Case Report

Periprocedural Management of Electroconvulsive Therapy in Pregnancy during COVID-19 Outbreak: The First Case Report in Thailand

Pawit Somnuke MD[1], Phuriphong Songarj MD[1], Juthawadee Lortrakul MD[2], Natee Viravan MD[2], Kitikan Thana-udom MD[2], Wanlop Atsariyasing MD[2], Wirin Chaiyajan BNS[3], Nattha Saisavoey MD[2]

[1] Department of Anesthesiology, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand

[2] Department of Psychiatry, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand

[3] Department of Nursing, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand

Objective: To described the periprocedural electroconvulsive therapy (ECT) management of a patient in the 3rd trimester of pregnancy, the ECT complications, and their treatment.

Materials and Methods: A retrospective chart review was conducted of a 26-year-old parturient with bipolar I disorder with psychotic features during the coronavirus disease 2019 (COVID-19) outbreak.

Case Report: The patient was admitted and scheduled for ECT. Fifteen ECT sessions (eight on her first admission, and another seven on a second admission) were performed. General anesthesia with endotracheal intubation was conducted after sufficient preoxygenation. Complications were observed: prolonged seizure, decreased fetal heart rate, and hypersecretion. Nonetheless, good outcomes were achieved after treated with thiopental to terminate the seizure, intravenous crystalloid loading and left uterine displacement to stabilize the fetus, and suctioning and an antisialagogue for secretion clearance.

Conclusion: In ECT during pregnancy, it can be challenging to apply electrical current, induce anesthesia and airway management to achieve safe patient care and ensure adequate seizure duration. Moreover, the ECT is conducted in a non-operating room setting where equipment may be deficient. A prerequisite is good periprocedural collaboration among members of the multidisciplinary team which include a psychiatrist, an anesthesiologist, and an obstetrics-gynecologist, as well as proper protective equipment to prevent the contamination to the environment.

Keywords: Coronavirus disease 2019 (COVID-19); Electroconvulsive therapy (ECT); Multidisciplinary team; Periprocedural management; Pregnancy

Received 24 May 2021 | Revised 27 July 2021 | Accepted 31 July 2021

J Med Assoc Thai 2021;104(8):1381-8

Website: http://www.jmatonline.com

Pregnancy poses an increased risk of susceptibility to psychiatric disorders, evidenced by the prevalence of parturients with mental disturbance (15% to 29%)[1]. Psychotropic medications can cross the placenta, resulting in the distribution of the drugs into the fetal circulation through the fetal-maternal interphase. Even though most medications have been proven safe to use during pregnancy, certain drugs can produce side effects on the fetuses. For example, anticonvulsants used as mood stabilizers, such as valproic acid, are associated with fetal neural tube defects[2]. Similarly, benzodiazepines have been reported to be connected with preterm labor, a low birthweight, and myoclonus[3,4]. Exposure to lithium during early pregnancy has also been linked to an increased risk of Ebstein's anomaly[5]. Apart from treatment modalities like antipsychotic medications, psychotherapy, and behavioral therapy, the electroconvulsive therapy (ECT) is an alternative treatment which has proven to be effective for bipolar, schizophrenia, and other psychotic disorders[1,6].

The complications of ECT in pregnant patients are similar to those of other populations[7]. However, 3 common adverse events in pregnancy need vigilant observation: vaginal bleeding, premature uterine contraction, and preterm labor. The first of these complications occurs mostly during the 1st trimester, whereas, the last two are mainly observed during the 2nd and 3rd trimesters[7,8]. Other significant physiological changes during pregnancy

Correspondence to:

Saisavoey N.

Department of Psychiatry, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand.

Phone: +66-2-4194293.

Email: nattha.sai@mahidol.edu

How to cite this article:

Somnuke P, Songarj P, Lortrakul J, Viravan N, Thana-udom K, Atsariyasing W, et al. Periprocedural Management of Electroconvulsive Therapy in Pregnancy during COVID-19 Outbreak: The First Case Report in Thailand. J Med Assoc Thai 2021;104:1381-8.

doi.org/10.35755/jmedassocthai.2021.08.12926

that contribute to complications are limited oxygen reserves and a greater risk of aspiration because of gravid uterus[9,10]. Therefore, providing anesthesia during pregnancy can be challenging and requires prudent management.

Given the ethical issues, performing clinical trials on parturients are not straightforward. The available descriptions and data relating to the application of ECT during pregnancy have mostly been presented as case series and case reports[11]. Despite there being no published recommendations or guidelines for its use in pregnancy, ECT is still considered to be a lifesaving procedure that ensures a speedy and effective response[8,12]. In Thailand, research on ECT during pregnancy is very limited, and no national or institutional practice-recommendations have been established for the procedure. Amidst the pandemic of coronavirus disease 2019 (COVID-19), the performance of any medical procedure is more challenging than ever. Most elective operations have been postponed as part of national strategies to reduce the COVID-19 infection rate. However, as ECT is strongly indicated in cases of suicidal attempt, it has been suggested that ECT should be continued until completion[13,14]. Also, maintenance of ECT is essential to prevent a relapse of symptoms. This is the first case report in Thailand of the periprocedural management of ECT and anesthesia for a pregnant patient at Siriraj Hospital, Mahidol University.

Case Report

Patient history

The patient was a 26-year-old parturient with no history of underlying diseases. She reported experiencing an irritable and labile mood, performing violent acts, and engaging in self-talk after using diet pills 6 years before. The patient became pregnant around mid-December 2019, and shortly after that, the psychological symptoms relapsed. Consequently, the patient visited a psychiatric hospital near her residence and received a medical prescription for lithium carbonate and flupentixol. Nevertheless, the symptoms did not improve: the patient had poor drug compliance, and her doctor recommended discontinuing the lithium during her pregnancy. She subsequently developed insomnia, exhibited aggressive behavior, and engaged in shoplifting. The symptoms progressively worsened, and the patient began to experience auditory hallucinations. To obtain treatment for her medical condition, she moved to Bangkok, the capital of Thailand. She initially visited the Institute of Psychiatry, she was intramuscularly administered haloperidol (5 mg) before being transferred to Siriraj Hospital, Mahidol University, for further management. Her diagnosis was manic bipolar I disorder with psychotic features, mood-congruent.

Preprocedural management

Strict patient screening (body temperature, history of disease contact, and signs of positive respiratory symptoms) was undertaken before the patient was admitted to the psychiatric ward. By the time of her admission to Siriraj Hospital, the patient was in the 3rd trimester of pregnancy, with a gestational age of 30 weeks and 3 days (30^{+3} weeks), as assessed by transabdominal ultrasonography. Her body weight and height at the time of admission were 87.7 kg and 166 cm, respectively. Upon admission, the patient was limb restrained on both arms and legs (4-point restraint) because of her aggressive and paranoid behavior. She was prescribed the following medications: quetiapine (200 mg/day), risperidone (2 mg/day), and intramuscular haloperidol (5 mg, when severe agitation was observed). Additionally, daily doses of dietary supplements were given: triferdine (150 mg) and calcium carbonate (1 g). The lithium carbonate was discontinued in view of evidence of neurotoxicity and poor ECT outcomes, probably because of its cholinergic mechanism of action. Even though proven to be effective, lithium may cause congenital diaphragmatic hernia, neural tube defects, hip dislocation, Ebstein anomaly, and other cardiovascular malformations. Lithium may also be associated with preterm birth and a low 1-minute APGAR score[15]. As ECT was considered optimal for the patient's psychological disorder according to her poor responsiveness to the medication, a treatment plan was initiated on the day after admission. A multidisciplinary team comprised psychiatrists, anesthesiologists, and obstetric gynecologists was formed for perioperative consultation. The anesthesiology team was informed the day before the scheduled ECT so that a thorough patient evaluation could be conducted and appropriate premedication administered. As well, the obstetric gynecologists performed the physical examination of the patient upon her admission were made available to give prompt assistance in the event of an adverse event during and after the ECT. The related equipment was decontaminated with 70% alcohol. The staff psychiatrists and anesthesiologists were also required to wear appropriate personal protective equipment, namely, an N95 mask, disposable gowns, gloves,

Table 1. Periprocedural ECT management

ECT session	Gestation (weeks+days)	Premedication	NPO time since last intake (minute)	Type of ECT	Current (mc)		Seizure (sec)				EEG seizure assessment	Procedure time (minute)	Anesthesia time (minute)
							Motor		EEG				
					1st	2nd	1st	2nd	1st	2nd			
1	30+4	Quetiapine (200 mg, ¼ tab)	425	Unilateral	9.6	19.2	0	94	0	143	Prolonged	5	95
2	31+1	Quetiapine (200 mg, ¼ tab)	482	Unilateral	115.2	N/A	58	N/A	82	N/A	Adequate	8	28
3	31+3	None	545	Unilateral	115.2	N/A	19	N/A	77	N/A	Adequate	2	20
4	31+5	None	550	Unilateral	115.2	N/A	13	N/A	30	N/A	Adequate	5	20
5	32+1	None	550	Bilateral	24	48	0	29	0	29	Adequate	7	10
6	32+3	None	555	Bilateral	120	N/A	42	N/A	58	N/A	Adequate	2	15
7	32+5	None	550	Bilateral	120	N/A	42	N/A	66	N/A	Adequate	2	20
8	33+3	None	545	Bilateral	120	N/A	40	N/A	47	N/A	Adequate	5	20

ECT=electroconvulsive therapy; EEG=electroencephalogram; mc=millicoulombs; N/A=not available; NPO=nothing per oral; sec=seconds; tab=tablet

N/A represents the events that ECT were not performed because the 1st electrical applications resulted in adequate seizure

caps, and a face shield. Moreover, the team adopted the human-resource approach recommended in the literature for the COVID outbreak: the utilization of the same anesthesiologists, psychiatrists, and nursing staff for each ECT session to minimize the risk of cross-contamination to other healthcare personnel[14].

Intraprocedural management

The ECT procedures were performed in a non-operating theater setting in a separate room located within the psychiatric ward. The first ECT session was conducted when the gestational age of the patient was 30+4 weeks. A total of 8 ECT sessions were performed during the patient's first admission period. While the first 4 sessions were unilateral ECT, the last 4 sessions were scheduled as bilateral ECT because of the absence of clinical improvement. Each session of unilateral ECT was performed 2 to 3 days apart. The first bilateral ECT was performed 3 days after the last session of unilateral ECT, and the rest of bilateral sessions were continued every other day until patient was discharged. For the first 2 ECT sessions, the patient was given a premedication of quetiapine (50 mg) due to anxiety and an irritable mood, the drug was administered more than 7 hours before the start of the ECT procedure. The average nothing-per-oral time was 525.25±46.94 minute (mean ± standard deviation). Electrical current titration was performed at the first unilateral and the first bilateral ECT sessions (the 1st and 5th sessions, respectively) to establish the optimal charge to achieve an adequate seizure duration. The electrical stimulus was initially titrated to achieve the seizure threshold. Optimal current used for ECT would be 6 and 2 times of the threshold intensity for unilateral and bilateral ECT, respectively. The first current applications by MECTA spECTrum 5,000Q ECT device, pulse width 0.5 to 1.5 millisecond (ms) [9.6 millicoulomb (mc) for unilateral ECT, and 24 mc for bilateral ECT] failed to provoke a seizure by both clinical observation with blood pressure cuff technique (motoric seizure) and electroencephalogram (EEG seizure). However, seizures were perceived with the second current applications (19.2 mc for unilateral ECT, and 48 mc for bilateral ECT). Upon the 2nd electrical charge application for the first unilateral ECT (the 1st session), a prolonged seizure of 143 seconds was observed on EEG; it was terminated with 50 mg of intravenous (IV) thiopental. The subsequent ECT sessions were uneventful and demonstrated adequate clinical and EEG seizures (Table 1).

General anesthesia was chosen for patient sedation and immobilization during the ECT sessions. Rapid sequence induction with manual pressure to the cricoid cartilage was performed in the absence of assisted positive pressure ventilation before intubation. The patient was placed in the supine position during the 1st ECT session, but the supine position with left uterine displacement (LUD) was utilized for all subsequent sessions. Patient monitoring included noninvasive blood pressure, 3-lead electrocardiogram, pulse oximetry, EEG, and fetal heart rate (FHR). Uterine contraction was determined by a tocometer prior to and after the ECT sessions. Adequate preoxygenation was ensured by allowing the patient to breath with 100% oxygen for 5 minutes or longer. As the ECT sessions were being performed during the COVID-19 outbreak, the multidisciplinary team employed their previously published disposable protective barrier[16]; it was

Table 2. Periprocedural anesthetic management

ECT session	Preprocedural vital signs			Sedative (mg)	Relaxant (mg)	Choice of anesthesia	ETT size/ depth (cm)	Position	Intraprocedural vital signs			Complications	Treatment
	BP (mmHg)	MHR (bpm)	FHR (bpm)						BP (mmHg)	MHR (bpm)	FHR (bpm)		
1	97 to 138/ 67 to 74	78 to 84	116 to 130	Thiopental 250	Succinylcholine 100	GA	6.5/22	Supine	115 to 132/ 65 to 90	75 to 88	114 to 170	Fetal bradycardia	OB/GYN consultation, LUD, IV loading
2	93 to 109/ 66 to 73	68 to 92	126 to 132	Propofol 120	Succinylcholine 75	GA	6.5/22	Supine + LUD	95 to 120/ 55 to 90	65 to 82	126 to 136	None	None
3	97 to 102/ 50 to 67	80 to 94	134 to 139	Propofol 120	Succinylcholine 75	GA	6.5/22	Supine + LUD	105 to 120/ 60 to 80	100 to 108	130 to 140	Hypersecretion	Suctioning
4	99 to 101/ 62 to 72	64 to 90	126 to 140	Propofol 120	Succinylcholine 75	GA	6.5/21	Supine + LUD	100 to 125/ 60 to 82	65 to 105	110 to 130	Hypersecretion	Suctioning, atropine 0.4 mg IV
5	106 to 121/ 70 to 83	80 to 106	122 to 144	Propofol 120	Succinylcholine 75	GA	6.5/20	Supine + LUD	105 to 135/ 50 to 90	75 to 104	100 to 140	None	None
6	97 to 107/ 63 to 72	78 to 96	125 to 137	Propofol 120	Succinylcholine 75	GA	6.5/20	Supine + LUD	110 to 120/ 65 to 75	80 to 120	118 to 122	None	None
7	108 to 121/ 72 to 83	82 to 102	134 to 138	Propofol 120	Succinylcholine 75	GA	6.5/21	Supine + LUD	100 to 115/ 65 to 70	85 to 90	134 to 146	None	None
8	107 to 117/ 64 to 77	84 to 92	132 to 142	Propofol 120	Succinylcholine 75	GA	6.5/21	Supine + LUD	120 to 130/ 65 to 90	70 to 90	126 to 137	None	None

BP=blood pressure; bpm=beats per minute; ECT=electroconvulsive therapy; ETT=endotracheal tube; FHR=fetal heart rate; GA=general anesthesia; IV=intravenous; LUD=left uterine displacement; mg=milligrams; MHR=maternal heart rate; mmHg=millimeters of mercury; OB/GYN=obstetrics-gynecology

placed over the patient's head, neck, and shoulders to avoid the spreading of aerosols during preoxygenation. During the 1st ECT session, thiopental (250 mg) and succinylcholine (100 mg) were administered intravenously for sedation and muscle relaxation, respectively. However, from the 2nd session onward, propofol (IV 120 mg) and succinylcholine (75 mg) were utilized alternatively. Upon the patient becoming fully anesthetized, the protective barrier was removed to aid patient visualization during an endotracheal tube (ETT) was inserted. Once the ETT was secured, the barrier was put back in position, and the patient was ventilated with 100% oxygen through the ETT, using a Mapleson's C circuit. The factors drawn upon to ensure adequate ventilation were equality of chest wall movement and breath sounds, and an oxygen saturation of ≥95%. The preprocedural patient blood pressure, maternal heart rate, and FHR were the same as the intraprocedural ECT values. A major complication, fetal bradycardia, was observed 15 minutes after the conclusion of the 1st ECT session, with the FHR dropping to 56 to 80 beats per minute (bpm). The incident lasted for 1 minute before the FHR raised up to 170 to 180 bpm. An obstetrics-gynecologist (OB/GYN) was consulted, and the patient was repositioned to supine with LUD. The OB/GYN advised the use of volume loading with 1 L of IV Ringer's lactate solution and the maintenance of adequate ventilation by administering 100% oxygen. The FHR subsequently dropped to 138 bpm, and the patient fully regained spontaneous breathing. After removal of the ETT, the patient was transferred for close monitoring at a nearby observation ward. The only other complication was minor: hypersecretion was observed during the 3rd and 4th ECT sessions. Adequate suctioning was applied in the first episode, and suctioning coupled with the administration of an antisialagogue, atropine (IV 0.4 mg), was used for the second instance (Table 2). No uterine contractions were observed before or after any ECT session.

Postprocedural management

The patient was safely transferred from the ECT room to the recovery area in the ward where her vital signs and uterine contractions were monitored. Postprocedural complications were noted only after the first 2 ECT sessions. The patient reported a headache with a high severity of pain (pain score 8 to 10). The symptoms developed hours after the end of the ECT sessions and were resolved by the oral administration of paracetamol (500 mg) Table 3. No other complications were observed. After having completed 8 ECT sessions, the patient was discharged with improved psychotic symptoms.

Second admission

The patient revisited the hospital 12 days after being discharged on account of recurrent psychotic symptoms (an irritable mood with manic episodes, paranoid behavior, talkativeness, and suicidal ideations). The patient was admitted and prescribed quetiapine (400 mg/day). Later, it was switched to

Table 3. Postprocedural complications and treatment

ECT session	Complications	Pain score	Onset after end of procedure (minute)	Treatment	Outcome
1	Headache	10/10	255	Paracetamol 500 mg oral	Improved
2	Headache	8/10	645	Paracetamol 500 mg oral	Improved
3	None	0/10	Not reported	None	Not reported
4	None	0/10	Not reported	None	Not reported
5	None	0/10	Not reported	None	Not reported
6	None	0/10	Not reported	None	Not reported
7	None	0/10	Not reported	None	Not reported
8	None	0/10	Not reported	None	Not reported

ECT=electroconvulsive therapy; mg=milligrams

haloperidol (10 mg/day) until delivery. She was also scheduled for a further 7 bilateral ECT sessions under 120 mc current, the 1st session at gestational age 35^{+5} weeks and the last session at 37^{+5} weeks. The anesthetic induction agent was the same as the previous admission: propofol (IV 120 mg) and succinylcholine (100 mg). All sessions were performed under general anesthesia with intubation, and no intra- or postprocedural complications were observed. As the length of the second admission period was longer than 2 weeks and the patient showed no signs of fever, she was considered free of COVID-19. Full protective equipment was, therefore, not required to be worn by staff while performing the ECT procedure, and surgical masks substituted for the N95 masks used during the first admission. ECT sessions were performed until few days before delivery. The patient was transferred to the OB/GYN ward after the symptoms ameliorated in preparation for a cesarean section. A healthy, full-term, female neonate, with a gestational age of 38^{+4}, was born uneventfully via a low transverse cesarean section under spinal anesthesia. The APGAR scores at 1 and 5 minutes after birth were 9 and 10, respectively. The birthweight was 2,830 g. After the operation, the patient recovered rapidly and was able to take appropriate care of the newborn infant. During postdelivery admission, oral medication was adjusted until the patient's symptoms were improved.

Discussion

ECT is a psychiatric treatment that has evolved over several decades. It is considered the only valid treatment of last resort in patients who are unresponsive to pharmacological treatments and have life-threatening conditions that required immediate management[6,17,18]. However, ECT may pose risks to special populations, such as pregnant women. Despite limited data on the use of ECT during pregnancy, several studies have proven its safety and effectiveness[7,8,11]. The present case report is the first in Thailand to describe the periprocedural management of ECT and anesthesia in a pregnant patient with bipolar I disorder. The ECT sessions were conducted by a multidisciplinary team consisting of psychiatrists, anesthesiologists, and OB-GYNs.

The time course of pregnancies is a key factor to be considered prior to performing ECT. The 1st trimester carries a considerable risk for vaginal bleeding leading to abortion, whereas the second and third mainly involve a transient decrease of FHR and post-ECT uterine contractions. Gastric reflux presents another threat of aspiration during the 3rd trimester[7]. The significant physiological changes associated with pregnancy must also be considered when anesthetizing patients for ECT. Those changes stem from an increase in hormonal levels, particularly of estrogen and progesterone. The respiratory involvement includes edematous upper respiratory tract mucosa and a risk of basal atelectasis due to the upward migration of the diaphragm. The resulting decreased functional residual capacity and total lung capacity may predispose a patient to hypoxemia during induction of the anesthesia. The baseline heart rate, stroke volume, and cardiac output increase by the end of the 1st trimester and plateau by the 32nd week of pregnancy. Gastrointestinal complications include a delayed gastric emptying time and an increase in gastric pressure due to gravid uterus; both complications heighten the risk of aspiration, especially when the gestational age exceeds 18 weeks[19,20].

The present reported case underwent ECT amidst the outbreak of COVID-19. Continuation of the ECT was allowed until treatment completion, evidenced by an appreciable clinical improvement.

In this regard, the ECT was considered an urgent procedure for the patient to prevent life-threatening sequelae. In normal practice, general anesthesia with endotracheal intubation is not required for ECT because it involves the use of extra time for an otherwise relatively short procedure. In addition, an ECT suite is regarded as a non-operating room anesthesia-setting, which means that limited resources are available for patient management in the event of mishaps during intubation. However, general anesthesia is considered essential for certain situations for which intubation is a prerequisite. Some examples are patients with a history of gastrointestinal obstruction; procedures performed after gastrointestinal surgery; patients with evidence of a difficult airway; parturients over 20 weeks of gestation; and procedures undertaken within 48 hours postpartum[21]. After a thorough consideration of the safety aspect, the team decided to induce general anesthesia with endotracheal intubation and constant pressure to the cricoid cartilage (Sellick's maneuver) to prevent aspiration. A newly designed contamination barrier was utilized while oxygenation was performed before the ECT procedure[16]. The team decided to use a disposable paper box as the barrier rather than a more conventional acrylic box because of the former's lighter weight, obviation of the need for a complicated decontamination process, and greater ease of disposal after use. Moreover, there had been a report that COVID-19 could survive on paper for 24 hours, whereas it could be stable on plastic surfaces for up to 96 hours[22]. Adequate suctioning was provided to ensure that a negative pressure was created inside the box, thereby preventing the contamination of aerosols during the ECT procedure. While methohexital has been proposed as the gold standard for anesthesia induction for ECT[23], the typical practice at Siriraj Hospital is to use thiopental as a sedative agent due to the unavailability of methohexital in Thailand. However, according to the fact that prolonged seizure was observed after thiopental administration in the 1st ECT session, an alternative agent was considered. The induction agent propofol has demonstrated positive attributes: a speedy patient recovery, an antiemetic property, stable hemodynamics, and swift clearance from the fetal circulation[24,25]. Interestingly, as observed in rat uterine smooth muscle, propofol might be the most effective agent to counteract uterine contraction[26]. Overall, then, propofol might prove to be the ideal agent for ECT in pregnancy. Succinylcholine is the sole muscle relaxant used for ECT at the present study institution because of its rapid onset and fast patient recovery, borne out by the rapid resumption of spontaneous breathing.

Based on the 169 ECT archives, the most common adverse event during the 3rd trimester of pregnancy is premature labor, while for the fetus/baby, it is fetal bradycardia. The decrease in the FHR can be induced by a prolonged seizure, but it can be attenuated by the administration of propofol[27]. With the present patient, fetal bradycardia occurred after the finish of the 1st ECT session. The suggested treatment for fetal bradycardia is the use of the LUD position and 100% oxygen supplementation[6]. In the present case, the patient was placed in that position, applied 100% oxygen via a face mask, and intravenously loaded a fluid supplement to support the fetal hemodynamics. Based on the present institutional practice which is coherent with the international guidelines[28,29], the authors suggest that the optimal ECT seizure time is a minimum of 20 seconds; and also recommend a seizure should be terminated promptly if it exceeds 120 seconds. Additionally, because of its anticonvulsant property, propofol has been recommended as an alternative agent for the sedation of patients with a history of prolonged seizures[30-32]. In the present case, there was an extended seizure (143 seconds) on the EEG after completion of the electrical charge application. This occurred during the 1st ECT session, with thiopental and succinylcholine being used as the anesthetic agents. No fatal clinical presentation was noticed after seizure termination with thiopental (IV 50 mg). The subsequent ECT sessions (2nd to 8th) were conducted with propofol being used for anesthetic induction; as expected, optimal seizures were obtained. Postprocedural headache is common after ECT and is routinely relieved with acetaminophen (paracetamol). Aspirin and nonsteroidal anti-inflammatory agents are not used as they may alter the feto-maternal hemodynamics and induce early closure of the ductus arteriosus[33]. The present case complained about having severe headache after the first 2 ECT sessions, each time, the headache was satisfactorily treated by oral acetaminophen.

Conclusion

In summary, psychiatric disorders in pregnancy are frequently observed, and they can lead to complications for both the mother and fetus if left untreated. ECT is safe and effective, and it may be regarded as the appropriate treatment in pregnancy in which the complications are minimal. Full consideration of the safety of the patient, maternal

physiological changes, and fetal wellbeing are required. Moreover, good multidisciplinary-team collaboration as well as proper personal protective equipment are pivotal for ECT conducted on pregnant patients during the COVID-19 outbreak.

What is already known on this topic?

ECT in pregnancy during the COVID-19 pandemic requires vigilance on hemodynamic stabilization and proper protective equipment to avoid spreading and contamination.

What this study adds?

Propofol is the drug of choice for ECT in pregnancy regarding its rapid onset, rapid clearance and attribution to more stabilized hemodynamics. Using personal protective equipment as well as placing protective barrier before performing ECT are recommended especially in the non-operative room environment where the contamination is highly plausible.

Conflicts of interest

The authors declare no conflict of interest.

References

1. Vesga-López O, Blanco C, Keyes K, Olfson M, Grant BF, Hasin DS. Psychiatric disorders in pregnant and postpartum women in the United States. Arch Gen Psychiatry 2008;65:805-15.
2. Meador KJ, Baker GA, Browning N, Clayton-Smith J, Combs-Cantrell DT, Cohen M, et al. Cognitive function at 3 years of age after fetal exposure to antiepileptic drugs. N Engl J Med 2009;360:1597-605.
3. Holland J, Brown R. Neonatal venlafaxine discontinuation syndrome: A mini-review. Eur J Paediatr Neurol 2017;21:264-8.
4. Huybrechts KF, Bateman BT, Desai RJ, Hernandez-Diaz S, Rough K, Mogun H, et al. Risk of neonatal drug withdrawal after intrauterine co-exposure to opioids and psychotropic medications: cohort study. BMJ 2017;358:j3326.
5. Patorno E, Huybrechts KF, Bateman BT, Cohen JM, Desai RJ, Mogun H, et al. Lithium use in pregnancy and the risk of cardiac malformations. N Engl J Med 2017;376:2245-54.
6. Ward HB, Fromson JA, Cooper JJ, De Oliveira G, Almeida M. Recommendations for the use of ECT in pregnancy: literature review and proposed clinical protocol. Arch Womens Ment Health 2018;21:715-22.
7. Leiknes KA, Cooke MJ, Jarosch-von Schweder L, Harboe I, Høie B. Electroconvulsive therapy during pregnancy: a systematic review of case studies. Arch Womens Ment Health 2015;18:1-39.
8. Anderson EL, Reti IM. ECT in pregnancy: a review of the literature from 1941 to 2007. Psychosom Med 2009;71:235-42.
9. Chang J, Streitman D. Physiologic adaptations to pregnancy. Neurol Clin 2012;30:781-9.
10. Bhatia P, Chhabra S. Physiological and anatomical changes of pregnancy: Implications for anaesthesia. Indian J Anaesth 2018;62:651-7.
11. Grover S, Sikka P, Saini SS, Sahni N, Chakrabarti S, Dua D, et al. Use of modified bilateral electroconvulsive therapy during pregnancy: A case series. Indian J Psychiatry 2017;59:487-92.
12. Bulbul F, Copoglu US, Alpak G, Unal A, Demir B, Tastan MF, et al. Electroconvulsive therapy in pregnant patients. Gen Hosp Psychiatry 2013;35:636-9.
13. Gournellis R, Tournikioti K, Touloumi G, Thomadakis C, Michalopoulou PG, Michopoulos I, et al. Psychotic (delusional) depression and completed suicide: a systematic review and meta-analysis. Ann Gen Psychiatry 2018;17:39.
14. Tor PC, Phu AHH, Koh DSH, Mok YM. Electroconvulsive therapy in a time of coronavirus disease. J ECT 2020;36:80-5.
15. Poels EMP, Bijma HH, Galbally M, Bergink V. Lithium during pregnancy and after delivery: a review. Int J Bipolar Disord 2018;6:26.
16. Somnuke P. An innovative design of Siriraj collapsible paper box set for electroconvulsive therapy in psychiatric patients during COVID-19 outbreak. Thai J Anesthesiol 2020;46(3 Suppl):165-70.
17. Ray-Griffith SL, Coker JL, Rabie N, Eads LA, Golden KJ, Stowe ZN. Pregnancy and electroconvulsive therapy: a multidisciplinary approach. J ECT 2016;32:104-12.
18. Rineh HM, Khoshrang H, Alavi CE, Rimaz S, Biazar G, Sani MK, et. al. Anesthesia management of electroconvulsive therapy at the late of pregnancy: A case report. Int J Women's Health Reprod Sci 2020;8:239-42.
19. Costantine MM. Physiologic and pharmacokinetic changes in pregnancy. Front Pharmacol 2014;5:65.
20. Gal O, Rotshtein M, Feldman D, Mari A, Hallak M, Kopelman Y. Estimation of gastric volume before anesthesia in term-pregnant women undergoing elective cesarean section, compared with non-pregnant or first-trimester women undergoing minor gynecological surgical procedures. Clin Med Insights Womens Health 2019;12:1179562x19828372.
21. Chawla N. Anesthesia for electroconvulsive therapy. Anesthesiol Clin 2020;38:183-95.
22. Kampf G, Todt D, Pfaender S, Steinmann E. Persistence of coronaviruses on inanimate surfaces and their inactivation with biocidal agents. J Hosp Infect 2020;104:246-51.
23. American Psychiatric Association Committee on Electroconvulsive Therapy. The practice of electroconvulsive therapy: recommendations for treatment, training, and privileging. 2nd ed. Washington, DC: APA; 2001.

24. Lovas A, Almos PZ, Peto Z, Must A, Horváth S. Anesthesia for electroconvulsive therapy in early pregnancy. J ECT 2011;27:328-30.
25. Özgül Ü, Erdoğan MA, Şanlı M, Erdil F, Begeç Z, Durmuş M. anaesthetic management in electroconvulsive therapy during early pregnancy. Turk J Anaesthesiol Reanim 2014;42:145-7.
26. Eun SS, An TH, Jung KT, Jung JD, So KY, Lin J, et. al. The comparison of the relaxant effects of propofol, thiopental, ketamine, and etomidate on isolated rat uterine smooth muscle. Korean J Anesthesiol 2008;55:723-30.
27. De Asis SJ, Helgeson L, Ostroff R. The use of propofol to prevent fetal deceleration during electroconvulsive therapy treatment. J ECT 2013;29:e57-8.
28. Mental Health Alcohol and Other Drugs Branch, Department of Health. Guideline for the administration of electroconvulsive therapy. Brisbane: The State of Queensland; 2018.
29. Department of Health Government of Western Australians. The Chief psychiatrist guidelines for the use of elctroconvulsive therapy in Western Australia. East Perth, Western Australia: LSRU; 2016.
30. Mankad MV, Beyer JL, Weiner RD, Krystal A. Clinical manual of electroconvulsive therapy. Washington, DC: American Psychiatric Publishing; 2010.
31. Aloysi AS, Bryson EO, Kellner CH. Management of prolonged seizures during electroconvulsive therapy. Indian J Psychol Med 2014;36:220-1.
32. Bailine SH, Petrides G, Doft M, Lui G. Indications for the use of propofol in electroconvulsive therapy. J ECT 2003;19:129-32.
33. O'Reardon JP, Cristancho MA, von Andreae CV, Cristancho P, Weiss D. Acute and maintenance electroconvulsive therapy for treatment of severe major depression during the second and third trimesters of pregnancy with infant follow-up to 18 months: case report and review of the literature. J ECT 2011;27:e23-6.