

Recurrence of atrial fibrillation ten years after thoracoscopic transdiaphragmatic epicardial radiofrequency ablation

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INTRODUCTION

Atrial fibrillation (AF) is the most frequent cardiac arrhythmia [1]. According to the European Society of Cardiology, AF may affect up to 3% of adults aged 20 years or older [1]. It is also associated with high rates of mortality and morbidity [1, 2].

Over the last 30 years, the number of invasive rhythm control methods has significantly increased. Percutaneous approaches, due to their low level of invasiveness, short period of postprocedural recovery, and low rate of complications, have gained popularity. However, it has been shown that sinus rhythm is present in only 66% to 89% of patients after 12 months of follow-up, and that the procedure must be repeated in 10% to 25% of patients to achieve a satisfactory effect [2, 3].

An alternative method of treatment in cases of AF resistant to standard therapy is epicardial radiofrequency (RF) ablation. This method is safe for the patient but requires general anaesthesia and an experienced surgeon to perform the procedure. Our previous short-term observations showed that after one year, the rate of successful thoracoscopic transdiaphragmatic ablation remains at over 80% after a single procedure [2]. Herein we present our 10-year outcomes of thoracoscopic transdiaphragmatic epicardial RF ablation.

METHODS

This was a prospective, non-randomised, single-centre study including 25 patients in whom RF ablation was performed between the years 2006 and 2007. Each patient had persistent or longstanding persistent AF after failure of earlier conservative treatment and endocardial ablation, before undergoing isolated thoracoscopic transdiaphragmatic epicardial RF ablation, which we described previously [2]. Follow-up visits were scheduled at one, three, six, and 12 months as well as 10 years after the procedure. Each follow-up visit consisted of

a medical interview, physical examination, electrocardiogram (ECG), 24-h ECG, and transthoracic echocardiography.

Statistical analysis

Continuous variables were expressed as mean (minimal-maximal value) and they were checked for normality of distribution using the Shapiro-Wilk test. To assess the differences between two continuous variables, Student t test or Mann-Whitney U test was used, as appropriate. Categorical variables were expressed as numbers and percentages. Baseline characteristics between the groups were compared using the t test for continuous variables and the χ^2 test for categorical variables. Statistical analysis was performed with STATISTICA 10.0 (StatSoft, Tulsa, OK, USA). A two-sided p-value < 0.05 was considered statistically significant.

RESULTS AND DISCUSSION

Herein we present the long-term outcomes of thoracoscopic transdiaphragmatic epicardial RF ablation. Ten years after the procedure, 18 (72%) patients responded to the invitation to a follow-up visit, of whom 13 (52%) agreed to attend and five (20%) declined due to poor health conditions, including exacerbation of congestive heart failure. Among the remaining patients, four (16%) were lost to follow-up (no response despite multiple attempts at contact and a written invitation to a free-of-charge full cardiological examination) and three (12%) died (from non-cardiovascular causes).

A total of 13 patients were included in further analysis. In 10-year follow-up, two (15.4%) patients presented with a stable sinus rhythm on both 12-lead ECG and 24-h ECG. One of them reported having two catheter ablations in the period between the one-year and 10-year follow-up visits. None of the patients used any antiarrhythmic pharmacological treatment. Atrial tachycardia and atrial flutter were diagnosed in

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Table 1. Patient characteristics before the ablation and at 10-year follow-up

	Baseline (n = 25)	10-year follow-up (n = 13)	p
Age [years]	56 (42–77)	66 (57–87)	0.001
Female sex [%]	52	38.5	0.65
Type of arrhythmia:			
Persistent AF	21 (84)	7 (53.8)	0.47
Recurrent AF	4 (16)	2 (15.4)	
Normal SR	–	2 (15.4)	
Atrial tachycardia	–	1 (1.7)	
Atrial flutter	–	1 (1.7)	
Antiarrhythmic treatment:			
Propafenone	22 (88)	1 (7.7)	0.001
Amiodarone and sotalol	3 (12)	2 (15.4)	
None	–	10 (76.9)	
CHA ₂ DS ₂ -VASc score	1 (0–3)	3 (1–4)	0.017
HAS-BLED score	1 (0–2)	1 (1–3)	0.002
LVEF [%]	56.6 (45–65)	55 (35–60)	0.036
Left atrial diameter [mm]	46 (32–54)	55 (42–69)	0.24

Data are shown as mean (minimal-maximal value) or number (percentage). AF — atrial fibrillation; LVEF — left ventricular ejection fraction; SR — sinus rhythm

one (7.7%) case each. Nine (69%) patients presented with AF on both standard and 24-h ECG.

Mean left ventricular ejection fraction (LVEF) at 10-year follow-up was 55% (35%–60%) and was different to the value before the procedure. Only two (15.4%) patients had LVEF < 45% after 10 years. Enlarged atria were found in all patients, with mean left atrial diameter of 55 mm (42–69 mm; Table 1). Mean systolic and diastolic diameters of the left ventricle were 34.3 mm (27–44 mm) and 50.4 mm (43–61 mm), respectively.

Before the procedure all patients received oral anticoagulant (OAC) therapy with vitamin K antagonists (VKAs). OAC therapy was maintained for three months after the procedure and then stopped. During the follow-up period, OACs were restarted in 10 (77%) patients, including nine patients with AF and one patient with atrial tachycardia. VKAs were restarted in eight (61.5%) patients: warfarin in one (7.7%) and acenocoumarol in seven (53.8%) cases. Non-vitamin K OACs were used in two (15.4%) patients (dabigatran and rivaroxaban in one [7.7%] case each). Patients presenting with normal sinus rhythm were not receiving anticoagulants. The decision about restarting OAC therapy depended on the clinical status of the patient and was made by the treating physician on the basis of the patient's history, contraindications to anticoagulation, and the risk of stroke or bleeding.

There was one case of ischaemic cerebellar stroke seven years after the procedure in a 59-year-old male patient with AF present at one-year follow-up. The patient, with a history

of hypertension and nephrectomy due to cancer, was on OAC therapy with warfarin during that event.

Data about antiarrhythmic pharmacotherapy at baseline and at 10-year follow-up are shown in Table 1.

After 10 years of follow-up, 15% of patients maintained sinus rhythm after surgical epicardial RF ablation, and 31% of patients were free of AF during the observation period. In a study by Bohó et al. [4] 31% of patients were reported to be free of AF 36 months after the cryoablation procedure. Cox et al. [5] indicated that 93% of patients were free of AF 8.5 years after the Cox Maze I, II, or III type ablation. Of note, Cox Maze ablations require open-chest surgery and are usually performed as a concomitant procedure [5]. Our procedure was performed via thoracoscopic access and therefore was less traumatic for the patient. Moreover, the use of an epicardial approach enables simultaneous performance of left atrial appendage occlusion with the LARIAT system to decrease the risk of stroke [6, 7]. In the study by Coolbear et al. [8] only 13% of patients were free of AF after nearly four years of observation following surgical RF ablation. Despite the difference in the follow-up period, our results seem to be comparable. Unfortunately, the rate of successful isolated epicardial ablation is limited due to the unfavourable anatomy and the lack of pulmonary vein isolation.

A hybrid approach, also called a convergent procedure, seems to be a reasonable option for the treatment of AF. This approach combines the epicardial and endocardial ablation techniques. It requires a collaboration of the cardiac surgeon,

who endoscopically creates full-thickness lesions along the posterior left atrium, and the electrophysiologist, who confirms the extent of the posterior left atrial lesions and completes pulmonary vein isolation by connecting the epicardial lesions at the pericardial reflections. Gersak et al. [9] reported that 81% of patients had sinus rhythm four years after the procedure. In our study only the epicardial part of the convergent procedure was performed; therefore, the AF recurrence rate was rather high.

Consequently, in our opinion, close cooperation between the cardiac surgeon and the electrophysiologist within a Heart Team is a key to obtaining acceptable long-term results of AF ablation. Isolated epicardial ablation is associated with poor long-term results.

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