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Ultra-Short Atrial Fibrillation Episodes: A Case Report

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Abstract

Atrial fibrillation (AF) is a common heart rhythm abnormality characterized by disorganized atrial activity and irregular ventricular contraction. AF should be diagnosed with ambulatory ECG monitoring if AF-like activity lasts more than 30 s. The term "micro-AF" defines episodes of ≥5 consecutive supraventricular beats and complete absence of P waves lasting less than 30 s. We present the case of very short episodes of AF-like activity recorded with ambulatory ECG monitoring. A 50-year-old man visited a cardiologist for recurrent episodes of fast irregular heartbeat. 72-hour ambulatory 12-lead ECG monitoring revealed four episodes of AF that lasted more than 30 seconds. The longest episode lasted for 29 minutes. Also, there were two episodes of AF-like activity lasting for 17.2 s and 4.8 s. However, the majority of the episodes of AF-like activity lasted less than 4 seconds. The shortest episode of AF-like activity lasted for 0.8 seconds and included 5 obvious f-waves with a rate close to 340 bpm and one QRS complex. Also, there were episodes of obvious ultra-short AF-like activity lasting less than 1.6 seconds and resulted in only 3 QRS complexes. Such episodes cannot be classified as micro-AF as at least 5 QRS complexes are needed. Clinicians should always pay attention to ultra-short episodes of AF, as they may coexist with underdiagnosed long episodes of AF. A special term to define ultra-short episodes of AF-like activity should be introduced.

Keywords: *Ambulatory ECG Monitoring, Atrial Fibrillation, Episodes, Micro-AF, Short, Ultra-Short.*

Introduction

Atrial fibrillation (AF) is an abnormal heart rhythm characterized by the absence of organized atrial activity and irregular ventricular contractions. Disorganized atrial activity is seen as fibrillatory waves (f-waves) on the ECG. AF may lead to heart failure and stroke, moreover, patients with strokes associated with AF have a greater disability [1, 2]. AF is classified as paroxysmal, persistent, or permanent depending on the duration of the episode [3]. Atrial fibrillation is asymptomatic or mildly symptomatic in some patients and they often do not visit a doctor for a long time [4]. Typically, episodes of AF become longer and more frequent, and paroxysmal atrial fibrillation becomes persistent and permanent. [5]. At the very beginning, there may be very short episodes of AF, but the fact of the association with stroke is under discussion [6, 7]. Fredriksson T. et al (2020) proposed the term "micro-AF", defining sudden onset of irregular tachycardia with episodes of ≥5 consecutive supraventricular beats and complete absence of P waves lasting less than 30 s [8]. However, there may be even shorter episodes of AF-like activity. We present the case of very short episodes of AF-like activity recorded with ambulatory ECG monitoring.

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Case Report

A 50-year-old man visited a cardiologist for recurrent episodes of fast irregular heartbeat. The patient was taking only valsartan 160 mg for arterial hypertension. ECG showed a first-degree atrioventricular block. 72-hour ambulatory 12-lead ECG monitoring showed multiple episodes of AF and intermittent first-degree atrioventricular block. Four episodes of AF lasted longer than 30 seconds; the longest episode lasted for 29 minutes. A fragment of this episode is shown in Figure 1. Also, there were two episodes of AF-like activity lasting for 17.2 s (Figure 2) and 4.8 s (Figure 3). However, the majority of the episodes of AF-like activity lasted less than 4 seconds, some of which are shown in Figure 4.

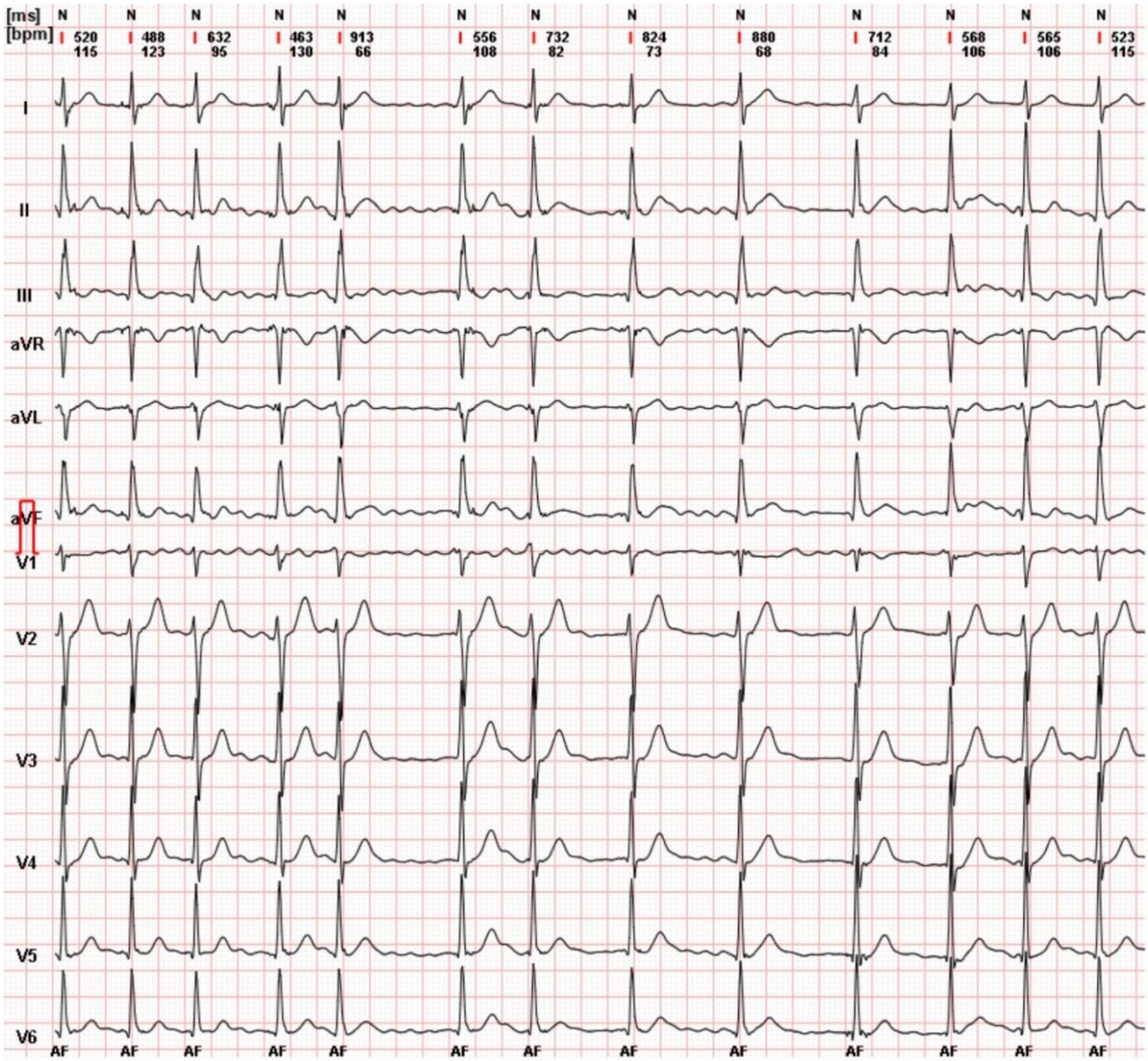

Figure 1. Ambulatory 12-Lead ECG Monitoring. Fragment of the Longest Episode of Atrial Fibrillation

Figure 2. Ambulatory 12-lead ECG Monitoring with a Paper Speed of 12.5 mm/s. An Episode of Atrial Fibrillation Lasting for 17.2 s

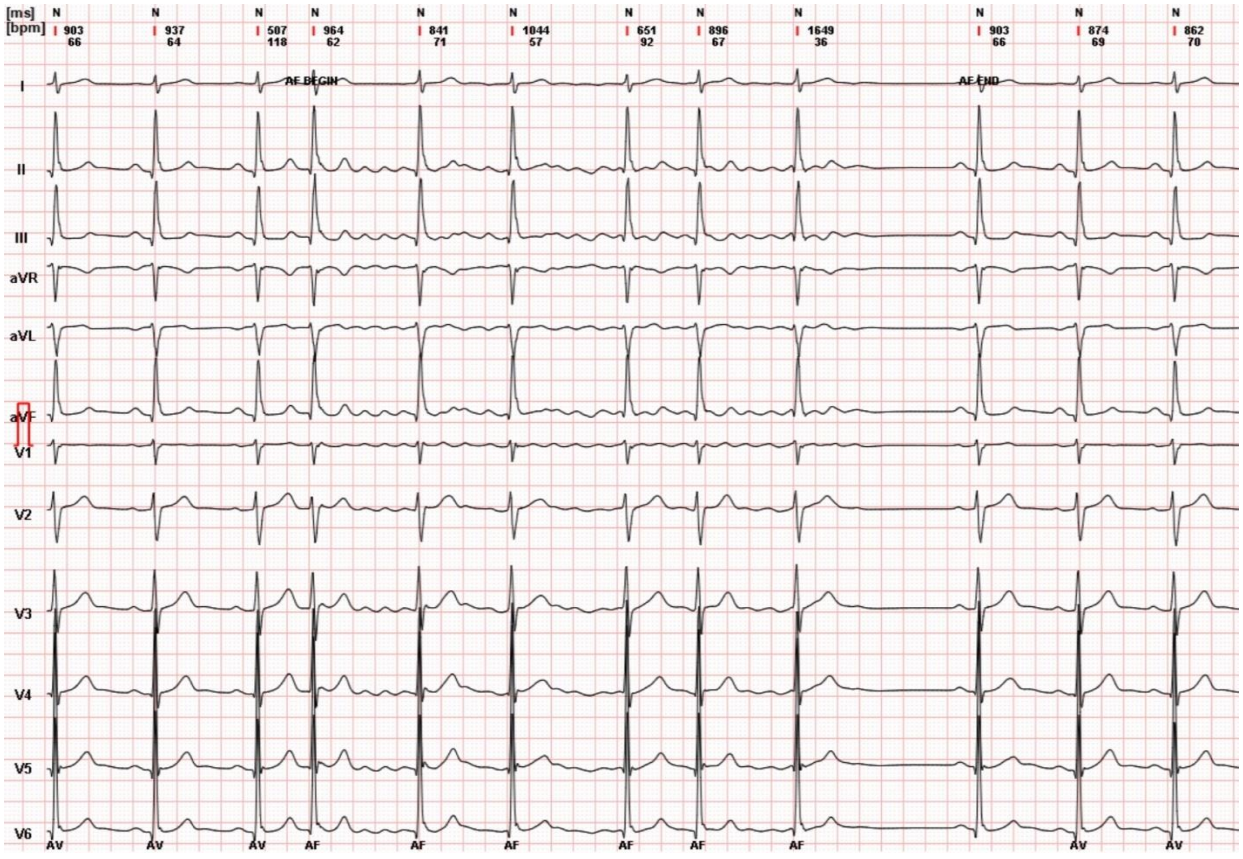

Fig. 3. Ambulatory 12-Lead ECG Monitoring. An Episode of Atrial Fibrillation Lasting for 4.8 s

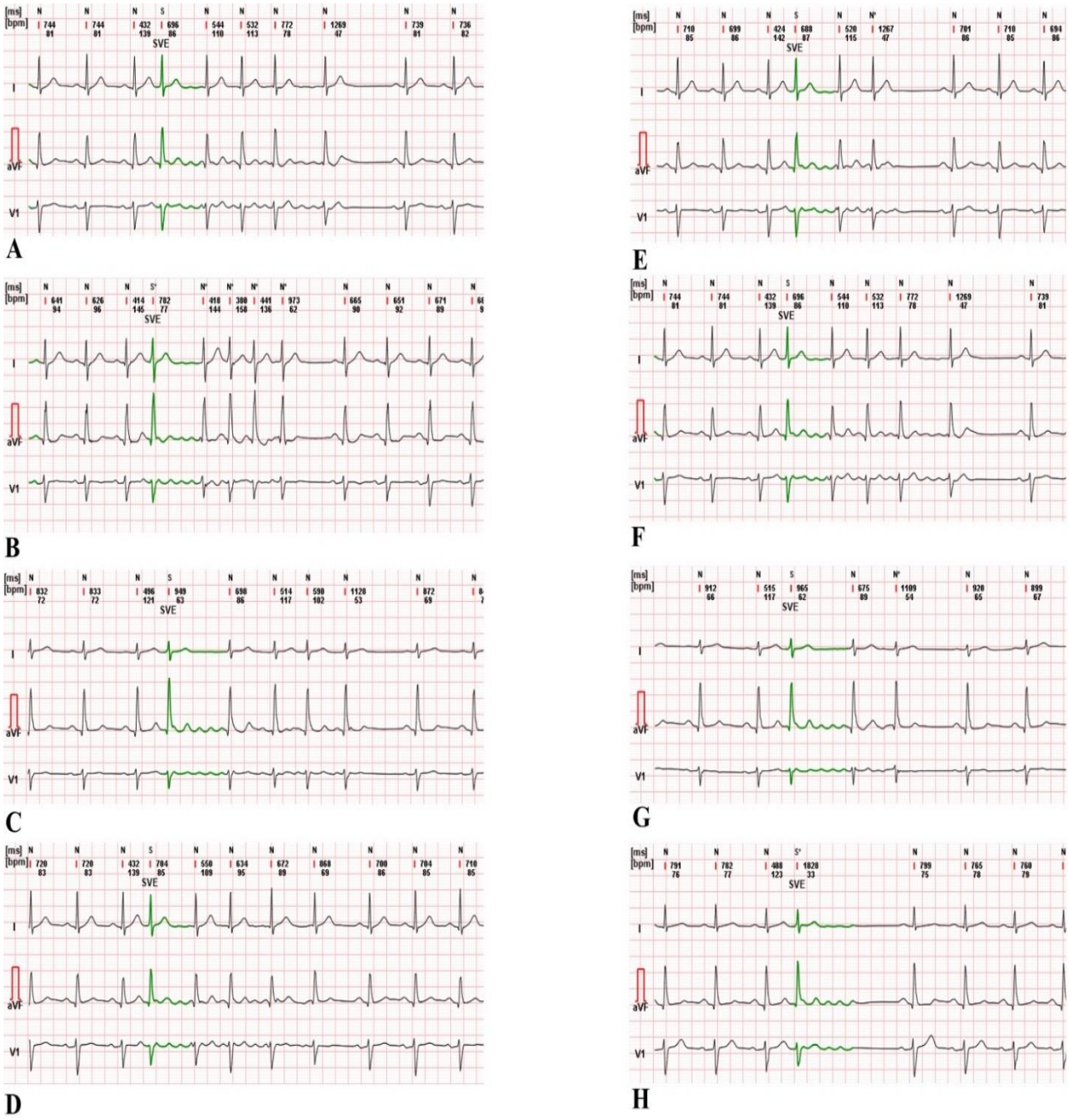

Fig. 4. Ambulatory 12-Lead ECG Monitoring. Ultra-short episodes of Atrial Fibrillation Lasting for 2.6 s (A), 2.4 s (B), 3.3 s (C), 2.8 s (D), 1.6 s (E), 2.7 s (F), 1.5 s (G), 0.8 s (H)

Discussion

The lower limit of the duration of AF required for diagnosis is debated. This is explained by the fact that artifacts may be interpreted as f-waves leading to inappropriate diagnosis and treatment. In general, ≥30 seconds of AF on at least a single-lead ECG was required for the diagnosis of AF in most studies [9, 10]. Also, the HRS/EHRA/ECAS/APHRS/SOLAECE expert consensus stated that an episode of AF should be diagnosed if it's documented by ECG monitoring or intracardiac electrogram monitoring and has a duration of at least 30 seconds, or if less than 30 seconds, is present throughout the ECG monitoring tracing [11].

Riccio P. et al. (2015) found that 8.9% of stroke survivors had episodes of AF lasting less than 30 seconds [12]. The first study on the prognosis of patients with micro-AF with prior

myocardial infarction was performed by Berge T. et al. (2022) [13]. They found that micro-AF is associated with an increased risk of major adverse cardiovascular events (non-fatal acute myocardial infarction, stroke, revascularization, or hospitalization for heart failure) [13]. However, there are no guidelines on how to evaluate or treat patients with episodes of micro-AF.

Another controversy is that there is no clear definition of the lower limit of micro-AF duration. According to the definition of micro-AF made by Frederikson T. et al. (2020), ≥5 consecutive supraventricular beats are required for the diagnosis [8]. But are ≥5 consecutive supraventricular beats required for diagnosis when shorter episode AF-like activity is obvious? We have demonstrated a case of ultra-short episodes of AF-like activity, where the shortest of which (Figure 4, H) lasts for 0.8 seconds and includes 5 obvious f-waves with a rate close to 340 bpm and one QRS complex. Also, there were episodes when obvious AF-like activity lasted for less than 1.6 seconds and resulted in only three QRS complexes (Figure 4, E, G). We believe that a special term should be implemented for such short episodes of AF-like activity.

Conclusion

Clinicians should always pay attention to very short episodes of AF, as they may coexist with underdiagnosed long episodes of AF. A special term to define ultra-short episodes of AF-like activity should be introduced.

Conflict of Interest

The authors declared no conflict of interest in the manuscript.

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