Detection of Atrial Fibrillation on Stroke Units: Look Harder, Look Longer, Look in More Sophisticated Ways

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Atrial fibrillation (AF) is the commonest sustained cardiac arrhythmia, often asymptomatic and sometimes presenting for the first time with a serious complication related to AF, notably stroke or heart failure. Patients with AF commonly have other cardiovascular risk factors and non-cardiovascular conditions. In patients without known AF, an important message is to “think of AF ...” especially in those aged ≥ 65 years or presenting for a clinical check-up for their comorbidity, before a complication occurs. What about patients without known AF who present with a stroke? What should we do about detecting AF and addressing comorbidities?

In those with known AF, the 2020 European Society of Cardiology guidelines for diagnosis and management of AF [1] recommend a structured characterization of AF using the 4S-AF scheme (Stroke risk; Symptom severity; Severity of AF burden; Substrate severity) [2] to better guide treatment decisions on thromboprophylaxis and rate versus rhythm management strategy. Apart from being an easy-to-remember guide for clinicians in managing AF, the 4S-AF scheme also highlights the importance of recognizing the complexity of AF pathophysiology, including clinical characteristics, other comorbidities, and atrial structure and function which should be taken into

consideration when evaluating a patient with new onset AF [3]. Management of AF focuses on a holistic approach using the simple ABC pathway (“A” anticoagulation/avoid stroke; “B” better symptom management; “C” cardiovascular and comorbidity optimization) which has been associated with better clinical outcomes in multiple studies [4–6].

In those without known AF, timely detection and diagnosis of incident AF is important to prevent the associated risks of stroke and mortality. There are many clinical risk factors related with the development of AF [7] and they are important to identify high risk patients who may benefit from screening for AF [1, 8]. Currently, there are many available methods for screening for AF ranging from clinical examination to mobile health technologies [1]. There are, however, risks involved in mass screening, in particular misinterpretation leading to overdiagnosis and over-treatment which can be associated with harm [9]. Another challenge is the identification of atrial high-rate episodes (AHRE) or subclinical AF, as it remains unclear whether patients with AHRE would have the same net clinical benefit from oral anticoagulants as those with clinically overt AF. It is currently recommended [1] that in patients with AHRE, continued patient follow-up and

Fig. 1. Detection of AF in post-stroke patients without known AF. AF, atrial fibrillation.

monitoring is required to detect progression to clinical AF and the use of OAC should be considered in patients with long-lasting AHRE and high/very high risk of stroke in whom a positive clinical benefit from OAC is anticipated.

The search for AF should not stop after the occurrence of an acute ischemic stroke. In fact, cardio-embolism associated with AF accounts for up to a third of all ischemic strokes [10]. AF, especially if paroxysmal, can be asymptomatic and, therefore, difficult to detect but asymptomatic AF carries the risk of stroke and mortality comparable to that with symptomatic AF [11]. Detection of previously unknown AF after acute ischemic stroke has important implications on the decision on future thromboprophylaxis treatment. In post-stroke patients, especially with embolic stroke of undetermined source, AF may play a larger role [12] thereby justifying a more prolonged and intensive search for AF [13].

With several RCTs establishing the efficacy of ECG monitoring in post-stroke AF detection [14, 15], the 2020 European Society of Cardiology AF guidelines [1] recommended short-term ECG recording followed by at least 72-h of continuous ECG monitoring post stroke. Up to 5.1% of post-stroke patients have AF detected as in-patients using serial ECGs, continuous ECG monitoring or telemetry [15]. A tiered longer ECG monitoring approach, identifying patients with higher risk clinical characteristics [7] to select for longer monitoring, including

the insertion of an intracardiac monitor in case of cryptogenic stroke could be considered in order to increase detection rate, which could be up to 23.7% [15].

The detection of AF during the inpatient post stroke period primarily relies on clinicians reviewing ECGs and monitors manually. AF episodes may also occur remote to the episode of stroke or thromboembolism. With advances in machine learning and automation, the idea of simplifying the process of detecting AF using computer-based analysis with minimal physician input is no longer implausible [16]. Apart from identifying AF, more sophisticated methods can be used to identify other atrial abnormalities associated with AF such as premature atrial complexes and atrial tachycardia which can be used to identify patients at higher risk of AF. However, there are implications in fully relying on automation, including the risk involved with a false-positive diagnosis (leading to overtreatment which can be associated with harm) and a false negative (missing the diagnosis and potentially not initiating appropriate treatment).

In this issue of the journal, Rogalewski et al. [17] set out to compare the differences between manual and automated analysis of continuous ECG monitoring to detect AF in post-stroke patients without prior history of AF. In a large German stroke unit, a total of 216 consecutive patients with ischemic strokes were enrolled. In 555 analysis days compared, manual analysis detected 37 AF,

whereas 57 were detected on automated analysis. Costs of analysis were also higher at USD 7.80 per ECG with automated and USD 2.10 per ECG for manual, calculated using per-hour cost for personnel. They concluded that although automatic AF detection is highly specific (94.6%), its sensitivity is relatively low (78.4%) when compared to the gold standard manual analysis and therefore should be complementary to manual ECG analysis rather than replacing it.

Although advancements in technology have the potential to reduce a proportion of manual work in the clinical setting, currently, there are still limitations as highlighted in the study. Therefore, while the promise of a fully automated system appears appealing, clinicians should approach that with a level of healthy skepticism. As a general rule, AF is more likely to be detected if we look longer, look harder and if we look using more sophisticated ways (Fig. 1).

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Conflict of Interest Statement

The authors have no conflicts of interests to disclose.

Funding Sources

This article was not funded by any external sources.

Author Contributions

Y.X.G.: conceptualization and writing – original draft. T.P.: conceptualization and writing – review and editing. G.Y.H.L.: conceptualization and writing – review and editing, corresponding author.