



## EDITORIAL COMMENT

# Atrial fibrillation monitoring to reduce thromboembolic risk: Selecting the patient and the monitoring device



## Monitorização eletrocardiográfica para a redução do risco tromboembólico: seleção do doente e do dispositivo de monitorização

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Atrial fibrillation (AF) is the most common sustained cardiac arrhythmia and is associated with a five-fold increased risk of stroke. At least 15-20% of strokes are attributed to underlying AF, but subclinical AF may be the cause of an additional number of cerebrovascular events. Data from cardiac implantable electronic devices (CIEDs) have shown that subclinical atrial tachyarrhythmias lasting more than six minutes are associated with increased risk of thromboembolism.<sup>1</sup> The often silent and intermittent nature of AF poses a problem; more than half of AF episodes are asymptomatic<sup>2,3</sup> and therefore identifying patients at risk remains a challenge. This is a good illustration of the importance of AF monitoring. Continuous monitoring with implantable cardiac monitors is now widely used in patients with cryptogenic stroke to identify those with silent AF who warrant antithrombotic therapy.<sup>4</sup> In this context, the prevalence of AF is approximately 20%. Stroke guidelines state that prolonged rhythm monitoring for AF of approximately 30 days is reasonable within six months of a cerebrovascular event with no apparent cause.<sup>5</sup> In addition to risk stratification for stroke prevention, AF monitoring and detection is also useful to assess the efficacy

of rhythm control strategies, prevent inappropriate shocks in implantable cardioverter-defibrillator (ICD) patients and maximize the benefit of cardiac resynchronization therapy (CRT).

Detection of subclinical atrial tachyarrhythmias can be performed through a variety of tools, including external surface monitoring with intermittent 12-lead electrocardiogram, ambulatory Holter monitors, cardiac event recorders, portable electrocardiogram recorders (such as AliveCor) and the more recent adhesive patch electrocardiographic monitors, as well as CIEDs such as implantable loop recorders, dual-chamber pacemakers or ICDs and CRT devices. Although longer-term Holter and event recorders have superior diagnostic yield compared to intermittent 12-lead ECGs,<sup>6</sup> the need for a transmitter device and lower patient compliance represent limitations. Patient compliance diminishes as the nominal monitoring duration increases, owing to concerns regarding skin irritation and the inconvenience of performing daily activities while wearing a monitor. More recent methods include simpler patch-type monitors which provide instant feedback and may lead to immediate changes in medical management. In patients with CIEDs, the possibility of continuous long-term monitoring increases the monitoring sensitivity. In the setting of post-cryptogenic stroke, long-term continuous monitoring with an implantable cardiac monitor has been shown to be superior in detecting AF to any intermittent monitoring strategy.<sup>7</sup> However, their applicability is hampered by the need for an invasive

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procedure. Ideally, the optimal monitoring device should be non-invasive, inexpensive, simple to use and able to provide continuous long-term monitoring with immediate feedback.

In this issue of the *Journal*, Primo et al. have elegantly provided an assessment of the prevalence of AF, based on episodes of atrial arrhythmia lasting for more than 30 seconds, obtained through a 12-lead Holter monitor.<sup>8</sup> Their study cohort included patients referred for Holter monitoring for a variety of reasons, as determined by their general practitioners. The main strengths of this study are (1) its prospective nature, (2) the use of 12-lead electrocardiographic monitoring, which enables more accurate determination of the underlying rhythm (with potential therapeutic implications) compared to the standard three-lead Holter, (3) continuous 24-hour monitoring, as opposed to a single 12-lead ECG as used in the FAMA study,<sup>9</sup> with improved diagnostic yield, (4) the inclusion of a relatively unbiased population of patients seen due to a variety of cardiovascular symptoms, enabling a more accurate representation of AF prevalence in this context, (5) an independent and blinded analysis by up to three different electrophysiologists, and (6) the large size of the study sample, allowing narrow 95% confidence intervals.

Several important observations can be made on the results of this study. Firstly, more than 10 out of 100 patients participating in this study had documented AF or atrial flutter (of which one fifth with paroxysmal AF). This figure is higher than previously reported in both European and American studies,<sup>10,11</sup> although AF prevalence in individuals aged 80 years or older may indeed be well above 10%.<sup>10</sup> In 2010, the number of adults aged  $\geq 55$  years with AF corresponded to 1.8% of the total European Union population, and this figure will rise to 3.5% by 2060. This increase will be particularly dramatic in adults aged over 75.<sup>12</sup> The higher prevalence of AF in the present study is likely a result of the criteria used for patient selection. A higher AF prevalence should be expected in patients who present with cardiovascular symptoms, even if non-specific, compared to a cohort of asymptomatic patients. However, this study does provide us with a reasonably accurate estimate of AF prevalence among symptomatic patients who are typically seen by their general practitioners. The number may be higher in the context of a more specialized cardiology outpatient clinic. It is also noteworthy that advances in treatment for chronic cardiac and non-cardiac conditions, aging populations, and improved ability to diagnose AF through a wider range of monitoring devices may explain the higher prevalence of AF in more recent studies compared with older ones.

Secondly, the vast majority of patients with documented paroxysmal AF had never had any ECG documentation of this arrhythmia and hence only a minority of these were anticoagulated. As the authors state, the very low use of anticoagulation is mainly a reflection of an undiagnosed cohort, although faulty judgments on the risk of bleeding, especially in elderly patients, also help explain the low rate of anticoagulation prescription in AF patients, as shown in the Portuguese setting.<sup>13</sup>

In patients with cardiovascular symptoms, manual pulse palpation should be performed to determine the presence of an irregular pulse that could indicate underlying AF. A

12-lead electrocardiogram should then be performed on all patients in whom a diagnosis of AF is suspected based on the detection of an irregular pulse. The present study demonstrates that 24-hour Holter should also be considered for all of these patients, with consideration of longer monitoring in patients whose characteristics may put them at higher risk of AF: male gender, advanced age, or a history of hypertension, chronic obstructive pulmonary disease, cerebrovascular or ischemic heart disease. Likewise, a large waist circumference, sedentary lifestyle and high alcohol intake are also predictors of AF. Young age should not preclude appropriate investigation, as AF is seen throughout all age strata, as this study shows.

Notwithstanding the unequivocal merit of this study, we should point out that, in patients considered to be at high risk of AF, and especially those who have sustained a cerebrovascular event, 24-hour Holter monitoring may be insufficient. It is well established that the longer a patient is monitored (and this is not exclusive to implantable cardiac monitors), the greater the likelihood of detecting sustained atrial arrhythmias including asymptomatic AF, with subsequent impact on the rate of anticoagulation prescription.<sup>14,15</sup>

The role of AF monitoring for the selection of patients who could benefit from catheter ablation is much less straightforward. AF ablation is mostly indicated in symptomatic patients for quality-of-life purposes. AF ablation in asymptomatic patients is not generally recommended, and this is unlikely to change in the near future unless studies such as the Catheter Ablation Versus Antiarrhythmic Drug Therapy for Atrial Fibrillation (CABANA) trial demonstrate that successful AF ablation can lead to decreased long-term risk of mortality or stroke compared with medical management. Despite promising results by Di Biase et al. in a recent study of heart failure patients with AF,<sup>16</sup> all other evidence supporting the utility of AF ablation in stroke or mortality risk reduction is based on observational data.

To summarize, 24-hour 12-lead Holter monitors are an elegant screening method for patients with a multitude of cardiovascular symptoms, enabling detection of paroxysmal AF or atrial flutter in a non-negligible percentage of patients. In patients with risk factors for AF and especially a recent history of thromboembolism, more prolonged or long-term continuous AF monitoring should be performed wherever possible. Even short-lasting atrial arrhythmias carry a significantly increased risk of thromboembolism and therefore any documented AF of at least a few minutes should lead to consideration of oral anticoagulation prophylaxis as per the CHA<sub>2</sub>DS<sub>2</sub>-VASc score.

## Conflicts of interest

The authors have no conflicts of interest to declare.

## References

1. Healey JS, Connolly SJ, Gold MR, et al., ASSERT Investigators. Subclinical atrial fibrillation and the risk of stroke. *N Engl J Med*. 2012;366:120–9.

2. Patten M, Maas R, Bauer P, et al., SOPAT Investigators. Suppression of paroxysmal atrial tachyarrhythmias – results of the SOPAT trial. *Eur Heart J*. 2004;25:1395–404.
3. Fetsch T, Bauer P, Engberding R, et al., Prevention of Atrial Fibrillation after Cardioversion Investigators. Prevention of atrial fibrillation after cardioversion: results of the PAFAC trial. *Eur Heart J*. 2004;25:1385–94.
4. Ritter, Martin A, Duning T, et al. Occult atrial fibrillation in cryptogenic stroke: detection by 7-day electrocardiogram versus implantable cardiac monitors. *Stroke*. 2013;44:1449–52.
5. Kernan WN, Ovbiagele B, Black HR, et al. Guidelines for the prevention of stroke in patients with stroke and transient ischemic attack: a guideline for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke*. 2014;45:2160–236.
6. Roche F, Gaspoz JM, Da Costa A, et al. Frequent and prolonged asymptomatic episodes of paroxysmal atrial fibrillation revealed by automatic long-term event recorders in patients with a negative 24-hour Holter. *Pacing Clin Electrophysiol*. 2002;25:1587–93.
7. Choe WC, Passman RS, Brachmann J, et al., CRYSTAL-AF Investigators. Comparison of atrial fibrillation monitoring strategies after cryptogenic stroke (from the Cryptogenic Stroke and Underlying AF Trial). *Am J Cardiol*. 2015;116:889–93.
8. Primo J, Gonçalves H, Macedo A, et al. Prevalência da fibrilhação auricular paroxística numa população avaliada por monitorização contínua de 24 horas. *Rev Port Cardiol*. 2017;36:535–46.
9. Bonhorst D, Mendes M, Adragao P. Prevalence of atrial fibrillation in the Portuguese population aged 40 and over: the FAMA study. *Rev Port Cardiol*. 2010;29:331–50.
10. Zoni-Berisso M, Lercari F, Carazza T, et al. Epidemiology of atrial fibrillation: European perspective. *Clin Epidemiol*. 2014;6:213–20.
11. Ryder KM, Benjamin EJ. Epidemiology and significance of atrial fibrillation. *Am J Cardiol*. 1999;84:131R–8R.
12. Krijthe BP, Kunst A, Benjamin EJ, et al. Projections on the number of individuals with atrial fibrillation in the European Union, from 2000 to 2060. *Eur Heart J*. 2013;34:2746–51.
13. Caldeira D, Barra M, David C, et al. The prevalence of oral anticoagulation in patients with atrial fibrillation in Portugal: systematic review and meta-analysis of observational studies. *Rev Port Cardiol*. 2014;33:555–60.
14. Sanna T, Diener HC, Passman RS, et al., CRYSTAL AF Investigators. Cryptogenic stroke and underlying atrial fibrillation. *N Engl J Med*. 2014;370:2478–86.
15. Gladstone DJ, Spring M, Dorian P, et al., EMBRACE Investigators and Coordinators. Atrial fibrillation in patients with cryptogenic stroke. *N Engl J Med*. 2014;370:2467–77.
16. Di Biase L, Mohanty P, Mohanty S, et al. Ablation versus amiodarone for treatment of persistent atrial fibrillation in patients with congestive heart failure and an implanted device: results from the AATAC Multicenter Randomized Trial. *Circulation*. 2016;133:1637–44.