Race and stroke in an atrial fibrillation inception cohort: Findings from the Penn Atrial Fibrillation Free study ⓔ

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BACKGROUND Stroke may be the initial manifestation of atrial fibrillation (AF). Limited studies, however, have evaluated racial differences in stroke before the diagnosis of AF.

OBJECTIVE We assessed racial differences in strokes that occurred before and after AF diagnosis in the Penn Atrial Fibrillation Free study.

METHODS The Penn Atrial Fibrillation Free study consists of 56,835 patients from the University of Pennsylvania Health System who were free of AF at the index visit. We developed an inception cohort of 3507 patients with incident AF and without any remote history of stroke.

RESULTS Among the AF inception cohort, there were 538 patients with ischemic strokes and 54 with hemorrhagic strokes. Nearly half (n = 254; 47%) of the ischemic strokes occurred within a 6-month period before the diagnosis of AF. Of these, the majority of strokes occurred either on the day of (n = 158) or within a 7-day period

before (n = 30) the diagnosis of incident AF. The remaining 284 (53%) ischemic strokes occurred a median of 3.6 years (interquartile range 1.9–5.4 years) after AF diagnosis. Compared with whites, blacks had an independently higher risk of having an ischemic stroke either before (adjusted odds ratio 1.37; 95% confidence interval 1.03–1.81) or after (adjusted hazard ratio 1.67; 95% confidence interval 1.30–2.14) AF diagnosis.

CONCLUSION In the population with incident AF, nearly half of the ischemic strokes occurred before the diagnosis of AF. Compared with whites, blacks had a higher risk of developing an ischemic stroke that persisted whether the stroke occurred in the period either before or after AF diagnosis.

KEYWORDS Atrial fibrillation; Ethnicity; Population; Race; Risk factor; Stroke

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Introduction

Blacks have a higher incidence of stroke and stroke-associated disability than do whites.[1–3] Multiple studies have demonstrated similar racial differences in the incidence of stroke among elderly patients with atrial fibrillation (AF) even after adjusting for anticoagulation use.[4–7] These findings suggest that the etiology and consequences of AF including electromechanical changes in the heart and potential complications such as stroke and systemic thromboembolism may differ in blacks compared with

whites. As such, clinical guidelines for the management of AF should emphasize not only the importance of population-based interventions to prevent stroke and thromboembolism but also their potential for reducing racial disparities in the elderly with AF.

Stroke may be the initial manifestation of AF. The recent American Heart Association and American Stroke Association guidelines recommend extended cardiac rhythm monitoring over at least a 6-month period for the evaluation of AF in patients who have experienced a stroke without an apparent cause.[8] In 2 recent studies—the 30-Day Cardiac Event Monitor Belt for Recording Atrial Fibrillation After a Cerebral Ischemic Event study and Cryptogenic Stroke and Underlying Atrial Fibrillation—investigators reported a significant increase in AF detection with longer-term monitoring that extended up to 36 months after the stroke event.[9,10] AF detection in these populations resulted in subsequent prescription of anticoagulation therapies.[9]

However, these studies enrolled a limited minority population, and only 2%–4% of the study population was black. A better understanding of the burden of AF after an ischemic stroke is important as recurrent events may be prevented by earlier AF detection and the subsequent initiation of anticoagulation therapies. We created an inception cohort of adults with AF and evaluated racial differences in the risk of ischemic or hemorrhagic stroke that either preceded or followed the diagnosis of AF.

Methods

We assessed racial differences in ischemic and hemorrhagic strokes in the Penn Atrial Fibrillation Free (PAFF) study.[11] The PAFF cohort is a large multihospital cohort of patients from the University of Pennsylvania Health System who were free of AF or atrial flutter at the index visit. The cohort was developed in collaboration with the Penn Data Analytics Center, which aims to integrate the massive stores of clinical data across the health system for the purposes of research and quality improvement initiatives. For this project, we first developed an inception cohort of patients with incident AF and without any remote history of stroke. As a result, we had the unique ability to evaluate strokes that occurred during the time period before the diagnosis of AF. We also evaluated ischemic and hemorrhagic stroke risk after the diagnosis of AF.

Figure 1 characterizes both the PAFF and AF inception cohorts. We included 80,682 patients who had an electrocardiogram (ECG) within the University of Pennsylvania Health System between June 1, 2004, and December 31, 2009.[11] Individuals with an ECG demonstrating AF or atrial flutter

(n = 12,302) or an uninterpretable rhythm (n = 1115) were excluded, leaving 67,265 patients for additional analyses (Figure 1). We then linked all ECG records to administrative and electronic medical record data from the University of Pennsylvania Health System. In particular, emergency room, outpatient, and inpatient data including demographic characteristics, diagnoses, laboratory examinations, and medications were extracted from electronic medical records, which included all clinical encounters. Multiple sources including MUSE (GE Healthcare, Little Chalfont, Buckinghamshire, United Kingdom), Sunrise Clinical Manager (Eclipsys Corporation, Atlanta, GA), Epic (Epic Systems, Verona, WI), Cerner (Cerner Corporation, North Kansas City, MO), EMTRAC (University of Pennsylvania, Philadelphia, PA), and MedView (University of Pennsylvania, Philadelphia, PA) were used. The MUSE database is an electronic depository of ECG information that spans several hospitals within the health system. The Sunrise Clinical Manager was used to obtain inpatient data. Epic was queried for outpatient data, and Cerner was queried for both inpatient and outpatient laboratory data. EMTRAC is an electronic medical record system exclusively for use by emergency room physicians. MedView is a database management system that coordinates transfer of data in various other data repositories. Because various clinical and laboratory settings within the University of Pennsylvania Health System had used their own medical recording system, the Penn Data Store (Penn Medicine's Clinical Data Warehouse, Philadelphia, PA) created a comprehensive combined database for the PAFF cohort.
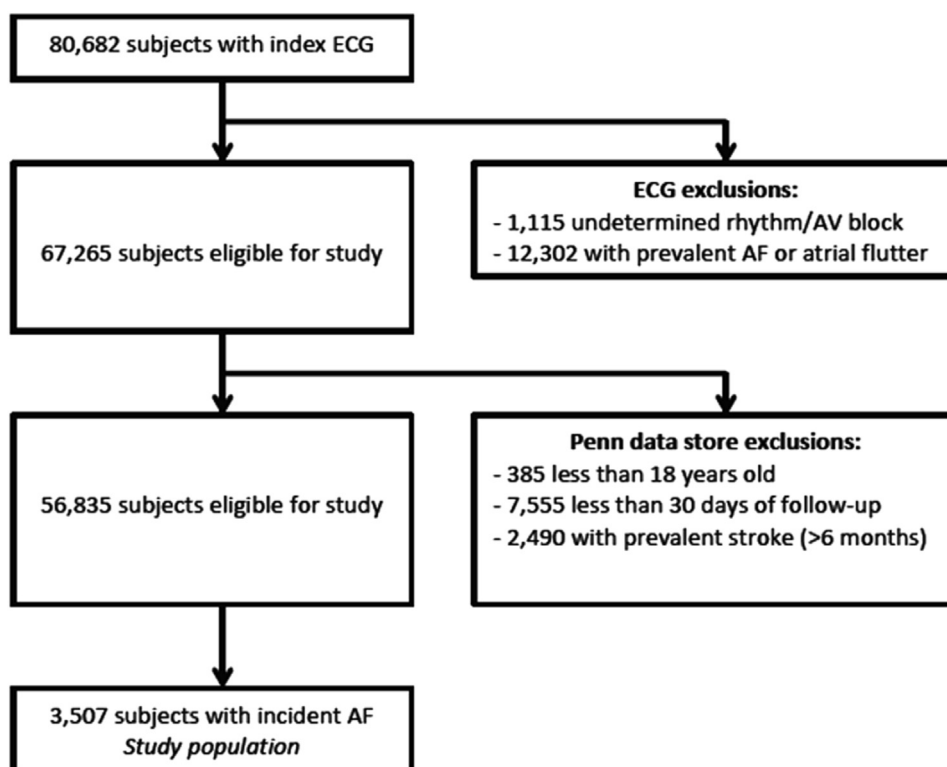
Figure 1 Design of the Penn Atrial Fibrillation Free study. AF = atrial fibrillation; AV = atrioventricular; ECG = electrocardiogram.