

**> THE PATIENT**  
29-year-old G1P0 woman;  
13 weeks' gestation

**> SIGNS & SYMPTOMS**  
– Heart palpitations  
– Chest tightness

**Joseph Lane Wilson, MD;  
Bridgid Hast Wilson, MD,  
PhD; Justin R. Edwards,  
MD, FAAFP**

Department of Family  
Medicine, East Carolina  
University Brody School of  
Medicine, Greenville, NC

[wilsonjo@ecu.edu](mailto:wilsonjo@ecu.edu)

*The authors reported no  
potential conflict of interest  
relevant to this article.*

## > THE CASE

A 29-year-old G1P0 woman at 13 weeks' gestation came in for a routine prenatal visit complaining of sudden-onset heart palpitations that were occurring about once a week. Each episode lasted between 15 and 60 minutes and was accompanied by chest tightness, with no identifiable cause. The patient could inconsistently terminate the episodes with Valsalva maneuvers. She reported having had 2 similar incidents of palpitations within the past year. Her family history was significant for sudden cardiac death of her father and paternal grandfather in their fifth decades of life.

A cardiovascular exam was normal; heart auscultation revealed a regular rate and rhythm without murmurs, rubs, or gallops, and the peripheral pulses were normal. A thyroid-stimulating hormone (TSH) level, basic metabolic panel (BMP), and complete blood count (CBC) were within normal limits. A transthoracic echocardiogram was negative for structural heart disease.

## THE DIAGNOSIS

An initial Holter monitor study failed to capture an episode of her palpitations. The frequency of her palpitations increased as her pregnancy progressed, occurring almost daily by the second half of the third trimester, and a repeat Holter monitor study in the third trimester was significant for a 3-minute episode of supraventricular tachycardia (SVT) that correlated with patient-recorded symptoms (FIGURE).

Based on these results, we diagnosed the patient with an atrioventricular nodal reentry tachycardia (AVNRT). Although atrioventricular reciprocating tachycardia (AVRT) remained a remote possibility, it is far less common, and a 12-lead electrocardiogram (EKG) showed no evidence of pre-excitation.

## DISCUSSION

AVNRT is the most common form of paroxysmal supraventricular tachycardia (PSVT). It occurs more frequently in women and typically manifests in the second to fourth decades of life.<sup>1</sup> AVNRT is a narrow complex tachycardia characterized by a heart rate of 120 to >200 beats/min.

**FIGURE**  
**Holter monitor study**

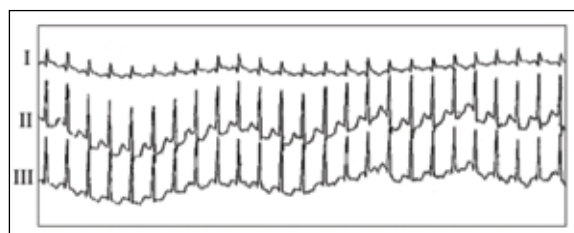


IMAGE COURTESY OF JUSTIN R.  
EDWARDS, MD, FAAFP

Narrow complex tachycardia was captured with a Holter monitor study. P waves were obscured by the QRS complex, and the patient's heart rate measured 218 beats/min.

CONTINUED

TABLE

## Antiarrhythmics used for the treatment of SVT<sup>8,9</sup>

Class	Medication	FDA pregnancy category	Lactation	Adverse effects
I	Flecainide	C	Little data, low levels enter breast milk	Little data, crosses placenta
II	Acebutolol	B	Enters breast milk, not preferred	Hypotension, bradycardia, tachypnea
	Atenolol	D	Enters breast milk, not preferred	IUGR, do not use
	Metoprolol	C	Safe	Bradycardia, sexual dysfunction
	Pindolol	B	Safe	Bradycardia, sexual dysfunction
	Propranolol	C	Safe	Bradycardia, sexual dysfunction
III	Sotalol	B	Enters breast milk, use only with close infant monitoring	Bradycardia, hypotension, IUGR, prematurity
	Amiodarone	D	Unpredictable breast milk levels, not preferred	Growth retardation, prematurity, hypothyroidism
IV	Diltiazem	C	Enters breast milk at low levels	May have tocolytic effect
	Verapamil	C	Enters breast milk at low levels	May have tocolytic effect
V	Adenosine	C	Safe, given its short half-life	Little evidence of harm in first trimester only

FDA, US Food and Drug Administration; IUGR, intrauterine growth restriction; SVT, supraventricular tachycardia.

### Hemodynamic changes in pregnancy can trigger arrhythmias

During pregnancy, hemodynamic changes (including increased blood volume and cardiac output) are thought to stimulate stretch-activated ion channels within the walls of the heart.<sup>2-4</sup> Such changes may exacerbate previously existing cardiac arrhythmias or (less commonly) cause new-onset arrhythmias.<sup>3,4</sup> A family history positive for arrhythmias or sudden cardiac death increases the likelihood of developing tachyarrhythmia during pregnancy.<sup>3</sup> Women with a known history of PSVT might experience symptom exacerbation despite being on prophylactic therapy.<sup>4</sup>

### Detection and diagnosis

While AVNRT is relatively benign in pregnancy, other cardiac arrhythmias (eg, atrial fibrillation/flutter, ventricular tachycardia) carry a greater risk for fetal and maternal

complications, underscoring the need to correctly identify the type of arrhythmia.<sup>2,3</sup>

■ **Physical exam findings** are often unremarkable unless the patient is actively experiencing SVT in the office, in which case prominent jugular pulsations may be seen due to simultaneous contraction of the atria and ventricles.

The initial evaluation of a pregnant patient presenting with tachycardia should include a BMP, TSH, 12-lead EKG, and trans-thoracic echocardiography.<sup>3,5</sup> In most patients with AVNRT, the results of these tests will be normal. A Holter monitor can be used to document an arrhythmia if the episodes are relatively frequent or an event monitor can be used if the episodes are infrequent.<sup>5</sup>

■ **EKG findings.** When patients are actively experiencing SVT, EKG findings include a P wave obscured by the QRS complex, sometimes manifesting as a pseudo-R wave

in the V1 lead and a pseudo-S wave in leads II, III, and AVF. The QRS complex is narrow and the R-R interval is regular.<sup>6</sup>

### Types of treatment

**Valsalva maneuvers.** Treatment of AVNRT in pregnancy should first involve addressing any precipitating causes, including metabolic and endocrine abnormalities.<sup>3</sup> As virtually all antiarrhythmic drugs cross the placenta and are traceable in breast milk,<sup>2,3</sup> patients should be counseled to try to stop episodes using Valsalva maneuvers before moving to pharmacologic treatment.

■ **Antiarrhythmics.** First-line pharmacologic treatment for the prevention of AVNRT in pregnancy is metoprolol or verapamil.<sup>2,5</sup> Neither drug has been associated with adverse outcomes in infants, although there is a large body of evidence suggesting that low levels of metoprolol are present in breast milk.<sup>7</sup>

Acute episodes of SVT that are refractory to vagal maneuvers or occur despite medical management can be treated acutely in pregnancy with adenosine, which effectively stops episodes about 90% of the time.<sup>2</sup> (See the **TABLE**<sup>8,9</sup> for a list of antiarrhythmics that may be used to treat AVNRT.)

■ **Catheter ablation** is first-line treatment for AVNRT in nonpregnant patients.<sup>1,5</sup> The risks of undergoing ablation during pregnancy include fetal exposure to radiation and anesthetic drugs.<sup>2,3</sup> Therefore, this treatment should be used only when pharmacologic treatment is unsuccessful and risks to the mother and fetus due to the arrhythmia outweigh the risks of the procedure. Ablation can be offered postpartum as more definitive therapy.

■ **Our patient** was started on metoprolol tartrate 12.5 mg bid at 35 weeks' gestation due to increasingly common and persistent palpitations. This helped control the episodes for 2 weeks, at which point they increased again in frequency. These were terminated using

Valsalva maneuvers; increasing the metoprolol dosage was prohibitive due to patient intolerance.

Following an uncomplicated delivery, and discontinuation of metoprolol, the patient reported a decrease in both the number of episodes and the duration of SVT. Ultimately, she opted for a catheter ablation to prevent SVT exacerbation during subsequent pregnancies.

### THE TAKEAWAY

AVNRT (and other tachyarrhythmias) may worsen or manifest with physiologic changes that occur during pregnancy. After establishing the diagnosis, effort should be made to manage the condition conservatively with Valsalva maneuvers and medication. Catheter ablation should be offered postpartum as a more definitive treatment option. **JFP**

#### CORRESPONDENCE

Joseph Lane Wilson, MD, ECU Brody School of Medicine, Department of Family Medicine Medical Director, 101 Heart Drive, Greenville, NC 27834; wilsonjo@ecu.edu.

#### References

1. Kwaku KF, Josephson ME. Typical AVNRT—an update on mechanisms and therapy. *Card Electrophysiol Rev.* 2002;6:414-421.
2. Enriquez AD, Economy KE, Tedrow UB. Contemporary management of arrhythmias during pregnancy. *Circ Arrhythm Electrophysiol.* 2014;7:961-967.
3. Knotts RJ, Garan H. Cardiac arrhythmias in pregnancy. *Semin Perinatol.* 2014;38:285-288.
4. Silversides CK, Harris L, Haberer K, et al. Recurrence rates of arrhythmias during pregnancy in women with previous tachyarrhythmias and impact on fetal and neonatal outcomes. *Am J Cardiol.* 2006;97:1206-1212.
5. Page RL, Joglar JA, Caldwell MA, et al. 2015 ACC/AHA/HRS guideline for the management of adult patients with supraventricular tachycardia: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Rhythm Society. *Circulation.* 2016;133:e471-e505.
6. Di Biase L, Gianni C, Bagliani G, et al. Arrhythmias involving the atrioventricular junction. *Card Electrophysiol Clin.* 2017;9:435-452.
7. Fitzpatrick RB. LactMed: drugs and lactation database. *J Electron Resour Med Libr.* 2007;4:155.
8. Yaksh A, van der Does LJ, Lanters EA, et al. Pharmacological therapy of tachyarrhythmias during pregnancy. *Arrhythm Electrophysiol Rev.* 2016;5:41-44.
9. US National Library of Medicine. Drugs and lactation database (LactMed). Available at: [toxnet.nlm.nih.gov/newtoxnet/lactmed.htm](http://toxnet.nlm.nih.gov/newtoxnet/lactmed.htm). Accessed July 3, 2018.

➤ Tachyarrhythmias such as atrioventricular nodal reentry tachycardia may worsen or manifest with physiologic changes that occur during pregnancy.