



Editorial

Low Burden of Atrial Fibrillation After PFO Closure: Is There a Need to Worry?

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Atrial fibrillation (AF) needs to be carefully excluded in patients with embolic stroke presumed due to patent foramen ovale (PFO). AF can be an elusive diagnosis due to its transient nature; therefore, a high index of clinical suspicion is essential to avoid overlooking AF as the cause of embolic stroke.

Current guidelines recommend 1 month of rhythm monitoring for most patients following a cryptogenic stroke or embolic stroke of unknown source.¹ Longer cardiac monitoring with an implantable loop recorder (ILR) can be done in selected patients at higher risk of AF. The European position paper on the management of patients with PFO² defines high-risk AF factors as uncontrolled diabetes, uncontrolled hypertension, left cardiac chambers anomalies (ventricular hypertrophy or atrial enlargement), and history of congestive heart failure. Additional predisposing risk factors for AF include obesity, frequent atrial runs, pulmonary disease, and thyroid disease. This expert consensus recommends 6 months of continuous rhythm monitoring for patients aged >65 years with a cryptogenic stroke, those aged 55 to 65 years with any aforementioned AF risk factor, and individuals aged <55 years with at least 2 high-risk AF factors.

In this issue of *JSCAI*, Imtiaz et al³ describe their center's unique protocol in which every patient >40 years with a cryptogenic stroke received an ILR for extended cardiac monitoring before PFO closure is considered. Their approach, although different from current guidelines, has enabled the collection of data that would not have been clinically available otherwise.

In this retrospective analysis of a selective subset of patients undergoing PFO closure, 38 individuals aged >40 years old with a cryptogenic stroke were studied. These patients were monitored with ILR for a minimum of 2 months (average of 3 months) prior to closure and had at least 2 months of postclosure data. These patients were older (mean age, 53.4 ± 12.2 years), with a mean risk of paradoxical embolism score of 6 ± 1.7. Closure was predominantly done using a GORE CARDIOFORM Septal Occluder (82%), but there was a nonsignificant numerically higher rate of AF noted with the Amplatzer Septal Occluder device (Abbott). Postclosure AF incidence was 26%, exceeding the 2.0% to

11.9% reported in prior studies based on self-reported symptoms or intermittent monitoring.⁴⁻⁷ The median onset of AF was 3.95 weeks postclosure, with 40% (4/10) of patients with AF experiencing their first episode after 6 weeks. The median duration of AF episodes was 1 hour (IQR, 0.21-13.68). Notably, all AF episodes self-terminated, and, importantly, no patient had a recurrent stroke during the monitoring period.

At first glance, the reported high rate of transient AF may raise concerns, yet it warrants contextual interpretation. Notably, this is a small, single-center, retrospective study of a subset of patients undergoing PFO closure. The mean age of patients in this study was 53.4 years, notably higher than those enrolled in contemporary landmark clinical trials for PFO closure: 45.9 years in RESPECT,⁴ 45.2 years in REDUCE,⁵ and 42.9 years in CLOSE.⁶ Considering that AF risk approximately doubles with each decade,⁸ it is reasonable to infer that the true AF incidence postclosure might be lower. The age discrepancy and small sample size restrict the generalizability of these findings to the broader PFO-closure population.

The routine use of ILR for all patients aged >40 years with a cryptogenic stroke or embolic stroke of unknown source is not supported by current guidelines or epidemiologic data.^{2,8-11} The CRYSTAL AF study, which followed patients with a cryptogenic stroke undergoing cardiac monitoring for 12 months, found that those aged <55 years rarely exhibited AF after 1 year. Although ILR have an increased AF detection rate, their use should be reserved for individuals at high risk of AF.¹² The European position paper has also adopted age 55 years as a threshold for longer cardiac monitoring as detailed above. A more selective approach for ILR use based on a comprehensive risk profile is recommended.

The duration of monitoring with ILR prior to PFO closure in this study was relatively brief (2-4 months). Guidelines advocate for 6 months of continuous monitoring with ILR for patients at high risk of AF following a cryptogenic stroke prior to consideration of PFO closure.² However, in patients with high-risk PFO features who are less likely to develop AF and more likely to benefit from PFO closure, a shortened monitoring

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period of 3 months has been suggested, especially when an atrial septal aneurysm is present.¹³ Such a targeted approach helps to address the financial concerns related to the use of ILR and inconsistent evidence on their role in reducing stroke recurrence.¹⁴

The timing of AF episodes identified post-PFO closure is also important to note. Patients undergoing PFO closure have a recognized higher risk of AF compared with those in the medical arm, with 86% of AF events occurring within 45 days postprocedure.⁹ AF within 45 days post-PFO closure is generally recognized as being procedure-related and aligns with the blinding period used in landmark contemporary trials.^{5,15} In the current study, the timing of AF can be categorized as early/procedural-related AF within 45 days postclosure (6/38 patients) and late AF (4/38 patients). With this classification, 60% (6/10) of patients experienced AF episodes likely related to the procedure. Excluding these events, this study identified 4/38 or 10.5% of patients who spontaneously developed AF after PFO closure. These rates are consistent with prior reported rates of AF.¹⁶

Reassuringly, most AF episodes detected were short-lived and well below the recognized 24-hour threshold for increased thromboembolic risk.¹⁷ The AF burden was very low, with each episode having a median duration of 1 hour. Such a minimal burden of AF has been associated with an unclear increased risk of stroke, comparable with that of patients without AF.¹⁷ Consequently, it is not surprising that none of the patients experienced a recurrent stroke. It also makes it unlikely that AF was the cause of their index stroke. Given the very low burden of AF identified in all ILR studies post-PFO closure and the absence of recurrent stroke, clinicians should consider explanting these ILR 3 to 6 months after PFO closure.

In this study, most AF episodes occurred early, were very short in duration, self-terminated, and were not associated with recurrent stroke. The timing of these more frequent than initially recognized episodes is consistent with a self-limited postimplant inflammatory mechanism. The clinical implications of these higher rates of AF post-PFO closure remain unclear. Continued careful patient selection remains key while further data are awaited.

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Declaration of competing interest

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