

Ablation of atrial fibrillation and esophageal injury: Role of bipolar and unipolar energy using a novel multipolar irrigated ablation catheter

Antonio Di Monaco, MD,^{*} Federico Quadrini, MD,^{*} Grigorios Katsouras, MD, FHRS, MSc, CEPS,^{*} Vincenzo Caccavo, MD,^{*} Federica Troisi, MD,^{*} Francesco Quatraro, MD,[†] Giacomo Cecere,^{*} Tommaso Langialonga, MD,^{*} Massimo Grimaldi, MD, PhD^{*}

From the ^{*}Ospedale Generale Regionale "F. Miulli," Dipartimento di Cardiologia, Acquaviva delle Fonti, Bari, Italy, and [†]Ospedale Generale Regionale "F. Miulli," Dipartimento di Gastroenterologia, Acquaviva delle Fonti, Bari, Italy.

BACKGROUND The circular nMARQ ablation catheter is a useful tool for pulmonary vein isolation (PVI). Some studies reported a high incidence of esophageal lesions by using this catheter.

OBJECTIVE The primary aim of this study was to compare the effects on the esophageal wall of bipolar and unipolar energy applied by the nMARQ ablation catheter during AF ablation.

METHODS Forty patients (mean age 53 ± 8 years; 26 [65%] men) were enrolled to perform PVI for symptomatic atrial fibrillation. Thirty patients underwent PVI with the nMARQ catheter (group 1) and 10 patients with the ThermoCool Surround Flow catheter (group 2). The procedures were performed with the CARTO3 system. All patients received an esophageal temperature probe. In group 1, we delivered unipolar energy on the left posterior wall with power between 15 and 18 W or bipolar energy with power at 15 W. In group 2, unipolar energy was delivered on the posterior atrial wall at 20–25 W power. All patients underwent esophagoscopy the day after the procedure.

RESULTS No patients had procedural complications. In group 1, bipolar energy was associated with a lower esophageal temperature

increase as compared with unipolar energy (0.6°C [range $0\text{--}2.2^\circ\text{C}$] vs 2.1°C [range $0.8\text{--}2.9^\circ\text{C}$]; $P < .001$). Unipolar energy was associated with a similar temperature increase in the 2 groups (1.9°C [range $0.8\text{--}2.9^\circ\text{C}$] in group 1 vs 1.7°C [range $0.7\text{--}2.9^\circ\text{C}$] in group 2; $P = .49$). No patient had esophageal injury.

CONCLUSION The use of the nMARQ catheter for PVI is feasible and safe. The use of 15 W for bipolar energy or 15–18 W for unipolar energy is an optimal strategy to avoid esophageal injury with this new catheter.

KEYWORDS Atrial fibrillation; Pulmonary vein isolation; nMARQ ablation catheter; Esophageal injury; Bipolar and unipolar energy

ABBREVIATIONS AF = atrial fibrillation; PV = pulmonary vein; RF = radiofrequency; SF = Surround Flow

(Heart Rhythm 2015;12:1120–1127) © 2015 Heart Rhythm Society. All rights reserved.

Introduction

Atrial fibrillation (AF) is the most common sustained cardiac arrhythmia, occurring in 1%–2% of the general population.¹ Current guidelines recommend catheter ablation of AF in symptomatic patients after failure or intolerance of antiarrhythmic drugs.^{2,3} The pathogenesis of AF is complex, but several studies reported that pulmonary vein (PV) foci play a critical role in both initiation and perpetuation of this

arrhythmia. PV isolation, therefore, has become the cornerstone of catheter ablation in AF treatment.^{2,3}

PV isolation can be performed with either single-tip ablation catheters or "single-shot" devices involving either balloon technology or multipolar ablation catheters.^{4–9} Recently, some studies have reported the usefulness of a novel irrigated decapolar radiofrequency (RF) energy circular ablation catheter (nMARQ, Biosense Webster Inc, Diamond Bar, CA) integrated into the CARTO3 system (Biosense Webster).^{4–8} The nMARQ ablation catheter is able to operate in both the unipolar mode (creating deep ablation lesions) and the bipolar mode (creating more superficial ablation lesions).

Some authors, however, reported a high rate of thermal esophageal lesions using this catheter for PV isolation,^{4,10} but in those studies the nMARQ ablation catheter was used

Dr Grimaldi holds an agreement with Biosense Webster on the development of new technologies not related to the nMARQ catheter.

Address reprint requests and correspondence: Dr Massimo Grimaldi, Ospedale Generale Regionale "F. Miulli," Dipartimento di Cardiologia, Acquaviva delle Fonti, S.P. Acquaviva-Santeramo Km 4, Acquaviva delle Fonti, Bari, 70021, Italy. E-mail address: fiatric@hotmail.com.

only in the unipolar mode and often at the maximal power (25 W) and for the maximal time of RF delivery (60 seconds).

The primary aim of this study was to compare the effects on the esophageal wall of bipolar and unipolar energy applied by the nMARQ ablation catheter to perform PV isolation for AF treatment.

Methods

Study population

From January to May 2014, we enrolled 40 consecutive patients (mean age 53 ± 8 years; 65% men) referred to our center to perform PV isolation for symptomatic AF according to the latest European Society of Cardiology guidelines.² Patients had either paroxysmal or persistent AF and had no history of ablation procedures. The patients were randomized in a ratio of 3:1. Thirty patients (group 1) underwent PV isolation with the irrigated decapolar RF energy circular ablation catheter (nMARQ) following the study protocol described in detail below. Ten patients (group 2) underwent AF catheter ablation with the single-tip ThermoCool Surround Flow (SF) ablation catheter (Biosense Webster) in order to have a control of the effects on the esophageal wall of unipolar energy by itself.

Study design

Clinical data were accurately collected in each patient. Particularly, we collected data on previous hospitalizations, cardiovascular risk factors, pharmacological therapy, clinical presentation, left atrial size, esophageal endoscopic evaluation, and all procedural data.

All patients underwent AF ablation by delivering RF energy in 5 posterior left atrial wall regions: the regions of the 4 PV ostia and the posterior atrial wall region contiguous to the esophagus.

In group 1, bipolar energy was initially delivered on the posterior atrial wall at 15 W power. Then, after the esophageal temperature had returned to its basal value, unipolar energy was delivered in the same atrial regions at 15 or 18 W power. In group 2, unipolar energy was delivered on the posterior atrial wall at 20–25 W power. Unipolar energy delivered—at 18 W power with the nMARQ catheter and at 25 W with the focal catheter—was related to our previous experience. We titrated the power in more than 100 patients treated with the nMARQ catheter before this study.

All patients had continuous monitoring of esophageal temperature during ablation interventions. Furthermore, all patients underwent endoscopic evaluation of the esophagus the day after the procedure. The study was approved by the ethics committee, and all patients gave their written informed consent.

nMARQ ablation catheter

nMARQ is a steerable 8.4-F ablation and mapping 10-pole irrigated RF catheter with a novel irrigation design.^{4–8} Each 3-mm electrode is individually irrigated via 10 irrigation

holes using a constant flush rate of 4 mL/min during mapping and a flushing rate of 60 mL/min during ablation. The 10 electrodes are arranged in a nearly circular array, and the diameter may shift from 23 to 35 mm. The catheter is connected to a novel multichannel RF system ablation generator (Biosense Webster) capable of synchronously delivering energy to all 10 electrodes. Each electrode is controlled by a single generator with a continuous check of temperature and impedance. RF power is automatically and/or manually titrated by this information. RF ablations are preset at 60-second duration in the temperature-controlled mode, and energy delivery can be individually arranged over each combination of the 10 electrodes in the unipolar mode (maximum 25 W and 45°C) or the bipolar mode over 2 adjacent electrodes (maximum 15 W and 45°C). The nMARQ catheter is visualized with the CARTO3 system. The nMARQ catheter has the Tissue Connect technology that gives information on the electrode contact on left atrial tissue.

ThermoCool SF ablation catheter

The ThermoCool SF catheter is an open irrigated RF energy ablation catheter, available in either bidirectional or unidirectional steering, with a 3.5-mm-tip electrode and three 1-mm sensing ring electrodes. The new tip ablation electrode incorporates 56 small diameter (0.0035 in) irrigation holes distributed all around the electrode surface, which are connected to a central reservoir within the distal electrode and linked to the external roller pump by the tube inside the catheter shaft.

As with other irrigated catheters, the electrode tip temperature is a poor indicator of tissue temperature. The superior cooling efficiency of the ThermoCool SF catheter design further reduces the thermocouple-sensed temperature feedback from tissue heating as a result of energy delivery. Typically, the electrode tip temperature remains below 40°C and therefore the physician, without contact force sensors, can only continue to use clinical indicators and tools such as electrograms, fluoroscopy, and impedance drop to assess adequate tissue contact during RF delivery. The ThermoCool SF ablation catheter is able to deliver only unipolar energy and is visualized with the CARTO3 system.

PV isolation

PV isolation was performed as described previously.^{2,3} All procedures were performed by expert operators. All patients underwent preprocedural transesophageal echocardiography, within 24 hours before the procedure, to exclude left atrial thrombosis. All procedures were carried out in conscious sedation with intravenous infusion of diazepam (maximum 10 mg), acetaminophen (1 g), and fentanyl (maximum 0.1 mg). All patients received barium sulfate suspension swallow (10–15 cm³) to visualize the esophageal dimension and location. Furthermore, an esophageal temperature probe (Esotherm Plus, FIAB SpA, Florence, Italy) with 3 thermocouples (T1, T2, and T3) was advanced in the esophagus at

Download English Version:

<https://daneshyari.com/en/article/5960127>

Download Persian Version:

<https://daneshyari.com/article/5960127>

[Daneshyari.com](https://daneshyari.com)