delivered a healthy baby (44). Brief fetal heart rate deceleration was reported in another case (45). *Abdominal pain* of unknown etiology after ECT was reported in three cases. The babies born were healthy in all of the cases (46).

In a patient with severe psychotic depression unresponsive to pharmacotherapy, ECT was accompanied by uterine contractions and *vaginal bleeding* occurred. Transient acute hypertension episodes (between 180/90 and 190/100mmHg) were also observed simultaneously (47). Five cases of mild known or suspected vaginal bleeding related to ECT occurred with no adverse effects on the infants (26). Vaginal bleeding leading to spontaneous abortion was reported in an eight-week pregnancy after third ECT treatment (48).

In a 23-year-old patient at 27 weeks of gestation treated for depression comorbid with generalized anxiety

disorder and panic attacks, unresponsive to antidepressant treatment, ECT was administered and *premature labor* risk occurred in the third treatment which subsided with hydration and tocolytic therapy with ritodrine hydrochloride (42). In another example premature labor occurring after the first ECT was treated successfully with ritodrine and indomethacin (49). ECT was administered to a 32-year-old seven month pregnant patient with a diagnosis of psychotic major depression unresponsive to drug treatment. Uterine contractions were observed in the fourth ECT session and the patient was referred to a hospital equipped with newborn intensive care unit. The patient had premature labor at 34 weeks of gestation and the baby born was healthy (50). *Stillbirth or neonatal death* in patients undergoing ECT during pregnancy was not related to ECT but to medical risks (26). No direct temporal relationship between the onset of labor and ECT treatment was noted.

*Prolonged seizure*, occasionally interpreted as status epilepticus, is an uncommon event in ECT. One is reported in a 31-year-old bipolar patient, primagravida at 22 weeks of gestation after third ECT treatment. An attempt was made to control the seizure activity with high doses of benzodiazepines, thiopental, propofol and diphenylhydantoin, but the fetus died in this complicated course (51).

*The physiological changes* associated with pregnancy may increase the anesthesia risks including pulmonary aspiration, and aortocaval compression which can reduce placental perfusion and fetal hypoxia due to maternal hypoxia (26, 52-54).

Pinette et al. (55) reported that primagravida underwent multiple ECT during pregnancy for the diagnosis of major depression. The infant was subsequently born with multiple deep interhemispheric infarcts. They suggested that although a cause-and-effect relationship cannot be established in this case, the multiple ECT treatments this patient received in pregnancy and the final neonatal outcome are temporally related.

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## USE OF PSYCHOTROPIC MEDICATIONS

The morbidity from continued illness and the incompletely understood adverse effects of psychotropic drugs have increased ECT's attractiveness for pregnant patients with severe mental illness, especially when they have associated high-risk conditions. Medications that pose some teratogenic risk during the first trimester include benzodiazepines, antipsychotics, lithium and other mood stabilizers (20, 46), but not tricyclic antidepres-

sants (TCAs) or selective serotonin reuptake inhibitors (SSRIs) (51, 56). Later in pregnancy, antipsychotics have been noted to cause neonatal motor abnormalities, and benzodiazepines are associated with neonatal hypotonia, apnea, and temperature dysregulation (46, 56). TCA treatment has been reported to cause anticholinergic effects and withdrawal symptoms in neonates. Lithium is associated with premature labor, polyhydramnios, neonatal hypothyroidism or lithium toxicity (20). In terms of teratogenic risk, ECT use in pregnancy is considered relatively safe. In the NICE review of extensive data from randomized controlled trials about ECT in depressive disorders, it is stated that although the use of ECT during pregnancy is known to cause some complications, the risks associated with ECT need to be balanced against the risks of using alternative drug treatments (1, 15).

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## EFFECTS OF ECT PROCEDURES IN PREGNANCY

### MUSCLE RELAXANTS

Succinylcholine, the muscle relaxant most commonly used to induce paralysis for anesthesia for ECT, does not cross the placenta in detectable amounts (14, 57). Succinylcholine is inactivated by the enzyme pseudocholinesterase. Approximately 4% of the population is deficient in this enzyme and could, consequently, have a prolonged response to succinylcholine. In addition, during pregnancy, pseudocholinesterase levels are low, so this prolonged response may occur (52).

In the Collaborative Perinatal Project (58), 26 births to women exposed to succinylcholine during the first trimester of pregnancy were assessed after birth. No abnormalities were noted. However, several case reports noted complications in the use of succinylcholine during the third trimester of pregnancy. The most notable complication studied in women undergoing caesarian section was development of prolonged apnea of mother that required continuous ventilation and lasted several hours to days. In nearly all the infants, respiratory depression and low Apgar scores were seen after birth (59).

### ANTICHOLINERGICS

Increased pharyngeal secretions and vagal bradycardia may occur and to prevent these effects during the procedure, anticholinergic agents are usually administered. The two anticholinergics of choice are atropine and glycopyrrolate (53).

In the Collaborative Perinatal Project (58), 401 women received atropine, and four women received glycopyrrolate



during their first trimester pregnancy. In the women who received atropine, 17 infants (4%) with malformations were born, while in the glycopyrrolate group, no malformations occurred. The incidence of malformations in the atropine group was not greater than would be expected in the general population. Likewise, studies of these two anticholinergics used in the third trimester pregnancy or during labor did not reveal any adverse effects.

### ANESTHETICS

To induce sedation and amnesia prior to the treatment, a short-acting barbiturate is typically used. The agents of choice, methohexital, thiopental, and thiamylal, have no known adverse effects associated with pregnancy. The only known exception is that administration of a barbiturate to a pregnant woman with acute porphyria may trigger an attack (52). The barbiturates used for brief anesthesia have not been fully studied, but the short exposure period is unlikely to cause teratogenicity (60). For the same reasons, neonatal toxicity is relatively low with ECT in the third trimester of pregnancy (61).

The recommended dose of methohexital for non-pregnant adults is considered effective during the third trimester of pregnancy (62). The risks of anesthetic agents to the fetus are likely to be less than those of pharmacologic alternatives. Nonetheless, potential teratogenic effects and neonatal toxicities should be discussed in the informed consent process.

### CONCLUSION

When a pregnant woman suffers a severe mood disorder or psychosis, antidepressant and antipsychotic drugs are usually not prescribed, especially during the first trimester of pregnancy because their use is associated with congenital abnormalities. ECT may be a safer treatment during the first trimester of pregnancy. In the second and third trimesters, ECT is recommended when medications do not control the illness or when the patient has had a good result with ECT in an earlier episode (12, 52).

Many clinics ask for consultation with the patient's obstetrician. Routine fetal monitoring is not recommended. Beyond the first trimester, risk of regurgitation is high, so intubation should be considered on a case-by-case basis (17, 27). The facilities in which ECT is administered during pregnancy should have the resources to manage obstetric and neonatal emergencies.

ECT has been reported as a treatment with high

efficacy and low risk in the management of psychiatric disorders during all trimesters of pregnancy, as well as postpartum. Consequently, ECT use in psychiatric disorders during pregnancy is an effective and safe treatment in many cases.

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