

Assessment of Long-term Use Versus Discontinuation of Direct Oral Anticoagulant After Catheter Ablation for Atrial Fibrillation – RYOUMA Registry Subanalysis –

**Yuka Oda¹, Akihiko Nogami¹, Yuki Komatsu¹, Itsuro Morishima², Kenichi Hiroshima³,
Ritsushi Kato⁴, Satoru Sakagami⁵, Fumiharu Miura⁶, Keisuke Okawa⁷, Kikuya Uno⁸,
Koichiro Kumagai⁹, Takashi Kurita¹⁰, Kyoko Soejima¹¹, Kazutaka Aonuma¹, Tomoko Ishizu¹**

¹University of Tsukuba, ²Ogaki Municipal Hospital, ³Kokura Memorial Hospital, ⁴Saitama Medical University International Medical Center,
⁵Kanazawa Medical Center, ⁶Hiroshima Prefectural Hospital, ⁷Kagawa Prefectural Hospital, ⁸Tokyo Heart Rhythm Hospital,
⁹Fukuoka Sanno Hospital, ¹⁰Kindai University School of Medicine, ¹¹Kyorin University School of Medicine
For the RYOUMA Investigators

This research was sponsored by DAIICHI SANKYO Company, Limited, for “corporate-initiated clinical research”



JCS2024 KOBE

The 88th Annual Scientific Meeting of
the Japanese Circulation Society

BE KOBE

The Japanese Circulation Society COI Disclosure

Name of Author : Yuka Oda

The author have no financial conflicts of interest to disclose concerning the presentation.



JCS2024 KOBE

The 88th Annual Scientific Meeting of
the Japanese Circulation Society



BE KOBE

Background

- Catheter ablation (CA) is an effective therapeutic strategy for atrial fibrillation (AF).
- Periprocedural oral anticoagulation (OAC) is crucial for preventing periprocedural thromboembolism.
- However, the optimal long-term OAC after successful AF ablation is not well defined.



Table 4 Anticoagulation strategies: pre-, during, and postcatheter ablation of AF

	Recommendation	Class	LOE
Postablation	Patients in whom discontinuation of anticoagulation is being considered based on patient values and preferences should consider undergoing continuous or frequent ECG monitoring to screen for AF recurrence.	IIb	C-E0

2017
HRS/EHRA/ECAS/
APHRS/SOLAECE

Recommendations for stroke risk management peri-catheter ablation

2020
ESC

Recommendations	Class ^a	Level ^b
After AF catheter ablation, it is recommended that: <ul style="list-style-type: none"> Long-term continuation of systemic anticoagulation beyond 2 months post ablation is based on the patient’s stroke risk profile and not on the apparent success or failure of the ablation procedure. 	I	C

2010 Canadian
Cardiovascular Society

If a patient has a high thromboembolic risk profile (eg, CHADS2 risk score of ≥ 2), then the patient should continue oral anticoagulation even after successful AF ablation.

2021
JCS/JHRS

Table 13. Recommendations and Evidence Levels for Anticoagulation Strategies Pre-, Intra-, and Post-Ablation of Atrial Fibrillation				
	COR	LOE	GOR (MINDS)	LOE (MINDS)
For patients with a high risk for embolism (CHADS ₂ score ≥ 2), continuation of systemic anticoagulation with warfarin or a DOAC should be considered even after 3 months of AF ablation, considering AF recurrence during the follow-up period	IIa	C	C1	VI

RYOUMA registry
(Real world ablation therapy
with anti-coagulants in Management of Atrial fibrillation)

- Prospective, multicenter, observational study from 2017 to 2018.
- Total of 62 institutions in Japan were included.
- Patients with non-valvular AF who were scheduled to undergo CA were eligible.

UMIN000026092

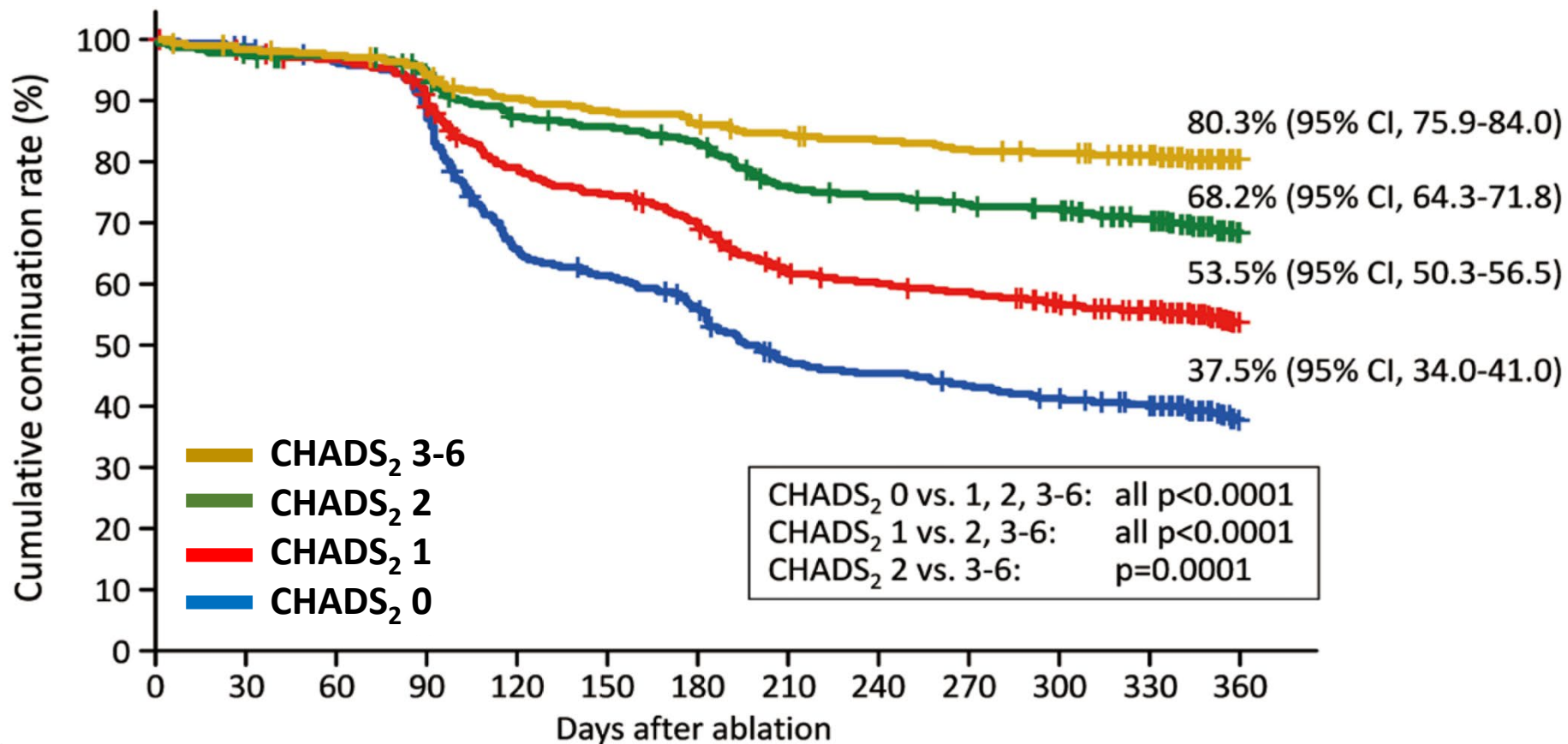


JCS2024 KOBE

The 88th Annual Scientific Meeting of
the Japanese Circulation Society

BE KOBE

Continuation Rate of DOACs after Ablation According to the CHADS₂ Score Categories



Number at risk

CHADS ₂ 0	782	687	427	326	198
CHADS ₂ 1	1044	937	717	591	358
CHADS ₂ 2	633	587	510	443	282
CHADS ₂ 3-6	382	353	320	300	199

*DOAC,
 direct-acting oral anticoagulants

Nogami A, et al. *Circ J* 2022; **87**: 50-62.



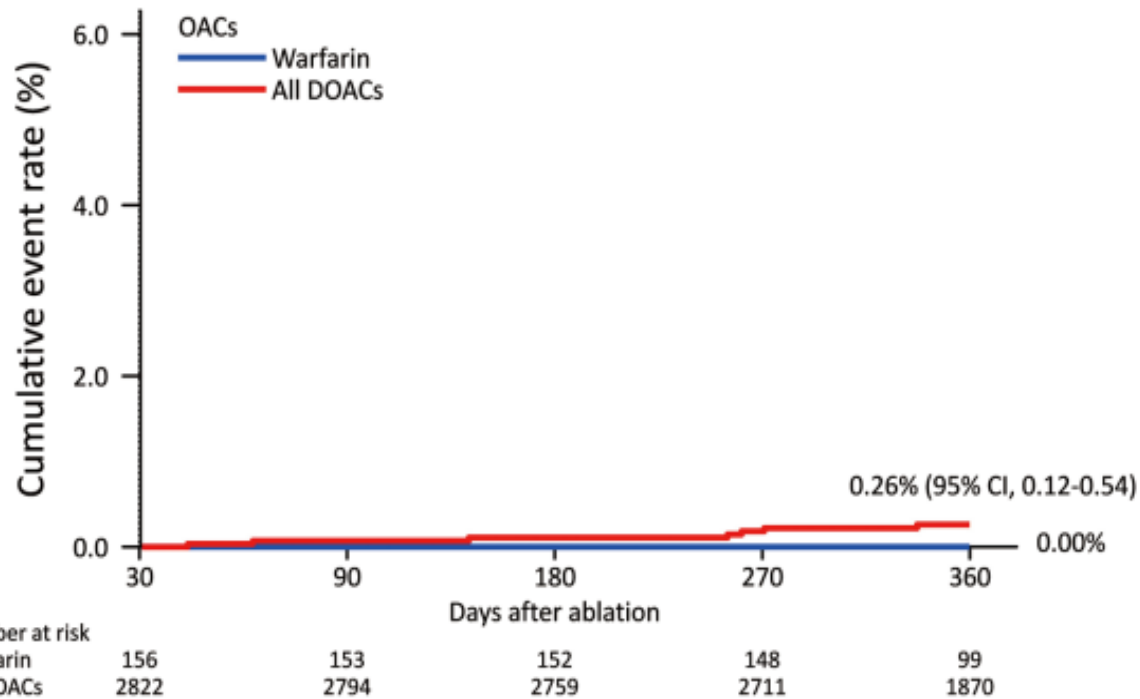
JCS2024 KOBE

The 88th Annual Scientific Meeting of
 the Japanese Circulation Society

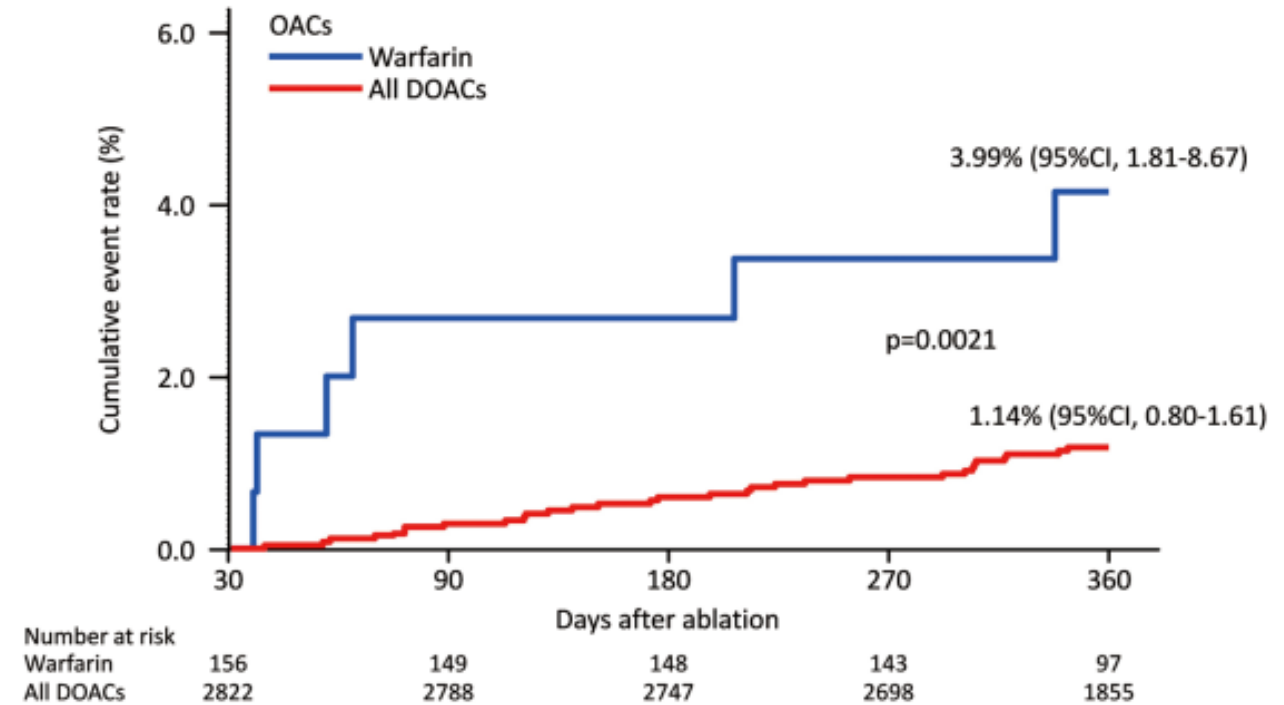


Cumulative Event Rate of Ischemic Stroke/Systemic Embolic Events (SEEs) or Major Bleeding

A. Ischemic stroke/systemic embolic events



B. Major bleeding



※Major bleeding was defined according to the International Society on Thrombosis and Haemostasis criteria.

Nogami A, et al. *Circ J* 2022; **87**: 50-62.

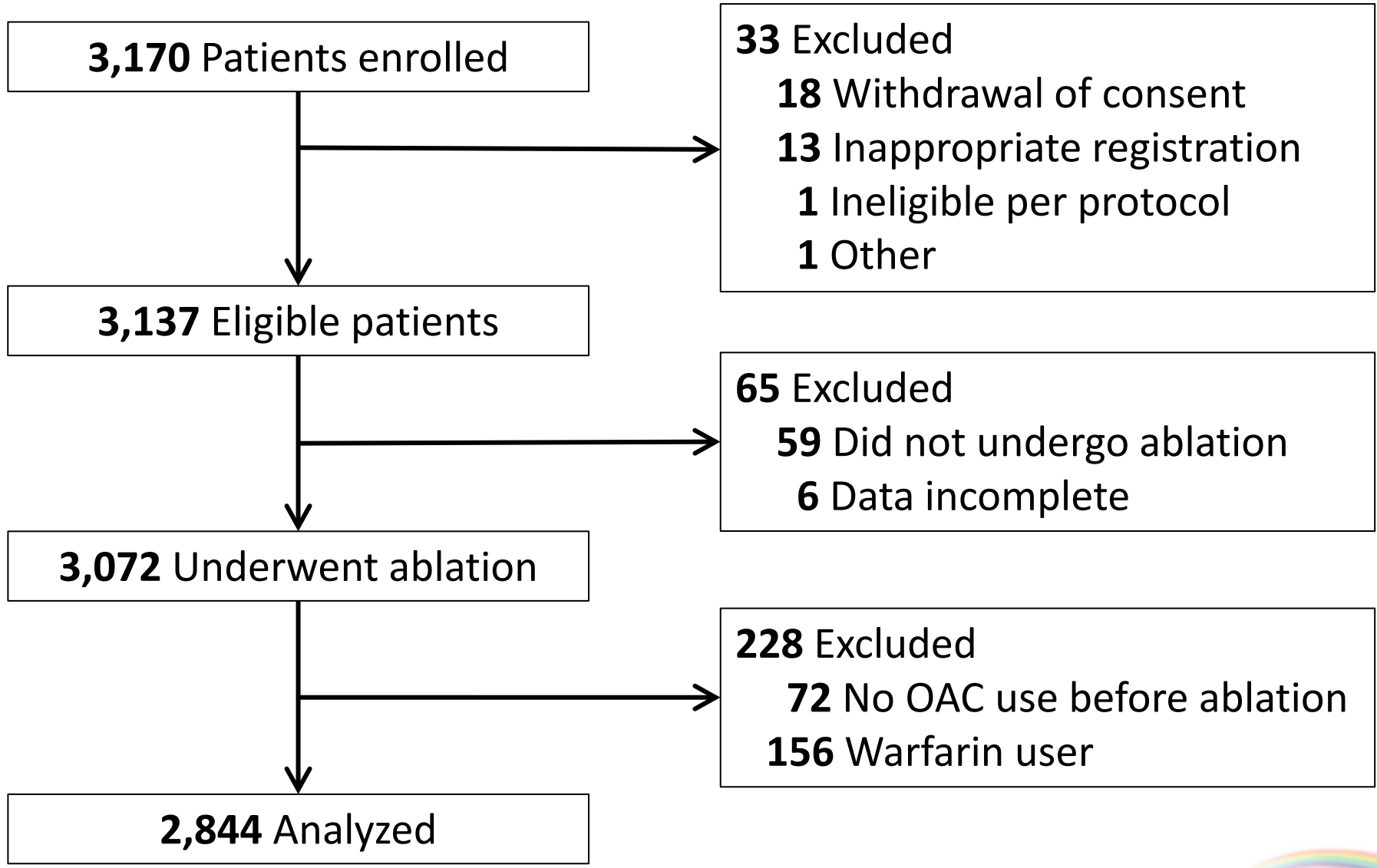


Objectives

- To investigate the relationship between the direct-acting OACs (DOACs) use status and the incidence of adverse events (ischemic strokes/SEEs, major bleeding, and all-cause death) after CA of AF.



Patient Flow Diagram



Baseline Demographic and Clinical Characteristics

	n=2844
Age, median (IQR), years	68.0 (60.0-73.0)
Male sex, n (%)	2016 (70.9)
Body weight, median (IQR), kg	64.9 (56.9-73.7)
BMI, median (IQR), kg/m ²	23.8 (21.8-26.3)
Creatinine clearance, median (IQR), mL/min	76.9 (61.4-96.0)
AF type	
Paroxysmal, n (%)	1821 (64.0)
Persistent, n (%)	711 (25.0)
Long-standing persistent, n (%)	312 (11.0)
CHADS ₂ score, median (IQR)	1.0 (0.0-2.0)
CHADS ₂ score ≥2, n (%)	1016 (35.7)
CHADS ₂ score ≥1, n (%)	2062 (72.5)
CHA ₂ DS ₂ -VASc score, median (IQR)	2.0 (1.0-3.0)
CHA ₂ DS ₂ -VASc score ≥3, n (%)	1191 (41.9)
CHA ₂ DS ₂ -VASc score ≥2, n (%)	1856 (65.3)
HAS-B(L)ED score, median (IQR)	2.0 (1.0-3.0)
HAS-B(L)ED score ≥3, n (%)	914 (32.1)

Comorbidity, n (%)	
Hypertension	1722 (60.5)
Diabetes	483 (17.0)
Heart disease	756 (26.6)
Kidney disease	229 (8.1)
Hemodialysis	2 (0.1)
Hepatic disorder	176 (6.2)
Cerebrovascular disease	314 (11.0)
Thromboembolism	98 (3.4)
Dementia	15 (0.5)
Antiplatelets use, n (%)	247 (8.7)
Type of DOACs, n (%)	
Dabigatran	377 (13.3)
Rivaroxaban	784 (27.6)
Apixaban	766 (26.9)
Edoxaban	917 (32.2)

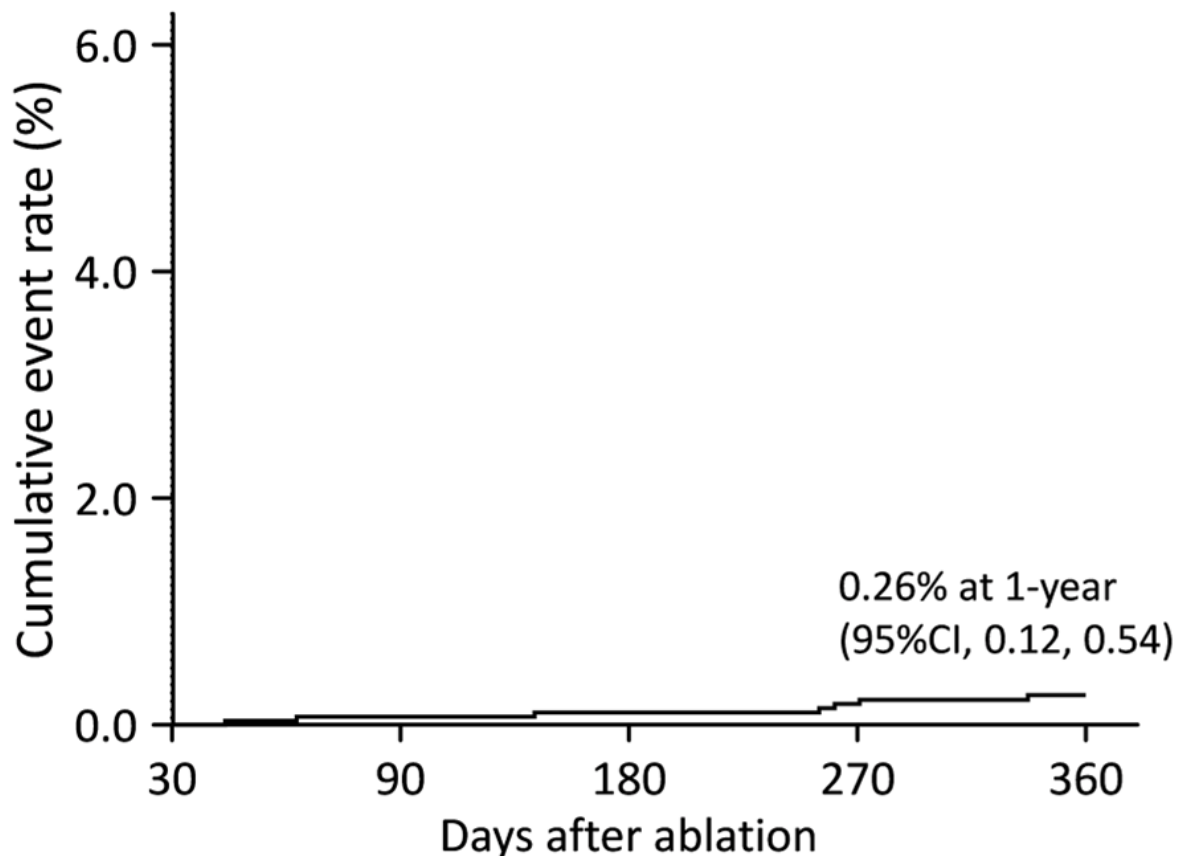
Patient Baseline Characteristics

According to the CHADS2 Score Categories and DOAC Continuation

CHADS2 Score	0-1			2			3-6			
	DOAC Status	Continued	Discontinued	p-value	Continued	Discontinued	p-value	Continued	Discontinued	p-value
		N =880	N =948		N =441	N =193		N =309	N =73	
Age, median (IQR), years		67.0 (60.0-71.0)	63.0 (54.0-69.0)	p<0.001	72.0 (66.0-77.0)	70.0 (63.0-77.0)	NS	75.0 (69.0-78.0)	75.0 (71.0-80.0)	NS
Male sex, n (%)		621 (70.6)	724 (76.4)	p=0.005	283 (64.2)	129 (66.8)	NS	210 (68.0)	49 (67.1)	NS
Body weight, median (IQR), kg		65.2 (56.6-74.2)	66.5 (59.2-74.5)	p=0.037	63.6 (56.2-72.2)	62.8 (56.8-75.1)	NS	62.3 (55.0-71.0)	61.5 (54.0-70.9)	NS
Creatinine clearance, median (IQR), mL/min		78.9 (64.5-98.6)	86.1 (70.3-105.6)	p<0.001	70.1 (54.4-86.20)	71.8 (57.1-92.8)	NS	63.9 (50.1-76.3)	56.7 (48.9-78.7)	NS
Paroxysmal AF, n (%)		519 (59.0)	669 (70.6)	p<0.001	275 (62.4)	124 (64.2)	NS	184 (59.5)	50 (68.5)	NS
CHADS2 score, median (IQR)		1.0 (0.0-1.0)	0.0 (0.0-1.0)	p<0.001	2.0 (2.0-2.0)	2.0 (2.0-2.0)	NS	3.0 (3.0-4.0)	3.0 (3.0-4.0)	NS
CHA2DS2-VASc score, median (IQR)		2.0 (1.0-2.0)	1.0 (0.0-2.0)	p<0.001	3.0 (3.0-4.0)	3.0 (3.0-4.0)	NS	5.0 (4.0-5.0)	5.0 (4.0-6.0)	NS
HAS-B(L)ED score, median (IQR)		2.0 (1.0-2.0)	1.0 (1.0-2.0)	p<0.001	2.0 (2.0-3.0)	2.0 (2.0-3.0)	NS	3.0 (3.0-4.0)	3.0 (2.0-5.0)	NS
Comorbidity, n (%)										
Hypertension		454 (51.6)	386 (40.7)	p<0.001	372 (84.4)	165 (85.5)	NS	280 (90.6)	65 (89.0)	NS
Heart disease		185 (21.0)	104 (11.0)	p<0.001	169 (38.3)	80 (41.5)	NS	182 (58.9)	36 (49.3)	NS
Malignancy		65 (7.4)	63 (6.6)	NS	66 (15.0)	36 (18.7)	NS	41 (13.3)	18 (24.7)	p=0.015

Kaplan-Meier Plot of the Time to the First Serious Adverse Events

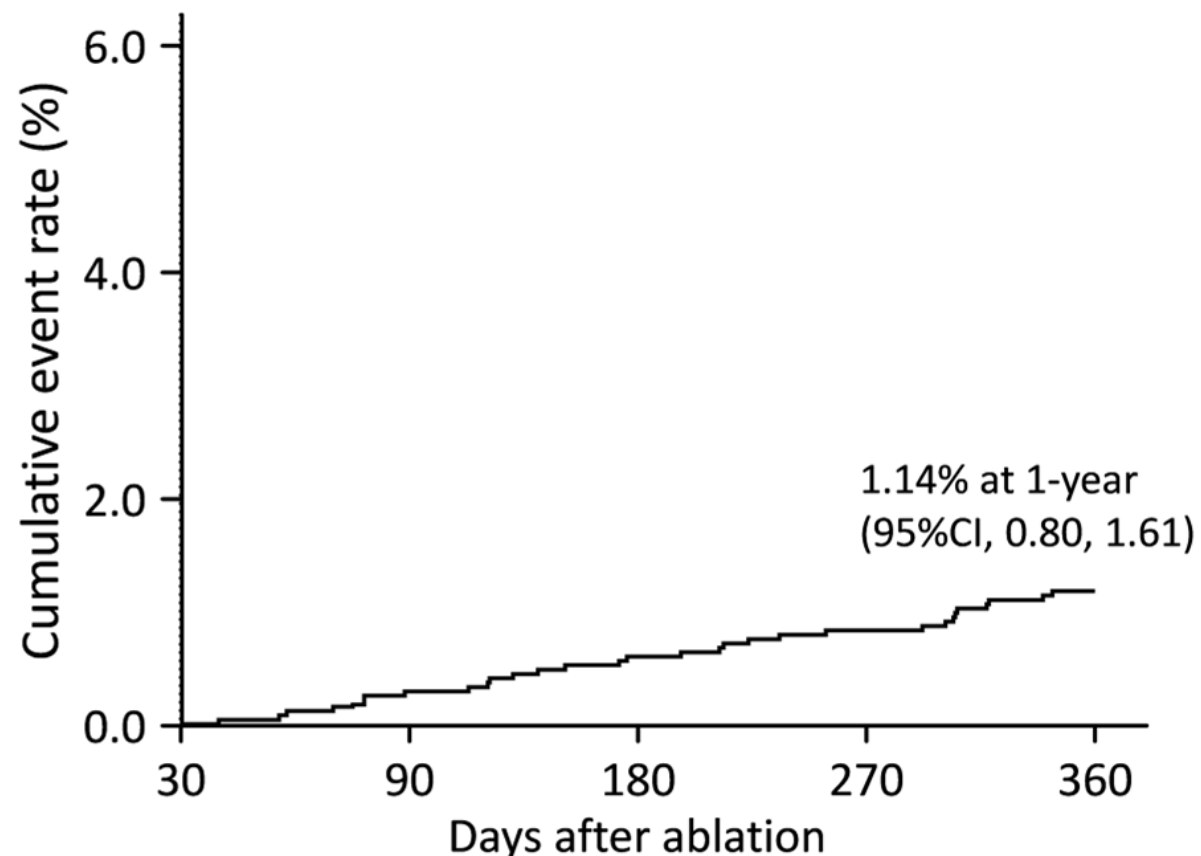
Ischemic Stroke or Systemic Embolic Events



0.26% at 1-year
(95%CI, 0.12, 0.54)

Number at risk	30	90	180	270	360
Number at risk	2822	2794	2759	2711	1870

Major Bleeding Events



1.14% at 1-year
(95%CI, 0.80, 1.61)

Number at risk	30	90	180	270	360
Number at risk	2822	2788	2747	2698	1855

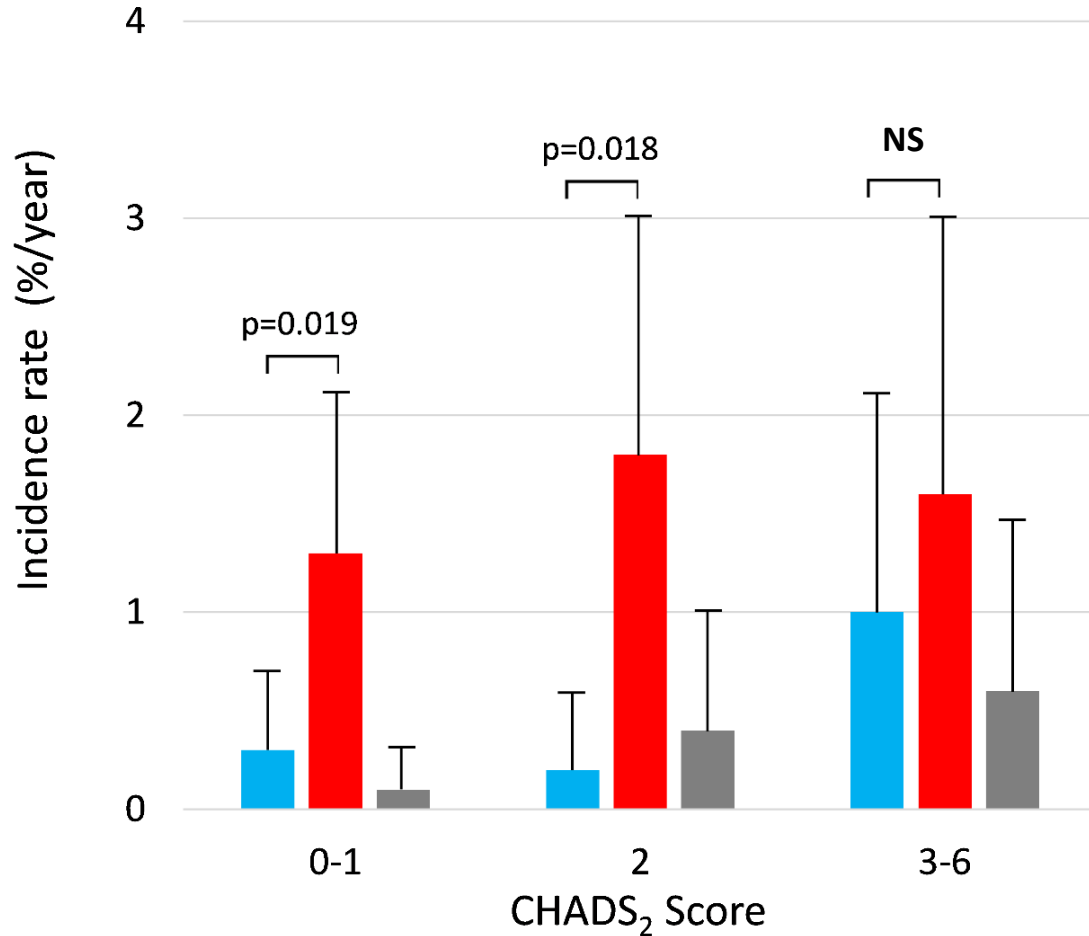


Serious Adverse Events After Ablation by CHADS2 Score Categories

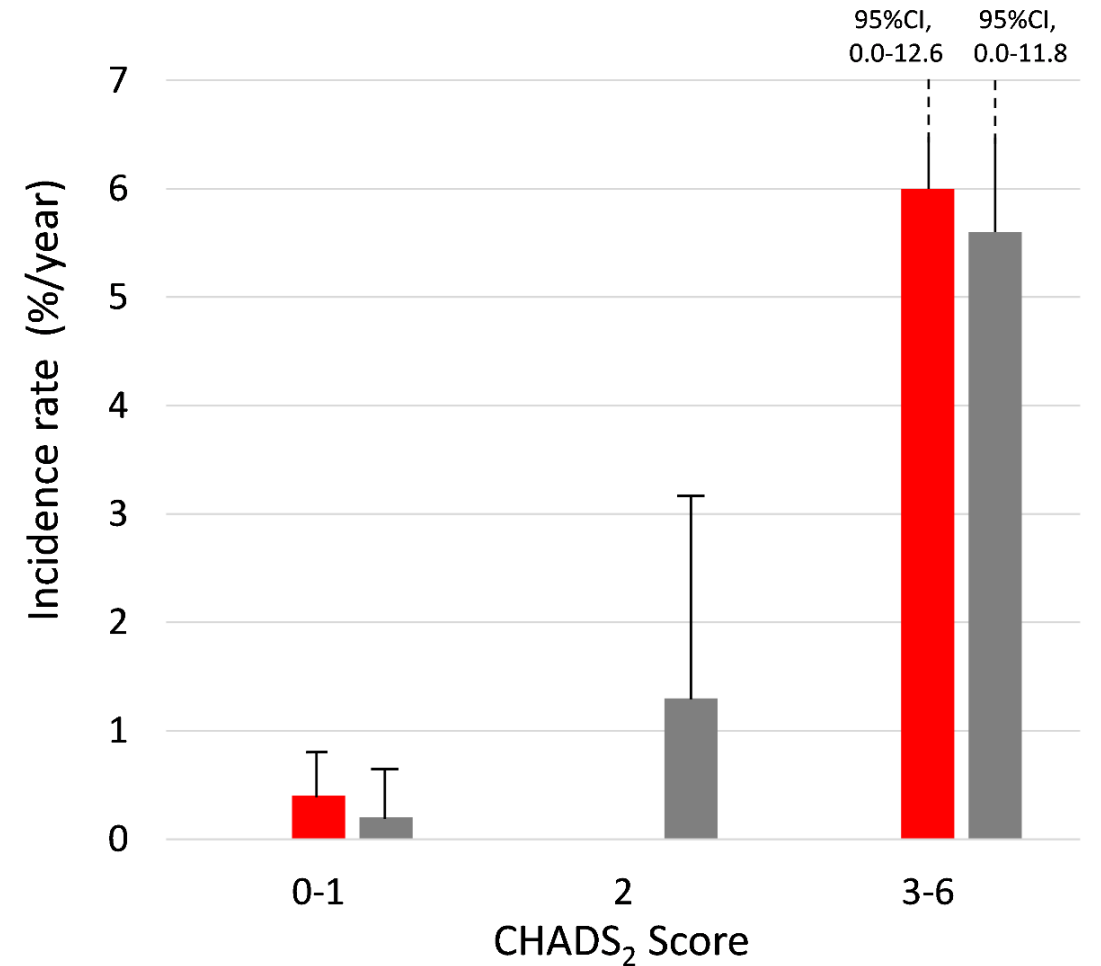
CHADS2 Score	Events While Taking DOACs, No. of events (% per Year) [95% CI]			Events While Taking No DOACs, No. of events (% per Year) [95% CI]		
	Ischemic Stroke/SEEs	Major Bleeding	All-cause Death	Ischemic Stroke/SEEs	Major Bleeding	All-cause Death
0-1 (n=1828)	3 (0.3) [0.0-0.7]	12 (1.3) [0.6-2.1]	1 (0.1) [0.0-0.3]	0 NC	3 (0.4) [0.0-0.8]	2 (0.2) [0.0-0.6]
2 (n=634)	1 (0.2) [0.0-0.6]	8 (1.8) [0.6-3.0]	2 (0.4) [0.0-1.0]	0 NC	0 NC	2 (1.3) [0.0-3.1]
3-6 (n=382)	3 (1.0) [0.0-2.1]	5 (1.6) [0.2-3.0]	2 (0.6) [0.0-1.5]	0 NC	3 (6.0) [0.0-12.6]	3 (5.6) [0.0-11.8]

Serious Adverse Events per Year of Follow-up After Ablation by CHADS2 Score Categories

Serious Adverse Events while Taking DOACs



Serious Adverse Events while Taking **No** DOACs

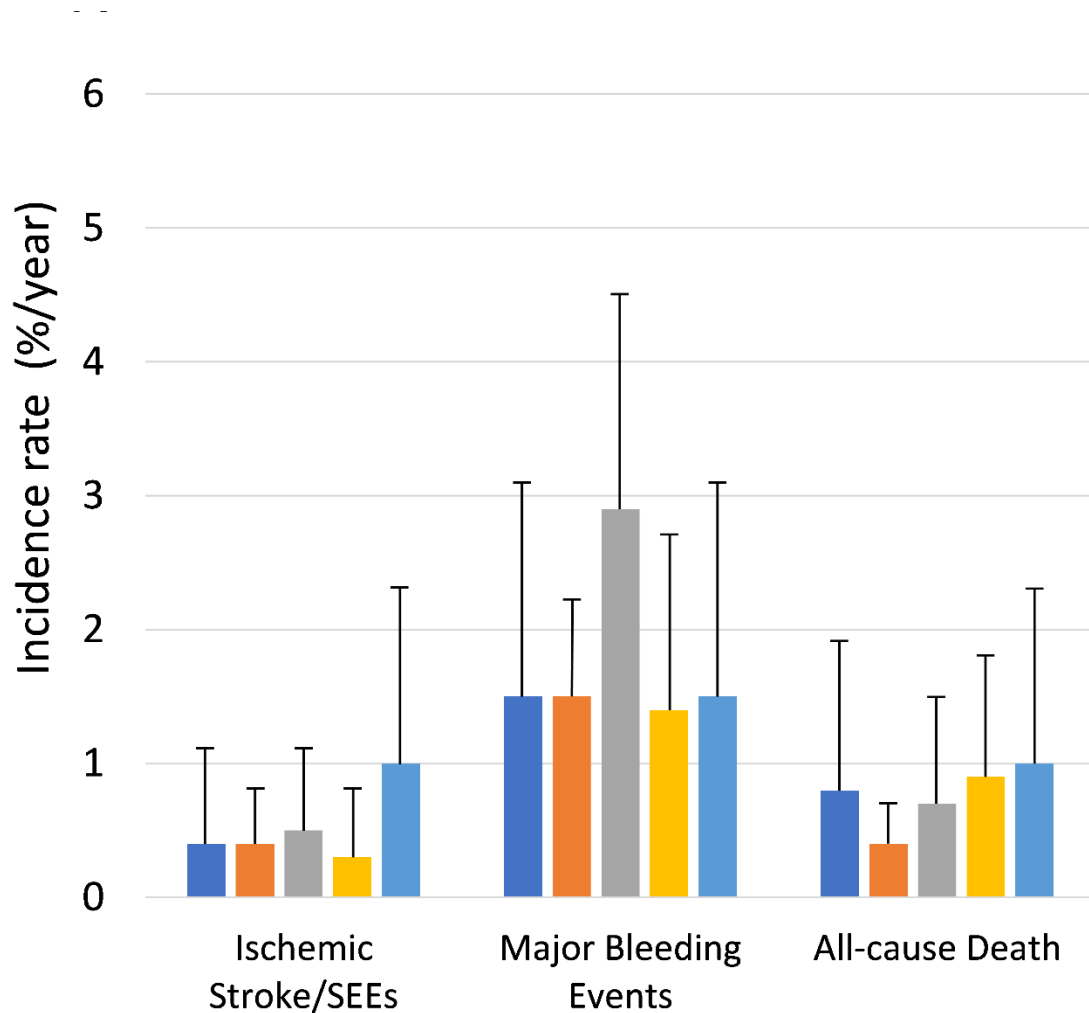


■ Ischemic Stroke/SEEs ■ Major Bleeding Events ■ All-cause Death

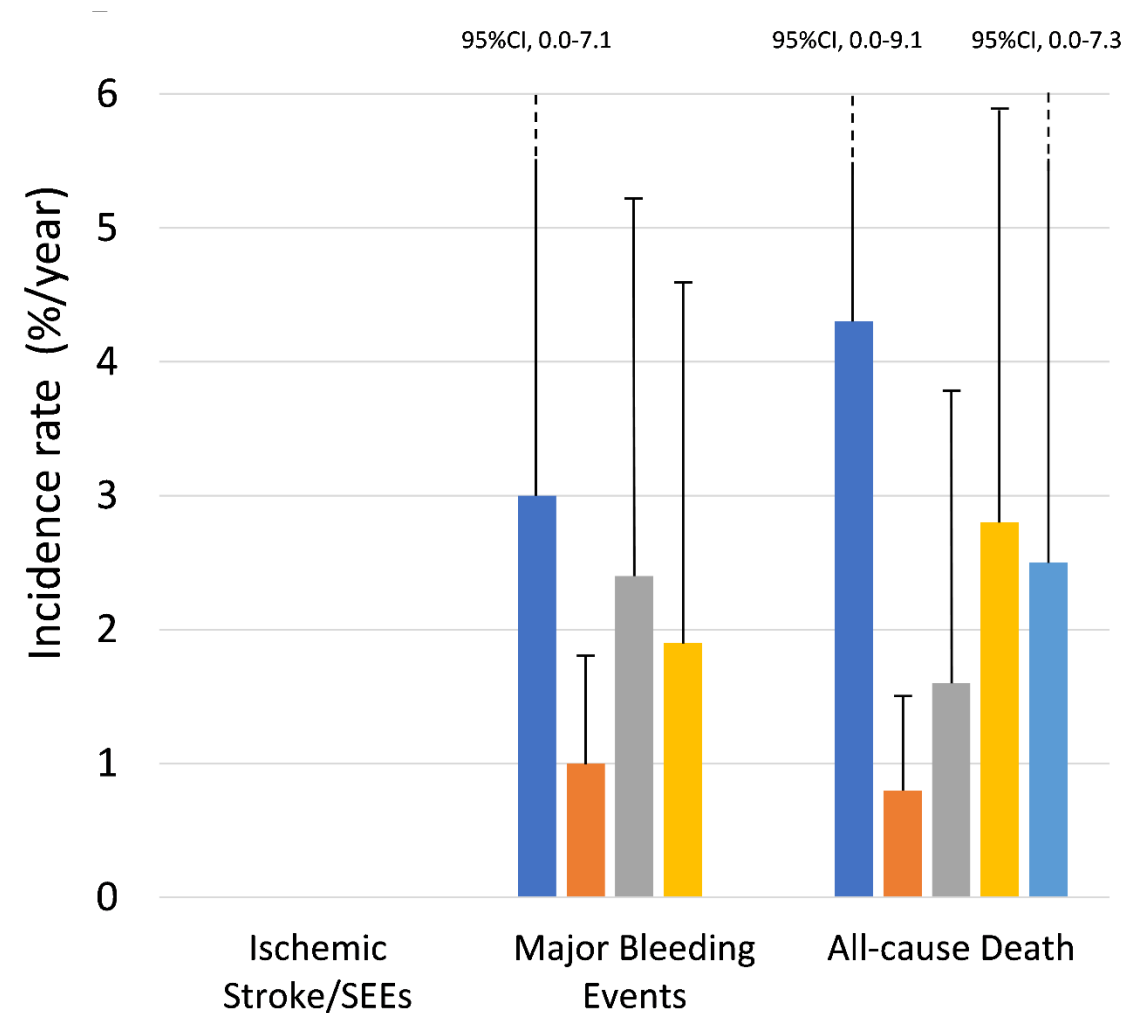
Error bars denote upper bound of 95% CIs.

Serious Adverse Events per Year of Follow-up After Ablation by Individual CHADS₂ Factors.

Serious Adverse Events while Taking DOACs



Serious Adverse Events while Taking **No** DOACs



CHADS₂ factors **C** (n=346) **H** (n=1,722) **A** (n=570) **D** (n=483) **S** (n=262)

Error bars denote upper bound of 95% CIs.

Discussion

➤ Main Findings

1. In patients with a CHADS2 score of 0-1, there were some differences between those who continued to take DOACs and those who discontinued (e.g., age, sex, body weight, AF type).
2. In patients who continued to take DOACs, the incidence rate of major bleeding was significantly higher than that of ischemic stroke in patients with a CHADS2 score of 0-1 and 2, but not in patients with a CHADS2 score of 3 or higher.



Previous Meta-analysis 1

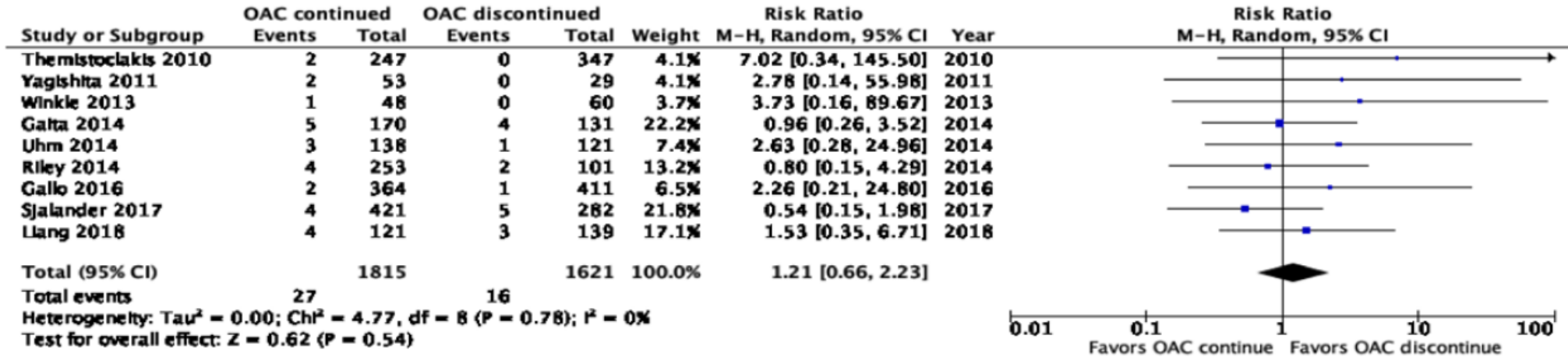


Figure 1.2: Systemic thromboembolism

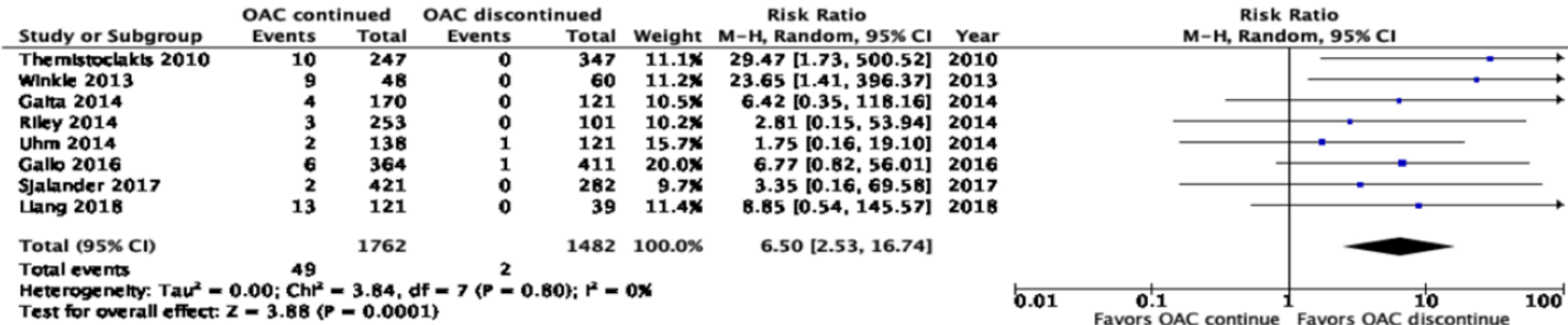
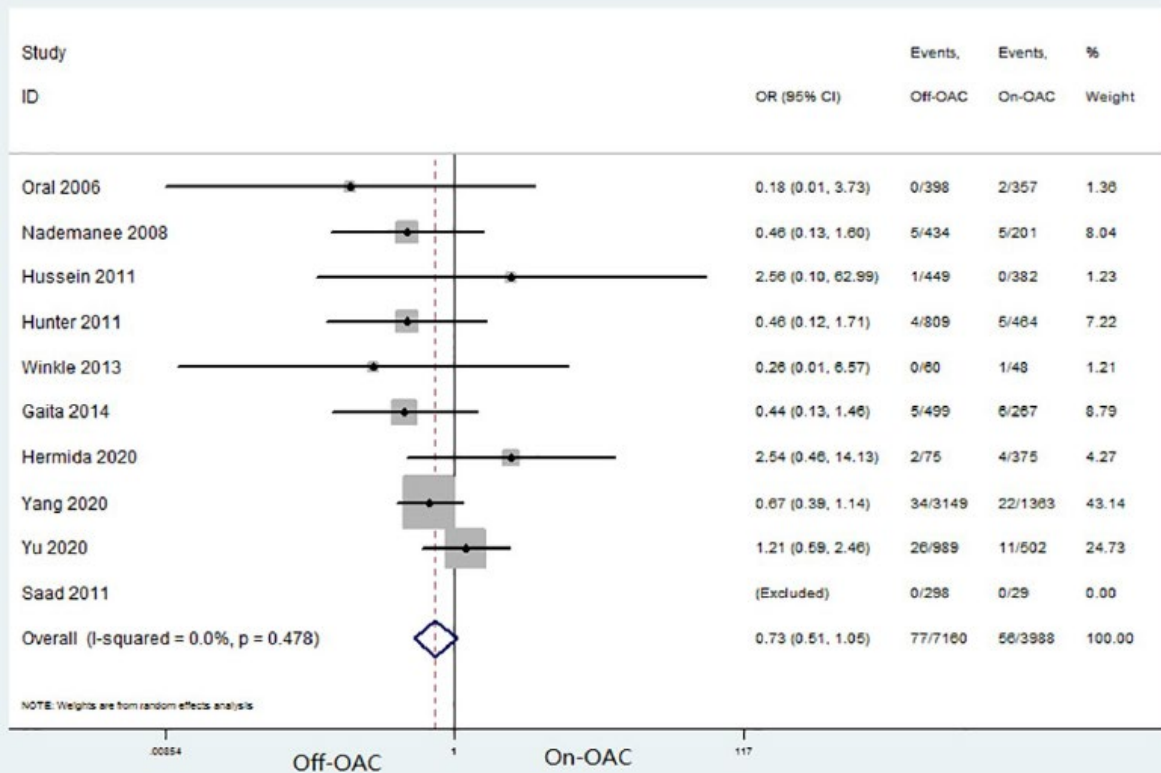


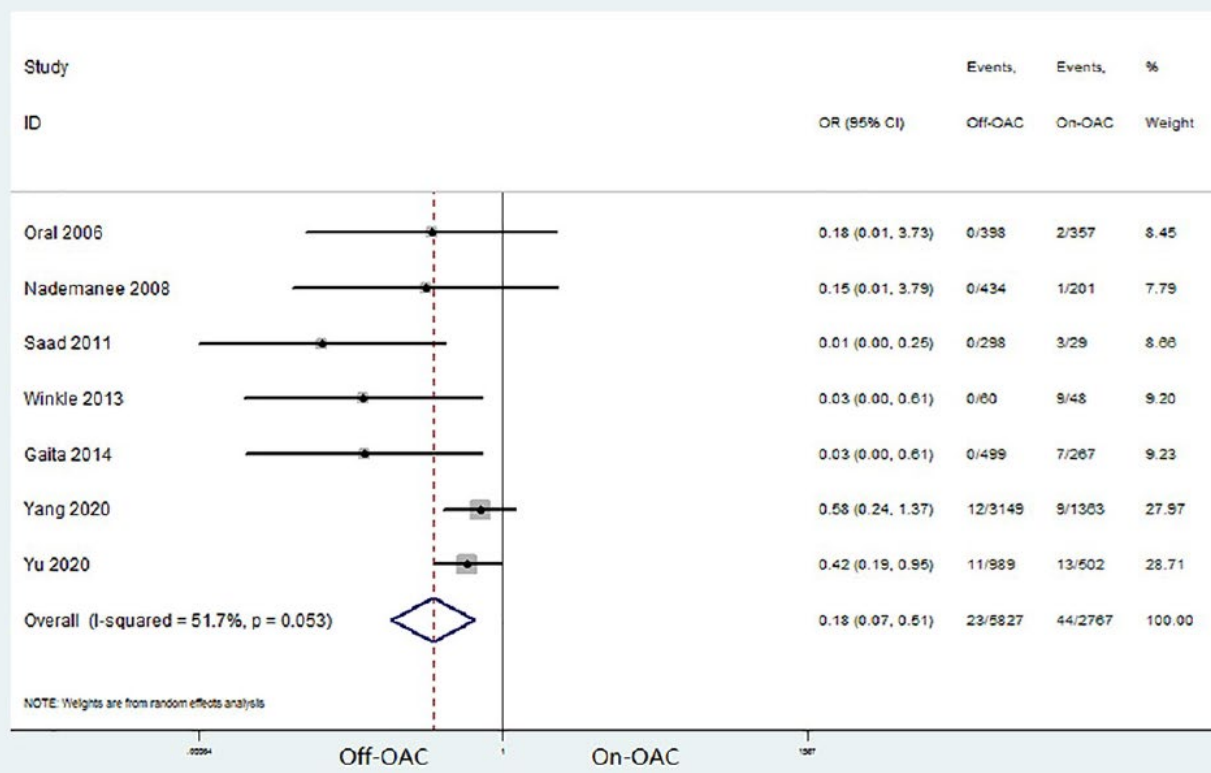
Figure 1.3: Major bleeding

Previous Meta-analysis 2

Forest plot for thromboembolism event

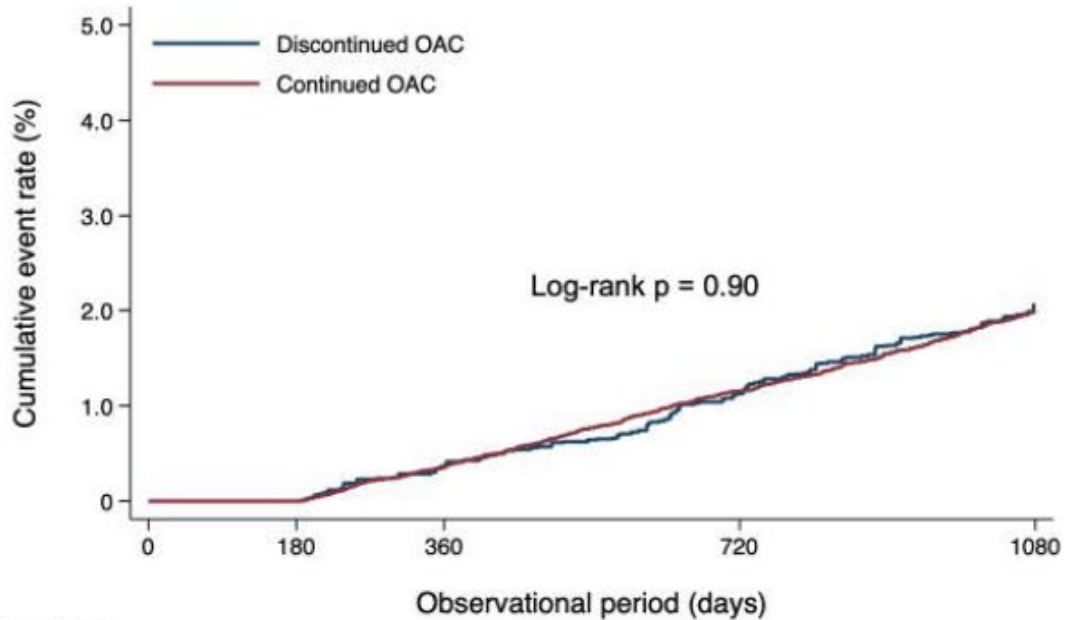


Forest plot for major bleeding event



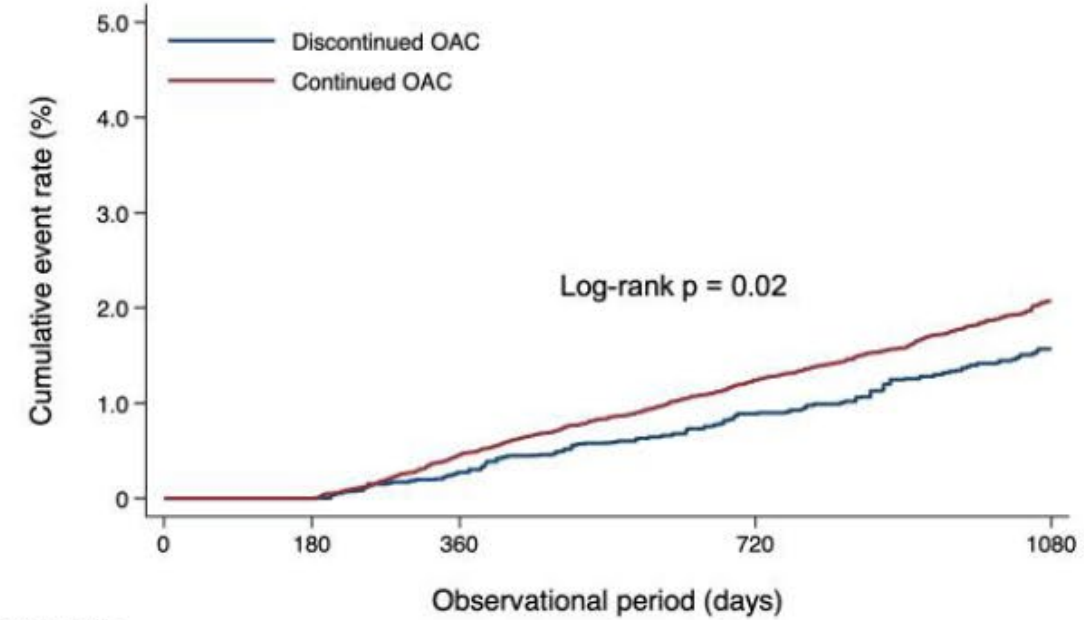
Liu XH, et al. *PLoS One* 2021; **16**: e0253709.

Thromboembolism (CHADS₂ = 2)



Number at risk		0	180	360	720	1080
Discontinued OAC	8270	8089	5820	3919		
Continued OAC	36781	36161	26237	17610		

Major bleeding (CHADS₂ = 2)



Number at risk		0	180	360	720	1080
Discontinued OAC	8270	8100	5847	3949		
Continued OAC	36781	36122	26220	17618		

Kanaoka K, et al. *EHJ* 2024; **45**: 522-534.



Study Limitations

1. The study was not a randomized trial.
2. The dosage of each DOAC was not taken into consideration.
3. Multivariate analysis could not be performed due to the small number of events after ablation.
4. Short follow-up period.



Conclusions

- For patients with a CHADS2 score of 0-1 and 2, continuing DOACs after CA may be associated with a higher risk of major bleeding than ischemic stroke/SEEs.
- Further study would be needed to evaluate the safety of discontinuing DOACs after CA in patients with a CHADS2 score of 2.

