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The Extra Mile: Special Consideration of Atrial Fibrillation in Older Adults with Endurance Athletic History

Authors' Contribution:
Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
Literature Search F
Funds Collection G

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Conflict of interest: None declared

Patient: **Male, 80-year-old**
Final Diagnosis: **Ischemic stroke**
Symptoms: **Altered mental status • hematoma • hemiparesis • hyperreflexia**
Medication: —
Clinical Procedure: —
Specialty: **Cardiology**

Objective: **Challenging differential diagnosis**





Background: Aerobic exercise is uniformly accepted as one of the most important modifiable factors to improve cardiovascular health, but endurance athletic training poses a significant risk factor for development of atrial fibrillation (AFib) in middle-aged and older adults. Ubiquitous risk assessment tools (CHADS2 and CHA2DS2-VASc) and US Preventive Services Task Force guidelines do not presently account for this association. A case is presented which illustrates a dire outcome of undiagnosed AFib in an elderly male patient who had run many marathons.

Case Report: An 80-year-old male with well-controlled hypertension and hypercholesterolemia and a history significant for running many marathons throughout his life was brought in via ambulance after being found down with head trauma by his wife at home. A short run of AFib was recorded on telemetry and electrocardiogram (ECG) and a review of previous ECGs revealed evidence of interatrial block (Bayés Syndrome), though the patient had no history of AFib or anticoagulation. This coupled with imaging indicated thromboembolic stroke to the left middle cerebral artery leading to right-sided hemiplegia and a subsequent fall to the right, causing right-sided head trauma and intracranial hemorrhage. His clinical course did not improve, and on his fifth day of admission he was transferred to comfort care, extubated, and succumbed to his injuries.

Conclusions: This case and the accompanying summary of evidence strongly encourage further investigation and a higher index of suspicion for AFib in asymptomatic older adults with a history of endurance athletic training.

MeSH Keywords: **Aging • Atrial Fibrillation • Exercise • Geriatrics • Risk Factors**

Full-text PDF: <https://www.amjcaserep.com/abstract/index/idArt/924580>

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Background

An estimated 2.7–6.1 million adults in the United States (US) currently have atrial fibrillation (AFib) and the projected prevalence is 12.1–15.9 million by the year 2050, with more than 50% of affected individuals aged 80 years or older [1,2]. Aerobic exercise is uniformly accepted as one of the most important modifiable factors to improve cardiovascular health [3], but endurance athletic training poses a significant risk factor for development of AFib in middle-aged and older adults [4,5]. Ubiquitous risk assessment tools (CHADS₂ and CHA₂DS₂-VASc) and US Preventive Services Task Force guidelines do not presently account for this association [6].

A case of an 80-year-old male with a minimal past medical history but a notable endurance exercise history of running many marathons throughout his life suffered a stroke, a fall, and significant head trauma. The lack of witnesses to the event illustrates the importance of a broad differential diagnosis and rapid imaging workup, while the accompanying summary of evidence connecting endurance exercise with AFib highlights a clinical pearl for both future patient encounters and research on this frontier topic.

Case Report

An 80-year-old male with a medical history of hypertension and hypercholesterolemia well-controlled on lisinopril, hydrochlorothiazide, and atorvastatin was brought in via ambulance after being found down with obvious head trauma by his wife at home at hour 1800 with a Glasgow Coma Scale (GCS) of 3. The patient's last known well time was hour 2200 the night prior. He was reported to be very healthy and active, did not smoke or drink alcohol, and most notably had run many marathons throughout his life. Physical examination was significant for an intubated male with bradycardia at a rate of 40–50 beats per minute, a large right-sided hematoma overlying the skull, as well as right hemiplegia and hyperreflexia. Differential diagnoses included stroke, mechanical fall, syncope, cardiac arrest, arrhythmia, subdural/epidural/subarachnoid hemorrhage, and neoplasm.

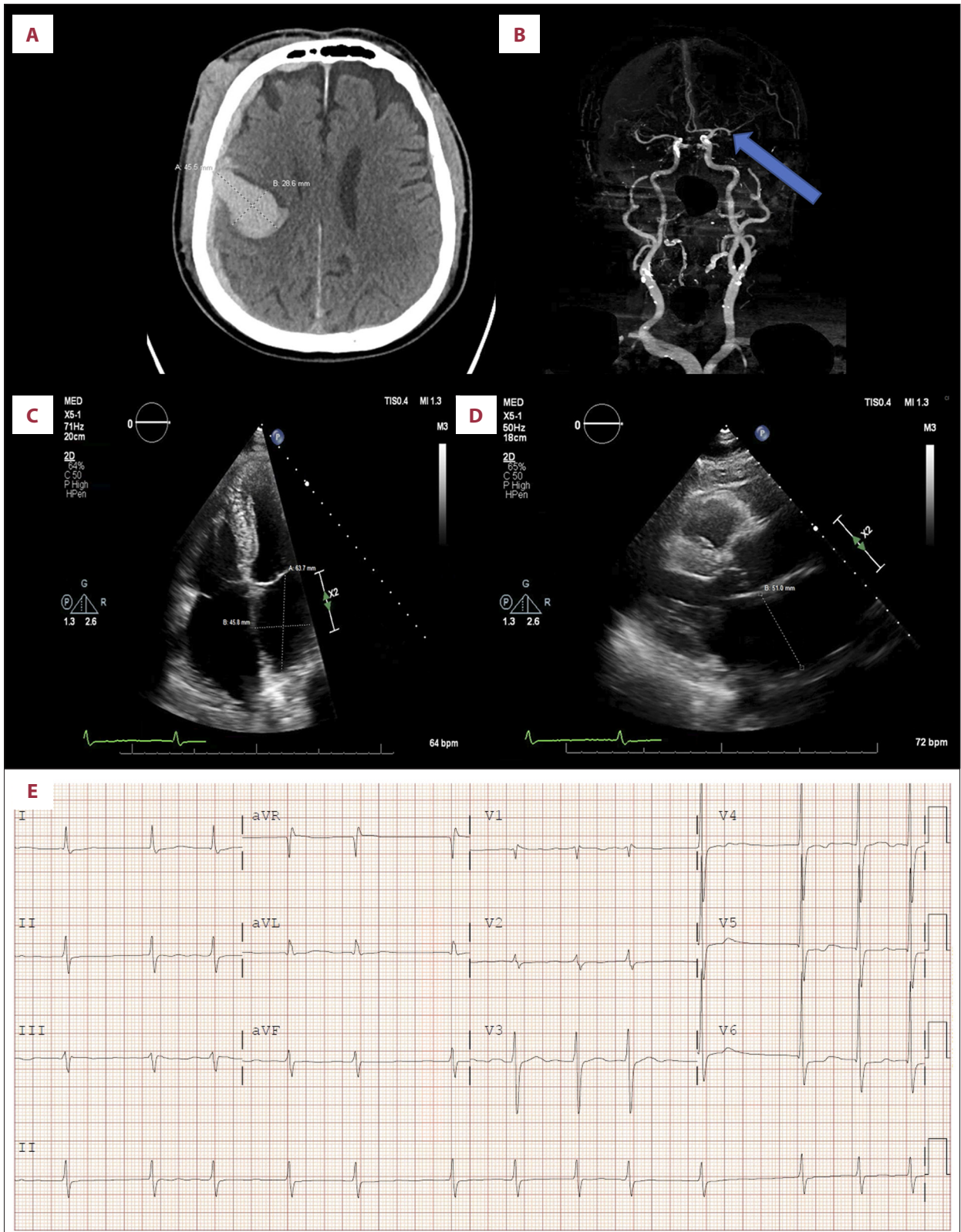
Head computed tomography (CT) without contrast (Figure 1A) showed right subdural hemorrhage continuous with an intraparenchymal hematoma with largest dimensions measuring 4.6×2.8 cm. CT angiogram (Figure 1B) revealed a proximal occlusion of the M2 branch of the left middle cerebral artery (MCA) with mild atherosclerotic disease in the bilateral internal carotid arteries. Initial magnetic resonance imaging (MRI) (not shown) confirmed left MCA territory infarct. The patient was noted to have extensor posturing during the CT and was loaded with levetiracetam, given normal saline at 125 mL/hour,

and placed on a permissive hypertension protocol with a systolic goal less than 160 mmHg. He was not a candidate for tissue plasminogen activator (tPA) due to his significant intracranial bleeding. Following admission to the neuro-intensive care unit (ICU), echocardiography (Figure 1C, 1D) showed severe bilateral atrial dilation with no shunting on bubble study and a left ventricle ejection fraction of 63%. A singular 5-minute episode of AFib was identified on telemetry and captured on ECG (Figure 1E) on day 2 of admission. Review of ECGs on presentation (Figure 2) and 3 years prior in the electronic medical record (not shown) revealed sinus bradycardia meeting criteria for interatrial block (Bayés Syndrome), a strong predictor of AFib [7]. Retrospective CHADS₂ and CHA₂DS₂-VASc scores were 2 (intermediate stroke risk, 4.0% of event/year) and 3 (moderate-high stroke risk, 3.2% event/year) respectively, though he was never on anticoagulant medication. His clinical course did not improve; repeat MRI on hospital day 4 (Figure 1F, 1G) showed extension of the left MCA territory infarct and a newly visualized right cerebellar infarct (not pictured), indicating minimal likelihood of meaningful recovery. In keeping with the patient's and his family's wishes, he was transitioned to comfort care, extubated on hospital day 5, and succumbed shortly after.

Discussion

Substantial evidence in this case suggests this dire outcome was the result of a stroke caused by thromboembolism secondary to undiagnosed paroxysmal AFib. A summary of support for this hypothesis includes atrial dilation measured by the parasternal long axis view greater than the 95th percentile compared to age-matched healthy adults [8,9], no shunting on bubble study, only mild atherosclerotic disease on CT angiogram, 2 ischemic strokes in different arterial territories, AFib on ECG during admission with prior interatrial block, and a retrospective CHA₂DS₂-VASc score of 3 (2 points for age, 1 point for hypertension). Each independent finding is moderately suggestive of AFib but taken together indicate the patient's risk for AFib was exceedingly high. While there were no witnesses to the event, this body of evidence and the imaging support the proposed following sequence of events: thromboembolic stroke to left MCA leading to right-sided hemiplegia and a subsequent fall to the right, causing right-sided head trauma and intracranial hemorrhage. In hindsight, the events described in this case report likely could have been prevented with AFib screening and adequate anticoagulation, although there is a current scarcity of guidelines pertaining to AFib screening.

Aerobic exercise is uniformly accepted as one of the most important modifiable factors to improve cardiovascular health [3]. While numerous studies in animals and humans have demonstrated potential detrimental effects of extensive endurance



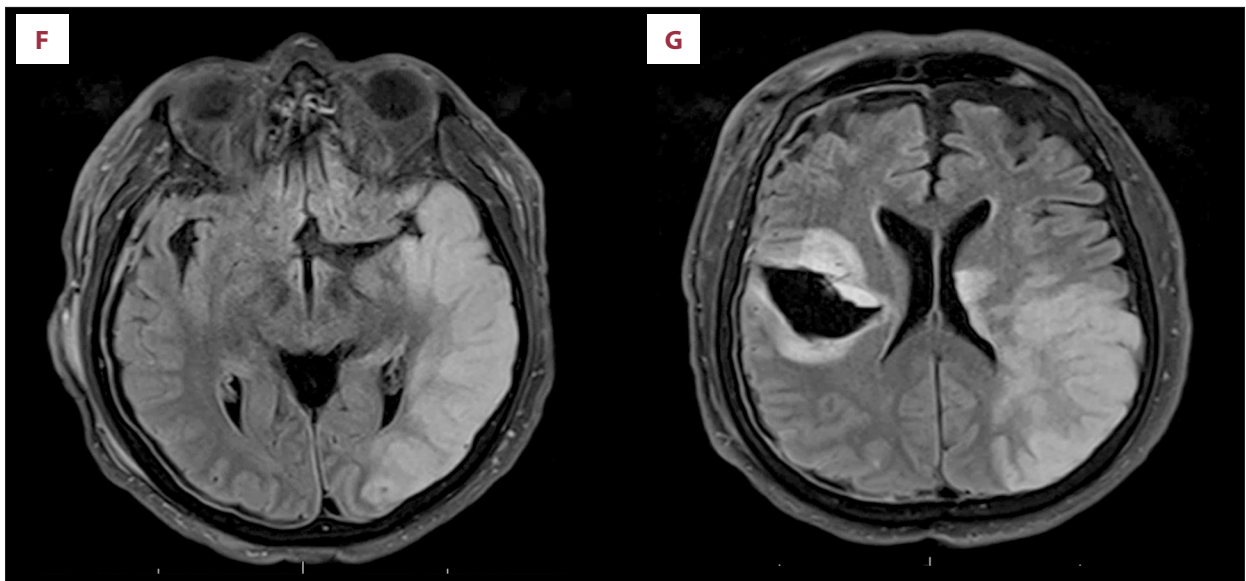


Figure 1. Clinical and imaging findings (A) Computed tomography (CT) head without contrast on admission. (B) CT Angiogram on admission. (C, D) Transthoracic echocardiogram with left atrial dimensions: apical 4-chamber view (63.7×45.8 mm) and parasternal long axis view (51 mm). (E) Electrocardiogram capturing atrial fibrillation obtained hospital day 2. (F, G) Magnetic resonance imaging (FLAIR) obtained hospital day 4.

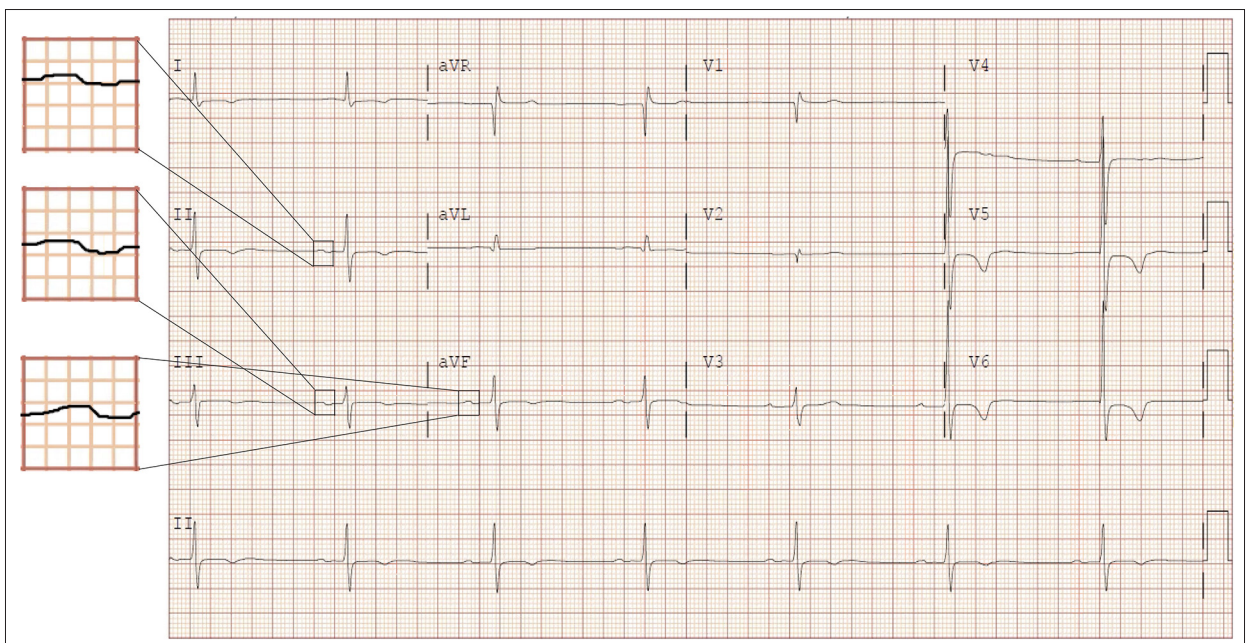


Figure 2. Electrocardiogram on initial presentation, meeting diagnostic criteria for interatrial block (Bayés Syndrome): biphasic P waves >120 ms in the inferior leads (II, III, aVF).

exercise, particularly in the context of developing AFib [4], the pathophysiological mechanisms remain speculative and there are no clinical guidelines for considering or screening for AFib in middle-aged or older endurance athletes [1,6]. The relative prevalence of AFib in middle-aged and older adults with extensive endurance training, when age matched to the general population, has been described as 2.3, 4.2, 5.8, 7.1, 12.8,

and 100 times as high in various studies [4]. Proposed mechanisms for the role endurance aerobic exercise plays in developing AFib include prolonged inflammation with myocardial injury and fibrosis, aberrant autonomic signaling, and atrial remodeling including dilation [5]. Most recently an association of aortic dilatation in older runners and rowers has been discovered in a cross-sectional study, though the clinical impact

of this specific finding in these individuals is not fully understood at this time [10]. In 2018, the US Preventive Services Task Force concluded there is inadequate evidence to issue a recommendation for routine ECG screening for AFib in asymptomatic adults >65 years of age [6]. Gaps in evidence may be partially satisfied by some recent and ongoing trials (D₂AF, IDEAL-MD, SCREEN-AF, STROKESTOP), all of which employ wearable technology for AFib detection in the outpatient setting [6]. None of the aforementioned trials describe analysis of endurance exercise in the past or present as a factor in risk stratification or clinical decision-making, which may provide invaluable retrospective data.

Conclusions

Given our imminently aging population, the association of prolonged endurance exercise and AFib is a frontier concept which warrants further exploration. With the advent of more convenient wearable technology for outpatient screening for AFib, we may now elaborate on individualized risk factors which will shape present and future research, guidelines, and allocation

References:

1. Chung MK, Eckhardt LL, Chen LY et al: Lifestyle and risk factor modification for reduction of atrial fibrillation: A scientific statement from the American Heart Association. *Circulation*, 2020; 141(16): e750–72
2. Go AS, Hylek EM, Phillips KA et al: Prevalence of diagnosed atrial fibrillation in adults: National implications for rhythm management and stroke prevention: the AnTicoagulation and Risk Factors in Atrial Fibrillation (ATRIA) Study. *JAMA*, 2001; 285(18): 2370–75
3. Piercy KL, Troiano RP, Ballard RM et al: The physical activity guidelines for Americans. *JAMA*, 2018; 320(19): 2020–28
4. Turagam MK, Flaker GC, Velagapudi P et al: Atrial fibrillation in athletes: Pathophysiology, clinical presentation, evaluation and management. *J Atr Fibrillation*, 2015; 8(4): 1309
5. Calvo N, Brugada J, Sitges M, Mont L: Atrial fibrillation and atrial flutter in athletes. *Br J Sports Med*, 2012; 46(Suppl. 1): i37–43
6. US Preventive Services Task Force, Curry SJ, Krist AH, Owens DK et al: Screening for atrial fibrillation with electrocardiography: US Preventive Services Task Force recommendation statement. *JAMA*, 2018; 320(5): 478–84
7. Bayes de Luna A, Baranchuk A, Robledo LAE et al: Diagnosis of interatrial block. *J Geriatr Cardiol*, 2017; 14(3): 161–65
8. Lang RM, Badano LP, Mor-Avi V et al: Recommendations for cardiac chamber quantification by echocardiography in adults: An update from the American Society of Echocardiography and the European Association of Cardiovascular Imaging. *J Am Soc Echocardiogr*, 2015; 28(1): 1–39
9. Aurigemma GP, Gottdiener JS, Arnold AM et al: Left atrial volume and geometry in healthy aging: The Cardiovascular Health Study. *Circ Cardiovasc Imaging*, 2009; 2(4): 282–89
10. Churchill TW, Groezinger E, Kim JH et al: Association of ascending aortic dilatation and long-term endurance exercise among older masters-level athletes. *JAMA Cardiol*, 2020 [Epub ahead of print]

Disclosures

The author has no disclosures, financial or otherwise.