Spontaneous Echo Contrast as a Risk Factor for Cerebrovascular Accident

Rami N. Khouzam* and Fahed Al Darazi

Abstract
Embolic stroke accounts for 20% of ischemic stroke. Atrial fibrillation (AFib) comes third as risk factor for stroke. Dense left atrial spontaneous echo contrast (LA SEC) has been shown to be an independent predictor of cerebral embolism in non-valvular AFib. We present an elderly patient with stroke in the left middle cerebral artery territory who was found to have LA SEC as dense as agitated saline on transesophageal echocardiogram (TEE). This case stresses the importance of recognizing SEC as a risk factor for stroke. It also emphasizes the value of TEE in the evaluation of stroke etiology and in risk stratifying patients with AFib and stroke.

Keywords
Spontaneous echo contrast; Stroke; Stasis; Echodensity; Atrial fibrillation; TEE

Introduction
Left Atrial Spontaneous echo contrast (LA SEC) is a sign of significant stasis and could potentially be a precursor for forming thrombi. We report a patient who presented with stroke, and was found to have evidence of impressive LA SEC; almost as echodense as agitated saline. This is demonstrated by a TEE with a figure and video clip.

Case Report
This is an 86-year-old female with history of persistent atrial fibrillation, hypertension, non-ischemic cardiomyopathy with an ejection fraction of 35% to 40%, who presented with right hemiparesis diagnosed as lacunar stroke in the left middle cerebral artery territory. A TEE shows left atrial enlargement and emphasizes the presence of LA SEC, almost as echodense as a bubble study using agitated saline seen in the right atrium (Figure 1, Figure 2 and Video 1). The LAA velocity was low at ~ 20 cm/sec (Figure 3). In spite of the absence of any obvious thrombi in the left atrium or left atrial appendage, the patient had a cerebrovascular accident (CVA). LA SEC is a sign of severe stasis in the circulation and can be a risk factor for CVA. This figure and video clip both underscore the presence of a classic LA SEC. The patient was considered to have a high CHADS-2 score of 5, and was started on anticoagulation with Warfarin. She was seen in follow up 3 months later, with no evidence of any recurrence of CVA.

Discussion
Stroke is defined as sudden neurologic deterioration or dysfunction resultant of a focal area affected in the brain [1]. Stroke is the third leading cause of death in the United States, with more than 700,000
new cases per year. Of these new cases, 550,000 are 1st time stroke, 400,000 are ischemic stroke. Moreover, 90% of people who survive a stroke are left with some neurologic deficit [2]. Approximately, 85% of stroke cases are ischemic and 15 % are hemorrhagic. Of the ischemic stroke cases, roughly 45% are thrombotic, 20% are of embolic origin and the rest have variable or unknown etiology. Embolic stroke occurs because of dislodging of microemboli form a plaque in the carotid artery, or from cardiac emboli due to hypokinetic left ventricular wall, patent foramen ovale (PFO) or atrial fibrillation (Afib) [3]. After age and hypertension (HTN), cardiac diseases come third as risk factors for stroke. Afib is responsible for 105,000 cases of stroke per year through formation of left atrial (LA) and left atrial appendage (LAA) thrombus or left atrial spontaneous echo contrast (LA SEC) [4].

LA SEC is due to the aggregation of red blood cells (RBCs) and fibrinogen in a milieu of stasis and decrease shear rate. Moreover, it does not require platelets, but platelet aggregation may follow RBCs aggregation and hence formation of thrombi. LA SEC is characterized by The Stroke Prevention in Atrial Fibrillation Investigator III (SPAF III) as faint when detected intermittently or with enhanced gain settings, and dense when present constantly at standard gain. Studies have shown that dense LA SEC may correspond to a transition phase in the formation of a thrombus rich in fibrin. The SPAF III estimated the rate of stroke with dense versus faint/absent LA SEC to be 18.2 % and 6% respectively despite treatment with aspirin and oral anticoagulation. Dense LA SEC has been shown to be and independent predictor of thrombo-embolism [5].

The risk of embolism is increased with risk factors. It is known that oral anticoagulation decreases this risk. Recent studies showed that patients with permanent Afib, despite appropriate oral anticoagulation, are still at high risk for brain embolism given other risk factors not accounted on with the CHADS2 score. These factors are named to be the echo predictors of brain embolism and death [5,6]. In 2005, a prospective study in JACC followed patients with LA SEC over a period of 12 months, and performed serial TEEs and modern cranial MRJs. The incidence of brain embolism was thought to be 7% despite oral anticoagulation. 15% had silent brain embolism and %2 had clinical evidence of stroke. This study found that dense LA SEC and low peak emptying velocity of the LAA are predictors of embolism to the brain. It was postulated that the reason is due to a low flow phenomena in the LA and LAA [8].

In a comparative follow up study done in 1993, patients with LA SEC were followed for 12 months. Six of 12 patients with non-valvular AFib and LA SEC identified at presentation developed symptomatic embolic phenomena versus 1 of 28 patients who did not have LA SEC. This was also true for other etiologies of LA SEC. There was no difference between both groups in terms of risk factors such as age, hypertension, diabetes, and left ventricular dysfunction. In the primary analysis, it was also found that LA SEC was related to earlier thromboembolic phenomena (ie. Stroke and peripheral thrombo-embolism) [7]. Similarly in a study looking at the incidence of silent brain infarction in patients with dilated cardiomyopathy, the multivariate analysis showed that dense LA SEC was the second most important variable after severe diastolic dysfunction to correlate with silent brain infarction [8].

Figure 3: Flow velocity, pulsed Doppler across the left atrial appendage (LAA), demonstrating low flow velocity ~ 20 cm/sec (N > 40 cm/sec).

LA SEC is rarely detected with transthoracic echocardiogram (TTE). We present this case to shed the light again on the importance of TEE in the assessment of patients with Stroke and Afib in order to reveal those patients with high echo risk. Many of the patients with embolic stroke and sinus rhythm at time of presentation were found to have paradoxical Afib at a later occasion. The presence of dense SEC on TEE can be used as a predictor of future embolic events and hence assist in the selection of patients who might benefit from oral anticoagulation. Given the fact that 7% of patients had brain embolism despite oral anticoagulation, we should probably re-stratify patients with high TEE risk to achieve a higher level of anticoagulation.

References


Author Affiliation

1Department of Medicine, Division of Cardiovascular Diseases, University of Tennessee Health Science Center, USA