Increasing Diagnostic Yield (DY) of Bradyarrhythmia

New Research Shows Continuous, Full-disclosure Telemetry Monitoring Significantly Increased DY Compared to Patch and Holter Methods

Background

Age is a key risk factor for bradyarrhythmia which is often associated with damage to heart tissue and can cause frequent fainting spells, fatigue, memory problems and, in some cases, sudden cardiac arrest and death. Since nearly 17% of the US population is 65 or older, it is becoming increasingly important to detect the disorders associated with bradyarrhythmia in patients who may be at risk for heart disease or a serious event, including sinus node dysfunction, known as bradycardia, atrioventricular block, and conduction disorders, known as pauses. These patients typically require pharmacotherapy or pacemaker implantation to manage their heart rhythm.

According to new guidelines from the American College of Cardiology, the American Heart Association, and the Heart Rhythm Society on evaluating and managing patients with bradycardia and cardiac conduction:

The intermittent nature of most symptomatic bradycardia and conduction disorders often necessitates a more prolonged form of electrocardiographic monitoring to correlate rhythm disturbances with symptoms … less frequent symptoms are best evaluated with more prolonged ambulatory electrocardiographic monitoring that can be accomplished with a broad array of modalities.[1]

Cardiologists now have many monitoring options in addition to Holter monitors, including event recorders, patches and various mobile cardiac telemetry (MCT) devices. Yet the new guidelines note that the yield of ambulatory monitoring for significant bradyarrhythmias is typically <15%.

What can be done to increase diagnostic yield? Research presented at the American College of Cardiology's 68th Annual Scientific Session suggests that continuous, full-disclosure ECG monitoring for longer durations is more effective than shorter duration Holter monitors and patches to identify patients with bradyarrhythmia.

> Better monitoring methods are needed to more accurately diagnose at-risk patients and more quickly identify those who will require pacemaker implantation to prevent serious adverse events.

Study Methodology

The retrospective study analyzed 26,567 mobile cardiac telemetry diagnostic summary reports of 2017 tests recorded by the PocketECG online system. Using simulations and the same dataset, the DY of the online PocketECG was compared to diagnoses made by 24-hour and 7-day Holter monitors and multi-day offline patches.
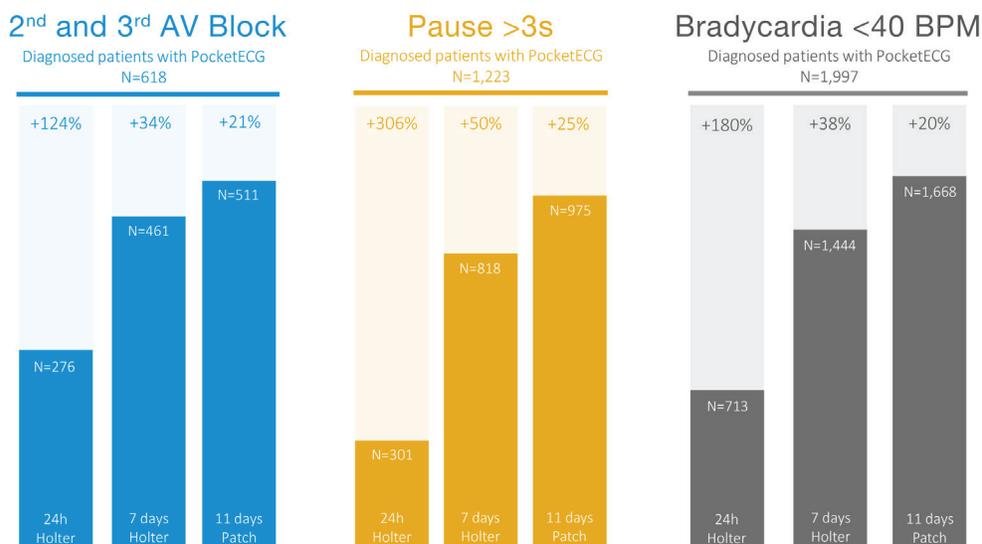
The cumulative DY on the composite outcome of a clinically relevant bradyarrhythmia was defined as having one of the following characteristics associated with a significantly higher risk of sudden cardiac death:

- Unusually slow heart rate (bradycardia with average rate <40 beats per minute)
- Blocked heart rates (2nd and 3rd degree atrioventricular blocks)
- Heartbeat pauses that lasted four seconds or longer

Study Results

Researchers identified 3,325 cases of bradyarrhythmia using the full-disclosure PocketECG device. The mean monitoring duration was 17.6 days and the median age of the patient was 71. The DY of bradyarrhythmia for continuous, full-disclosure MCT monitoring for up to 30 days of with PocketECG was:

- 75% higher than 24 hours of monitoring with the Holter method
- 37% higher than 7 days of monitoring with the Holter method
- 19% higher than 11 days of monitoring with the offline Patch

2nd and 3rd AV Block
Diagnosed patients with PocketECG
N=618

24h Holter	7 days Holter	11 days Patch
+124%	+34%	+21%
N=276	N=461	N=511

Pause >3s
Diagnosed patients with PocketECG
N=1,223

24h Holter	7 days Holter	11 days Patch
+306%	+50%	+25%
N=301	N=818	N=975

Bradycardia <40 BPM
Diagnosed patients with PocketECG
N=1,997

24h Holter	7 days Holter	11 days Patch
+180%	+38%	+20%
N=713	N=1,444	N=1,668

Conclusions

Determining the optimal monitoring duration and method has significant implications for patient outcomes and health care costs. The new research found that:

1) short-term monitoring methods may fail to diagnose some patients, and

2) optimizing monitoring duration with a method that provides continuous, full-disclosure ECG data resulted in higher diagnostic yield of bradyarrhythmia.

Such information will enable cardiologists to more accurately identify patients who may require pharmacotherapy or pacemaker implantation to prevent serious adverse events.

PocketECG

One of the world's leading online cardiac monitoring technologies, PocketECG is a portable device similar to a smartphone. PocketECG streams continuous, full-disclosure ECG signals for up to 30 days, classifies every heartbeat and detects short arrhythmia episodes — including atrioventricular blocks — while providing clinicians complete access to all data, at every point during the monitoring period. This results in a substantially increased diagnostic yield for bradyarrhythmia over Holter and traditional MCT methods.[2] (MCT does not transmit full-disclosure ECG).

For more information, visit **www.pocketecg.com.**

1. Kusomoto FM, Schoenfeld MH, Barrett c, et al. 2018 ACC/AHA/HRS guideline on the evaluation and management of patients with bradycardia and cardiac conduction delay [published online November 6, 2018]. *Circulation*. doi: 2018;0:CIR.0000000000000628

2. Frequency of Serious Arrhythmias Detected With Ambulatory Cardiac Telemetry," The American Journal of Cardiology, May 1, 2010, pages 1313 – 1316)

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