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Case Report

CASE REPORT

Smart watch-detected tachycardia: a case of atrial flutter

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Abstract

The use of smart watches like the Apple watch and other wearable electronic devices by the general public has been increasing dramatically. Until their accuracy for detecting dysrhythmias has been well-established, however, it would not be appropriate to rely on them solely to rule-in or rule-out pathology. Nonetheless, unusual findings from these devices should be followed up with more conventional investigations, and this approach may prove highly beneficial to patients and treating clinicians alike. This case demonstrates a diagnosis of atrial flutter that was suspected based on the Apple watch and iPhone Health app findings.

INTRODUCTION

The use of smart watches like the Apple watch and other health monitoring devices (so-called wearables) by the general public has been dramatically increasing [1, 2]. Their value in the long-term monitoring of patients is being investigated with a focus on atrial fibrillation (AF) [1, 2]. We present a case of atrial flutter which was suspected based on the Apple watch and iPhone Health app findings.

CASE REPORT

A 56-year-old hypertensive, diabetic male patient presented with a 4-day history of new-onset palpitations. He attributed the symptoms to the dietary 'fat burners' that he had recently started. Since he became symptomatic with the palpitations 4 days previously, he had noticed that his heart rate on his Apple watch had remained essentially unchanged at ~150 bpm at all times of the day including during training at the gym and even before bed. He had no symptoms of chest pain, nausea, vomiting, diaphoresis or dizziness.

When the 'Health app' data on his iPhone was reviewed, it could be seen that his Apple watch had recorded a consistent rate of 150 bpm for the previous 4 days (Top pane of Fig. 1). This created a suspicion of atrial flutter with 2:1 AV nodal block by the emergency physician. The diagnosis of atrial flutter was confirmed on a formal 12-lead electrocardiogram (ECG). Apple Watches that are series 4 or later have the capability to record an ECG as well as the ability to notify the user of irregular heart rhythms. These features, however, are only available in some regions and languages—not currently in South Africa [3].

The patient was admitted to the coronary care unit and anti-coagulated. A trans-oesophageal echocardiogram showed that there was no thrombus in the left atrial appendage. Attempted chemical cardioversion initially dropped the heart rate but the patient subsequently required electrical cardioversion, which restored sinus rhythm (Bottom pane of Fig. 1). He was discharged on an oral anticoagulant as well as an oral anti-arrhythmic medication. The long-term medical plan, such as the consideration for ablation, has not yet been finalized given that the arrhythmia was seemingly provoked.

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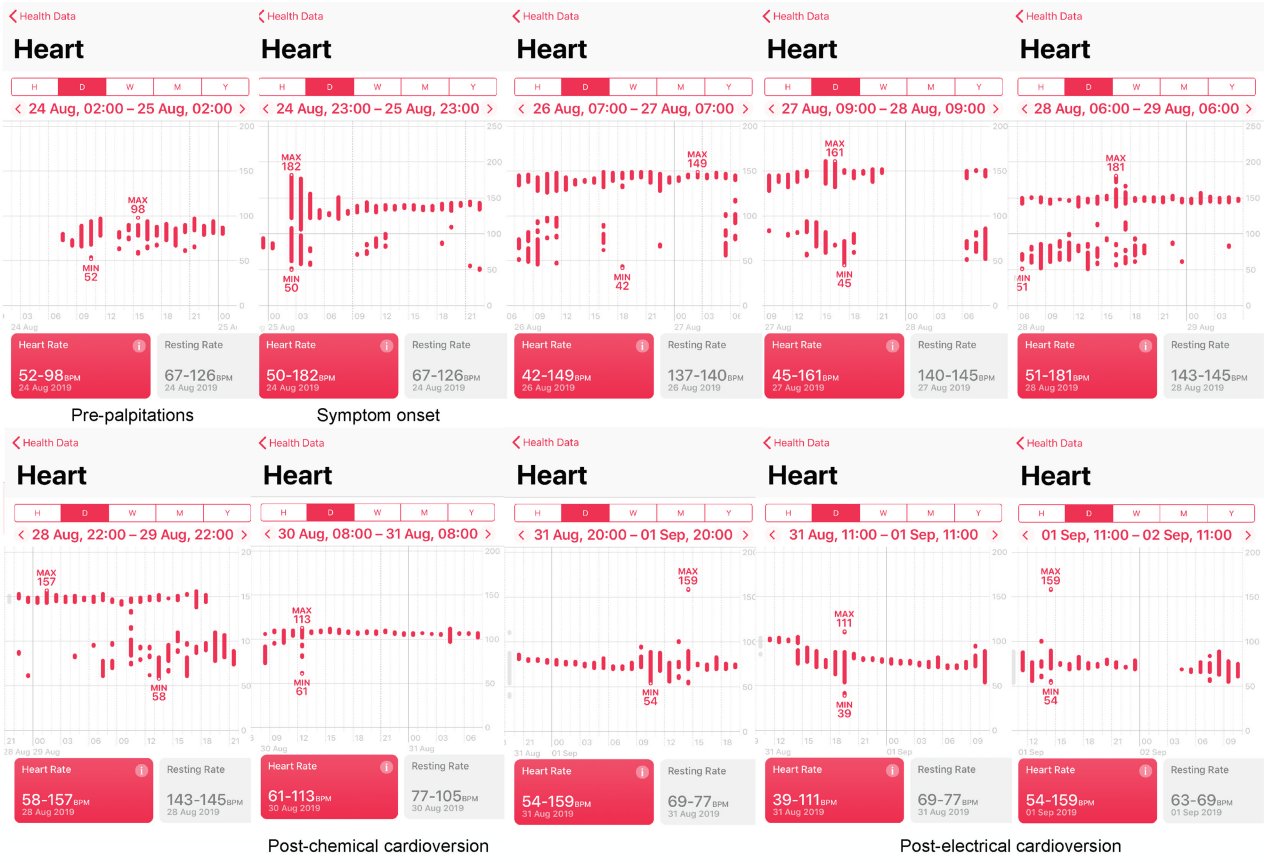

Figure 1: Composite screenshots from the Apple Health app over a 1-week period. The top panes show the patient's pre-symptom heart rate (left) and subsequent post-symptom heart rates (right) averaging 150 bpm. The bottom panes show the drop in heart rate to 113-bpm post-chemical cardioversion (left) and then to normal post-electrical cardioversion (right).

DISCUSSION

When it comes to supraventricular tachycardias, the focus is usually on AF especially with its high prevalence in the aging population [4]. However, second in incidence to AF is atrial flutter. Although occurring < 1/10 as often as AF, atrial flutter commonly coexists with or precedes AF and is $2\frac{1}{2}$ times as common as paroxysmal supraventricular tachycardias [5, 6]. Typical atrial flutter is a macro-re-entrant tachycardia with an atrial rate of 300 bpm that almost always has an atrioventricular transmission of 2:1 resulting in a ventricular rate of 120–150 bpm [5].

Although they are not marketed for medical use, the increased use of wearables is leading to an increase in patient presentations for medical assessment based on abnormalities detected by the devices. Their ability to detect arrhythmias, however, has not been validated [2]. The heart rate measurements from the Apple watch have shown high-correlation coefficients compared with 12-lead ECG, which corresponds to differences of only 1.3 ± 4.4 beats per minute on average, although devices tend to underestimate the heart rate in patients with AF [1, 2].

Current guidelines for the therapy of macro-re-entrant atrial arrhythmias recommend anticoagulation for patients with atrial flutter and concomitant AF (Class I, Level of Evidence [LOE] B) [7]. Similar to AF, anticoagulation is recommended in order to decrease the thrombo-embolic risks especially if the rhythm has been present for more than 48 hours [7].

Haemodynamically unstable patients should have synchronized DC cardioversion performed (Class I, LOE B) [7]. If the patient is haemodynamically stable, both low-energy (≤100 J biphasic) electrical cardioversion and anti-arrhythmic medications (intravenous ibutilide or intravenous or oral dofetilide) are recommended for conversion to sinus rhythm (Class I, LOE B) [7]. Propafenone and flecainide are not recommended (Class III, LOE B). Rapid ventricular rates can be controlled by considering intravenous beta-blockers or non-dihydropyridine calcium channel blockers (verapamil or diltiazem) (Class IIa, LOE B) [7]. If the previous medications are not available, amiodarone may be tried (Class IIb, LOE C) [7]. High-rate atrial pacing may also be considered (Class IIb, LOE B) especially in the presence of an implanted pacemaker or defibrillator (Class I, LOE B) [7].

Until the accuracy of wearables for detecting dysrhythmias has been well-established, it would not be appropriate to rely on them to rule-in or rule-out such pathologies. Nonetheless, unusual findings from these devices should be followed up with more conventional investigations, and this approach may prove highly beneficial to patients and treating clinicians alike.

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ETHICAL APPROVAL

Ethical approval was not required for this submission.

CONSENT

Written informed consent was obtained from the patient for this submission.

GUARANTOR

LG is the guarantor for the paper.

CONFLICT OF INTEREST STATEMENT

The authors declare that they have no conflicts of interest.

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