

**ARTICLE**

Successful Vaginal Delivery after Implantable Cardiac Defibrillator Placement for Management of Ventricular Tachycardia

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Received: 28 July 2020 Accepted: 12 October 2020

ABSTRACT

A 23-year-old female with Tetralogy of Fallot who is 30w6d pregnant presented with palpitations and syncope from an outside hospital. She was found to have ventricular tachycardia. Successful placement of a transvenous implantable cardiac defibrillator allowed for symptomatic control and a subsequent successful vaginal delivery.

KEYWORDS

Ventricular tachycardia; pregnancy; intracardiac defibrillatory

1 Introduction

23-year-old G3P2002 with 2 prior term deliveries presented at 31 weeks gestation as a transfer from an outside hospital after presenting with palpitations, chest pain and syncope. Patient reported that for the past few months, she had been experiencing increasing palpitations on exertion, worsening over the past few days, resulting in a syncopal episode while standing up. She was found to be in wide complex tachycardia, prompting direct current cardioversion. This resulted in sinus rhythm with a ventricular rate of 40 BPM. On admission to our hospital, her heart rate was 52 BPM, blood pressure was 119/57 mmHg and sPO₂ was 99%. Electrolytes were the following: Na 138, K 3.9, Mg 1.7, and Calcium 8.6. Hgb was 11.3, platelets were 234. She did not know she was pregnant until this admission and denied any similar symptoms in past pregnancies. An EKG was performed showing sinus bradycardia with occasional PVCs and a right bundle branch block, QRS duration of 150 ms. Echocardiogram showed mild tricuspid valve regurgitation, mildly regurgitant and stenotic RV-PA conduit, moderately dilated RV with mildly depressed systolic function, and normal LV systolic function. Telemetry monitoring revealed premature ventricular contractions and episodes of non-sustained ventricular tachycardia.

This pregnancy was complicated by two prior emergency department visits to outside hospitals presenting with syncope and tachycardia requiring DC Cardioversion. She was referred to adult congenital heart disease, but did not show up for her scheduled outpatient visits.

2 Past Medical History

Patient has a history of depression in addition to a cardiac diagnosis of Tetralogy of Fallot. At the age of 3 months, she underwent VSD closure, pulmonary valvotomy, and right ventricular outflow tract patch. Post



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operatively, she had severe pulmonary artery stenosis requiring a Rastelli-type repair with placement of a RV-PA conduit nine months later. She subsequently underwent balloon dilation of the left pulmonary artery 3 years later due to residual pulmonary artery stenosis. She was lost to follow-up with adult congenital heart disease until this hospital admission.

3 Differential Diagnosis with Investigations

In this patient presenting with syncope and wide-complex tachycardia, ventricular tachyarrhythmias were suspected, most likely with a focus derived around previous surgical scar. Certainly, channelopathies such as Brugada syndrome and long QT syndrome are also on the differential. However, ECG findings were not consistent with Brugada syndrome and the patient did not have a prolonged QT interval. The need for an implantable cardiac defibrillator was discussed with the patient as secondary prevention in the setting of documented ventricular tachycardia and syncope.

4 Management

Management options were discussed with the patient, including medical management with beta blockers, external wearable defibrillator, subcutaneous ICD, and transvenous ICD. Antiarrhythmics and beta blockers were a consideration for this patient, however, due to her history of structural heart disease and syncope associated with known ventricular tachycardia, the risk of recurrent arrhythmia and sudden cardiac death was high. Defibrillator therapy was indicated in this patient with options including either external vest defibrillator or internal subcutaneous versus transvenous defibrillators. While the external defibrillators pose no risk to the pregnancy, they are associated with noncompliance, thus remaining at risk for sudden cardiac death. Implantable device was considered to be safest and most effective in this patient. Subcutaneous ICDs, when compared to the transvenous option, uses minimal to no radiation but requires defibrillator threshold testing in order to ascertain gauge placement. The patient was deemed not a candidate for subcutaneous ICD due to T-wave oversensing. After risks and benefits were thoroughly discussed with the patient, the patient underwent uncomplicated placement of a dual chamber Medtronic ICD in the left axillary vein under ultrasound guidance to minimize fluoroscopy. The patient was discharged three days later on Metoprolol 25 mg twice daily. She returned at 33w6d in active labor, and she was able to undergo an uncomplicated vaginal delivery after epidural placement. On admission, she denied any palpitations, shortness of breath, syncope, or chest pain. During the labor process, patient was placed on telemetry monitoring with no recorded arrhythmias.

5 Discussion

Outcomes of ventricular tachycardia as well as management options in pregnancy are not well known. Yet, cardiovascular diseases during pregnancy are the leading cause of mortality in the peripartum period [1]. The arrhythmic risk of ventricular tachycardia in pregnancy is evident, with one study noting a 5% risk of cardiac syncope and 13% risk of miscarriage in patients succumbing to ventricular tachycardia [2]. According to the ACC, AHA and ESC, patients with known structural heart disease, cardiac arrest survivors, and patients with unstable and sustained ventricular tachycardia are all candidates for internal defibrillators [3]. However, the safety and efficacy profile of implantable cardiac defibrillators in pregnancy has not been widely assessed. In one study performed by Boulé et al. [4] assessing the obstetric and cardiac outcomes in patients with structural cardiomyopathies and channelopathies, they found no device related complications or device related adverse pregnancy outcomes. Myoshi et al. [5] described an increase in nonsustained ventricular tachycardia after the second trimester in six women who underwent ICD placement in pregnancy. All of these patients were delivered by cesarean section. Thus, it is evident that more studies need to be conducted to evaluate the effects of ICDs in pregnancy and the feasibility for vaginal delivery. Our case supports previous studies that show transvenous ICDs can safely

be placed under ultrasound guidance as an effective method for secondary prevention in pregnancy, thus limiting, radiation exposure.

6 Follow-Up

The patient did well postpartum and followed up with cardiology on a monthly basis. An echocardiogram done one year later showed normal left ventricular systolic function with the ICD lead in the right ventricle, mildly dilated right ventricle with mildly depressed right ventricular systolic function and mild RV-PA conduit stenosis and regurgitation. The patient was still experiencing occasional palpitations, with evidence of recurrent ventricular and atrial tachycardia on EKGs. She underwent catheter ablation of ventricular tachycardia at 6 months postpartum.

7 Conclusion

Ventricular tachycardia is a rare occurrence in pregnancy, but can lead to severe morbidity and mortality if not addressed. Follow up with a maternal fetal specialist and cardiologist is crucial as these patients are at a higher risk for decompensation due to the physiological changes in pregnancy. In particular, patients with known structural heart defects are at higher risk for arrhythmias during pregnancy and must be monitored closely. Transvenous ICD placement is a safe and effective method for management of ventricular tachycardia in pregnancy when indicated. Our patient was able to have a successful vaginal delivery, with no adverse outcomes. Ultrasound guided lead placement can be considered during transcutaneous ICD placement in order to reduce the need for radiation, thus making it a more enticing alternative.

Funding Statement: The author(s) received no specific funding for this study.

Conflicts of Interest: The authors declare that they have no conflicts of interest to report regarding the present study.

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