

Successful Electrical Cardioversion in Late Pregnancy Woman With Supraventricular Tachycardia: A Case Report.

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Abstract

Background: Pregnancy may lead to the development of cardiac arrhythmia, with supraventricular tachycardia (SVT) being the most frequent and sustained arrhythmia among pregnant patients. Generally, the pharmacological treatment of SVT in pregnant women is comparable to that in non-pregnant women. Nevertheless, concerns about fetal safety need to be taken into account before initiating any therapy.

Case Presentation: We reported a 34-year-old female G3P2A0 in her 35 weeks of gestation who came to the emergency department with sudden onset palpitations within 2 hours prior to admission. She had no prior history of any major medical illness. The clinical examination revealed that the patient had a regular pulse rate of 198 bpm and a blood pressure of 80/50 mmHg. The electrocardiogram showed the presence of SVT. Synchronized cardioversion using 50 joules of power was performed. The patient's rhythm converted to sinus tachycardia with a pulse rate of 120 bpm and a blood pressure of 90/60 mmHg. The patient was admitted to the ICCU immediately after cardioversion and discharged from the hospital without any adverse effects after two days of monitoring.

Conclusion: SVT is the predominant arrhythmia found in pregnant women. When dealing with an unstable SVT patient, cardioversion is the preferred treatment option, which generally can be done safely for both the mother and the fetus. Close monitoring following cardioversion is necessary to guarantee the well-being of the fetus.

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Introduction

Supraventricular tachycardia (SVT) is a type of arrhythmia marked by a rapid atrium rate exceeding 100 bpm when the person is in resting condition, with the mechanism involving the bundle or tissue above it.¹ Traditionally, the term SVT is used to describe all kinds of tachycardia except ventricular tachycardia (VT) and atrial fibrillation (AF).²

The prevalence of SVT in the general population was 2,25/1000 people, with an incidence rate of 35/100.000 people annually. People older than 65 years old have five times the risk of developing SVT compared to younger patients. Women have been shown to have twice the risk of having SVT compared to men.³

Pregnancy can predispose to the occurrence of arrhythmia, particularly among individuals with a background of congenital or structural heart disease.⁴ Although SVT in pregnancy can be treated in the same manner to that in non-pregnant patients through the application of the valsalva maneuver or carotid sinus massage, managing SVT in pregnant patients with hemodynamic instability necessitates the use of electrical cardioversion. However, this approach gives rise to apprehensions regarding its impact on the well-being of the fetus.⁵⁻⁷ In this paper, the authors report SVT cases with hemodynamic instability in a pregnant woman who was successfully treated with cardioversion.

Case Illustration

A woman aged 34 years old, G3P2A0, on her 35th week of pregnancy, was admitted to the emergency room of RSIY PDHI, presenting with palpitations. The condition occurred two hours prior to hospitalization. The condition appeared suddenly without any prior activity and didn't improve with rest. The patient also complained that she had difficulty breathing, as if her chest were weighed down with heavy objects. The patient denied the consumption of any medication prior to the condition. The patient also denied having symptoms such as tremors, weight loss, excessive sweating, or any abnormal mass on her neck. The patient admitted that she experienced the same condition during her first pregnancy. However, the symptom disappeared on its own, so the patient didn't go for a thorough examination and treatment afterward.

On physical examination, the patient was fully conscious, despite looking restless. The blood pressure was 80/60 mmHg, the pulse rate was 198 bpm, the pulses were palpable, strong, fast, and regular, and the respiratory rate was normal. The lung and heart examinations showed an abnormality. Obstetric examination revealed the uterine's fundus was 28 cm, the fetal heart rate was 157 x/minute, the fetus was actively moving, and no sign of uterine contractions was detected. Oliguria was not found, and the capillary refill time (CRT) was within the normal range. The result of the electrocardiogram (ECG) showed supraventricular tachycardia with a regular heart rate of 187 x/min (**Figure 1**).

Based on the symptoms and examination's results, the patient was diagnosed with supraventricular tachycardia with unstable hemodynamics. The patient agreed to have synchronized cardioversion done for her. As a means of sedation, 2.5 mg of Midazolam were administered intravenously. After sedation, synchronized cardioversion with a dose of 50 joules was administered. After the first dose of synchronized cardioversion, the ECG rhythm converted into sinus tachycardia with heart rates of 115x/minute (**Figure 2**) and a blood pressure of 90/60 mmHg. The blood laboratory showed 11.6 g/dL hemoglobin, 35.0% hematocrit, 10.97 x 10³/μL Leukosit, and 3,53 x 10⁶/μL Eritrosit. The blood serum electrolyte showed a level of natrium of 150,4 mmol/l, kalium of 3,17 mmol/l, and chloride of 98,8 mmol/l. The thyroid function test showed a free T4 hormone level of 0.85 ng/dL and TSH-s of 0.97 μIU/mL.

The patient was admitted to the Intensive Cardiovascular Care Unit (ICCU) with the echocardiography result revealed a moderate regurgitation of the mitral valve, left atrium dilatation, normal global and segmental function with an ejection fraction of 70%, and normal right ventricle systolic function. After a day of care in the ICCU, the condition of the patient had improved; symptoms of palpitation and difficulty breathing had gone; the patient was fully conscious; the blood pressure was 90/60; the pulse was strong, palpable, and regular with a rate of 98 x/min; the respiratory rate was 20 x/min; and the patient had a normal temperature. The patient was then moved to the ward, and after two days of observation, the patient and the fetus were in good and stable condition. Finally, the patient was discharged from the

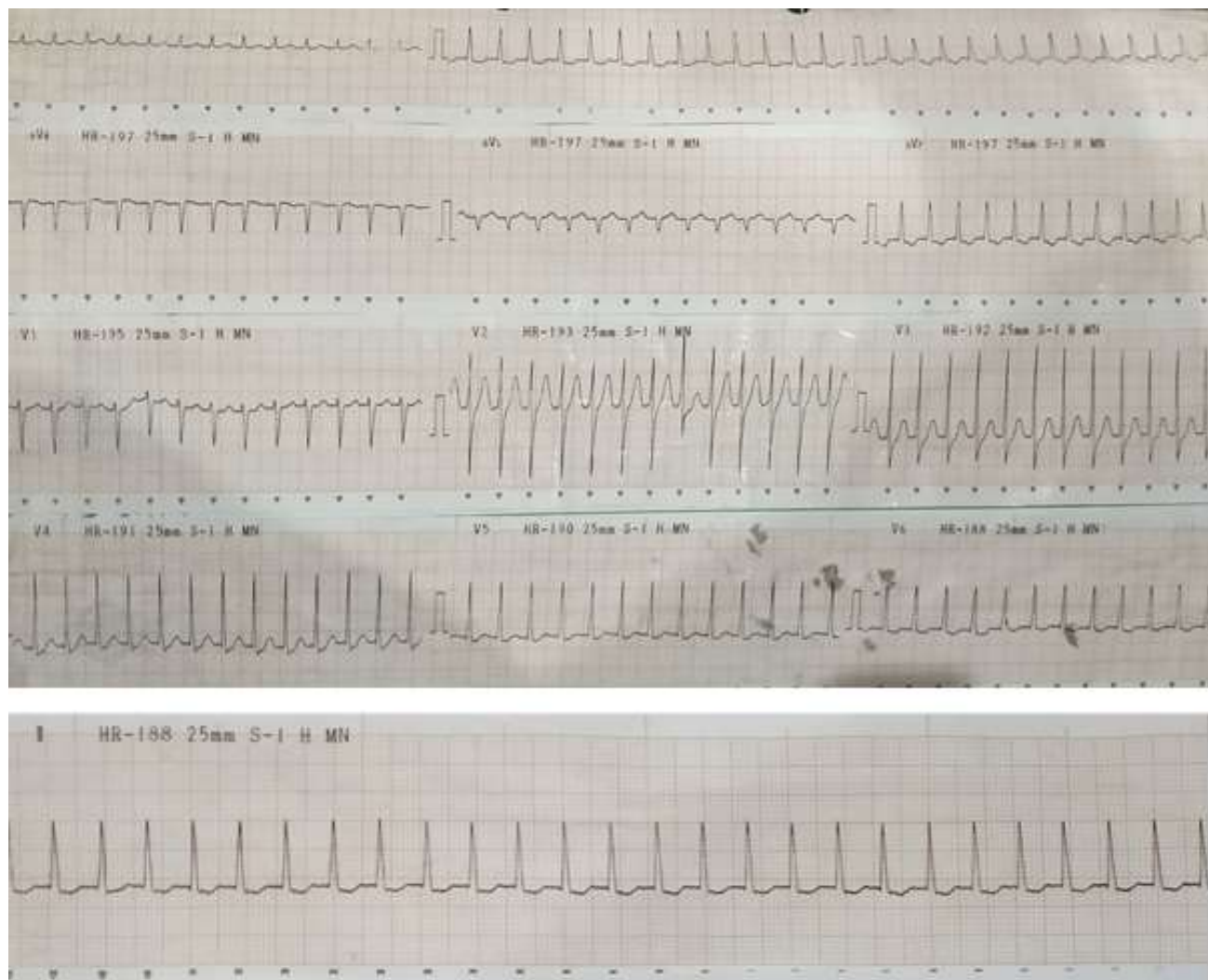


Figure 1. ECG showing supraventricular tachycardia with the rate of 187x/minute.

hospital.

Discussion

Arrhythmia is a condition that frequently happens in pregnant women with structural heart abnormalities or in those who have previously suffered from arrhythmia. However, it can also happen in pregnant women without any structural abnormalities of the heart during their first pregnancy.⁸ AVNRT, followed by AVRT, are the most common types of SVT in pregnant women without any structural heart abnormalities.⁹ AF and SVT are the types of arrhythmia that often occur in

pregnant women, with the prevalence of SVT around 24 per 100,000 pregnant women who were hospitalized.¹⁰

Research by Regitz-Zagrosek V et al. showed that the rates of cesarean delivery, low birth weight, preterm delivery, fetal distress, and pregnancy-related abnormalities in pregnant women with SVT are higher compared to those without SVT.¹⁰

The proposed mechanism for the incidence of arrhythmia in pregnant women is thought to be a combination of hemodynamic factors, hormonal changes, and autonomic nervous system changes that occur during pregnancy. The increase in plasma volume caused the atrium and ventricle to stretch. It has

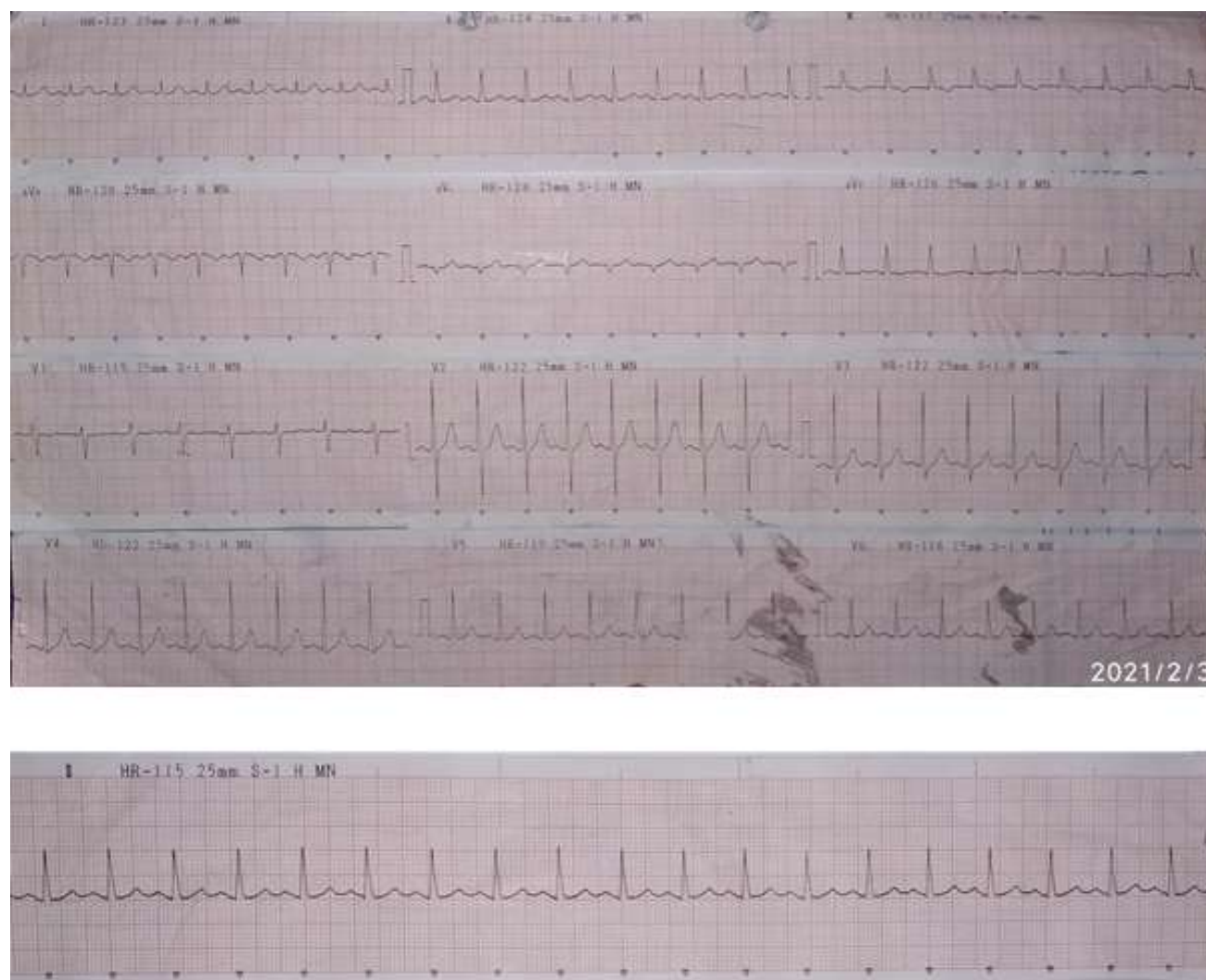


Figure 2. ECG after cardioversion showing sinus tachycardia with the rate of 115x/minute.

contributed to the arrhythmogenesis process through some mechanisms, such as membrane depolarization caused by the activation of stretched ion channels, a shortened refractory phase, and a decrease in conduction speed.⁹ The increase of estrogen and progesterone also contributes to the induction of arrhythmia by increasing the sensitivity of adrenergic receptors.⁸⁻¹¹

The most common symptoms experienced by the patient are palpitations, sometimes followed by shortness of breath, chest discomfort, and presyncope.¹⁰ A blood laboratory examination is important to find the cause of arrhythmia, like hyperthyroidism, anemia, or electrolyte imbalance, especially hypokalemia or hypomagnesemia.⁸

The management of SVT in pregnant patients is generally the same as in other populations. On the stable SVT, a vagal maneuver was done as the first choice. If the vagal maneuver is unable to convert the rhythm back to sinus, adenosine becomes the first choice of medication for SVT termination.^{2,9,10} Adenosine is considered safe for pregnancy, with a conversion level of up to 90%.⁹ If adenosine fails, beta-blockers like acebutolol, pindolol, or metoprolol can be given safely to pregnant women.⁵ Calcium channel blockers, such as verapamil, come as the third-line medication if all previous attempts failed.^{2,5,9} Amiodarone can only be given as the last resort if all of the medications before failed to convert the SVT into sinus rhythm, considering the teratogenic

risk of amiodarone, especially during the first trimester of pregnancy.^{2,12}

The majority of SVT cases are stable SVT cases whose symptoms are tolerable to the patient. However, some cases can cause hemodynamic problems that compromise the blood flow to the fetus.⁸ Synchronised cardioversion becomes the mainstay of therapy for unstable SVT. It can also be given to the condition if the anti-arrhythmic drugs fail to convert the SVT. According to scientific statement issued by American Heart Association, anterolateral defibrillator pad placement is recommended with class recommendation IIa, with lateral pad should be placed underneath the breast tissue.¹⁵ Cardioversion poses a very low risk to the fetus, so it is generally safe for the pregnant woman and the fetus.⁸ However, close monitoring is needed following cardioversion to detect any possibility of fetal distress.⁸ The recommended first dose of cardioversion starts at as low as 50 joules.⁸

Despite the patient's blood pressure measuring 90/60 post-electrical cardioversion, the presence of hypotension in the initial emergency scenario could not be overlooked, as the baseline blood pressure of the patient was unavailable. Taking this into account, the decision was made to proceed with electrical cardioversion in alignment with the guidelines recommended by the American Heart Association.

There has been a report of fetal distress following cardioversion; however, this condition can also occur from the mother's hypotension as a result of arrhythmia.¹³ In this case, the pregnancy should be terminated with a cesarean section. Thus, the management of SVT in pregnancy also requires collaborative teams consisting of obstetricians and pediatricians in cases of fetal distress to occur.^{11,13} It was found that the success rate of cardioversion in a pregnant woman was around 93.2%, while in the regular population, it was around 42–92%.¹⁴ The success of the cardioversion was affected by several factors, including the type of arrhythmia and the characteristics and power of the current.¹⁴

Conclusion

SVT is a type of arrhythmia that frequently occurs in pregnant women, with the highest incidence occurring in women who have a history of structural heart disease or arrhythmia before the pregnancy. In cases of unstable

SVT, cardioversion is the first-line therapy that is considered safe for the mother and the fetus. In such a condition, close monitoring needs to be done prior to and following cardioversion to detect any adverse effects on the fetus.

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