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Case Report

Anesthetic Management for Electroconvulsive Therapy in Pregnant Patient - Case Report

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Abstract *- Maternal mental health disorder causes significant morbidity for mothers and their newborns. Psychotropic medication might not be quite safe in these cases. In addition, pharmaco-resistant, life-threatening, and severe symptoms such as catatonia and suicidal behavior, which affect the health and safety of both parturient and child, can appear with the acute need for an instant therapeutic response. Electroconvulsive therapy (ECT) may be investigated in several situations as a potential substitute for pharmaceutical treatment. The monitoring of the depth of anesthesia is achieved using a frontal electroencephalographic device called the Bispectral index (BIS). High pre-ictal BIS value has been positively correlated with seizure duration. This report describes how a pregnant woman in her second trimester who needed ECT because of paranoid schizophrenia was successfully managed under anesthesia while being monitored by BIS.*

Keywords *- Bispectral index, Electroconvulsive therapy, Paranoid schizophrenia, Pregnancy, Seizure.*

1. Introduction

Significant morbidity is brought on by maternal mental health disorders for both mothers and their newborns; for patients with severe mental diseases such as schizophrenia and major depressive disorder that are life-threatening or resistant to pharmacological therapy, electroconvulsive therapy (ECT) has been suggested. The ECT procedure is carried out under the muscle relaxation brought on by a general anesthetic to minimize seizure-related problems and significant muscle spasms.

Based on the patient's comorbidities and clinical condition, anesthetic medications are selected. Anesthetic drugs such as propofol can increase the seizure threshold of patients receiving ECT. The seizure duration is considered an important factor in determining the effect of treatment during ECT. [1] By raising stimulation energy, deep anesthesia may decrease the effectiveness of therapy [2] and raise the likelihood of cognitive side effects. [3][4] The Bispectral Index (BIS), a frontal electroencephalographic instrument, is used to measure the depth of anesthesia. [13] It is advised to use BIS values between 40 and 60 to produce a sufficient level of general anesthesia. Seizure duration has been positively linked with high pre-ictal BIS levels. [6] This case report focused on the anesthetic management for pregnant women with schizophrenia who receive ECT.

2. Case

A 25-year-old primigravida at 25^{+0} weeks of gestation was admitted to a Psychiatric Department for irritability, aggressive behavior, and poor oral intake. These symptoms started 3 days before admission. She was diagnosed with schizophrenia 2 years ago and was hospitalized at the time with psychotic symptoms. The patient has not been taking medicine for pregnancy since 7 months ago.

She was diagnosed with a recurrence of paranoid schizophrenia with catatonia. As a result of the psychiatric evaluation, she cannot take care of herself and has severe catatonic symptoms. Above all, the fetus was small for gestational age because she refused to eat and did not take medication, so psychiatrists and obstetricians decided to use ECT.

There were no abnormalities in her obstetric ultrasound, such as the location of the placenta, amount of amniotic fluid, and fetal heart rate. Her laboratory tests, including CBC, chemical test, and electrocardiography, were within normal range.

The patient received ECT eight times during three weeks, but one time she did not get one due to mechanical problems of the ECT device. Non-invasive blood pressure, electrocardiogram, and peripheral oxygen saturation were monitored during every ECT. BIS was monitored from 4^{th} session. The fetal heart rate and uterine contractility were monitored during ECT, before and after ECT by obstetricians. The patient was given an H_2 blocker and GI modulator to reduce aspiration risk before ECT. A pad was put under the right side hip of the patient for left uterine displacement.

Non-invasive blood pressure, ECG, and pulse oximetry monitoring were performed during ECT. After

preoxygenation with 100% oxygen via a facial mask, anesthesia was induced with 70 mg-100mg propofol. After the loss of consciousness was achieved, the tourniquet cuff on the isolated leg was inflated to a pressure of 300 mmHg, and 50 mg succinylcholine was used for muscle relaxation. When muscle relaxation was complete, electric stimulation was provided to produce adequate seizure duration with an ECT device. Esmolol, a short-acting beta blocker, was used to treat and prevent tachycardia immediately after electric stimulation. Blood pressure, heart rate, and SpO_2 were recorded every 5 minutes.

Fetal heart rate and seizure duration were monitored during ECT, and BIS value was recorded baseline before the start of anesthesia, pre-ictal, post-ictal, and eye-opening. Pre-ictal BIS is when the eyelash reflex disappears and does not respond to verbal commands. Post-ictal BIS is right after the seizure is over, and eye-opening BIS is when the eyes are opened in response to verbal order. ECT was performed for a total of eight sessions until symptoms improved, and all sessions applied the same anesthesia technique by the same anesthetist.

The patient was hemodynamically stable, and the Fetal heart rate was stable between 120 and 160 bpm during the ECT. There was a uterine contraction once before 3rd treatment, but it was temporary and passed without other complications. The duration of the seizure was between 48 and 120 seconds. Electrical stimulation was not provided due to an ECT device error in 2nd treatment. BIS value was recorded from the 4th session. BIS value before induction of anesthesia was not different from that of the general population. Pre-ictal BIS value was 52 to 83. Post-ictal BIS value was lowest during ECT, and BIS value when eye-opening was similar to BIS value after induction of anesthesia. (Table.1) The patient was transferred to the ward after full recovery, and the fetus's condition was evaluated before, after, and during ECT. There was no problem during all the sessions. ECT stopped when food and medication became available after the 8th ECT, and she was discharged from the hospital after clinical recovery. She gave birth to a child at PA 35^{+1} weeks by cesarean section due to fetal growth retardation.

3. Discussion

ECT indicates when a patient does not respond to medication, cannot administer medicine, or requires a rapid response to treatment. Examples include pregnancy, persistent suicidal thoughts, food refusal leading to dehydration or nutritional compromise, psychotic features, and catatonia. [7] Two years ago, our patient was given a diagnosis of schizophrenia and started taking medication. However, she stopped taking her pregnancy medication without visiting a doctor seven months ago. Symptoms like food and medicine refusal, delusion, and catatonia worsened gradually, and she visited an emergency room.

The risks, unfavorable effects, length of therapy, and outcome of ECT during pregnancy are comparable to those of ECT in the general population. [8] Premature contraction and preterm labor were the most frequent adverse events in pregnant patients, with both occurring more commonly in the second and third trimesters. [8] However, These negative effects were not amplified by ECT and were minimal. [8] Miscarriages were not disproportionately more common than in the general population, and ECT had no discernible influence on them. [9] Although fetal problems happened in 7.4% of ECT treatments, it is unlikely that the treatment caused most of them. [10] Neither morphological nor behavioral congenital defects have been linked to ECT. [9] Cardiac arrhythmia, including abnormal fetal heart rate, fetal bradycardia, or decreased heart rate variability, is the most frequently documented adverse event for fetuses occurring during ECT. [8][9] Thus, close monitoring of the mother and fetus is required before, after, and sometimes during ECT. In our case, the obstetrics monitored the mother and fetus, and there was no problem.

Table 1. Relationship between BIS value, electrical energy, and seizure duration

	Baseline(BIS)	Pre-ictal(BIS)	Post-ictal(BIS)	Eye-opening(BIS)	Seizure duration(s)	Electrical energy(J)
1st session	-	-	-	-	120	8.4
2nd session	-	-	-	-	-	-
3rd session	-	-	-	-	85	8.4
4th session	70	70	44	58	58	14.1
5th session	98	69	39	43	56	14.1
6th session	98	83	33	69	77	14.1
7th session	97	80	43	83	60	33.8
8th session	92	52	43	58	48	33.8

BIS: Bispectral index, Baseline: before administration of propofol, Pre-ictal: eyelash reflex disappears and does not respond to verbal command, Post-ictal: right after the seizure is over, Eye-opening: eyes are opened in response to verbal command.

The length of the seizure is thought to be a significant influence on ECT therapy outcomes. [3] It has been demonstrated that the depth of anesthesia influences the delivery of stimulation energy and seizure characteristics. Deep anesthesia may lessen ECT's therapeutic benefit [2] and could increase the risk of cognitive side effects by increasing stimulation energy. [3][4] It has also been proposed that the BIS, a derived variable of electroencephalography (EEG), reflects the degree of hypnosis and drowsiness with intravenous and inhalational anesthesia. [11][12] High pre-ictal BIS values have been positively correlated with seizure duration. [6] In our case, it was also found that the pre-ictal BIS value had a positive correlation with seizure duration. In the 4-6th session with electrical stimulation of 14.1J, the higher the pre-ictal BIS value, the longer the seizure duration. The same result was found in the 7-8th session with electrical stimulation of 33.8J. (Table.1)

Even though there were no serious adverse effects, in this case, ECT was administered. ECT should only be used as a last resort during pregnancy, for instance, in cases of severe depression, catatonia, a sickness that is resistant to treatment, high risk of suicide, psychotic agitation, acute starvation, or dehydration, where it is impossible to use another kind of therapy. The benefits of ECT should be assessed against any potential hazards, taking into mind the mother and fetus. A highly qualified and competent specialist team composed of a psychiatrist, obstetrician, and anesthesiologist should give ECT during pregnancy.

In our case, pregnant patients received ECT safely without adverse events like premature contraction and preterm labor. The patient was discharged after clinical recovery and gave birth to a child who had no other problem except fetal growth retardation, which is not related to ECT.

4. Conclusion

In our instance, ECT was safely administered while pregnant. For a patient with schizophrenia who exhibits pharmacoresistant, fatal, and severe psychotic symptoms during pregnancy, ECT is advised. Although ECT is a safe procedure, obstetricians must cooperate, and the mother and fetus must be continuously monitored. BIS monitoring might help increase ECT's effectiveness and reduce cognitive side effects.

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