



Atrial fibrillation in transcatheter aortic valve implantation patients: Incidence, outcome and predictors of new onset

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Abstract

Background: There is controversial evidence if atrial fibrillation (AF) alters outcome after transcatheter aortic valve implantation (TAVI). TAVI itself may promote new-onset AF (NOAF).

Methods: We performed a single-center study including 398 consecutive patients undergoing TAVI. Before TAVI, patients were divided into a sinus rhythm (SR) group ($n = 226$, 57%) and baseline AF group ($n = 172$, 43%) according to clinical records and electrocardiograms. Furthermore, incidence and predictors of NOAF were recorded.

Results: Baseline AF patients had a significantly higher 1-year mortality than the baseline SR group (19.8% vs. 11.5%, $p = 0.02$). NOAF occurred in 7.1% of patients with prior SR. Previous valve surgery was the only significant predictor of NOAF (HR 5.86 [1.04–32.94], $p < 0.05$). NOAF was associated with higher rehospitalization rate (62.5 vs. 34.8%, $p = 0.04$), whereas mortality was unaffected.

Conclusions: This study shows that NOAF is associated with higher rates of rehospitalization but not mortality after TAVI. Overall, patients with pre-existing AF have higher mortality.

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Keywords:

Atrial fibrillation; Transcatheter aortic valve implantation; New-onset AF; Retrospective study; One-year mortality

Introduction

Transcatheter aortic valve implantation (TAVI), first described 2002 [1], is an established treatment option for patients with severe aortic stenosis. TAVI showed favorable results compared to standard treatment [2]. Consequently, it is already recommended for patients with elevated surgical risk or previously inoperable patients (class IIa level B and class I level B indication in recent ESC guidelines, respectively) [3].

Atrial fibrillation (AF) is the most common cardiac arrhythmia with a prevalence >15% in patients ≥ 80 years [4]. Patients suffering from AF have a higher mortality and a five-fold increased risk of stroke [4]. In patients with severe aortic stenosis, coexisting AF is more frequent [5] and an independent predictor for a higher mortality [6]. Whether

pre-existing AF before a TAVI procedure impairs post-procedural morbidity and mortality remains controversial.

New-onset atrial fibrillation (NOAF) is known as the most common complication of aortic valvular surgery (incidence 7%–64%) [7–9]. It is associated with elevated 1-year mortality [10]. Rhythm disturbances, especially the need for pacemaker implantation, are common side effects after TAVI [11,12]. The identification of NOAF is essential for adequate anticoagulation. However, there has been little research on the incidence and predictors of NOAF after TAVI [7,13]. The rationale of this study was to explore 1) one-year prognosis of patients with pre-existing AF undergoing TAVI and 2) incidence and predictors of NOAF after TAVI.

Materials and methods

The Department of Cardiology, University Hospital of Graz, Austria is a high volume center for TAVI. Moreover, it hosted the nationwide Austrian TAVI Registry [12]. In this

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Table 1
Baseline characteristics of treated patients.

	All patients	Pre-existing AF (n = 172)	NOAF (n = 16)	No NOAF (n = 210)	p (pre-AF vs. others)	p (NOAF vs. no NOAF)
Epidemiology						
Age, years	82 (78–85)	82 (78–85)	84 (79–87)	82 (78–86)	0.72	0.52
Body mass index, kg m ⁻²	25 (23–28)	25 (22–28)	25 (21–27)	25 (23–28)	0.94	0.60
Female gender	249 (63)	65 (62)	9 (56)	133 (63)	0.92	0.60
Comorbidities						
Arterial hypertension	330 (83)	143 (83)	14 (88)	173 (82)	1.00	1.00
Coronary artery disease	283 (71)	124 (72)	9 (56)	150 (71)	0.74	0.26
Extracardial arteriopathy	161 (40)	76 (44)	5 (31)	80 (38)	0.22	0.79
Cerebral arteriopathy	106 (27)	49 (29)	5 (31)	52 (25)	0.49	0.56
Peripheral arteriopathy	81 (20)	38 (22)	1 (6)	42 (20)	0.45	0.32
Previous percutaneous Intervention	137 (34)	60 (35)	4 (25)	73 (35)	0.92	0.59
Diabetes mellitus type II	117 (29)	60 (35)	2 (12)	55 (26)	0.04*	0.37
Previous cardiac surgery	73 (18)	32 (19)	3 (19)	38 (18)	1.00	1.00
Coronary arterial bypass surgery	60 (15)	22 (13)	3 (19)	35 (17)	0.26	0.74
Previous valve surgery	20 (5)	13 (8)	2 (13)	5 (2)	<0.05*	0.08
Cardiomyopathy	69 (18)	36 (21)	3 (19)	30 (14)	0.09	0.71
Concentric LV hypertrophy	22 (6)	11 (6)	1 (6)	10 (5)	0.52	0.56
Cardiomyopathy with reduced LVEF	47 (12)	25 (15)	0	20 (10)	0.16	0.66
Chronic obstructive pulmonary disease	63 (16)	25 (15)	1 (6)	21 (10)	0.16	0.72
Neurological disease	56 (14)	22 (13)	1 (6)	33 (16)	0.56	0.48
Porcelain aorta	54 (14)	21 (12)	1 (6)	32 (15)	0.45	0.48
Dialysis	6 (2)	1 (0.6)	1 (6)	4 (2)	0.16	0.31
Risk scores						
Logistic EuroSCORE, %	13.3 (7.8–23.8)	15.3 (9.3–24.7)	12.2 (8.1–25.6)	11.2 (7.3–22.6)	<0.01*	0.61
EuroSCORE II, %	5.9 (3.2–10.8)	7.2 (4.4–12.8)	7.3 (3.0–9.6)	4.5 (2.8–9.6)	<0.01*	0.36
German AV score, %	6.4 (3.8–10.3)	6.8 (4.7–12.7)	5.0 (4.1–8.1)	5.7 (3.3–8.0)	<0.01*	0.64
STS score, %	6.3 (3.8–9.6)	6.6 (4.5–11.0)	5.1 (3.9–13.5)	6.0 (4.0–8.8)	<0.01*	0.90
CHA ₂ DS ₂ -VASc score	5 (5–6)	5 (5–6)	5 (4–6)	5 (5–6)	0.70	0.16
Medication						
Antiplatelets or anticoagulation	342 (86)	158 (92)	15 (94)	169 (81)	<0.01*	1.00
Antiplatelets	241 (61)	69 (40)	13 (81)	159 (76)	<0.01*	0.77
Anticoagulation	143 (36)	120 (70)	2 (13)	21 (10)	<0.01*	0.67
Antiarrhythmics	246 (62)	124 (72)	9 (56)	113 (54)	<0.01*	0.32
Class II (beta-blockers)	238 (60)	121 (70)	8 (50)	109 (52)	<0.01*	1.00
Digoxine	59 (15)	52 (30)	0	7 (3)	<0.01*	1.00
Class III	7 (2)	2 (1)	1 (6)	4 (2)	0.70	0.31
Class I	2 (0.5)	1 (0.6)	0	1 (0.5)	1.00	1.00
Others	5 (1)	4 (2)	0	1 (0.5)	0.17	1.00
Blood						
Creatinine, μmol L ⁻¹	98 (80–123)	106 (89–133)	91 (81–127)	90 (76–112)	<0.01*	0.59
Elevated troponin T ^a	246 (62)	96 (64)	6 (67)	82 (44)	<0.01*	0.30
Hemoglobin, g dL ⁻¹	12 (11–13)	12 (11–13)	11 (10–13)	12 (11–13)	0.23	0.06
Estimated glomerular filtration rate, ml min ⁻¹	53 (39–66)	47 (36–61)	52 (35–76)	56 (43–72)	<0.01*	0.61
Adjusted NT-proBNP, pg ml ⁻¹ (n = 368)	1443 (578–2930)	3297 (1678–5770)	1558 (363–3470)	1603 (625–4302)	<0.01*	0.80
Albumin, g dL ⁻¹ (n = 290)	4.1 (3.8–4.4)	4.1 (3.7–4.4)	4.2 (3.9–4.3)	4.2 (3.9–4.4)	0.07	0.95
Rhythmology						
Implanted pacemaker	40 (10)	28 (16)	0	12 (6)	<0.01*	1.00
Atrial probe	20 (5)	10 (6)	0	10 (5)	0.37	1.00
CRT	1 (0.3)	1 (0.6)	0	0	0.33	1.00
ICD	2 (0.5)	1 (0.6)	0	1 (0.5)	0.76	1.00
Hemodynamics						
Systolic pulmonary pressure, mm Hg (n = 302)	45 (33–60)	53 (41–65)	42 (29–56)	38 (30–50)	<0.01*	0.79
Mean pulmonary pressure, mm Hg (n = 302)	29 (21–37)	34 (26–41)	28 (19–36)	25 (19–33)	<0.01*	0.57
Pulmonary capillary wedge pressure, mm Hg (n = 299)	18 (12–24)	21 (26–41)	19 (10–23)	15 (10–20)	<0.01*	0.37
Left ventricular end-diastolic pressure, mm Hg (n = 326)	18 (13–23)	17 (13–21)	20 (15–28)	19 (13–24)	0.02*	0.35
Aortic valve peak gradient, mm Hg (n = 334)	52 (36–72)	47 (31–64)	62 (44–81)	57 (40–78)	<0.01*	0.62
Aortic valve mean gradient, mm Hg (n = 335)	45 (32–60)	41 (28–52)	56 (42–65)	48 (34–62)	<0.01*	0.44
Indexed aortic valve area, cm ² /1.72 m ² (n = 296)	0.53 (0.41–0.66)	0.53 (0.40–0.69)	0.46 (0.32–0.67)	0.54 (0.41–0.66)	0.71	0.27

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