Post-cardioversion Atrial Stunning – Not to be Forgotten

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Abstract

We present a case of a 60 year old male who found to be in atrial fibrillation during routine evaluation. Anticoagulation was initiated for 36 hours and he was referred for TEE guided electrical cardioversion. There was no thrombus identified in the left atrial appendage, however the appendage was large and had a tongue like accessory lobe along with spontanous contrast on the left atrium and its appendage. TEE probe was not withdrawn, patient underwent successful cardioversion with 200 joules and developed a thrombus in the left atrial appendage immediately after cardioversion, which rapidly became more dense. There was an associated marked decrease in appendage velocities. Patient was hospitalized to initiate low molecular weight heparin. This case highlights the need for vigilance in patients with unknown duration of atrial fibrillation, who have received a short duration of anticoagulant therapy and who have adverse appendage anatomy as thrombus may develop immediately after cardioversion despite anticoagulation.

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Abstract

We present a case of a 60 year old male who found to be in atrial fibrillation during routine evaluation. Anticoagulation was initiated for 36 hours and he was referred for TEE guided electrical cardioversion. There was no thrombus identified in the left atrial appendage, however the appendage was large and had a tongue like accessory lobe along with spontanous contrast on the left atrium and its appendage. TEE probe was not withdrawn, patient underwent successful cardioversion with 200 joules and developed a thrombus in the left atrial appendage immediately after cardioversion, which rapidly became more dense. There was an associated marked decrease in appendage velocities. Patient was hospitalized to initiate low molecular weight heparin.

This case highlights the need for vigilance in patients with unknown duration of atrial fibrillation, who have received a short duration of anticoagulant therapy and who have adverse appendage anatomy as thrombus may develop immediately after cardioversion despite anticoagulation.

Key words: atrial fibrillation, left atrial appendage, cardioversion, transesophageal echocardiography, appendage thrombus

Herein we present an isolated patient teaching case in whom informed consent was waived by the institutional policy. A verbal consent was obtained from the patient about anonymous publishing of the case at the time of the procedure due to its teaching value.

Case Presentation

A 60-year-old Caucasian male with a past medical history of hypertension and hyperlipidemia was found to have atrial fibrillation (afib) on ECG during a routine annual exam. Metoprolol was initiated, and he was advised to hold lisinopril by his provider. Two weeks later, the patient was evaluated in our electrophysiology clinic and found to be in persistent afib (Figure 1). Salient laboratory data included serum creatinine of 1.6 mg/d, serum potassium of 6.1 mEq/L and NT proBNP of 1951 pg/mL (normal < 77). Chest X-ray revealed biatrial enlargement. A transthoracic echocardiogram (TTE) showed a structurally normal heart with an ejection fraction (EF) of 70%, biatrial enlargement, and no hemodynamically significant valvular disease. 24-hour Holter showed continuous atrial fibrillation. He was started on Apixaban 5 mg bid and referred for outpatient cardioversion with a plan to initiate antiarrhythmic drug therapy post-cardioversion. At presentation for cardioversion he had taken 3 doses of Apixaban. Transesophageal echocardiography (TEE) was performed to rule out left atrial appendage thrombus. The left atrium (LA) was severely enlarged, and the LA appendage was dilated along with an elongated large accessory lobe directed upwards (Figure 2A & 2B). Spontaneous echo contrast was identified in LA, and LA appendage and appendage body (Figure 2C) and accessory lobe velocities (Figure 2D) were mildly reduced. However, no thrombus was present ((Figure 2A & 2B), Video 1). The right atrium (RA) was severely enlarged without RA appendage thrombus. Left ventricular (LV) function was normal, and the right ventricular chamber was mild-moderately enlarged with normal systolic function. There was mild mitral regurgitation. Due to the presence of significant LA enlargement, spontaneous contrast in the dilated LA appendage, brief duration of anticoagulant therapy, unknown duration of afib, and the phenomenon of post-cardioversion LA stunning, the TEE probe was left in the esophagus during DC cardioversion to evaluate LA appendage post cardioversion. Patient converted successfully to sinus rhythm after a single 200 joule shock. Post-cardioversion ECG showed sinus rhythm (Figure 3).

Immediately after cardioversion, a further increase in spontaneous contrast was noted in the LA appendage, along with the progressive development of a thrombus in the accessory lobe of the left atrial appendage on TEE (Figures 4 A-D & video 2). Marked reduction in velocities of the main body of the LA appendage and the accessory lobe was observed (Figures 4, E & F). Injection of image-enhancing agent Lumason showed a filling defect in the LA appendage accessory lobe, followed by the uptake of contrast by the thrombus (Figure 5, A-C).

Due to the development of LA appendage thrombus on anticoagulation, the patient was hospitalized, subcutaneous Enoxaparin 100 mg twice daily was started along with Flecainide 100 mg twice daily, and Apixaban was discontinued. The patient's hospital course was uncomplicated. Telemetry revealed sinus bradycardia with intermittent 1st-degree AV block with a heart rate range of 49-68 bpm. Lab results were significant for an elevated creatinine level of 1.43 mg/dL and a blood urea nitrogen level of 25.3 mg/dL. The patient was discharged on Enoxaparin 1 mg/kg for two weeks, followed by apixaban 5 mg once daily for four weeks. A follow-up appointment in the outpatient cardiology clinic was scheduled six weeks later. The patient was advised to continue his Flecainide until re-evaluation in the clinic.

Discussion

This case is unique in that it highlights potential complication of LA appendage thrombus formation with the

current practice of TEE-guided cardioversion, especially with the availability of newer anticoagulants that provide rapid and effective anticoagulation. Following the publication of ACUTE trial (1) that demonstrated the safety of short-term anticoagulation followed by TEE-guided cardioversion and anticoagulation in preventing thrombo-embolic risk, it is a common practice for patients to undergo TEE-guided cardioversion after a brief period of outpatient anticoagulation. This strategy shortens the duration of afib and, in many cases, the total duration of anticoagulation. If no thrombus is found on TEE, the TEE probe is withdrawn, and patient is cardioverted. However, post-cardioversion thrombo-embolic events occur even in patients without LA appendage thrombus on TEE. Presence of spontaneous echo contrast is a predictor of such events (2) and has been shown to worsen after cardioversion along with transient atrial dysfunction (3). However, in our patient, the TEE probe was left in due to multiple concerns, including significant biatrial enlargement suggesting afib might be more chronic, the presence of spontaneous contrast, unusual appendage anatomy with a dilated appendage, and an elongated accessory lobe, along with the short duration of anticoagulant therapy. In this context, we have previously reported dissociation of atrial rhythm in the LA appendage body and similar elongated accessory lobe and presence of a thrombus at the tip of this accessory lobe in a patient with afib (4).

Indeed this patient demonstrated the formation of a large LA appendage thrombus in the appendage accessory lobe that developed shortly after cardioversion. Typically, the patient would have been discharged and may have had a complication of a cardioembolic event. Our case highlights that even with direct anticoagulants, there should be a waiting period before cardioversion is performed, either with or without TEE guidance. In a patient with a short duration of anticoagulation and particularly adverse cardiac anatomy, as in our patient, TEE probe may be left in during cardioversion so that LA appendage may be evaluated post-cardioversion.

Figure Legends:

Figure1: Baseline 12 lead ECG showing atrial fibrillation. Black arrow show irregularly irregular atrial fibrillatory waves on ECG rhythm strip II (black arrows)

Figure 2: (A) Pre-cardioversion TEE showing left atrium (LA), LA appendage body (LAA) with an elongated accessory lobe (LAAA - A & B). Pulsed Wave Doppler measurement showing variable appendage velocities upto 30 cm/second in the main body and accessory lobe of the LA appendage ((yellow arrows – C & D).

Figure 3: 12 lead ECG showing sinus bradycardia at 55 beats per minute following external direct current cardioversion with 200 joules. Sinus p wave are shown with black arrows

Figure 4: Post-cardioversion TEE images of the left atrium (LA), left atrial appendage (LAA) and its accessory lobe showing progressively dense thrombus formation in the LA appendage accessory lobe from A through D. Thrombus increases progressively in echogenicity immediately post cardioversion (A) upto 3 minutes post cardioversion (D). Pulsed Wave Doppler in the LA appendage post cardioversion show near absence of velocities in the appendage body (yellow arrows E) and accessory lobe (yellow arrows F).

Figure 5: Post-cardioversion successive TEE mages of the left atrium (LA), left atrial appendage (LAA) and its accessory lobe after injection of Lumason image enhancing agent. A filing defect is present at the site of thrombus in the LA accessory lobe (yellow arrow A) with progressive uptake of contrast by the thrombus (yellow arrows B and C). C is the biplane view of the appendage and accessory lobe in B color mode showing long axis view on the left and its orthogonal short axis view on the right showing accessory lobe thrombus with contrast uptake (yellow arrows C).

Video 1: Pre-cardioversion TEE video showing a dilated left atrial appendage (LAA) and an elongated LA appendage accessory lobe with contractile function and without thrombus.

Video 2: Post-cardioversion TEE video demonstrating LA appendage (LAA) and appendage accessory lobe becoming more elongated (due to stuning) and with a thrombus within it (white arrow).

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