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Electrical Cardioversion in Pregnancy: A Case Report

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ABSTRACT

A case of 28 years primigravida with refractory tachycardia at term is reported. She was refractory to medical cardioversion. Electrical cardioversion was applied before and after the delivery of baby. With several cycles of variable joules of electrical cardioversion, the normal rhythm was not obtained. However, patient's rhythm reverted to sinus with anti-arrhythmic medication after third week of cesarean delivery.

Keywords: cardioversion, pregnancy, refractory tachycardia

INTRODUCTION

Arrhythmias are the most common cardiac complication encountered during pregnancy in women with and without structural heart disease.¹ The incidence of maternal arrhythmia during pregnancy was reported to be 1.2 per 1000 women.² Arrhythmias may manifest for the first-time during pregnancy, or pregnancy can trigger exacerbations in women with preexisting arrhythmias. Women with established arrhythmias or structural heart disease are at the highest risk of developing arrhythmias during pregnancy.³ Exaggerated cardiac excitability in response to estrogen and other autonomic

and emotional changes might be the cause of arrhythmia during pregnancy.⁴ Palpitation is a common symptom in pregnancy with heart issues. Electrocardiogram is helpful in diagnosing arrhythmias in pregnancy.

Supraventricular tachycardia (SVT) is a relatively common form of arrhythmia seen during pregnancy which can manifest as atrioventricular nodal reentrant tachycardia (AVNRT), atrioventricular reentrant tachycardia (AVRT), atrial fibrillation (AF) or flutter, and atrial tachycardia (AT).⁵ Pregnancy has been identified as a risk factor for paroxysmal SVT, which might be due to

excessive cardiac excitability in estrogen response.⁶ Other autonomic and emotional changes might be the cause of arrhythmia during pregnancy.

CASE

A 28 years primigravida at 38 weeks of gestation, not in labor, was referred to the Emergency room of Manmohan Cardiothoracic Vascular and Transplant Centre, Institute of Medicine, Tribhuvan University with the diagnosis of paroxysmal supraventricular tachycardia (SVT) refractory to medical cardioversion along with left ventricular ejection fraction (LVEF) of 30%. On evaluating clinical notes from the referring hospital, she had a history of shortness of breath and palpitation five days before presentation. She was diagnosed as paroxysmal SVT with a heart rate ranging from 190-230 beats per minute. She was initially managed with various physical maneuvers and drugs (adenosine, verapamil, esmolol, diltiazem), but her heart rate didn't revert to normal. During her antenatal period, she had on and off palpitations, shortness of breath. Initially, it was episodic and subsided independently, but later on, symptoms were more severe; thus, she sought medical help.

At a presentation to our center, except for her heart rate of 180-190 bpm, all vital parameters were within normal limits. The uterus was term size, longitudinal, cephalic and relaxed with a fetal heart rate of 154 bpm. As medical cardio version was resistant, she was planned for electrical cardioversion. A diagnosis of Primigravida at 38 weeks of gestation with

paroxysmal SVT refractory to the medical cardioversion with peripartum cardiomyopathy with LVEF of 30%, not in labour, was made. The patient was already term, an emergency cesarean section was decided. Under general anesthesia, direct current (DC) shock was given before skin incision. The first cycle started with 100 Joules, followed by two cycles of 200 Joules each but did not succeed in reverting the maternal heart rate. Then, a cesarean section proceeded, and the other four cycles of 270 J DC cardioversion were tried after delivery of the baby. However, arrhythmia didn't revert.

A single, alive female baby was born with a good Apgar Score. Intra-operatively intramuscular PGF_{2α}, three doses of 250µg each was given. Prophylactically modified B-Lynch sutures were applied. Intraoperative blood loss was 250 ml, blood pressure ranged from 60-100/40-70 mm of Hg, and heart rate ranged from 170-190 bpm. Intraoperative one pint packed red blood cells were also transfused.

Postoperatively the patient was kept in CCU under mechanical ventilation with volume assisted mode and had heart rate of 190- 200 bpm. Digoxin, amiodarone, spironolactone, dobutamine, and noradrenaline were started. Echocardiography repeated post operatively showed dilated left atrium and left ventricle, and LVEF of 10%. Other three cycles of electric cardioversion each of 200 Joules on the first post-operative day was given but with no success. On the

third post-operative day, the patient was extubated still with a heart rate of 140- 150 bpm. The patient received nine cycles of DC cardioversion however, normal rhythm was not reverted. She was then planned for radiofrequency ablation. However, the patient party refused further intervention, and she was kept in cardiac care unit for three weeks under anti-arrhythmic drugs. She was discharged after three weeks with a controlled heart rate (80-100 bpm). However, the patient could be followed-up only on phone, she was fine without any cardio respiratory problem.

COMMENT

Cardiac arrhythmias are among the common cardiac complications which can come across in the course of pregnancy. The most common sustained arrhythmia encountered during pregnancy with a prevalence of 24 per 100,000 hospital admissions is supraventricular tachycardia. Pregnancy itself may trigger exacerbations of preexisting arrhythmias, or arrhythmias may manifest for the first-time during pregnancy.⁷ Based on arrhythmia type, maternal hemodynamic status, and possible side effects on the fetus, patients are looked upon. For hemodynamically stable patients, vagal maneuvers such as the valsalva maneuver or carotid sinus massage are first-line therapy during pregnancy. Intravenous adenosine has a very short plasma half-life and is an appropriate second choice without affecting the fetus. AV nodal blocking agents like digoxin, diltiazem, and verapamil can be used as a third-line option. Beta-blockers other than atenolol can also be safely used to control uncontrolled tachycardia in pregnancy. In he-

modynamically unstable patients or hemodynamically stable patients who failed to aforementioned measures, electrical cardioversion or radiofrequency ablation is justified; however, it jeopardizes the health of the mother and her fetus.⁸

Initial management of pathological tachycardia in stable pregnant women is noninvasive maneuvers, followed by pharmacological methods. However, when all plans fail, electrical cardioversion is indicated. During pregnancy, electrical cardioversion is a rarely applied but highly effective procedure in treating maternal cardiac arrhythmias when other interventions fail or in life-threatening conditions.⁸ However, it may precipitate premature labor. Also, occasionally, it may rain in transient fetal bradyarrhythmias requiring emergency cesarean section.⁹

There are less than 50 cases been reported describing the use of ECV during pregnancy, and less than 20 patients reported the use of ECV, particularly for SVT in pregnancy.¹⁰ There is considerable variation in specific arrhythmias for which ECV is applied and required energy varied from 50 to 400 J. Successful ECV during pregnancy after one or more attempts in 41 pregnant women is reported (93.2%), which is comparable to non-pregnant population(42-92%).¹¹ However, European Resuscitation Council guidelines recommend a 200 J, 360 J sequence with subsequent shocks at 360 J if the arrhythmia is uncorrected.¹² Electrical cardioversion success depends on the type and length of the arrhythmia, method, voltage, and kind of energy. Some Investigators have reported cardioversion between 50 J and 300 J applied at various pregnancy phases reve-

aled negligible effects on the fetus, which means harmful electrical current may not reach the fetus.¹³

However, most case reports show no detrimental effect on fetuses as the fetus's current reach is insignificant.^{12,13} Furthermore, the mammalian fetus has a high fibrillation threshold. Few maternal mortality cases were reported following ECV more in women with preexisting heart lesions.¹³ The data above were acquired from case reports and case series, as there were no randomized clinical trials from which data could be obtained. Furthermore, there was no standardized dose of electric current delivery (direct current cardioversion) and thus clear recommendations concerning energy doses cannot be made.

CONCLUSION

Pregnancy is a pro-arrhythmogenic state due to various physiological changes of pregnancy. Electric cardioversion is the choice if other measures fail or in life-threatening conditions. ECV is considered safe in all trimesters of pregnancy.

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