Higher incidence of esophageal lesions after ablation of atrial fibrillation related to the use of esophageal temperature probes

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BACKGROUND Endoscopically detected esophageal lesions (EDELs) have been identified in apparently asymptomatic patients after catheter ablation of atrial fibrillation (AF). The use of esophageal probes to monitor luminal esophageal temperature (LET) during catheter ablation to protect esophageal damage is currently controversial.

OBJECTIVE The purpose of this study was to investigate the impact of the use of esophageal temperature probes during AF catheter ablation on the incidence of EDELs.

METHODS Eighty consecutive patients (mean age 63.8 ± 11.36 years; 68.8% men) with symptomatic, drug-refractory paroxysmal (n = 52, 65%) or persistent AF who underwent left atrial radiofrequency catheter ablation were prospectively enrolled. Posterior wall ablation was power limited (≤25 W). In the first 40 patients, LET was monitored continuously (group A), whereas no esophageal temperature probe was used in group B (n = 40 patients). Assessment of EDEL was performed by endoscopy within 2 days after radiofrequency catheter ablation.

RESULTS Overall, 13 patients (16%) developed EDELs after AF ablation. The incidence of EDELs was significantly higher in group A than group B (30% vs 2.5%, $P < .01$). Within group A, patients who developed EDEL had higher maximal LET during AF ablation than patients without EDEL (40.97 ± 0.92°C vs 40.14 ± 1.1°C, $P = .02$). Multivariable logistic regression analysis revealed the use of an esophageal temperature probe as the only independent predictor for the development of EDEL (odds ratio 16.7, $P < .01$).

CONCLUSION The use of esophageal temperature probes in the setting of AF catheter ablation per se appears to be a risk factor for the development of EDEL.

KEYWORDS Atrial fibrillation; Atrioesophageal fistula; Catheter ablation; Esophageal lesion; Esophageal temperature monitoring

ABBREVIATIONS AF = atrial fibrillation; **BMI** = body mass index; **EDEL** = endoscopically detected esophageal lesion; **LA** = left atrial; **LET** = luminal esophageal temperature; **PPI** = proton pump inhibitor

Introduction

Atrial fibrillation (AF) is the most common sustained arrhythmia. Currently, AF affects 5 million Americans and 6 million Europeans, and its prevalence is expected to increase over the next several decades.[1,2] In consideration of the rising prevalence of AF, the use of catheter ablation to treat patients with symptomatic drug-refractory AF has grown rapidly during the past decade.[1] Although major complications in the context of AF ablation are rare, atrioesophageal fistula is the most devastating complication of left atrial ablation and often is fatal.[3] In contrast to a low incidence of atrioesophageal fistula (0.03%–0.05%),[4,5] recent studies revealed a high incidence of asymptomatic endoscopically detected esophageal lesions (EDELs) in patients after AF ablation that ranged from 10% to 48%.[6–11]

A lower body mass index (BMI), the use of general anesthesia, maximal energy at the posterior left atrial wall, maximal esophageal temperature during ablation, and type of ablation performed appear to be predictors for the development of postablation EDEL.[6–12] To avoid esophageal injury during AF ablation, many centers routinely use continuous luminal esophageal temperature (LET) monitoring by esophageal temperature probe, but to date, the impact of the use of an esophageal temperature probe by itself on the incidence of EDEL has been controversial.

The purpose of this study was to investigate whether the use of an esophageal temperature probe per se affects the incidence of EDEL after AF ablation. For this reason, 2 ablation groups were compared prospectively in our center: group A, with continuous LET using a temperature probe, and group B, in which LET monitoring was excluded.

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Methods

Study population

In this study, we recruited 80 patients presenting for radiofrequency catheter ablation of symptomatic, drug-resistant paroxysmal (65%) or persistent (35%) AF. Transesophageal echocardiography was performed on the day before the ablation procedure to rule out left atrial thrombi in every patient. Patients were excluded from the study if they had known history of esophageal disease or symptoms of gastrointestinal disease (dysphagia, heart burn, abdominal pain). In the first 40 patients, AF ablation was monitored by LET (group A); the next consecutive 40 patients underwent ablation without esophageal temperature control (group B).

This study was approved by the local institutional review board and conforms to the declaration of Helsinki of 2008. All authors had full access to the data and have read and agreed to the manuscript as written. All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000. Written informed consent was obtained from all patients to be included in this study.

Electrophysiological study and ablation procedure

Irrigated-tip radiofrequency ablation was performed with the CARTO 3 (Biosense Webster, Diamond Bar, CA) or NavX (St. Jude Medical, St. Paul, MN) electroanatomic mapping system with a ThermoCool Smart Touch catheter (Biosense Webster). Ablations were only performed with a contact pressure of 10 g to a maximum of 40 g. All left atrial ablation procedures were performed with the patient in deep sedation using propofol infusion without general anesthesia and via single transseptal access to the left atrium by use of the standard technique. A circular diagnostic pulmonary vein mapping catheter was used to create a 3-dimensional shell of the left atrium, and prior computed tomography images were integrated by merging. Isolation of the ipsilateral pulmonary veins was performed en bloc in a point-by-point fashion and started only after the activated clotting time reached $\geq$300 seconds. Intraprocedurally, activated clotting times were controlled every 20 minutes during the course of the procedure. Additional ablations were performed if low-voltage areas were identified on bipolar voltage maps ($<$0.5 mV). Ablation patterns were at the discretion of the operator, and low-voltage areas were usually encircled. Ablation was performed with a maximum of 35 W with a target temperature of 43°C and a maximum irrigation rate of 30 mL/min. Maximal energy delivery at the posterior wall was reduced to a maximum of 25 W. To monitor LET, an intraluminal temperature probe (SensiTherm, FIAB, Firenze, Italy) was used in the first 40 patients (group A). This temperature probe has a 7F body and 5 olive-shaped electrodes. This multisensor probe has 3 middle electrodes to monitor esophageal temperature in 3 locations, whereas proximal and distal electrodes can be used for pacing and sensing. This probe is not steerable and has an atraumatic silicone tip to simplify esophageal insertion (Figure 1). The location of the probe was adapted with regard to the site of ablation. In addition, radiofrequency energy was discontinued when the temperature of the esophagus probe reached 39.5°C (group A). Within the next 40 consecutive patients, no temperature probe was used (group B). Procedures were performed either under continued oral anticoagulation with warfarin and a therapeutic international normalized ratio (2.0–2.5) or with continued novel oral anticoagulation (Figures 2 and 3).

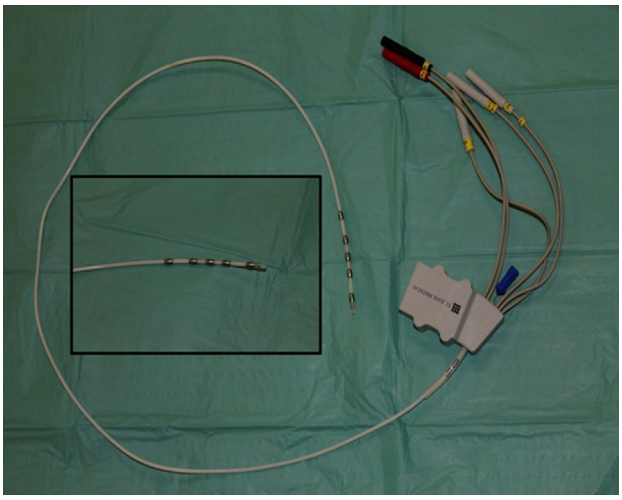

Figure 1 The SensiTherm probe. This esophageal temperature probe has a 7F catheter, is not steerable, and has an atraumatic silicone tip and 3 middle electrodes to monitor esophageal temperature in 3 locations, whereas proximal and distal electrodes can be used for pacing and sensing.

Postablation esophageal endoscopy

In brief, esophageal endoscopy was performed 1 to 2 days after ablation in all patients to assess for the presence and extent of esophageal endoluminal thermal injury. Findings were photo documented and classified as (1) no lesion, (2) erosion (erythema with intact mucosa), (3) ulceration, or (4) perforation. Investigators of postablation esophageal endoscopy were blinded to the use of the temperature probe.

Clinical course of patients with EDEL

In case of EDEL, esophageal endoscopy was repeated within 2 weeks. Patients with EDEL received both a liquid diet and proton pump inhibitors (PPIs) at double the standard dose until repeat endoscopy revealed healing of the esophagus. If EDEL persisted at second endoscopy, PPIs in double the standard dose were continued until repeat endoscopy revealed healing of the esophagus.

Statistical analysis

Data are expressed as mean $\pm$ SD or median (interquartile range) for continuous variables or as numbers and proportions for categorical variables. Depending on the class of analyzed data, univariate analysis was performed with unpaired Student *t* test, Wilcoxon-Mann-Whitney *U* test, or χ^2 test, respectively. For multivariable logistic regression,