Embolic stroke, sinus rhythm and left atrial mechanical function

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Received 27 December 2004; received in revised form 20 July 2005; accepted 28 July 2005
Available online 28 September 2005

KEYWORDS
Echocardiography; Atrial fibrillation; Stroke

Abstract
A 64-year-old man manifested a stroke two years after restoration of sinus rhythm through a radiofrequency catheter ablation. Transesophageal echocardiography demonstrated the presence of a thrombus in the left atrial appendage. Left atrial volumes and different parameters of atrial emptying showed that, despite the persistence of the sinus rhythm, atrial mechanical function was severely impaired.

After atrial ablation procedures echocardiography can be useful to stratify patients according to their risk of developing embolic events and hence be of help in deciding whether or not discontinuation of anticoagulant therapy is the appropriate choice.

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A 64-year-old man was admitted to a neurological department because of dysarthria and left brachial and hand plegia. He was a farmer with a long history of palpitations and supraventricular arrhythmias treated with antiarrhythmic medications. He had no history of other relevant diseases.

Five years before admission he entered the hospital because of persistent atrial fibrillation (AF). A normal sinus rhythm was restored with a biphasic DC shock. At that time the echocardiogram showed a normal geometry and systolic function of the left ventricle (LV), a slight dilatation of the left atrium (LA 22 cm² in the apical four-chamber view), a trivial mitral regurgitation and a Doppler E/A ratio of 1.14 (Fig. 1). Four years before...
admission another echocardiogram was almost unchanged if not for a further dilatation of the LA (24 cm² in the apical four-chamber view). He experienced other episodes of AF and amiodarone was used as prophylaxis. In the same year the patient was admitted to the hospital because of AF with a ventricular response of 75 bpm. He was asymptomatic and underwent several DC shocks that restored sinus rhythm only for few hours. No further attempts were made to restore sinus rhythm and oral anticoagulation for primary prevention of thrombo-embolism was prescribed. Two years before admission the patient was admitted to a center for the treatment of arrhythmias where he underwent a radiofrequency catheter ablation of the cavotricuspid isthmus. Six months after the procedure, still in stable sinus rhythm, anticoagulant treatment was discontinued and replaced with aspirin.

No more symptoms until the sudden appearance of the neurological syndrome. At admission the EKG was in sinus rhythm at 55 bpm. The CT scan of the brain showed a large infarct in the territory of the right middle cerebral artery. An echo-Doppler study of the carotid arteries was unrevealing. The echocardiogram showed a normal LV ejection fraction and a further dilatation of the LA (26 cm² in the apical four-chamber view); the mitral regurgitation was still trivial. The transmitral pulsed-wave Doppler flow (Fig. 2) showed a normal E wave of 70 cm/s and a low A wave of 20 cm/s, with an E/A ratio of 3.5, strikingly different from that recorded five years before. This different pattern of ventricular filling motivated a pathophysiological approach. 

Table 1 shows echocardiographic LV and LA volumetric and functional parameters of the patient in comparison with 101 healthy subjects with a similar age. All LA volumes were dilated but what was noteworthy was that the volume after the atrial contraction was only 2 ml/m² less than the volume before the atrial contraction, so that 94% of the emptying process occurred in the passive phase of atrial mechanical cycle and only 6% was due to the atrial contraction. This was congruent with a very high E/A due to the low velocity of the A wave. These results were a clear evidence that

Figure 1  Doppler spectral tracing of the transmitral flow five years before admission.

Figure 2  Doppler spectral tracing of the transmitral flow at admission.
(a) the LA behaved as a simple conduit, (b) the atrial systolic function was practically non-existent, (c) the scant preponderance of the A wave was the result of an insufficient atrial contraction, despite the persistence of the sinus rhythm for two years. Radiofrequency ablation had restored an electrical activity without an efficient mechanical atrial contraction.

Transthoracic echocardiography showed a thrombus in the left atrial appendage (LAA). LAA velocity was 20 cm/s and a barely perceptible thrombus in the left atrial appendage (LAA). LAA contraction.

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Recovery of mechanical function after restoration of sinus rhythm can be delayed for several weeks, depending on the duration of AF, thus anticoagulation is recommended for 3–4 weeks after a successful cardioversion. No randomized controlled trial directly assessed strategies for identifying candidates to long term anticoagulant therapy after an ablation procedure. Current guidelines identify patients at high-risk of embolic events where anticoagulation is mandatory. The AFFIRM trial had previously reported that the majority of strokes both in the rhythm-control and in the rate-control strategies occurred in patients who stopped taking warfarin or whose INR was subtherapeutic at the time of the stroke and that anticoagulation should be continued in high-risk patients. It is remarkable however that our patient neither had any of the high- or medium-risk criteria for embolic events nor had any symptoms that required medical attention. It is not possible to exclude the possibility of recurrent and silent episodes of AF that might have contributed to the unfavorable clinical evolution, but the lack of symptoms or Holter monitoring recordings leaves this aspect unanswered. The patient’s atrial disease, of which AF was an expression, could have determined a progressive LA dilatation with unrelenting lose of atrial mechanical function despite the restoration of a normal sinus rhythm.

This clinical case is obviously not able to determine which LA measurements would be the best predictor of stroke in patients undergoing radiofrequency ablation procedures. Prospective trials might be useful to evaluate if, despite the presence of a regular sinus rhythm, a progressive LA remodelling with a reduced atrial mechanical contraction can be linked to an increased probability of cerebral ischemic accidents.

References

