Transforming growth factor-β_1 level and outcome after catheter ablation for nonparoxysmal atrial fibrillation

Cheng-Hsueh Wu, MD,[*†] Yu-Feng Hu, MD,[†‡] Chia-Yu Chou, MD,[*†] Yenn-Jiang Lin, MD,[†‡] Shih-Lin Chang, MD,[†‡] Li-Wei Lo, MD,[†‡] Ta-Chuan Tuan, MD,[†‡] Cheng-Hung Li, MD,[†‡] Tze-Fan Chao, MD,[†‡] Fa-Po Chung, MD,[†‡] Jo-Nan Liao, MD,[‡] Shih-Ann Chen, MD, FHRS[†‡]

From the [*]Department of Critical Care Medicine, Taipei Veterans General Hospital, Taipei, Taiwan, [†]Institute of Clinical Medicine and Cardiovascular Research Institute, National Yang-Ming University, Taipei, Taiwan and [‡]Division of Cardiology, Department of Medicine, Taipei Veterans General Hospital, Taipei, Taiwan.

BACKGROUND Atrial fibrosis plays a role in the development of a vulnerable substrate for atrial fibrillation (AF). Transforming growth factor (TGF)-β_1 is related to the degree of atrial fibrosis and the recurrence of AF after surgical maze procedures. Whether TGF-β_1 is associated with the outcome after catheter ablation for AF remains unclear.

OBJECTIVE The purpose of this study was to investigate whether plasma TGF-β_1 was an independent predictor of AF recurrence after catheter ablation.

METHODS Two hundred consecutive AF patients (154 with paroxysmal AF and 46 with nonparoxysmal AF) underwent catheter ablation. Their TGF-β_1 levels and clinical and echocardiographic data were collected before ablation.

RESULTS Thirty patients (65%) with nonparoxysmal AF and 57 (37%) with paroxysmal AF had AF recurrence after catheter ablation. Among patients with nonparoxysmal AF, those experiencing recurrence had higher TGF-β_1 levels than did those who did not experience recurrence (34.63 $\pm$ 11.98 ng/mL vs 27.33 $\pm$ 9.81 ng/mL; $P = .026$). In patients with paroxysmal AF, recurrence was not associated with different TGF-β_1 levels. In patients with nonparoxysmal AF, TGF-β_1 levels and left atrial diameter (LAD) were independent predictors of AF recurrence after catheter ablation. Moreover, TGF-β_1 levels had an incremental value over LAD in predicting AF recurrence after catheter ablation (global χ^2 of LAD alone: 6.3; LAD and TGF-β_1 levels: 11.9; increment in global $\chi^2 = 5.6$; $P = .013$). Patients with small LAD and low TGF-β_1 levels had the lowest AF recurrence rate at 11%.

CONCLUSION TGF-β_1 level is an independent predictor of AF recurrence in patients with nonparoxysmal AF and might be useful for identifying those patients likely to have better outcomes after catheter ablation.

KEYWORDS Atrial fibrillation; Atrial fibrosis; Catheter ablation; Transforming growth factor-β_1

ABBREVIATIONS **AF** = atrial fibrillation; **ECG** = electrocardiogram; **LA** = left atrium; **LAD** = left atrial diameter; **ROC** = receiver operating characteristic; **SD** = standard derivation; **TGF** = transforming growth factor

(Heart Rhythm 2013;10:10–15) © 2013 Heart Rhythm Society. All rights reserved.

Introduction

Catheter ablation is an effective treatment of paroxysmal atrial fibrillation (AF), with high sinus rhythm maintenance rates of 89%.[1] However, the success rates of catheter ablation for nonparoxysmal AF range between only 31% and 63%.[2,3] Thus, the development of serologic predictors for AF recurrence after catheter ablation may reduce unnecessary procedures and prevent complications related to catheter ablation. Atrial fibrosis is associated with the electrophysiologic and structural remodeling of atrial tissue and is involved in the development of AF.[4–6] Plasma transforming growth factor (TGF)-β_1 is one of the important factors that induces cardiac fibrosis.[7] In an animal study, selective atrial fibrosis caused by overexpression of TGF-β_1 increased AF inducibility.[8] Moreover, preoperative plasma TGF-β_1 levels have been correlated with the degree of fibrosis in the left atrium (LA) of patients with mitral valvular heart disease and could be used to predict the persistence of AF at 1-year follow-up after surgical maze procedures using cryoablation.[9] Whether plasma TGF-β_1 levels also can be used as a factor for predicting AF recurrence after catheter ablation has remained unclear. Therefore, we measured the plasma levels of TGF-β_1 before catheter ablation for AF and investigated its relationship to AF recurrence after catheter ablation.

Drs. Cheng-Hsueh Wu and Yu-Feng Hu contributed equally to this study. This work was supported by research grants from the Taipei Veterans General Hospital (V98C1-037, V99C1-120, V100C-109, V101B-005, V101C-060) and the National Science Council (NSC97-2314-B-010-037-MY3, NSC97-2314-B-010-038, NSC98-2314-B-010-031-MY3, NSC 99-2911-I-008-100, NSC 100-2314-B-075-051). **Address reprint requests and correspondence to co-authors:** Dr. Shih-Ann Chen, Division of Cardiology, Taipei Veterans General Hospital, No. 201 Sec. 2, Shih Pai Road, Taipei, Taiwan. E-mail address: epsachen@ms41.hinet.net; Dr. Chia-Yu Chou. E-mail: cychou@vghtpe.gov.tw.

Methods

Participants

This prospective study involved 200 consecutive AF patients referred for catheter ablation. Patients with hematologic, renal, or hepatic impairment, inflammation, neoplastic disorders, recent (<3 months) myocardial infarction or stroke, acute AF precipitated by thyrotoxicosis, or any acute infection were excluded. Ethical approval was granted by the Institutional Review Board of the Veterans General Hospital, Taipei, Taiwan. All subjects gave written informed consent.

Blood sampling and echocardiography

Before catheter ablation, comprehensive echocardiographic studies were performed and fresh peripheral blood samples collected. The left atrial diameter (LAD) was derived from the parasternal short-axis view of the transthoracic echocardiogram. Plasma TGF-β_1 levels were measured by enzyme-linked immunosorbent assay (Quantikine Human TGF-β_1 Immunoassay, R&D Systems, Minneapolis, MN).

Catheter ablation for AF

Electrophysiologic study, contact electroanatomic mapping, signal analysis, catheter ablation for AF, and follow-up of recurrences were performed as described in our previous work,[10–12] and the techniques are described in detail in the Online Supplemental Material.

According to the 2006 American College of Cardiology/American Heart Association (ACC/AHA) guidelines, recurrent AF is defined as paroxysmal if the arrhythmia terminates spontaneously.[13] AF is defined as persistent when sustained beyond 7 days. The category of persistent AF includes cases of long-standing AF (eg, >1 year), usually leading to permanent AF, in which cardioversion has failed or has not been attempted. In the present study, persistent and permanent AF were classified as nonparoxysmal AF. The duration of AF history in those with nonparoxysmal AF was 71.3 ± 58.1 months.

Follow-up of AF recurrence

After discharge, patients underwent follow-up (2 weeks after catheter ablation, then every 1–3 months thereafter). Follow-ups were performed at our cardiology clinic or by referring physicians, during which either 24-hour Holter monitoring or a full week of cardiac event recording had to be performed, and antiarrhythmic drugs were prescribed for 8 weeks to prevent any early recurrence of AF. An AF recurrence was defined as an episode lasting >1 minute and was confirmed by ECG 3 months after the ablation (blanking period). The end-point for follow-up was the clinically documented recurrence of atrial arrhythmias or repeat ablation procedures.

Statistical analysis

All continuous variables are expressed as mean ± SD and categorical variables as proportions. Between-group comparisons were performed using the two-sample *t*-test or χ^2 test as appropriate. Age, sex, and variables with $P < .1$ on univariate analysis were selected for logistic regression multivariate analysis. Statistical significance was established at $P < .05$. Freedom from AF (including recurrences or repeat procedures) was determined and compared using Kaplan-Meier analysis and log-rank test. We defined the incremental value of TGF-β_1 over LAD to assess the risk for AF recurrence as a statistically significant increase in global χ^2 after adding TGF-β_1 to the predictor (LAD) of AF recurrence. The cutoff points for TGF-β_1 were identified by receiver operating characteristic (ROC) curves. Statistical analysis was performed using SPSS software (version 17; SPSS Inc, Chicago, IL).

Results

Patient characteristics

AF was paroxysmal in 154 patients and nonparoxysmal in 46 patients. After mean follow-up of 10.9 ± 7.4 months, 57 patients (37%) with paroxysmal AF and 30 patients (65%) with nonparoxysmal AF had AF recur after catheter ablation (Figure 1). In patients with paroxysmal AF, the recurrence was not associated with different TGF-β_1 levels (Figure 2A). In the patients with nonparoxysmal AF, those who experienced recurrence had higher TGF-β_1 levels than did those who did not (Figure 2B). Further analysis was performed for patients with nonparoxysmal AF. The clinical and echocardiographic characteristics of patients with nonparoxysmal AF are summarized in Table 1. Comparing the recurrence and nonrecurrence groups, there were no significant differences in age, sex, underlying diseases, and left ventricular

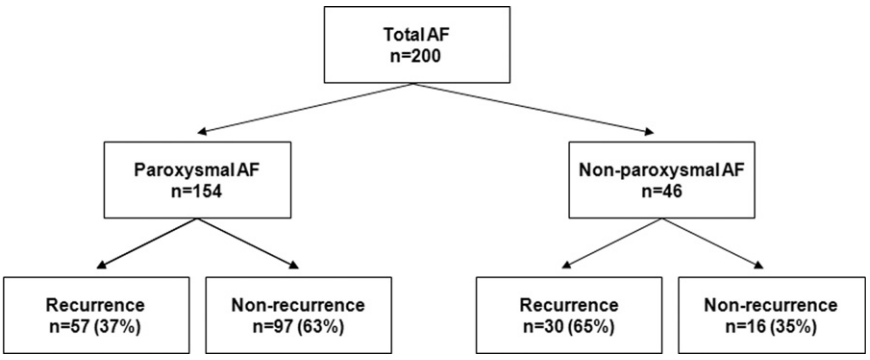

Figure 1 Schematic representation of outcomes after catheter ablation for atrial fibrillation (AF).

Download English Version:

https://daneshyari.com/en/article/2922676

Download Persian Version:

https://daneshyari.com/article/2922676

Daneshyari.com