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CASE REPORT Open Access

One ominous case of focal atrial tachycardia in pregnancy, two victims and a successful outcome: a case report

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Abstract

Background: Pregnancy is associated with both new-onset and exacerbation of pre-existing arrhythmias, particularly supraventricular tachycardia, with increased maternal and fetal risks and with added concerns on the safety of the available drug therapy and catheter ablation techniques.

These are often withheld, with worse outcomes, and lead to challenging decisions in the approach to pregnant women with refractory supraventricular arrhythmias.

Case presentation: We present a case of a 28-year-old 37-weeks pregnant woman with symptomatic, almost incessant, atrial tachycardia causing tachycardia-induced cardiomyopathy, refractory to medical therapy, that evolved in acute cardiac failure and needed emergency cesarian delivery. The patient was afterward submitted to catheter ablation therapy, with an electrical isolation of the ectopic foci on the lower left pulmonary vein with radiofrequency and total suppression of the arrhythmia. The patient and infant were discharged clinically well and during follow-up the patient was asymptomatic, without recurrence of tachycardia and with complete recovery of left ventricle function.

Conclusions: This case highlights the challenges in the treatment of this special population with a stepwise medical approach that proved ineffective and clinical deterioration requiring termination of pregnancy and catheter ablation in the postpartum period, with a successful maternal and fetal outcome.

Keywords: Case report, Focal atrial tachycardia, Tachycardia-induced cardiomyopathy, Arrhythmias in pregnancy, Catheter ablation therapy

Background

Arrhythmias are a common cardiovascular complication in pregnancy and have been increasing in recent years [1]. Women with pre-existing arrhythmias are at high risk of recurrence or exacerbation during pregnancy, particularly in the latter part of the second trimester, third trimester and peripartum period [2]. This may be due to a variety of factors such as: increased plasma catecholamine concentrations; increased heart rate; temporary cardiac remodeling associated with progesterone, estrogen and relaxin; and an increased ventricular end-diastolic volume caused by intravascular volume expansion [2–4]. The treatment of such arrhythmias poses a challenge, given the potential teratogenic effect of some of the drugs commonly used and of the radiation implicated in catheter ablation [3].

Case report

A 28-year-old patient, 37-weeks pregnant, with no relevant priors or regular medication, was consulted by her gynecologist due to a long-lasting history of palpitations

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and pre-syncope aggravated since the twentieth week of pregnancy.

A 12-lead electrocardiogram and a 24-h Holter monitoring were requested that demonstrated repetitive, almost incessant, narrow QRS complex tachycardia alternating with rare sinus beats, suggestive of atrial tachycardia (Figs. 1 and 2). The average heart rate was 155 beats per minute (bpm), maximum of 234 bpm and a minimum of 84 bpm. A cardiology consultation was then requested, and the patient was immediately admitted for initiation of antiarrhythmic therapy under close monitoring.

At admission the patient was hemodynamically stable with an unremarkable physical examination, except for a rapid and irregular rhythm. A transthoracic echocardiogram (Additional File 1: Video S1) demonstrated a dilated left ventricle with diffuse hypokinesis and moderately compromised ejection fraction (35% by Simpson Biplane) and a diagnosis of tachycardia-induced cardiomyopathy was assumed.

Administration of adenosine with complete atrioventricular block demonstrated monomorphic P waves and resumption of clinical arrhythmia. The patient was started on propranolol in uptitrating doses and flecainide which were ineffective. Digoxin was then administered with some reduction in the average heart rate while maintaining frequent symptomatic episodes of atrial tachycardia.

The patient evolved in acute congestive cardiac failure at third day of admission and, after multidisciplinary meetings, an emergency cesarean delivery was decided

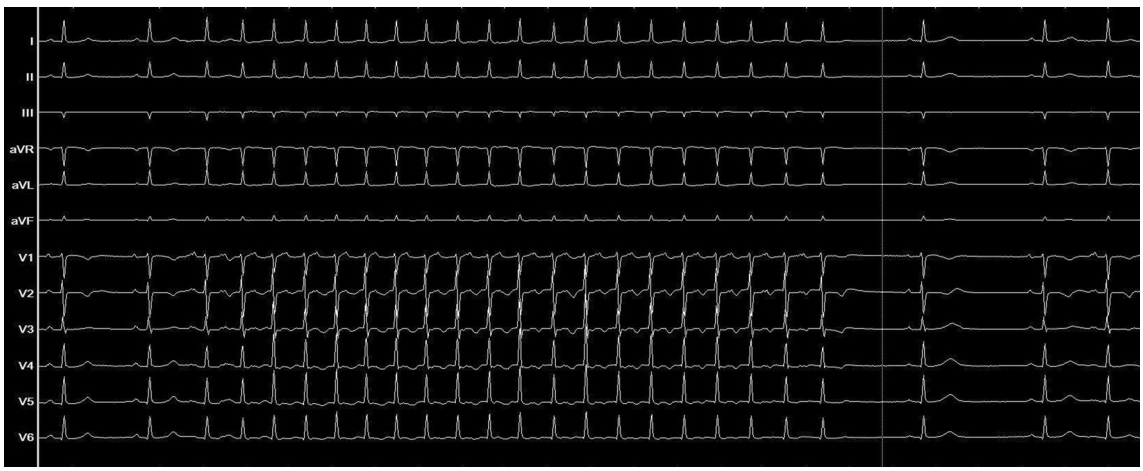

Fig. 1 A 12-lead Electrocardiogram demonstrating a narrow QRS complex tachycardia

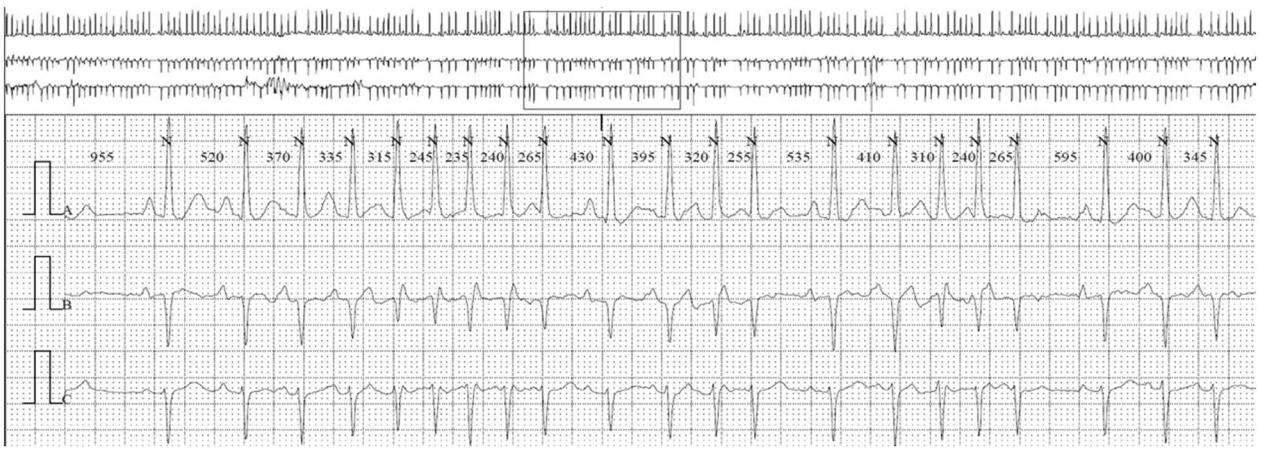

Fig. 2 A 24-h Holter monitoring strip demonstrating repetitive narrow QRS complex tachycardia alternating with rare sinus beats, suggestive of atrial tachycardia

on and performed. Perioperative hemodynamically instability occurred with transient need of vasopressor therapy. The patient was admitted in an intensive care unit achieving clinical stability at 24 h. The newborn was admitted in a neonatal intensive care unit as a precaution.

Given the poor response to pharmacological treatment the patient was submitted to an electrophysiological study. The study confirmed a focal atrial tachycardia (Fig. 3) and, using a 3D mapping system (CARTO ©3D Mapping system), identified the earliest local activation at the lower left pulmonary vein (Fig. 4 and Additional File 2: Video S2). An electrical isolation of the vein with radiofrequency catheter ablation was performed with total suppression of the ectopic foci (Fig. 5). There was no recurrence, even after infusion of isoprenaline.

Upon clinical improvement, the patient was discharged, asymptomatic, and without recurrence of the arrhythmia. The newborn evolved clinically well, without sequelae.

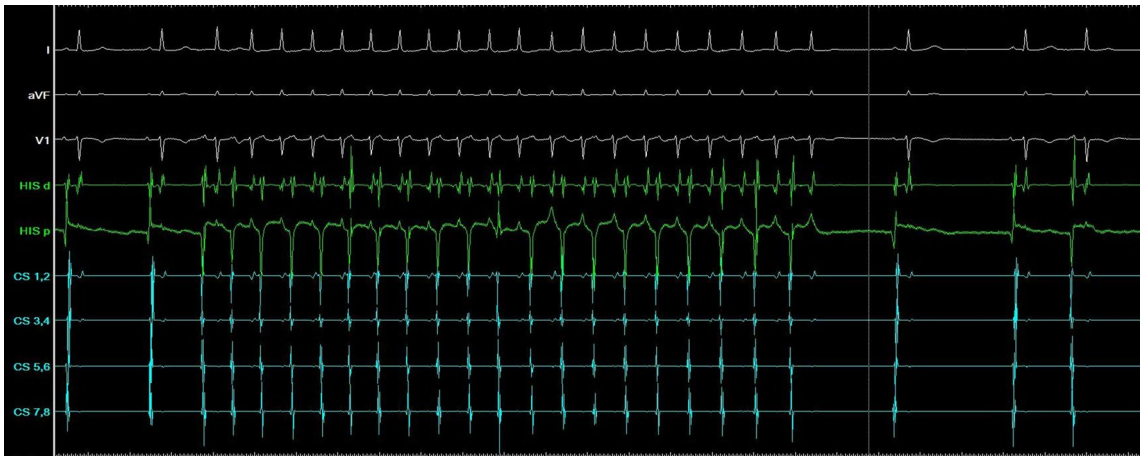

Fig. 3 An intracardiac electrogram of the electrophysiological study demonstrating focal atrial tachycardia

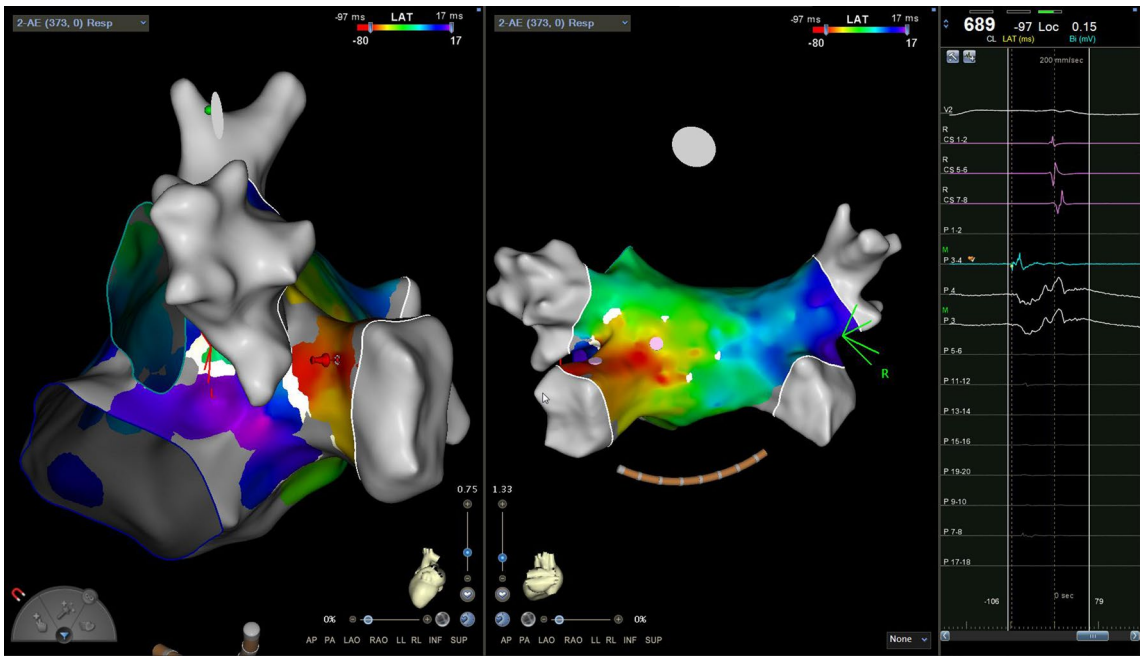

Fig. 4 The electrophysiological study performed in focal atrial tachycardia identified the region of earliest local activation in the lower left pulmonary vein (CARTO ©3D Mapping system)

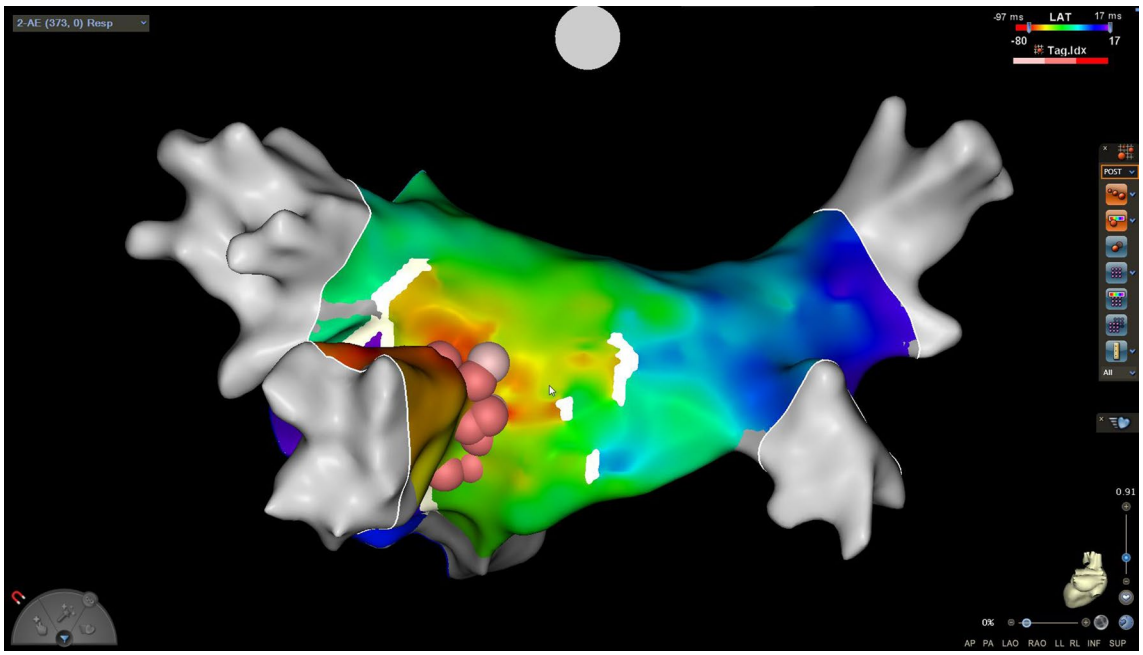

Fig. 5 The electrical isolation of the lower left pulmonary vein with radiofrequency catheter ablation was performed with total suppression of the ectopic foci (CARTO ©3D Mapping system)

In the follow-up at 4 months the patient was asymptomatic, without drug therapy, with normal resumption of everyday activity. There was no recurrence of arrhythmia or supraventricular extrasystoles on a 24 h Holter monitoring and the transthoracic echocardiogram (Additional File 3: Video S3) showed a non-dilated left ventricle, without regional wall motion abnormalities, and a complete recovery of left ventricular function (64% by Simpson Biplane).

Discussion

Paroxysmal supraventricular tachycardia has been previously considered the most frequent sustained arrhythmia in pregnancy. However, atrial fibrillation and ventricular tachycardia have had an increasing frequency, probably due to increasing maternal age and cardiovascular risk factors [3, 4]. Hospitalizations during pregnancy for arrhythmias are associated with an increased risk of both maternal and fetal complications, including maternal mortality [4].

In the treatment of atrial arrhythmias one should consider that although some drugs are deemed safe, most data on the safety of medication use during pregnancy relies on observational studies and expert opinion [3].

Some beta-blockers, like propranolol, and digoxin have extensive data in its safety and were therefore used in our patient but with poor clinical response. Flecainide is considered moderately safe in pregnancy, while other drugs like propafenone have mixed data [3, 4], and thus opted for although once again with no satisfying result. Amiodarone was not used as it is contraindicated in pregnancy [3].

Catheter ablation has been successfully performed during pregnancy in experienced centers using either minimal fluoroscopy or electroanatomic mapping systems and intracardiac ultrasound ("zero-fluoroscopic ablation") for drug-refractory and poorly tolerated arrhythmias [4]. However, given the scarce data and the potential fetal and maternal procedural risk, deferring ablation until the postpartum period is preferred whenever possible [4]. After close coordination with the Gynecology department, and given an early term pregnancy with adequate fetal development, an emergency cesarian delivery was opted for and a catheter ablation was successfully performed afterward, with good clinical outcome.

Conclusion

This case highlights a malignant course of focal atrial tachycardia, aggravated by pregnancy and unresponsive to medical therapy, with a successful catheter ablation therapy and clinical response, demonstrating the paramount importance of a multidisciplinary and stepwise approach to a complex situation.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s42444-022-00079-7.

Additional file 1: Video S1. A transthoracic echocardiogram demonstrating a dilated left ventricle with diffuse hypokinesis and moderately compromised ejection fraction (35% by Simpson Biplane).

Additional file 2: Video S2. The electrophysiological study performed in focal atrial tachycardia identified the region of earliest local activation in the lower left pulmonary vein (CARTO ©3D Mapping system).

Additional file 3: Video S3. A transthoracic echocardiogram demonstrating a non-dilated left ventricle, without regional wall motion abnormalities, and a normal left ventricular ejection fraction (64% by Simpson Biplane).

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Author contributions
JGS, AB and DS were responsible for data collection and drafting the manuscript; SA and RM were the electrophysiologists in charge of the patient assessment, electrophysiological study and follow-up; LB was responsible for critically revising the manuscript; HP is the Head of Department and gave the final approval for the manuscript submitted. All authors read the final manuscript.

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Declarations

Ethical approval and consent to participate
Not applicable.

Consent for publication
All data generated is anonymized.

Competing interests
The authors declare that they have no competing interests to disclose.

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