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CASE REPORT

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A case of paroxysmal atrial fibrillation in a patient successfully treated by radiofrequency catheter ablation with a severely right-sided dislocation of the heart after a total right lung excision

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Abstract

A 72-year-old woman with symptomatic and drug-refractory paroxysmal atrial fibrillation (AF) underwent radiofrequency catheter ablation (RFCA). She had a history of a total right lung excision. Her chest X-ray and computed tomography (CT) revealed a severely sight-sided dislocation of the heart. Thus, the procedure was carefully performed under guidance of a CT, intracardiac echogram, atriography, and 3D mapping system. Finally, the AF was successfully treated by RFCA without any complications.

KEYWORDS
atrial fibrillation, dislocation of heart, radiofrequency catheter ablation

1 | INTRODUCTION

Pulmonary vein antrum isolation (PVAI) has proven to be a useful strategy for radiofrequency catheter ablation (RFCA) of atrial fibrillation (AF) worldwide.[1] Some reports have demonstrated that RFCA of AF utilizing a 3D mapping system is feasible and safe to achieve a favorable outcome even though in patients with an abnormal anatomy.[2,3] Here, we report a case of paroxysmal AF successfully treated by RFCA in a patient with a severely right-sided dislocation of the heart after a total right lung excision.

2 | CASE REPORT

A 72-year-old woman was admitted to our hospital with a chief complaint of palpitations due to drug-refractory AF to undergo RFCA. She underwent a total right lung excision due to bronchiectasia at an age of 23 years old. Her physical examination and laboratory analysis yielded no abnormalities. Her 12 lead electrocardiogram exhibited normal sinus rhythm, but a counter clockwise rotation (Figure 1A). Her echocardiograms yielded no evidence of clinically overt structural and/or organic heart disease including right ventricular dysfunction and dilation, and pulmonary hypertension, and a normal ejection fraction of 70% and left atrial (LA) dimension of 30 mm. Her chest X-ray (Figure 1B) and computed tomography (CT) (Figure 1C) revealed a severely right-sided dislocation of the heart. The CT also revealed that the area of the atrial septum was small and parallel in the 40° left anterior oblique (LAO) view and perpendicular to the 50° right anterior oblique (RAO) view (Figure 1C). Thus, before the transseptal puncture, right atriography was performed in those views (Figure 2A,B). A temperature probe (SensiTherm™, St. Jude Medical, St. Paul, MN, USA) for

monitoring the esophageal temperature and a guidewire were inserted and placed between the level of the left superior and inferior pulmonary veins (PVs) and in the ascending aorta, respectively. Then, a double transseptal puncture was carefully performed under guidance of an intracardiac echogram (Ultra ICE catheter; EP Technologies, Boston Scientific Corporation, San Jose, CA, USA) (Figure 2C). After an open irrigated 3.5-mm-tip ablation catheter (FlexAbility™, St. Jude Medical, St. Paul, MN, USA) and circular mapping catheter (Optima™, St. Jude Medical, St. Paul, MN, USA) were positioned in the LA, the LA was reconstructed by a 3D mapping system (EnSite NavX/Velocity™ Cardiac Mapping System, St. Jude Medical, St. Paul, MN, USA). The left atriography (Figure 2D) and EnSite voltage map (Figure 2E,F) revealed that the right PVs had a blind edge, but had PV potentials. The left PVs' stenosis or occlusion might be fatal complication in this present case. Thus, to prevent those complications, a circumferential PVAI was performed and the radiofrequency energy did not deliver in the PV, especially left PVs, under electroanatomic guidance with the 3D mapping system (Figure 2H,I) until the achievement of bidirectional conduction block between the LA and PVs under the administration of isoproterenol (Figure 2G). Because the run of the phrenic nerve was unknown, the procedure was performed while confirming the diaphragmatic movement by fluoroscopy. Because firing from the superior vena cava (SVC) was induced under an intravenous administration of isoproterenol, an SVC isolation was additionally performed. Then, program stimulation could no longer induce any arrhythmias including AF. She has remained well without any symptoms or medications for 1 year after the RFCA.

3 | DISCUSSION

It has been reported that the probable mechanism of AF long term after lung excision may be associated with right atrial overloading (RAO) resulting from pulmonary hypertension due to lung excision.[4] However, in this present case, her 12 lead electrocardiogram and echocardiograms did not exhibit RAO, right ventricular dysfunction and dilation, and pulmonary hypertension. Thus, we guessed the probable mechanism of AF was ectopic beats originating in the PVs and/or non-PV foci including SVC[5] and targeted those sites of RFCA. Because the new technologies for RFCA of AF have advanced over the last 10 years, their outcome and complications have improved.[1] However, in the real world, physicians sometimes encounter patients with AF who have an abnormal anatomy and/or dislocation of their heart, such as this present case. We gave attention to the following 5 points. We confirmed (i) the relationship between the positions and torsions of each chamber of the heart using preoperative CT, and (ii) the line of the anterior and posterior walls of the LA using a guidewire in the ascending aorta and temperature probe in the esophagus. (iii) Because the CT revealed that the atrial septum was parallel in the 40° LAO view and perpendicular to the 50° RAO view (Figure 1C), to confirm the atrial septum, right atriography was performed in those views before the transseptal

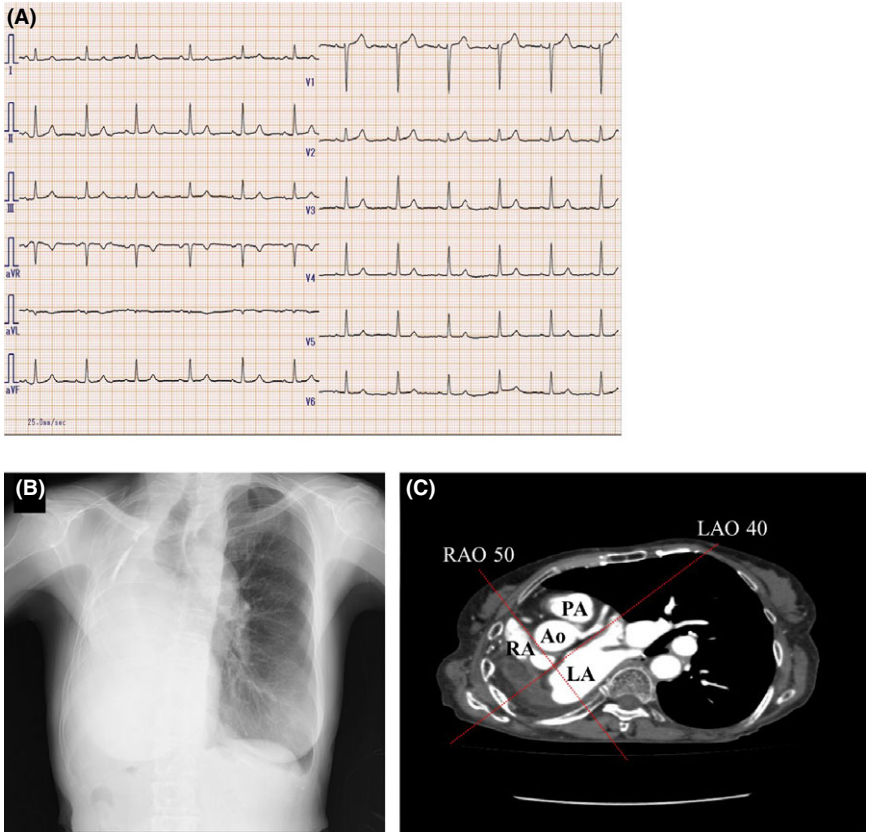

FIGURE 1 The 12 lead electrocardiogram (A), chest X-ray (B), and chest computed tomography on admission

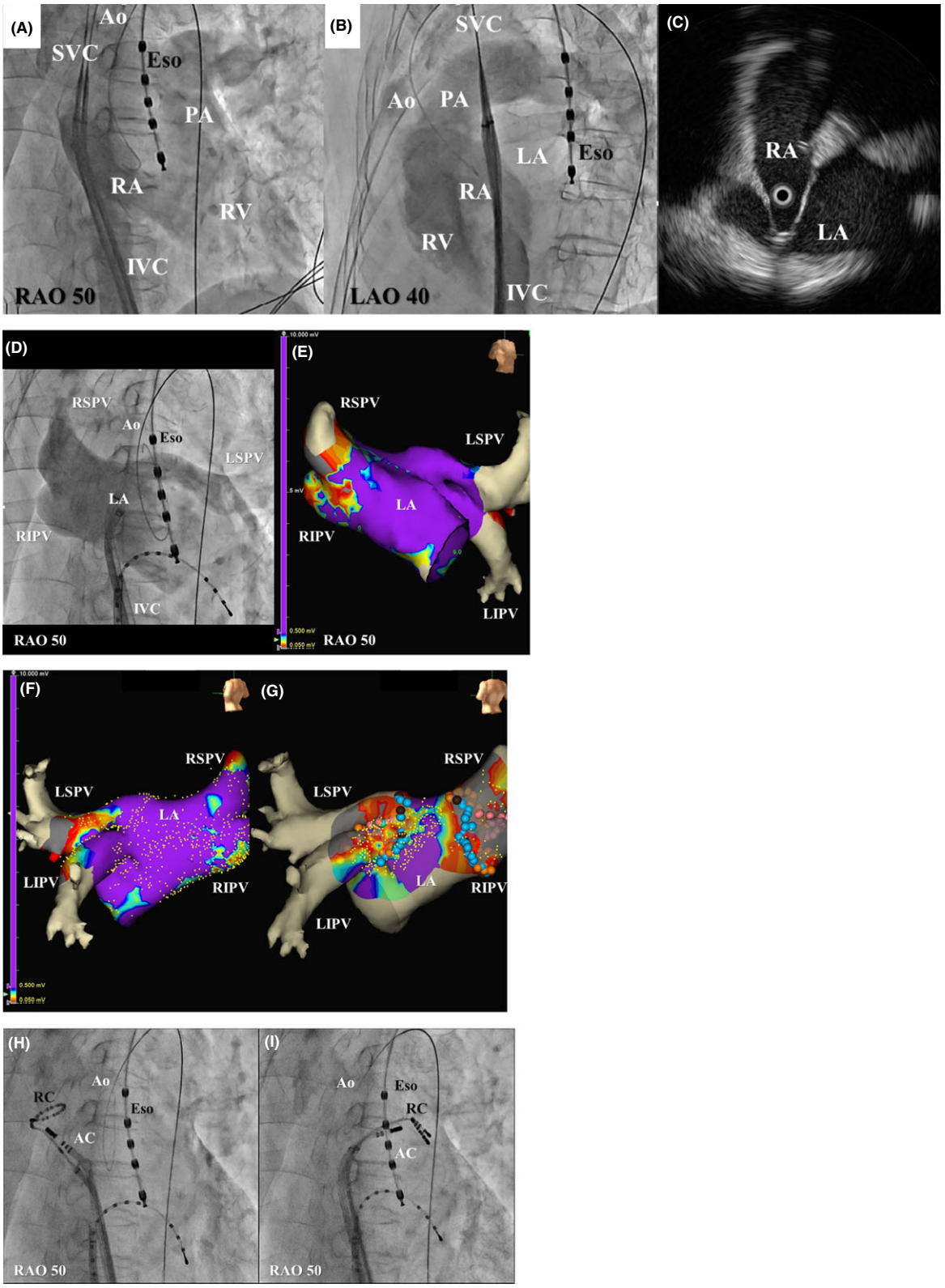

FIGURE 2 The right atriography in the right anterior oblique (RAO) (A) and left anterior oblique (LAO) (B) views, and the intracardiac echography images (C). The left atriography in the RAO view (D). The EnSite voltage maps in the RAO view (E) and back images before (F) and after (G) the pulmonary vein antrum ablation. The fluoroscopic images in the RAO view during a circumferential pulmonary vein antrum isolation of the right (H) and left (I) pulmonary veins under electroanatomic guidance with a 3D mapping system. SVC, supra vena cava; IVC, inferior vena cava; Ao, aorta; PA, pulmonary artery; RA, right atrium; LA, left atrium; RV, right ventricle; Eso, esophageal temperature probe; LSPV, left supra pulmonary vein; LIPV, left inferior pulmonary vein; RSPV, right supra pulmonary vein; RIPV, right inferior pulmonary vein; RC, ring electrode catheter; AC, ablation catheter

puncture (Figure 2A,B). (iv) Because the run of the phrenic nerve was unknown, the procedure was performed while confirming the diaphragmatic movement using fluoroscopy during the RF energy delivery. Because of the blind edge of the right PVs, the balloon catheters,[6,7] which are the recent advancements in the new technologies,[3] are not thought to be suitable for those PVs. (v) Thus, an open irrigated 3.5-mm-tip ablation catheter was used in this present case. Finally, AF was successfully treated by RFCA utilizing a 3D mapping system without any complications and obtained a good clinical course. Thus, it is very important to understand the abnormal anatomy of their hearts and elaborately make strategies before the procedures.

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CONFLICT OF INTEREST

Authors declare no conflict of interests for this article.

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