Diagnosing Supraventricular Tachycardia When Physical Examination Trumps the Electrocardiogram

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With readily available access to technology and imaging modalities, the art of physical examination is seldom emphasized in the contemporary practice of medicine. Occasionally, however, the most efficient method by which to make a diagnosis is based on our ability to discern physical signs during examination.

Case Report
A 79-year-old man with a history of hyperlipidemia and hypertension who underwent 2 previous catheter ablation procedures for treatment of atrial fibrillation, presented with palpitations and a heart rate of 97 beats per minute. His ECG is shown in Figure 1. The differential diagnosis includes sinus rhythm with first-degree atrioventricular block or atrial tachycardia with 2:1 atrioventricular conduction. The latter diagnosis should be suspected whenever the P waves of a supraventricular tachycardia are midway between the ventricular complexes according to the Bix rule.1

Discussion
Normal jugular venous pulsations occur in 2 phases.2 The a wave occurs during right atrial contraction and is often merged with an almost imperceptible c wave, which is caused by closure of the tricuspid valve cusps at the onset of right ventricular contraction. The v wave occurs during passive filling of the right atrium from the vena cavae during right ventricular systole (tricuspid valve closed). The descents following each of these waves include the x descent from atrial relaxation and the y descent, which occurs with tricuspid valve opening and passive emptying of blood into the right ventricle during early and mid diastole.

In our patient, examination of his jugular venous pulsations revealed 3 pulsations for every ventricular contraction, instead of 2. The Movie in the Data Supplement shows his initial examination in real-time and again at half-speed. The patient was attached to a telemetry monitor with an audible beep indicating the timing of the QRS complexes. The observation of triple pulsations was diagnostic of atrial tachycardia with 2:1 atrioventricular conduction. Figure 2 reviews the relationship of the a and v waves during normal sinus rhythm (top) and during atrial tachycardia with 2:1 atrioventricular conduction (bottom).

The patient was referred for transesophageal echocardiography to exclude the presence of left atrial thrombus before direct current cardioversion. The diagnosis of atrial tachycardia with 2:1 atrioventricular block was confirmed with Doppler imaging of the left atrial appendage (Figure 3). Following restoration of sinus rhythm after a single synchronized 200 J biphasic shock, the jugular venous pulsations returned to a normal pattern (last segment in Movie in the Data Supplement). In cases when the jugular venous pulsation pattern is ambiguous, another method for distinguishing sinus rhythm with first-degree atrioventricular block from atrial tachycardia with 2:1 atrioventricular conduction would be to have the patient perform a vagal maneuver and uncover any concealed P waves.

Although the art of physical examination is seldom emphasized in the contemporary practice of medicine, as this case illustrates, it can sometimes be the most expedient method by which to make a diagnosis when the ECG is consistent with 2 different tachycardia mechanisms.

Disclosures
None.

References

Key Words: diagnosis ▪ physical examination ▪ tachycardia, ectopic atrial ▪ tachycardia, supraventricular
Figure 1. Twelve-lead ECG.

Figure 2. Schematic of jugular venous pulsation patterns. Top, Tracing shows venous pulsations during sinus rhythm. Bottom, Tracing shows venous pulsations during atrial tachycardia with 2:1 atrioventricular conduction with asterisk indicating P wave concealed within the QRS complex. a indicates a wave that occurs during right atrial contraction; c, c wave caused by closure of the tricuspid valve cusps at the onset of right ventricular contraction; v, v wave that occurs during passive filling of the right atrium from the vena cavae during right ventricular systole (tricuspid valve closed); x, x descent from atrial relaxation; and y, y descent from tricuspid valve opening and passive emptying of blood into the right ventricle during early and mid diastole.

Figure 3. Transesophageal echocardiogram showing pulse wave Doppler imaging of the left atrial appendage (LAA) revealing 2 atrial contractions (arrows) for every QRS complex recorded during simultaneous electrocardiography (bottom).
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SUPPLEMENTAL MATERIAL

**Video 1:** Jugular venous pulsations during physical examination. The Video shows the initial examination and again at half-speed. The patient was attached to a telemetry monitor with an audible beep indicating the timing of the QRS complexes. The third segment shows the two “a waves” and a single “v wave” for each QRS cycle. Following cardioversion, normal jugular venous pulsations are seen with two pulsations for each cardiac cycle and the heart rate is slower.