

# Low 30-day Mortality after Atrial Fibrillation Ablation; Results from the Netherlands Heart Registration

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## Research Letters

### Low 30-Day Mortality After Atrial Fibrillation Ablation: Results From the Netherlands Heart Registration

Catheter ablation has become a cornerstone in the treatment of atrial fibrillation (AF). Procedural complications have been reported to be low; 3.6% of patients undergoing AF ablation develop a procedural-related complication, and mortality is < 0.01–0.57% depending on the study type and sample size.<sup>1–3</sup> Most large studies only report in-hospital death or provide limited data on the cause of death.<sup>1,2</sup> The generalizability of these studies might be limited because of differences in population characteristics and ablation volume. Therefore, we assessed 30-day mortality and report the cause of death in a large-scale registry of patients who underwent catheter AF ablation in The Netherlands.

#### Methods

We used data from the Netherlands Heart Registration, a nationwide registry in which 15 of 16 Dutch ablation centres participate in the value-based health care program and present AF ablation outcomes.<sup>3</sup> The medical ethics board, MEC-U, Nieuwegein, The Netherlands, issued a waiver for informed consent. All patients who underwent catheter AF ablation between 2013 and 2020 (inclusive) were included. Participating hospitals retrieved mortality status from the municipal death registration and obtained the cause of death from the medical chart. Thirty-day mortality was categorized in procedural and nonprocedural death.

For the collected clinical data, continuous variables are presented with a mean  $\pm$  SD and categorical variables with numbers and percentages. The independent *t* test, Mann-Whitney *U* test, and Fisher exact test were used to compare differences between the survivors and deceased patients. All analyses were performed on the AF procedures and not on the unique patients.

#### Results

In total, 30,238 AF procedures were analyzed. The vital status was available for 30,197 (99.9%) procedures in 24,151 patients. Overall, the mean age was  $61 \pm 10$  years, 33% were female, the average body mass index was  $27.4 \pm 4.2$ , and Congestive Heart Failure, Hypertension, Age ( $\geq 75$  Years) (doubled), Diabetes Mellitus, Stroke (doubled), Vascular Disease, Age (65–74) Years, Sex Category (Female) (CHA<sub>2</sub>DS<sub>2</sub>-VASc) score was  $1.6 \pm 1.4$ . On average, the ablation centres performed 288 (range, 57–527) AF ablations/year.

Fifteen (0.05%) patients died within 30 days. The median time from AF ablation to death was 15 days (range, 0–30 days). Nine (0.03%) deaths were considered procedure-related, 4 (0.01%) were considered nonprocedural, and the cause of death was unknown for 2 patients (0.01%). Compared with survivors, deceased patients were older ( $66 \pm 7$  vs  $61 \pm 10$  years;  $P = 0.027$ ) and more frequently had mitral valve regurgitation ( $P = 0.005$ ; Table 1). Procedure-related death included cardiac tamponade ( $n = 4$ ), atrioesophageal fistula ( $n = 1$ ), stroke ( $n = 2$ ), pneumonia and reactive pericarditis ( $n = 1$ ), and right ventricular heart failure during thrombocytosis ( $n = 1$ ). The nonprocedural death included pancreas carcinoma ( $n = 1$ ), palliative care because of pleural fluid suspected for malignancy ( $n = 1$ ), non-natural death ( $n = 1$ ), and exacerbation of preexisting pulmonary fibrosis ( $n = 1$ ).

#### Discussion

This study presents 30-day mortality after AF ablation from all value-based health care ablation centres in The Netherlands. Only 0.1% of the mortality data were missing in a cohort of > 30,000 AF ablations in > 24,000 patients and 0.05% of patients died within 30 days. In The Netherlands, the crude death rate for persons aged 50–80 years was 10.8/1000 persons (0.09% for 30 days).<sup>4</sup> Thus, the 30-day mortality rate after AF ablation was numerically lower than the crude death rate in The Netherlands.

The strength of our study relies on the cohort size, data completeness, and the description of the cause of death. In comparison, Cheng et al. reported 30-day mortality after AF ablation with admission and readmission data retrieved from a large nationwide database.<sup>2</sup> They observed a tenfold higher mortality rate; 0.46% of patients died during the first admission or at readmission. Procedural complications and procedures performed in low-volume ablation centres (< 21 AF ablations per year) were associated with increased 30-day mortality risk. Because that study only included patients who died in-hospital, the true death rate might be higher.<sup>2</sup> In addition, a recent systematic review and meta-analysis showed that patients who underwent AF ablation in high-volume centres ( $\geq 50$  AF ablations per year) had a 67% lower mortality risk after AF ablation than those treated in low-volume centres.<sup>5</sup> In our study, 9 deaths (60% of the deaths; 0.03% of the total) were considered procedure-related, and AF ablation was performed primarily in high-volume centres with cardiothoracic surgical backup on site. The population described was relatively young and healthy; most of the patients had a history of paroxysmal AF and the average CHA<sub>2</sub>DS<sub>2</sub>-VASc score was low.

**Table 1. Baseline characteristics**

	Survivors (n = 30,182)	Deceased patients (n = 15)	P
Age, years	61.4 ± 9.8	65.9 ± 7.1	0.027
Female sex	9816 (32.5)	7 (46.7)	0.273
Body mass index	(n = 27,327) 27.4 ± 4.2	(n = 14) 25.9 ± 2.9	0.073
CHA <sub>2</sub> DS <sub>2</sub> -VASc score	(n = 27,174) 1.6 ± 1.4	(n = 14) 2.5 ± 2.0	0.087
Left atrial volume index, mL/m <sup>2</sup>	(n = 15,179) 35.8 ± 11.3	(n = 9) 38.4 ± 12.2	0.561
Mitral valve regurgitation	(n = 24,025)	(n = 14)	0.005
None/mild	22,529 (93.7)	11 (78.6)	
Moderate	1456 (6.1)	2 (14.3)	
Severe	40 (0.2)	1 (7.1)	
AF type	(n = 27,369)	(n = 14)	0.826
Paroxysmal AF	19,527 (71.3)	11 (78.6)	
Persistent AF	7300 (26.7)	3 (21.4)	
LS persistent AF	542 (2.0)	0	
Ablation method	(n = 27,572)	(n = 14)	0.168
Conventional RF	13,954 (50.6)	9 (64.3)	
Phased RF*	3389 (12.3)	3 (21.4)	
Cryoballoon	10,141 (36.8)	2 (14.3)	
Laser	52 (0.2)	0	
Other	36 (0.1)	0	
Previous ablation	(n = 27,657) 6793 (24.2)	(n = 14) 3 (21.4)	1.000

Data are presented as mean (± SD) or n (%).

AF, atrial fibrillation; CHA<sub>2</sub>DS<sub>2</sub>-VASc, Congestive Heart Failure, Hypertension, Age (≥ 75 Years) (doubled), Diabetes Mellitus, Stroke (doubled), Vascular Disease, Age (65-74) Years, Sex Category (Female); LS, longstanding; RF, radiofrequency.

\* Phased RF includes multiarray septal catheter and multiarray ablation catheter.

The main limitation of this study is that the 30-day mortality was obtained in the Dutch population, and generalizability to other countries might be limited because of differences in population characteristics or ablation volume. Second, because this was a registry study, the reporting of some baseline characteristics was incomplete. However, we only provided a descriptive analysis, and by using the municipal death registration, very few values were missing for 30-day mortality.

In a setting where AF ablation is performed in high-volume centres with cardiothoracic surgical backup on site, the 30-day mortality rate was extremely low.

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