



Patent Foramen Ovale Secondary Stroke Prevention

Adapted from:

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Summary of Clinical Questions

- The 2 clinical questions addressed in the 2016 Update of the 2004 Practice Parameter remain unchanged in this 2020 Update.
 - The first clinical question deals only with percutaneous PFO closure.
 - The second clinical question concerns medical therapy and determined that anticoagulation and antiplatelet therapy are possibly equally effective at reducing recurrent stroke.

Key Points

- For patients with cryptogenic stroke and PFO, percutaneous PFO closure probably reduces the risk of stroke recurrence (HR-0.41, summary rate difference -0.67% per year), probably is associated with a periprocedural complication rate of 3.9%, and probably is associated with the development of serious non-periprocedural atrial fibrillation (RR-2.72, summary rate difference 0.33% per year).
- For patients with cryptogenic stroke and PFO, anticoagulation medication and antiplatelet medication are possibly equally effective at reducing recurrent stroke.

Management

Recommendations Regarding Percutaneous PFO Closure

- In patients being considered for PFO closure, clinicians should ensure that an appropriately thorough evaluation has been performed to rule out alternative mechanisms of stroke, as was performed in all positive PFO closure trials (B).
- In patients being considered for PFO closure, clinicians should obtain brain imaging to confirm stroke size and distribution, assessing for an embolic pattern or a lacunar infarct (typically involving a single deep perforator <1.5 cm in diameter) (B).
- In patients being considered for PFO closure, clinicians should obtain complete vascular imaging (MRA or CTA) of the cervical and intracranial vessels to look for dissection, vasculopathy, and atherosclerosis (B).
- In patients being considered for PFO closure, clinicians must perform a baseline ECG to look for atrial fibrillation (A).
- Select patients being considered for PFO closure thought to be at risk of atrial fibrillation should receive prolonged cardiac monitoring for at least 28 days (B).

Note: Risk factors for atrial fibrillation include: age ≥50 years, hypertension, obesity, sleep apnea, enlarged left atrium, elevated NT-proBNP, frequent premature atrial contractions, and increased P wave dispersion. Recently published guidelines from the American Heart Association, American College of Cardiology, and Heart Rhythm Society recommend prolonged ECG monitoring following cryptogenic stroke for patients older than 40 years, although more research is needed to define the yield in unselected young patients and in patients with PFO.¹
- In patients being considered for PFO closure, clinicians should assess for cardioembolic sources using TTE, followed by TEE assessment if the first study does not identify a high-risk stroke mechanism. Studies should use bubble contrast, with and without Valsalva maneuver, to assess for right-to-left shunt and determine degree of shunting (B).
- In patients being considered for PFO closure, clinicians should perform hypercoagulable studies that would be considered a plausible high-risk stroke mechanism that would lead to a change in management, such as requiring lifelong anticoagulation (e.g., persistent moderate- or high-titer antiphospholipid antibodies in a younger patient with cryptogenic stroke)² (B).
- In patients being considered for PFO closure, clinicians may use TCD agitated saline contrast as a screening evaluation for right-to-left shunt, but this does not obviate the need for TTE and TEE to rule out alternative mechanisms of cardioembolism and confirm that right-to-left shunting is intracardiac and transseptal (C).

Management (cont'd)

- Before undergoing PFO closure, patients should be assessed by a clinician with expertise in stroke to ensure that the PFO is the most plausible mechanism of stroke (B).
- If a higher risk alternative mechanism of stroke is identified, clinicians should not routinely recommend PFO closure (B).
- Before undergoing PFO closure, patients should be assessed by a clinician with expertise in assessing the degree of shunting and anatomical features of a PFO and performing PFO closure, to assess whether the PFO is anatomically appropriate for closure, to ascertain whether other factors are present that could modify the risk of the procedure, and to address post-procedure management (B).
- In patients with a PFO detected after stroke and no other etiology identified after a thorough evaluation, clinicians should counsel patients that having a PFO is common, that it occurs in about 1 in 4 adults in the general population, that it is difficult to determine with certainty whether their PFO caused their stroke, and that PFO closure probably reduces recurrent stroke risk in select patients (B).
- In patients younger than 60 years with a PFO and an embolic-appearing infarct and no other mechanism of stroke identified, clinicians may recommend closure following a discussion of potential benefits (reduction of stroke recurrence) and risks (procedural complication and atrial fibrillation) (C).
- Clinicians may inform patients that presence of a large shunt probably is associated with benefit from closure. Conversely, there probably is less likelihood of benefit in patients with a small shunt or a non-embolic-appearing single, small, deep infarct, and it is uncertain whether atrial septal aneurysm in the absence of a large shunt influences the likelihood of benefitting from PFO closure (C).
- PFO closure may be offered in other populations, such as for a patient who is 60–65 years old with a very limited degree of traditional vascular risk factors (i.e., hypertension, diabetes, hyperlipidemia, or smoking) and no other mechanism of stroke detected following a thorough evaluation, including prolonged monitoring for atrial fibrillation (C).
- PFO closure may be offered to younger patients (e.g., <30 years) with a single, small, deep stroke (<1.5 cm), a large shunt, and absence of any vascular risk factors that would lead to intrinsic small-vessel disease such as hypertension, diabetes, or hyperlipidemia (C).
- In a patient for whom PFO closure is being considered, a shared decision-making approach between clinicians and the patient should be used, exploring how well the patient's attributes match those included in the positive PFO closure trials and the patient's preferences and concerns regarding risk of stroke recurrence and risk of adverse events (B).

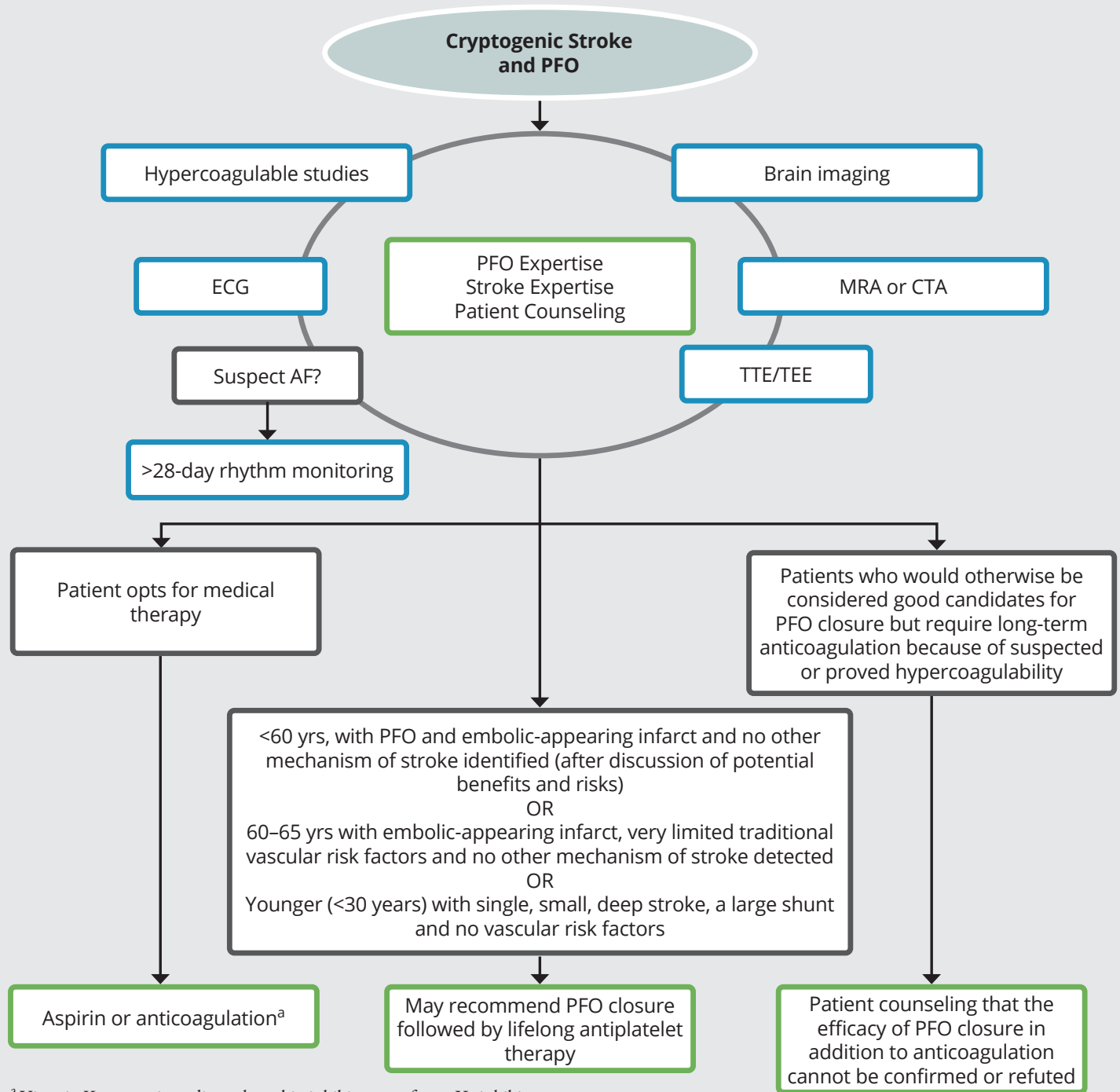
Recommendations Regarding Medical Therapy

- In patients who opt to receive medical therapy alone without PFO closure, clinicians may recommend either an antiplatelet medication such as aspirin or anticoagulation (using a vitamin K antagonist, a direct thrombin inhibitor, or a factor Xa inhibitor) (C).
- In patients who would otherwise be considered good candidates for PFO closure but require long-term anticoagulation because of suspected or proven hypercoagulability (defined thrombophilia, unprovoked deep venous thrombosis, or unprovoked pulmonary embolism), clinicians should counsel the patient that the efficacy of PFO closure in addition to anticoagulation cannot be confirmed or refuted (B).

Classification of Management Recommendations

| Classification | Definition |
|----------------|--|
| Level (A) | Denotes a practice recommendation that must be done. In almost all circumstances, adherence to the recommendation will improve health-related outcomes. Almost all patients in this circumstance would desire that the recommendation be followed. |
| Level (B) | Corresponds to the helping verb should. Should recommendations tend to be more common, as the requirements are less stringent but still based on the evidence and benefit-risk profile. |
| Level (C) | Corresponds to the helping verb may. May recommendations represent the lowest allowable recommendation level the AAN considers useful within the scope of clinical practice and can accommodate the highest degree of practice variation. |
| Level (U) | Indicates that the available evidence is insufficient to support or refute the efficacy of an intervention. |
| Level (R) | Assigned when the balance of benefits and harms is unknown and the intervention is known to be exorbitantly expensive or have important risks. This level designates that the intervention should not be used outside of a research setting. |

Figure 1. Management Algorithm



^a Vitamin K antagonist, a direct thrombin inhibitor, or a factor Xa inhibitor.

Abbreviations

AF, atrial fibrillation; CTA; computed tomographic angiography; HR; hazard ratio; MRA; magnetic resonance angiography; PFO; patent foramen ovale; RR; risk ratio; TCD; transcranial Doppler ultrasonography; TEE; transesophageal echocardiography; TTE; transthoracic echocardiography

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Source

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This practice advisory was endorsed by the Society for Cardiovascular Angiography and Interventions, the American Heart Association/American Stroke Association, and the European Academy of Neurology.

Resources

1. January CT, Wann LS, Calkins H, et al. 2019 AHA/ACC/HRS focused update of the 2014 AHA/ACC/HRS guideline for the management of patients with atrial fibrillation: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Rhythm Society. *Heart Rhythm* 2019;16:e66-e93.
2. Tektonidou MG, Andreoli L, Limper M, et al. EULAR recommendations for the management of antiphospholipid syndrome in adults. *Ann Rheum Dis* 2019;78:1296-1304.