Vasospastic angina shortly after left atrial catheter ablation for atrial fibrillation

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Introduction

Left atrial (LA) catheter ablation is performed as a curative treatment for drug-resistant atrial fibrillation (AF).[1–4] This technique may have the advantage of a lower frequency of pulmonary vein (PV) stenosis and a higher success rate for treating persistent AF than PV isolation technique.[1] However, the development of an atrioesophageal fistula or transient left recurrent laryngeal nerve palsy has been reported as an unexpected complication after LA catheter ablation.[5,6] This article describes two cases of vasospastic angina occurring shortly after LA catheter ablation that may be caused by impairment of the autonomic nerve system or by indirect thermal trauma from radiofrequency (RF) energy applications near the coronary artery.

Case reports

Patient 1

A 63-year-old man with drug-resistant paroxysmal AF was admitted to our institution for LA catheter ablation. The patient had no history of coronary arterial disease, ischemia-related symptoms, or any coronary risk factors, except for hypertension. Twelve-lead ECG demonstrated no significant abnormalities (Figure 1A), and left ventricular ejection fraction was 65%. After obtaining written informed consent, LA catheter ablation was performed. Two decapolar catheters (Lasso, Biosense-Webster, Inc., Diamond Bar, CA, USA) were placed within the ipsilateral superior and inferior PVs during RF energy delivery. LA catheter ablation was performed to encircle the left-sided and right-sided PVs 1 to 2 cm from their ostia under fluoroscopic guidance.[1,2] An 8-mm-tip catheter (Japan Lifeline Co., Tokyo, Japan) was used for the ablation. RF energy was delivered at a target temperature of 55°C and maximum power of 35 to 40 W. At targeted sites, RF energy was applied until the maximum local electrogram amplitude decreased by $\geq$ 50% to $<$0.1 mV.[1] After LA catheter ablation, PV isolation was performed for residual conduction between the PV and LA in all four PVs, resulting in complete isolation of the right-sided PVs.[1,7] However, tiny PV potentials were still present in the left PVs. A linear ablation at the cavotricuspid isthmus also was performed for typical atrial flutter. There was no evidence of tissue carbonization, and the catheter was free of thrombus at the end of the procedure. The total duration and mean power of the RF energy applications, including the catheter ablation at the cavotricuspid isthmus, were 47.2 minutes and 29 $\pm$ 7 W per application, respectively.

AF recurred shortly after the procedure. At midnight on postprocedural day 1, the patient complained of chest pain at rest. Although the pain spontaneously resolved, the patient's ECG demonstrated mild ST-segment elevation on leads II, aVF, V_5, and V_6 (Figure 1B). Intravenous nitroglycerin was started. A second episode of chest pain occurred at 4:00 AM on day 2 and resolved within several minutes. Although the cause of the chest pain could not be determined, diltiazem was given to prevent coronary vasospasm. On the morning of day 4, the patient had an attack of chest pain. The ECG exhibited prominent ST elevation (Figure 2). The chest pain disappeared after several minutes, with resolution of the ST-segment elevation (Figure 2). Coronary angiography demonstrated no organic stenosis. Serum levels of creatine kinase or isoenzyme MB were not elevated. No regional wall-motion abnormalities or pericardial effusions were found by echocardiography. The patient was discharged on aspirin, warfarin, flecainide, bepridil, doxazosin, and nifedipine. No episodes of chest pain occurred during 8-month follow-up.

Patient 2

A 59-year-old man with paroxysmal AF underwent LA catheter ablation and cavotricuspid isthmus ablation. The patient had a history of hypertension treated with a beta-

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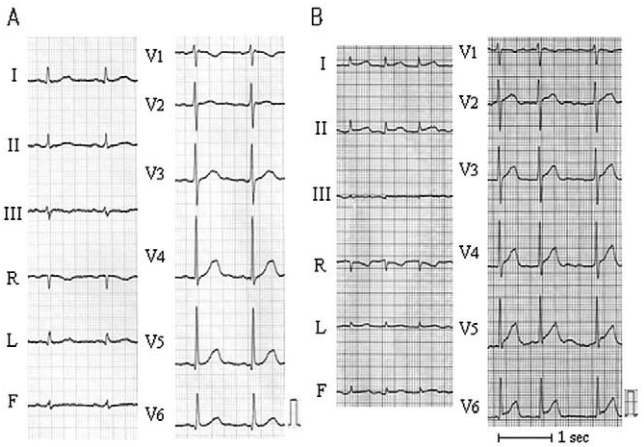

Figure 1 Patient 1. **A:** Twelve-lead ECG on admission. **B:** Twelve-lead ECG obtained shortly after development of chest pain. ST-segment elevations are seen on leads II, aVF, V_5, and V_6.

adrenergic blocker and mild hypercholesterolemia; however, he had not experienced any ischemia-related symptoms. Baseline ECG demonstrated no significant abnormalities (Figure 3A), and no structural heart disease was found by echocardiography. LA catheter ablation, PV isolation, and cavotricuspid isthmus ablation were performed as described for patient 1. The total duration and mean power of the RF energy applications, including the catheter ablation at the cavotricuspid isthmus, were 57.1 minutes and 26 ± 6 W per application, respectively. On the night of the postprocedural day 3 while the patient was cooking, he experienced chest pain that resolved within a few minutes. On days 8 and 12, he had attacks of chest and back pain that lasted for 30 minutes at rest at night or in the morning. Single-photon emission computed tomography (SPECT) perfusion scintigraphy was performed on day 13. Shortly after the initiation of ergometer exercise, the patient complained of chest and back pain that disappeared shortly after stopping exercise. However, the ECG demonstrated ST-segment depression on leads II, III, aVF, and V_4–V_6 that persisted for 8 minutes (Figure 3B). SPECT images revealed ischemia in the basal posterior and basal posterolateral portions of the left ventricle (Figure 4A). After initiation of intravenous nitroglycerin and nisoldipine, no further chest pain occurred. No elevation of serum creatine kinase or isoenzyme MB levels, regional wall-motion abnormalities, or pericardial effusions were observed. Coronary angiography demonstrated luminal irregularities but no significant stenosis. Analysis of heart rate variability using a 24-hour Holter recording revealed attenuation of parasympathetic nervous activity (Figure 4B). The patient was discharged on aspirin, warfarin, isosorbide mononitrate, benidipine, and nisoldipine and has done well with no recurrence of AF or chest pain during 6-month follow-up.

Discussion

LA catheter ablation is a promising modality for cure of drug-resistant AF.[1–4] However, unexpected or unique complications, such as atrioesophageal fistulas,[5] transient left recurrent laryngeal nerve palsy,[6] and macroreentrant LA tachycardias,[3] may occur because of the extensive linear ablations of the LA and because of the specific locations of

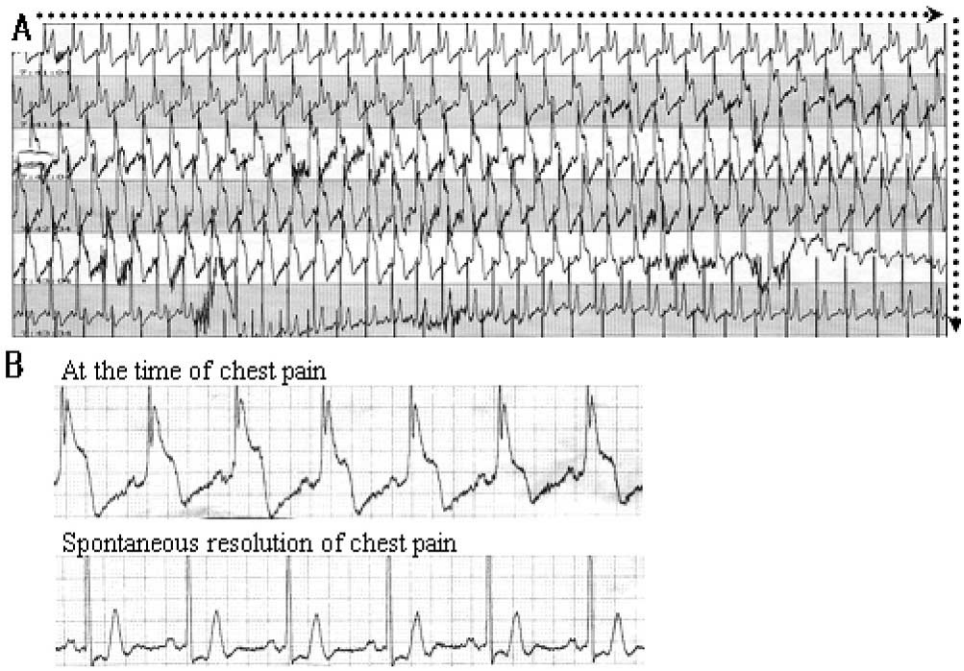

Figure 2 Patient 1. **A:** Continuous ECG recordings during attack of chest pain. **B:** ECG monitor recordings during chest pain and after spontaneous resolution of the chest pain.