The Assessment Of Left Atrial And Left Atrial Appendage Function In Patients With Lone Atrial Fibrillation During Sinus Rhythm

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A. Background and Study Objective

Atrial fibrillation in patients with organic heart disease has been associated with left atrial enlargement. Stretching of myocardial cells due to atrial dilatation may induce changes in electrical activation and contribute to the onset and persistence of the arrhythmia. More recently, hypertension, the leading cause of atrial fibrillation, was positively linked to left atrial enlargement and decreased left atrial contraction. Despite of these findings, a significant number of patients suffers from atrial fibrillation in the absence of organic heart disease, hypertension other known risk factors for the arrhythmia (such as diabetes mellitus, hyperthyroidism, and alcohol intoxication). These patients have been called the "lone atrial fibrillators". There is little literature on the echocardio graphical characteristics of patients with lone atrial fibrillation. However, at least some of these patients demonstrate normal left atrial size on traditional transthoracic echocardiogram. For the past several years, transesophageal echocardiogram has been used to evaluate the left atrial appendage function in patients with atrial fibrillation in order to predict the risk of systemic embolism, as this latter event has been related to severely depressed left atrial appendage function and left atrial appendage spontaneous echocardiographic contrast or thrombus formation. Whether patients with lone atrial fibrillation have decreased left atrial appendage function which may predispose them to the development of the arrhythmia is not known. This study is designed to evaluate the left atrial and left atrial appendage function in patients with lone atrial fibrillation. As it is known that prolonged period of atrial fibrillation by it self may lead to left atrial and left atrial appendage dysfunction, the study will be carried out in patients with first episode of atrial fibrillation of limited duration and while they are in sinus rhythm.

B. Study Design

Study subjects with lone atrial fibrillation will be selected from patients referred to a group of cardiologists after the first episode of symptomatic atrial fibrillation. Control subjects will be selected from healthy volunteers of the same ethnic and socioeconomic background matched to the study group in age, gender and body surface area. Both transthoracic and transesophageal echocardiogram will be performed at the time of entry to the study in the control group and 1 week after the first episode of atrial fibrillation in the study group provided that no further episode of atrial fibrillation occurred in the interim. The result of the echocardiogram will be read by two independent cardiologists blinded to the history of the subject. Left atrial and left atrial appendage function will be evaluated in the study group and compared to that obtained in the control group.

C. Subiect Selection

a. Study Subjects

Cases referred to a group of cardiologists working in the Atchley Pavilion after the first episode of symptomatic atrial fibrillation will be screened with a detailed questionnaire, a routine physical exam, a chest X-ray, an electrocardiogram, and laboratory tests for blood count, serum chemistry, coagulability, and thyroid function. Those who meet the criteria for lone atrial fibrillation will be rescreened in 1 week to exclude those who had recurrent arrhythmia during the interim. Patients who pass both screens will proceed with the study protocol.

i. Inclusion Criteria

a) adult (18 years or older).
b) first episode of atrial fibrillation as documented by 12 lead electrocardiogram which lasts less than 24 hours and without recurrence within I week of the first episode.
c) no history of valvular heart disease, prosthetic valve, coronary heart disease, congestive heart failure, hypertension, hyperthyroidism, diabetes mellitus, and chronic alcohol ingestion.

ii. Exclusion Criteria

a) active upper gastrointestinal bleeding.
b) oropharyngeal, esophageal or intestinal Pustule, ulceration, laceration, or perforation.
c) esophageal diverticula, varices, or esophageal obstruction (neoplasm or stricture)
d) recent gastrointestinal surgery (less than 6 month prior
e) significant coagulopathy: INR > 4.0, PTT > twice of control or platelets less than 50,000 previous radiotherapy to the chest region
f) cervical spine instability

b. Control Subjects

Volunteers with the same ethnic and socioeconomic background matched to the study subjects in age, gender and body surface area will be screened to exclude systemic and cardiac disease. Transthoracic and transesophageal echocardlogram:

The subjects will have been NPO since midnight the previous night. Echocardiogram will be performed in the morning in the Presbyterian Hospital ECHO Lab. Spray of Cetacaine will be used for the local anesthesia in the oropharynx. Transthoracic echocardiogram will be obtained in the supine position and transesophageal echocardiogram in the left lateral decubitus position. Vital signs and oxygenation saturation will be monitored during the procedure at 2 minutes intervals. The following parameters will be measured by transthoracic echocardiogram:

a) maximal (end systolic) and minimal (end diastolic) left atrial areas: obtained by planimetry on the apical four chamber view during cross-sectional imaging study
b) peak early and late diastolic flow velocities across the mitral valve: obtained by pulsed doppler study of a sample volume placed at the mitral valve leaflet tip level
c) presence of valvular or intracardiac anatomical abnormality or evidence of left ventricular hypertrophy

The following parameters will be measured by transesophageal echocardiogram:

a) maximal (just before the P wave on EKG) and minimal (immediately after the QRS complex on EKG) left atrial appendage areas: obtained by planimetry with perimeters extended top of the limbus between the upper left pulmonary vein along a straight line drawn to the aorta at its shortest point at the base of the left atrial appendage
b) peak forward and backward diastolic flow velocities of the left atrial appendage: obtained by pulsed doppler study with sample volume placed at the outlet of the left atrial appendage
d) presence of left atrial or left atrial appendage thrombus formation or spontaneous echocardiographic contrast

D. Statistical Analysis

With a power of 0.8 and an alpha value of 0.05, the study will recruit approximately 20 study subjects and 20 control subjects. Chi-square test will be used to compare categorical variables and student's t-test to compare continuous variables. Statistical significance will be defines as two-tailed $p < 0.05$.

E. Risks and Benefits

There is no potential risk involved during the performance of transthoracic echocardiogram. The risk of transesophageal echocardiogram is very small using the above exclusion criteria.

The risk of thromboembolic event is considered small in patients with lone atrial fibrillation. However, if left atrial or left atrial appendage thrombus formation or spontaneous echocardiographic contrast is demonstrated by either transthoracic or transesophageal echocardiogram, the patient may benefit from stroke prevention by starting on anticoagulation treatment.

F. Costs and Compensations

There will be no additional cost to the patients or control subjects if they decide to participate in the study. Both the transthoracic and transesophageal echocardiogram will be provided free of charge. The patients or control subjects will not receive monetary compensation for their participation.

G. Issues

There is no foreseeable ethic issues involved in this study.