New-Onset Postoperative Atrial Fibrillation Predicts Late Mortality After Mitral Valve Surgery

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Background. **New-onset postoperative atrial fibrillation (POAF) is a common rhythm disturbance after mitral valve surgery. In this study we investigated the independent effect of POAF on early and late mortality after mitral valve surgery.**

Methods. **Data of patients who consecutively underwent mitral valve surgery with or without concomitant coronary or tricuspid valve surgery between January 2003 and June 2010 were prospectively collected. The study included 856 patients with preoperative sinus rhythm, and no history of atrial fibrillation. Logistic regression and Cox proportional hazard analyses were performed to investigate independent predictors of early and late mortality. Propensity score adjustment was performed to reduce the effect of confounders.**

Results. **The median follow-up was 3.1 years (range, 0 to 7.4 years). The POAF was documented in 361 patients (42%). Early mortality did not differ in patients with and without POAF ($p = 0.93$). Postoperative atrial fibrillation was not identified as predictor for early mortality. Late survival was worse in patients with POAF (log-rank, $p < 0.001$). Multivariate and propensity score adjusted Cox proportional hazard analyses demonstrated that POAF was an independent predictor for late mortality with hazard ratios of 2.09 and 1.61 ($p = 0.001$ and $p = 0.033$, respectively).**

Conclusions. **Postoperative atrial fibrillation is an independent predictor for late all-cause mortality after mitral valve surgery but not for early all-cause mortality.**

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New-onset postoperative atrial fibrillation (POAF) is common after mitral valve and combined mitral valve and coronary surgery. The incidence of POAF is reported to be up to 50% in isolated mitral valve surgery, and up to more than 60% in combined procedures [1–3]. The POAF after coronary artery bypass grafting (CABG) is associated with higher early and late mortality [4–7]. However, little is known about the effect of POAF on early and late mortality after mitral valve surgery. The incidence of morbidity, such as stroke and congestive heart failure, is higher in patients with POAF than in patients without POAF after mitral valve surgery [8], which might lead to higher mortality in patients with POAF. However, to the best of our knowledge, there are no reports about the relation between POAF after mitral valve surgery and early and late mortality. The aim of this study was to investigate the independent effect of POAF after mitral valve surgery on early and late survival by multivariate analyses and propensity score adjusting methods.

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Material and Methods

Patients

The Institutional Research Review Board approved this study and waived the need for patient consent. This study included patients who consecutively underwent mitral valve repair or replacement with or without concomitant CABG, and with or without concomitant tricuspid valve surgery, in a single center in the Netherlands (Catharina Hospital, Eindhoven) between January 2003 and June 2010. Patients who died within 24 hours after the procedure were excluded, as were patients with active endocarditis. Patients undergoing other cardiac surgical procedures such as aortic valve replacement were also excluded from the study. Only patients with documented preoperative sinus rhythm and without a history of atrial fibrillation (AF) were included. Demographic data, known risk factors for mortality, and in-hospital complications were prospectively collected in a computerized database.

Endpoint

Follow-up mortality data were gathered using databases of health insurance companies and by information requests to general practitioners or municipal authorities. Early mor-

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Table 1. Demographic and Clinical Characteristics

Variable[a]	No POAF (n = 495)	POAF (n = 361)	*p* Value
Preoperative characteristics			
Male	58.6	62.6	0.24
Age, years	62.6 ± 11	67.0 ± 9.5	<0.001
BMI, kg/m^2	26.1	26.5	0.15
Obesity (BMI ≥ 35)	3.5	4.6	0.45
Underweight (BMI < 20)	6.5	2.3	0.005
Diabetes	17.4	22.2	0.080
Hypertension	40.2	39.6	0.86
COPD	12.9	13.0	0.97
Peripheral vascular disease	10.1	10.2	0.94
Prior CVA	3.8	7.2	0.029
Prior MI	34.9	38.0	0.37
Reduced LVF (EF < 0.50)	33.1	28.3	0.13
NYHA class	2.6 ± 1	2.5 ± 1	0.058
Preoperative hemoglobin, g/dL	13.4 ± 1.5	13.5 ± 1.4	0.17
Creatinine clearance, mL/minute	73.1 ± 26	66.9 ± 27	0.001
Redo operation	12.1	13.9	0.46
Emergency procedure	7.9	6.4	0.40
IABP	8.1	7.8	0.86
CABG	52.7	60.4	0.026
TVS	11.9	13.9	0.40
Superior-transseptal incision	27.1	30.7	0.24
Ischemic mitral disease	33.5	37.7	0.21
MV replacement	34.9	40.2	0.12
ECC time, minutes	118 ± 48	124 ± 46	0.070
Perioperative characteristics			
Perioperative RBC transfusion	58.0	63.4	0.11
Reoperative for bleeding	5.7	6.6	0.55
Perioperative MI	6.9	7.5	0.72
Postoperative characteristics			
Postop CVA	1.2	4.4	0.003
Mediastinitis	1.6	1.4	0.79
Early death	7.1	6.9	0.93
EuroSCORE	6.0 ± 3.0	6.6 ± 2.8	0.006

[a] Categoric variables are presented as percentage; continuous variables as mean ± standard deviation.

BMI = body mass index; CABG = coronary artery bypass grafting; COPD = chronic obstructive pulmonary disease; CVA = cerebrovascular accident; ECC = extracorporeal circulation; EF = ejection fraction; EuroSCORE = European system for cardiac operative risk evaluation; IABP = intraaortic balloon pump; LVF = left ventricular function; MI = myocardial infarction; MV = mitral valve; NYHA = New York Heart Association; POAF = postoperative atrial fibrillation; RBC = red blood cell; TVS = tricuspid valve surgery.

tality was defined as death within 30 days postoperatively. Late mortality was defined as death from any cause beyond 30 days.

Operative Technique and Postoperative Policy

Cardiac medication, including β-blocking agents and acetylsalicylic acid were continued until the day of the operation. Extracorporeal circulation was performed using normothermic nonpulsatile flow. Intermittent cold crystalloid cardioplegia (St Thomas solution), or intermittent warm blood cardioplegia, was used to induce and maintain cardioplegic arrest, according to the surgeon's preference. Two-stage right atrial, or bicaval canulation, was performed for venous drainage, depending on the need for tricuspid valve surgery, and on the preference of the surgeon. The mitral valve was approached through a left atriotomy or superior-transseptal [9], depending on the need for tricuspid valve surgery and the preference of the surgeon. We did not perform surgery in patients with asymptomatic mitral valve disease. Postoperatively, metoprolol was prescribed as an AF prophylaxis in all patients (unless β-blocking agents were contraindicated). In case of POAF, extra metoprolol was prescribed if not contraindicated. Intravenous amiodarone and electrical cardioversions were used when indicated. The first day postoperative, oral anticoagulation with coumarin derivates was started and continued for at least 3 months, in case of repair and replacement with biological valve prosthesis, and life-long after replacement with a mechanical valve prosthesis. The heart rhythm was monitored continuously during at least 48 hours postoperatively and afterward at least 3 times a day, or continuously in case of dysrhythmia. After discharge to the referring hospital or homeward, diagnosis and treatment of AF were performed by the referring cardiologist. The POAF was defined as any evidence of new AF (by electrocardiography or continuous monitoring) that lasted at least 30 minutes during the postoperative stay in our hospital.

Statistical Analyses

Categoric variables were compared using the χ^2 test and are presented as percentages. Continuous variables were

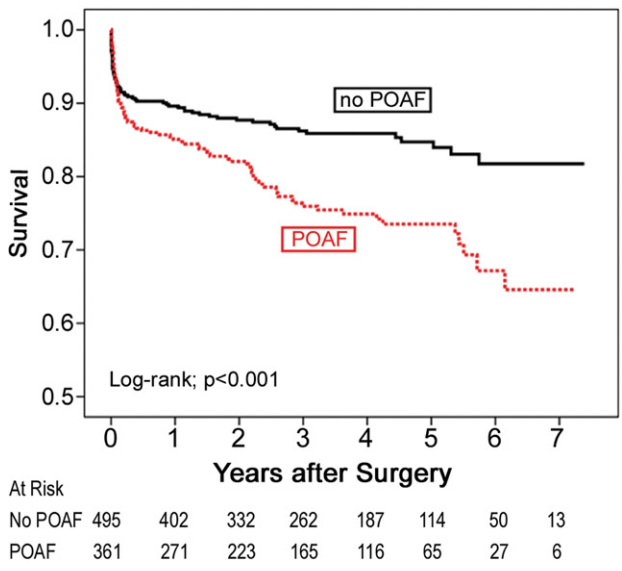

Fig 1. Cumulative survival after mitral valve surgery (n = 856). (POAF = postoperative atrial fibrillation.)