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Juan Benezet-Mazuecos

Alvaro Lozano Rosado

Julian Crosa

Jose Antonio Iglesias

EDITORIAL

# Atrial High-Rate Episodes, Subclinical Atrial Fibrillation and Short-Duration Clinical Atrial Fibrillation: Different Names for the Same Arrhythmia or a New Player On the Pitch?

Juan Benezet-Mazuecos*, Alvaro Lozano Rosado, Julian Crosa, Jose Antonio Iglesias

Arrhythmia Unit, Cardiology Department, Hospital La Luz, Quironsalud, Madrid, Spain

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Atrial fibrillation (AF) is the most common sustained arrhythmia with important clinical comorbidities. Although clinically described by physicians during the 17th century, it was not properly delineated until James Mackenzie described the loss of the 'a' wave in the venous pulse, using the polygraph that he invented to demonstrate the form of the pulse wave, and Willem Einthoven published the first electrocardiogram (ECG) showing AF in 1906. From that moment, ECG recording has been key for AF diagnosis and subsequently for its treatment. But today, new technologies are opening our eyes to new points of view regarding the diagnosis and management of this old arrhythmia. Dual-chamber cardiac implantable electronic devices (pacemakers and defibrillators) can detect and report AF episodes as atrial high rate episodes (AHRE). AHRE refers to device-detected atrial events, usually tachyarrhythmias, meeting programmed or other specified atrial high-rate criteria (usually >175-180 bpm). Moreover, these devices are capable of recording intracardiac electrograms during these episodes to confirm the diagnosis of subclinical AF (SCAF), excluding other causes of AHRE as noise or far-field detection, and even report the duration of the episodes. Therefore, SCAF refers to asymptomatic episodes of AF detected and confirmed by intracardiac electrograms and not previously detected by ECG or ambulatory monitoring. [1] There is no doubt that AHRE and SCAF are different names for the same arrhythmia, AF. Both AHRE and SCAF have been linked to an increased risk of stroke and systemic embolism, nevertheless this risk seems lower than when AF is recorded on an ECG. In this sense, patients' embolic risk, defined by $CHA_2DS_2VASc$ score, and the duration of the episodes are important to guide the management of these patients. Current Guidelines recommend anticoagulation for those patients presenting with AHRE/SCAF lasting >24h or when history of stroke is present. [2] Therefore clear and evidence based recommendations do not currently exist for

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* Corresponding author at. Hospital La Luz, Quironsalud, Calle Maestro Angel Llorca 8, Madrid, 28003. Spain; fax: +34 914530200.
E-mail address: jbenezet@quironsalud.es (J. Benezet-Mazuecos).

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patients with $CHA_2DS_2VASc$ score ≧ 2 and episodes lasting <24h.

Nowadays, the use of anticoagulation in this scenario is unclear in the absence of randomized studies. A theoretical benefit of anticoagulation preventing embolic events in this particular AF might be counterbalanced by an inherent increased haemorrhagic risk. In the following years, results from ongoing trials ARTESiA (Apixaban for the Reduction of Thrombo- Embolism in Patients With Device-Detected Sub-Clinical Atrial Fibrillation) [3] and NOAH (Non- Vitamin K Antagonist Oral Anticoagulants in Patients With Atrial High Rate Episodes) [4] will provide evidence about the best treatment for these short episodes of AF detected in pacemakers and defibrillators … and even more … Today's new electronic devices (smart phones, smart watches …) that we carry with us every day, with accurate and high-quality single-lead ECG monitoring capabilities, will make heart rhythm assessment feasible in a broader population. [5] These devices can detect short episodes of symptomatic AF activated by the "patient" and, maybe in the near future, even asymptomatic episodes automatically. Therefore, both ARTESiA and NOAH will provide a much needed answer to the question of what to do with short episodes of AF, whatever the method of diagnosis used is.

Since these AHRE and SCAF are AF, all these entities share the same risk factors. AF is clearly related with aging and therefore it is not strange to find a high prevalence of AHRE in patients with pacemakers. But it has also been related to other risk factors such as high blood pressure, obstructive sleep apnea syndrome, obesity, left atrial enlargement, history of heart failure or even $CHA_2DS_2$-VASc score. [6] In the article published in this issue of the Journal, authors show that these episodes were significantly more frequent in those patients presenting a wider paced QRS complex and, as previously described, in patients with left atrial dilatation. [7] The relationship between the QRS duration and the occurrence of AHRE that authors point out in this article is also interesting to note. Traditional right ventricular apical permanent pacing has been related to negative hemodynamic effects and poor clinical outcomes, especially in patients with structural heart disease and left ventricle systolic dysfunction. Cardiac resynchronization therapy (CRT) through biventricular pacing improved the clinical prognosis of these patients (functional improvement and higher survival rates). In most cases CRT leads to a narrower QRS complex associated with an improvement in the hemodynamic parameters and systolic functioning. Recently, His bundle pacing has re-emerged as a means to provide physiologic pacing (paced narrow QRS complex) or even resynchronization (by correcting QRS duration) by direct capture of the His-Purkinje system with promising results. Therefore, the more physiologic pacing the better and, translated to QRS complex duration, the narrower the better. In this paper, it is reasonable that patients with narrow QRS complex could present a better evolution and therefore less AHRE. On the other hand, there are important limitations related to the nature of the study such as the percentage of ventricular pacing that patients received during the follow-up and programming. Nevertheless, it is reasonable to avoid unnecessary pacing, particularly unnecessary right ventricular pacing, and when needed, provide the more physiologic pacing, usually that resembling a physiologic narrow QRS complex.

New technologies have opened our eyes to new tools for diagnosis of AF. Now we are able to detect and record short duration episodes that we would have ignored some years ago. AHRE, SCAF and short-duration clinical atrial fibrillation detected on smart devices represent three forms of the same arrhythmia. It is the same *old player on the pitch*, the same AF, not a new entity. But today we know that AF risk is different not only according to the $CHA_2DS_2VASc$ score but also according to the duration of the episodes. Ongoing studies will define the duration threshold to consider whether this short duration AF might benefit from anticoagulation or not. Until we get these results, management of these patients continues to be challenging and treatment should be individualized.

## Disclosures

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## Author contribution

Juan Benezet-Mazuecos: Conception, Design, Supervision, Literature review, Writer, Critical review.

Alvaro Lozano Rosado: Conception, Literature review, Writer, Critical review.

Julian Crosa: Conception, Literature review, Writer, Critical review.

Jose Antonio Iglesias: Conception, Literature review, Writer, Critical review.

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