THE JOURNAL OF
SEXUAL MEDICINE

Erectile Dysfunction Is Not a Predictor of Atrial Fibrillation: A Population-Based Propensity-Score Matched Cohort Study

Kuan-Liang Liu, MD,[1,2] Ling-Long Ye, MS,[3] Shing-Hsien Chou, MD,[1,2] Ying-Chang Tung, MD,[1,2] Yu-Sheng Lin, MD,[1,2] Lung-Sheng Wu, MD,[1,2] Chia-Pin Lin, MD,[1,2] Ben-Chang Shia, PhD,[4] and Pao-Hsien Chu, MD[1,2,5]

ABSTRACT

Introduction: Erectile dysfunction (ED) has been regarded a marker of cardiovascular diseases. Nevertheless, the association between ED and incident atrial fibrillation (AF) remains unknown.

Aim: To determine the association between ED and incident AF.

Methods: This population-based cohort study was conducted using the National Health Insurance Research Database in Taiwan. In total, 6,273 of patients with ED without a prior diagnosis of AF were enrolled from January 1, 2001 through December 31, 2009, and a propensity-score matching method was used to identify 3,516 patients in the ED and control groups.

Main Outcome Measures: Newly incident AF at follow-up was recorded as the end point.

Results: The mean age of the study population was 40.0 ± 17.1 years, and the follow-up period was 8.0 ± 0.5 years. Compared with the control group, patients with ED were older and had more of the following comorbidities: D'Hoore Charlson Comorbidity Index, hypertension, congestive heart failure, diabetes mellitus, dyslipidemia, chronic kidney disease, coronary artery disease, stroke, chronic lung disease, major depression disorder, obstructive sleep apnea, and hyperthyroidism. After adjusting for confounders, the ED group was not associated with more incident AF compared with the control group (hazard ratio = 1.031, 95% confidence interval = 0.674−1.578, P =.888). In these patients, ED of an organic origin was associated with a trend of having AF more often compared with ED of a psychosexual type (P =.272 by log-rank test).

Conclusion: Although ED is known as a predictor of atherosclerotic cardiovascular diseases, it is not independently associated with incident AF in men.

J Sex Med 2016;13:55−62.

Key Words: Atrial Fibrillation; Cardiovascular Disease; Cohort Study; Erectile Dysfunction; National Health Insurance Research Database

INTRODUCTION

Atrial fibrillation (AF) is the most common cardiac arrhythmia worldwide, and approximately 1% of the population in Western countries have AF.[1,2] Its prevalence increases as the population ages, and it is associated with a higher risk of ischemic stroke, heart failure, myocardial infarction, dementia, chronic kidney disease, and mortality.[1] In Taiwan, a community-based study found that the prevalence of AF was 1.4% in men and 0.7% in women, and that AF was a risk factor for stroke and all-cause mortality.[3] To decrease the burden of AF and its complications, multiple efforts have been made to determine the risk factors of AF, including hypertension (HTN), congestive heart failure (CHF), diabetes mellitus (DM), coronary artery disease (CAD), rheumatic heart disease, obesity, hyperthyroidism, and obstructive sleep apnea.[1,4,5]

Received September 3, 2015. Accepted November 30, 2015.

[1]Division of Cardiology, Department of Internal Medicine, Chang Gung Memorial Hospital, Chang Gung University College of Medicine, Taipei, Taiwan;

[2]Heart Failure Center, Chang Gung Memorial Hospital, Chang Gung University College of Medicine, Taipei, Taiwan;

[3]Graduate Institute of Business Administration, College of Management, Fu Jen Catholic University, Taipei, Taiwan;

[4]Big Data Research Center, Taipei Medical University, Taipei, Taiwan;

[5]Healthcare Center, Chang Gung Memorial Hospital, Chang Gung University College of Medicine, Taipei, Taiwan

http://dx.doi.org/10.1016/j.jsxm.2015.11.010

Erectile dysfunction (ED) affects more than 50% of men older than 40 years according to the Massachusetts Male Aging Study, and the prevalence and severity of ED have been found to increase with aging.[6] ED not only shares common risk factors with atherosclerosis, such as HTN, DM, smoking, and dyslipidemia, but also has been observed to be a predictor of subsequent cardiovascular diseases (CVDs) as shown in a post hoc analysis of the Prostate Cancer Prevention Trial.[3] In addition, previous meta-analyses have shown an increased risk of all-cause mortality, CVD, coronary heart disease, stroke, and peripheral vascular disease for patients with ED.[7–10] Corona et al[11,12] showed by Doppler ultrasound that impairment of penile blood flow also is an independent risk factor for CVD.

Despite the evident association between ED and atherosclerotic CVDs, the relation between ED and AF remains unknown. In a cross-sectional registry in Spain, ED was associated with AF after adjusting for covariables.[13] Nevertheless, no prospective studies have demonstrated an association between ED and AF until recently. Lin et al[14] reported that patients with AF had more incident ED than those without AF in a 4.7-year follow-up. To the best of the authors' knowledge, the role of ED as a predictor for AF has never been investigated. Therefore, this retrospective cohort study was conducted using a national population-based database with the hypothesis that ED might be a harbinger of AF in men.

METHODS

Database

The National Health Insurance (NHI) program has provided health insurance in Taiwan since 1995. It covers nearly all residents throughout the country, with inpatient and outpatient medical benefit claims. Data for this study were obtained from the NHI Research Database (NHIRD), which has been validated by numerous studies,[15–21] and all patient data were anonymized and de-identified. The Longitudinal Health Insurance Database (LHID) of 1 million randomly sampled beneficiaries from the NHIRD for ambulatory care claims, inpatient claims, and the *International Classification of Diseases, Ninth Revision, Clinical Modification* (ICD-9-CM) diagnostic and procedure codes were used for this study. To ensure diagnostic accuracy, all diseases were diagnosed at discharge or confirmed more than twice in the outpatient department. The study was approved by the institutional review board of Chang Gung Memorial Hospital, Taipei, Taiwan (number 98-4060B).

Patient Selection and Definition

This retrospective cohort study enrolled patients who were diagnosed with ED (ICD-9-CM code 607.84 [impotence of organic origin] and/or 302.72 [psychosexual dysfunction]) from 2001 to 2009, similar to a previous study.[15] Those who were diagnosed before 2001 and those with AF (ICD-9-CM code 427.31) before ED were excluded to clarify the association between ED and incident AF. Women, patients withdrawing from the NHI program, and those younger than 18 years also were excluded. Also excluded were conditions that might cause secondary ED, including penis surgery (ICD-9-CM codes 64.3–64.5), pelvic fracture (ICD-9-CM code 808), prostate surgery (ICD-9-CM code 60), genital cancer (ICD-9-CM codes 185–187), and colorectal cancer (ICD-9-CM codes 153–154). The algorithm of patient selection is shown in Figure 1. Drugs that might cause or ameliorate ED, such as α-blocker, β-blocker, calcium channel blocker, and diuretics were analyzed.

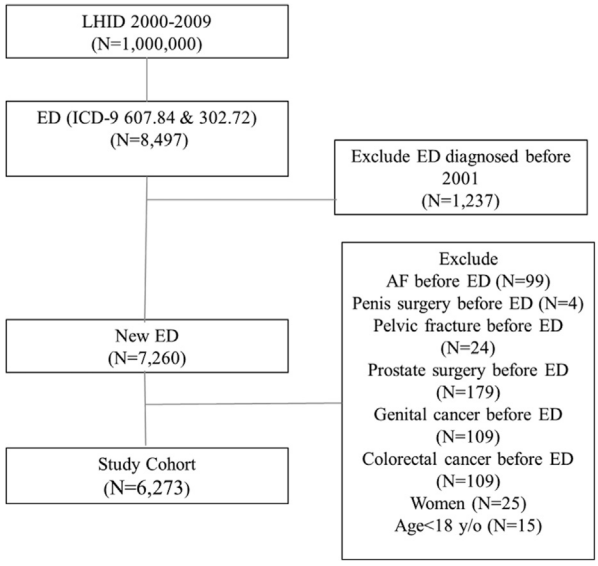

Figure 1. Algorithm of patient selection. AF = atrial fibrillation; ED = erectile dysfunction; LHID = Longitudinal Health Insurance Database.

The remaining 6,273 patients were enrolled in the study cohort, and the first date that ED was diagnosed served as the index date. Using this date, a control cohort was selected from the remaining beneficiaries in the LHID. Confounders used for matching the two cohorts, chosen based on previous studies,[4,22] were age, CHF, and HTN. Their ICD-9-CM codes are shown in the Supplemental Table 1.

Statistical Analysis

Continuous variables were expressed as median (interquartile range) when non-normally distributed and as mean ± SD when normally distributed. Comparison of continuous variables between the two groups was performed with the unpaired Student *t*-test when normally distributed and with the Mann-Whitney *U*-test when non-normally distributed. Nominal variables were analyzed by χ^2 test. A propensity-score matched analysis was performed to adjust the baseline demographics between patients with and without ED. The D'Hoore Charlson Comorbidity Index (CCI) was calculated for the two groups.[23] Hazard ratios (HRs) and their 95% Cis in subgroups were computed using Cox proportional hazard regression analysis to clarify the impact