8-1-2011

Atrial Tachycardia

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August 12 2011

Tachycardias are characterized by a heart rate greater than 100 beats per minute and categorized according to the width of the QRS segment on the ECG. A narrow QRS complex (<120 milliseconds) indicates ventricular contraction caused by impulse transmission through the normal conduction system (ie, the atrioventricular [AV] node, the bundle of His, and the Purkinje system). A heart rate greater tha 100 beats per minute in the presence of a narrow QRS complex is identified as an *atrial*, or *supraventricular*, *tachycardia*. A widened QRS complex (>120 milliseconds) reflects activation of the ventricles below the AV node and indicates a *ventricular tachycardia*.

Common types of atrial tachycardia include sinus tachycardia, atrial fibrillation, atrial flutter, multifoca atrial tachycardia (MAT), and atrioventricular nodal reentrant tachycardia (AVNRT). Paroxysmal supraventricular tachycardia (PSVT) refers to supraventricular tachycardias other than atrial fibrillation atrial flutter, and MAT. Since AVNRT is by far the most common PSVT, the two terms are almost synonymous.

SYMPTOMS

The symptoms of atrial tachycardia are nonspecific, and their severity is related to the rate of the tachycardia. The most common complaint is palpitations, followed by light-headedness. Patients with significant heart disease may have dyspnea and chest pain.

DIAGNOSING TACHYCARDIAS

Multifocal atrial tachycardia is not an uncommon arrhythmia. It is usually preceded or followed by a premature atrial contraction. Approximately 60% of MAT patients have lung disease. The characteristic ECG finding in MAT is variability in P wave morphology. The diagnosis of MAT requires the following ECG criteria:

- P waves with at least three different morphologies (including the normal sinus P wave). The P wave morphology is usually best seen in leads II and V_1.
- P-P intervals and the P-R duration vary.
- An atrial rate greater than 100 beats per minute (greater than 90 beats per minute has been proposed in patients with chronic obstructive pulmonary disease [COPD]).

There are two types of paroxysmal supraventricular tachycardia: reentry (the more common form) and enhanced automaticity. *Atrioventricular nodal reentrant tachycardia* represents an abnormality in the propagation of the electrical impulse resulting from the presence of two separate pathways. The ECG criteria for AVNRT are as follows:

· Narrow QRS complex (<120 milliseconds), with regular R-R intervals and an absence of P waves, which are buried in the QRS

· P waves that are visible are inverted in leads II, III, and aVF

· Atrial rate between 150 and 250 beats per minute.

Episodes of AVNRT often have no apparent precipitating cause. In some patients, nicotine, alcohol, stimulants, or exercise can trigger an episode.

Enhanced automaticity tachycardia is an abnormality in impulse initiation rather than conduction. Some cells in the atria spontaneously depolarize faster than the SA node.

TREATMENT

The most effective therapy for MAT is aimed at the inciting underlying disease. Use of antiarrhythmic drugs is generally not effective.

In patients with AVNRT, vagal maneuvers should be attempted before any pharmacologic agent is given. The Valsalva maneuver induces a slowing of sinoatrial (SA) node activity and conduction. Patients are asked to bear down hard to increase the intrathoracic pressure.

Carotid sinus massage may also be used to induce a slowing of the SA node. External pressure on the carotid bulb stimulates baroreceptors in the carotid sinus, increasing vagus nerve activity and sympathetic withdrawal.

If vagal maneuvers fail to terminate the AVNRT, adenosine is usually the first agent used. Adenosine has a rapid onset and a short half-life. Second-line medications include IV verapamil and diltiazem or beta-blockers.

ECG CHALLENGE

A 30-year-old female presented to the emergency department complaining of intermittent light-headedness and a sensation of rapid pounding in her chest for the past day. **Figure 1** shows the ECG obtained during her workup.

FIGURE 1. ECG of a patient complaining of light-headedness and a rapid pounding in her chest.

Using the stepwise approach to analyze the ECG, we observe the following:

1. Is the heartbeat **regular**? Yes, the QRS complexes march out.
2. What is the heart **rate**? Find a QRS near a dark line.

Method A: Counting large boxes, we see that there are 1.5 boxes before the next QRS complex. This puts the second QRS complex midway between the lines indicating 300 beats per minute and 150 beats per minute, translating to a rate of about 225 beats per minute.
Method B: There are about 23 QRS complexes in 6 seconds (30 large boxes), which estimates the rate at 230 beats per minute (23 × 10).
Method C: There are 1.5 boxes between the QRS complexes: 300 ÷ 1.5 = 200 beats per minute.

3. There is no **P wave** preceding the QRS.
4. With no P wave, there is **no PR interval**.
5. The **QRS complex** spans approximately three small boxes, which is 120 milliseconds.
6. **ST segments** show no elevation or depression.

7. The **T wave** is buried in the P wave.
8. There are **no U waves**.

Based on the rapid heart rate, the absence of P waves, and the narrow QRS complex, the diagnosis was AVNRT. After performing several vagal maneuvers, the patient converted to sinus rhythm. **JAAPA**