Multicenter Registry of ILR in Korea

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COI Disclosure

Name of First Author: Ju Youn Kim

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

Disclosure

Relationships with commercial interests:

- None

Implantable loop recorder

- Implantable loop recorder (ILR) is an effective tool for detecting arrhythmia.

- A long-term ECG monitoring strategy with an ILR is used to diagnose, screen and monitor various types of arrhythmias.

Diagnosis

Recommendation for implantable loop recorders

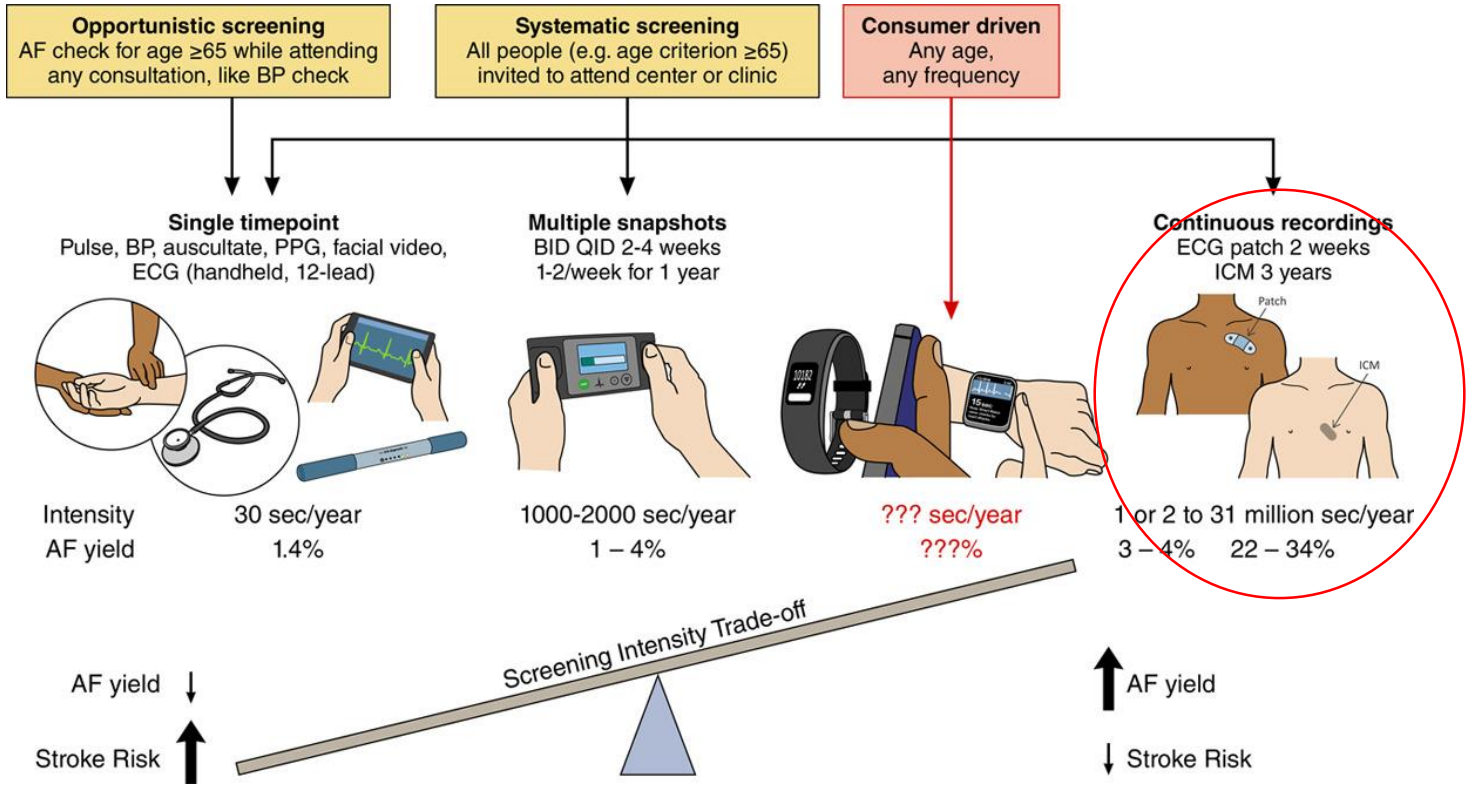
Recommendation	Class[a]	Level[b]
In patients with infrequent (less than once a month) unexplained syncope or other symptoms suspected to be caused by bradycardia, in whom a comprehensive evaluation did not demonstrate a cause, long-term ambulatory monitoring with an ILR is recommended.[108–112]	I	A

Screening

Recommendations for the search for AF in patients with cryptogenic stroke

Recommendations	Class[a]	Level[b]
In patients with acute ischaemic stroke or TIA and without previously known AF, monitoring for AF is recommended using a short-term ECG recording for at least the first 24 h, followed by continuous ECG monitoring for at least 72 h whenever possible.[1113–1116]	I	B
In selected[c] stroke patients without previously known AF, additional ECG monitoring using long-term non-invasive ECG monitors or insertable cardiac monitors should be considered, to detect AF.[1112]	IIa	B

AF Screening Intensity



Benjamin E et al., Circulation. 2021 Jan 26;143(4):372-388.

Monitoring

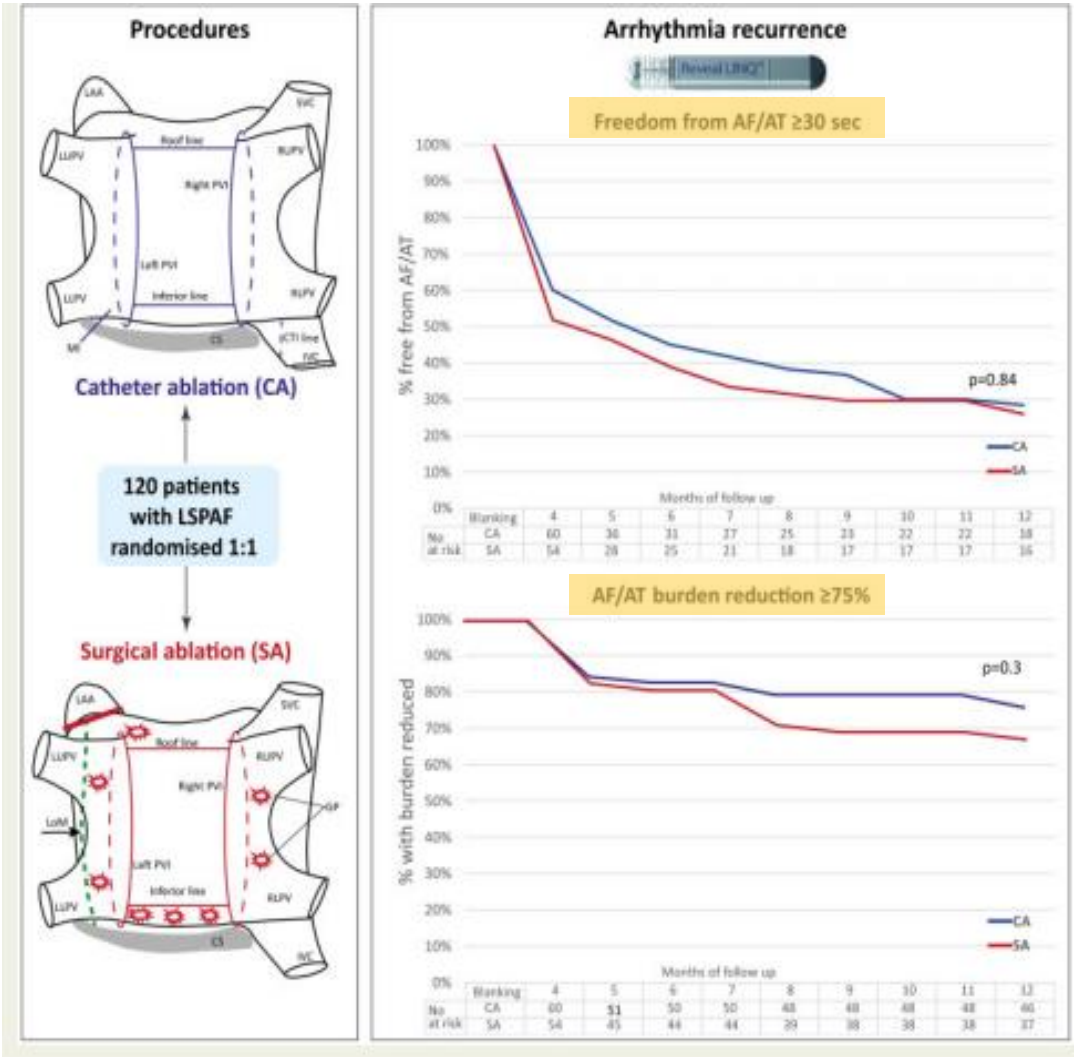
ORIGINAL RESEARCH ARTICLE

Cryoballoon or Radiofrequency Ablation for Atrial Fibrillation Assessed by Continuous Monitoring

A Randomized Clinical Trial

SUPPLEMENTAL TABLE 2: Implantable loop recorder programming

AF detection threshold	Balanced Sensitivity
Ectopy rejection	Nominal
Episode storage threshold	All (Record ECG of 2 minutes)



Circulation. 2019;140:1779–1788.

European Heart Journal (2020) 41, 4471–4480

Indication

- Unexplained syncope
- Palpitation
- Embolic Stroke of Undetermined Source (ESUS)

Diagnostic and therapeutic value of implantable loop recorder: A tertiary care center experience

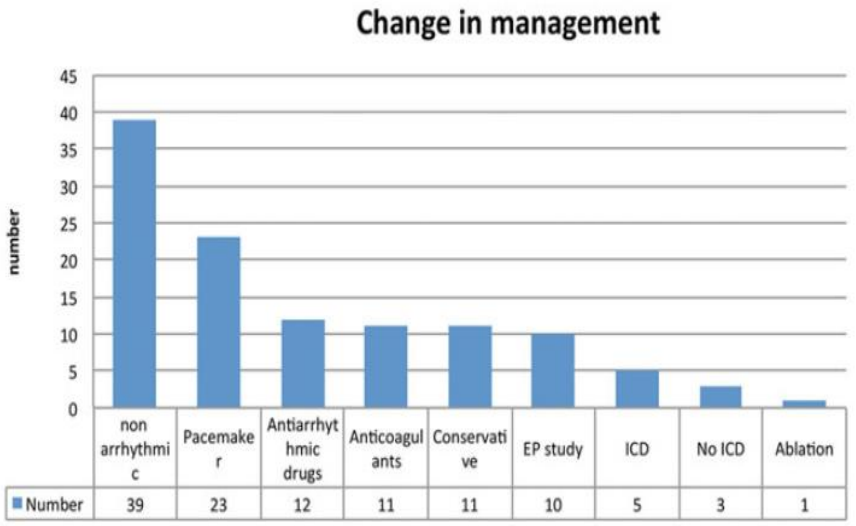
Abstract

Background: Implantable loop recorders (ILRs) are effective in achieving symptom-rhythm correlation. However, diagnostic yield in routine clinical practice is not well established.

Methods: Patients undergoing ILR implantation between April 2010 and May 2015 were included. All devices were enrolled in remote monitoring with automatic arrhythmia detection and P sense algorithms switched "ON." Symptom-rhythm correlation was assessed and changes in management were recorded.

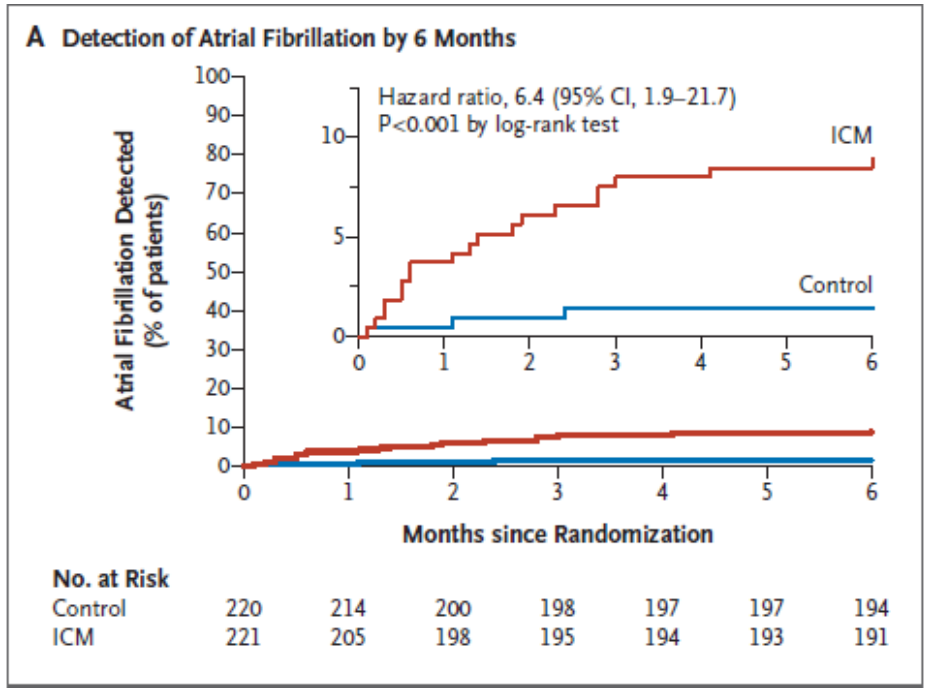
Results: A total of 312 patients (57% male, age 53 ±22 years; median CHADS2VaSc score = 1) were included in this study. ILRs were implanted for evaluation of syncope in 206 (66.0%), presyncope in 23 (7.4%), unexplained palpitations in 51 (16.3%), and cryptogenic stroke in 27 (8.7%) patients. ILR monitoring yielded a diagnosis that changed management strategy in 146 (46.8%) patients over a median of 12 (1-42) months. Out of 163 (52.2%) patients with symptoms during the monitoring period, 100 (61.3%) had an arrhythmia. ILR was useful in ruling out an arrhythmic cause for symptoms in 63 (38.7%) patients. ILR results led to pacemaker implantation in 23 patients (7.4% overall and 11.2% of those with syncope) after median follow-up of 3 months. A new diagnosis of atrial fibrillation was made in 38 (12.2%) patients, 11 of whom were initiated on oral anticoagulants. ILR results led to pacemaker implantation in 31 patients (9.9% overall and 19.0% of those with syncope) after median follow-up of 3 months. A new diagnosis of atrial fibrillation was made in 38 (12.2%) patients, nine of whom were initiated on oral anticoagulants. Overall, ILR led to a change in management in 47% patients with a number needed to implant of 2.1 to change management.

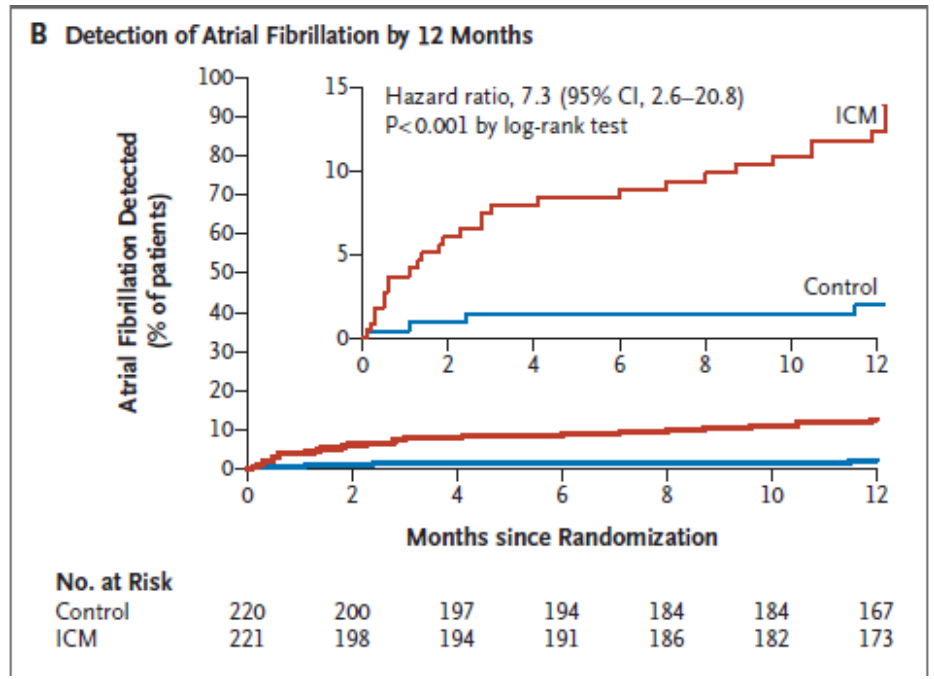
Conclusion: ILR monitoring is effective in achieving symptom-rhythm correlation and results in changes in management in nearly half of implanted patients. Additional studies are needed to evaluate cost efficacy of ILR and the optimal monitoring duration.



Pacing Clin Electrophysiol. 2019;42:38–45.

Cryptogenic Stroke and Underlying Atrial Fibrillation





N Engl J Med 2014;370:2478-86.

How to diagnose the AF?

- Different settings for detect AF

Table 1 Nominal atrial fibrillation detection programming based on the indication for insertable cardiac monitor implant

	Indication for ICM implant		
AF detection programming in ICM	Syncope	Known AF	Cryptogenic stroke
AF detection type	AF only*	AF only*	AF only*
AF detection sensitivity	Least sensitive*	Balanced sensitivity*	Balanced sensitivity*
Ectopy rejection	Aggressive*	Nominal*	Aggressive*
ECG storage	Longest episode only†	All episodes†	All episodes†

Heart Rhythm 2016;13:1624–1630

AF detection algorithm

- The AF detection algorithm based on R-R intervals, looks for patterns in a Lorenz plot of the difference in R-R intervals to compute an AF evidence score every 2 minutes.

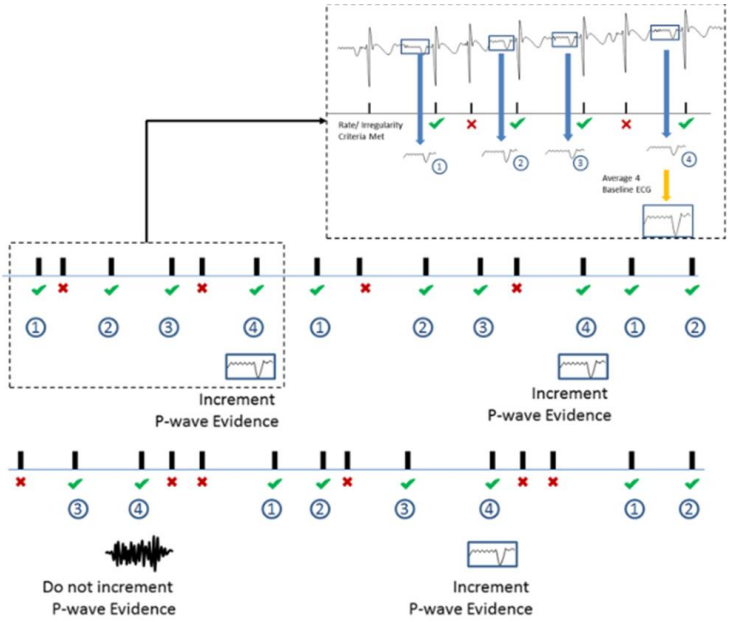
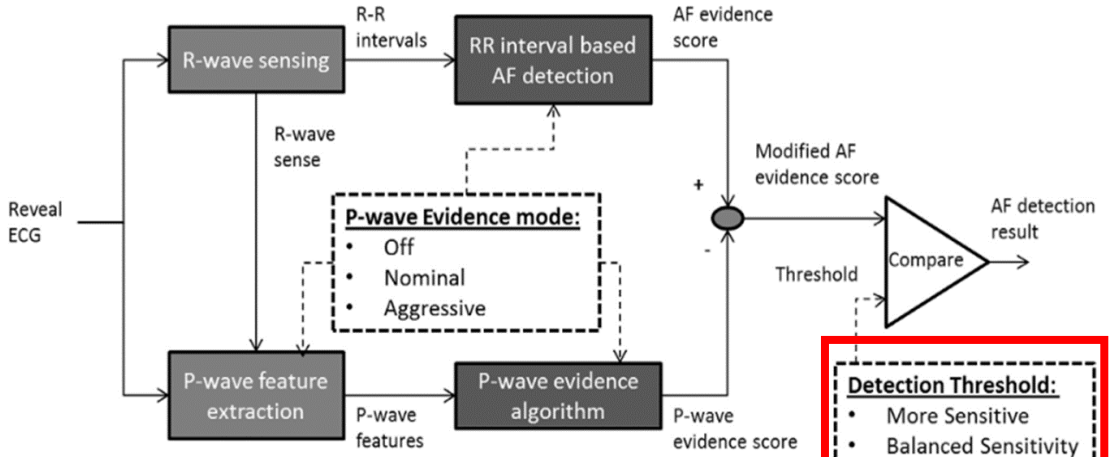


Figure 1 Initial segment of a 2-minute detection period illustrating the P-wave evidence accumulation procedure. The inset illustrates the procedure for P-wave averaging every 4 beats that meet the rate and irregularity criteria.



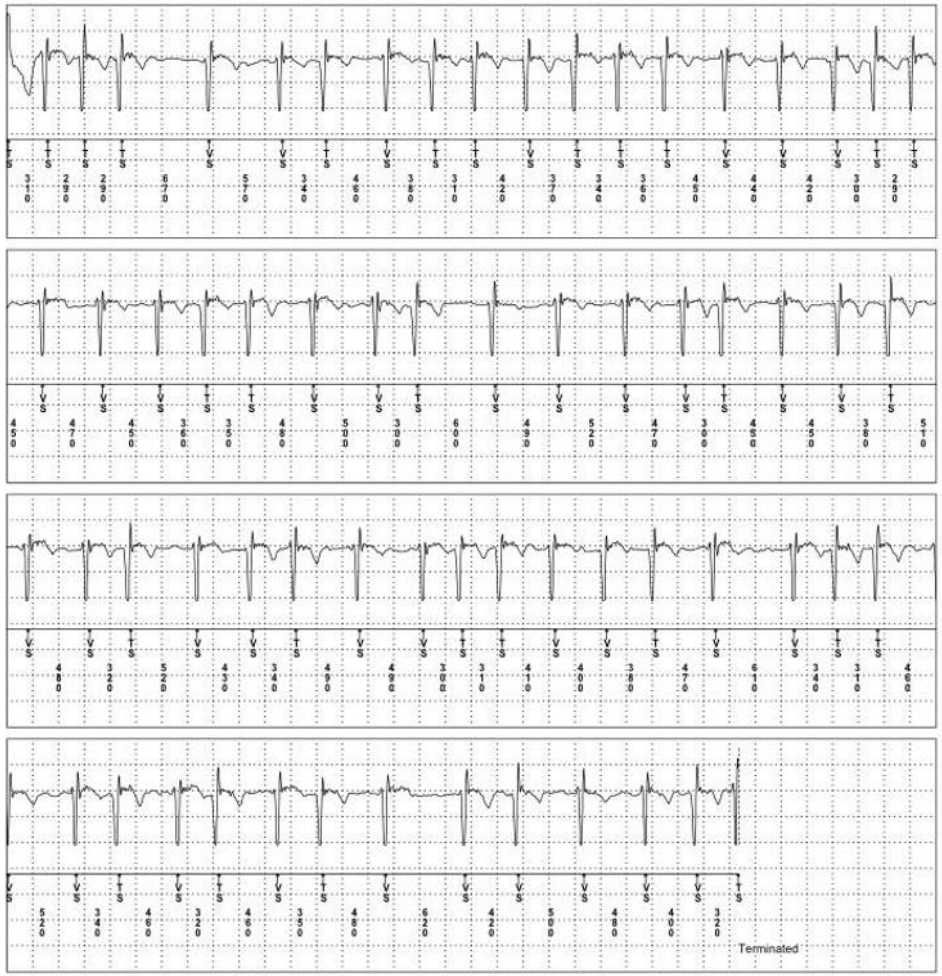
Intention for Usage	P-wave Evidence	Detection Threshold	Optimization Rationale
AF monitoring	Nominal	Balanced Sensitivity	AF burden accuracy
AF diagnosis	Aggressive	Balanced Sensitivity	Diagnostic Yield
Non-AF	Aggressive	Least Sensitive	High Specificity
Original algorithm	Off	Balanced Sensitivity	AF burden accuracy

Heart Rhythm 2014;11:1575–1583

AT/AF Detection

AT/AF Detection	On
Type	AF Only
AF Detection	Least Sensitive
Ectopy Rejection	Aggressive
AT/AF Recording Threshold	All Episodes

AF



AT/AF Detection

AT/AF Detection	On
Type	AF Only
AF Detection	Balanced Sensitivity
Ectopy Rejection	Aggressive
AT/AF Recording Threshold	All Episodes

No AF

Korean ILR registry

Purpose

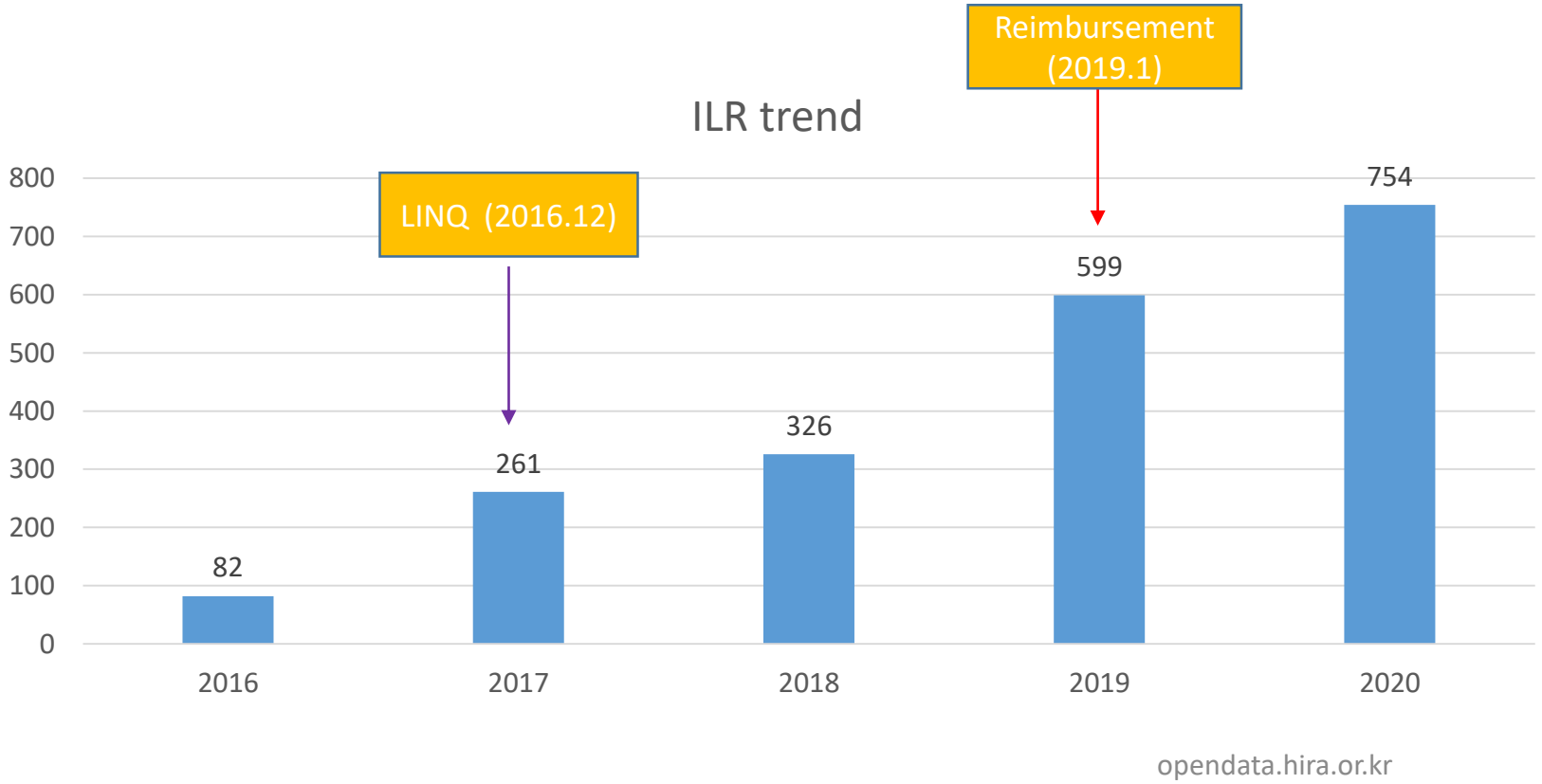
- To evaluate Epidemiology, Diagnostic and Therapeutic value of implantable loop recorder in Korea

Method

- Multicenter, retrospective, observational study of patients who received an ILR at 15 hospitals in Korea were gathered from January 2017 to December 2020

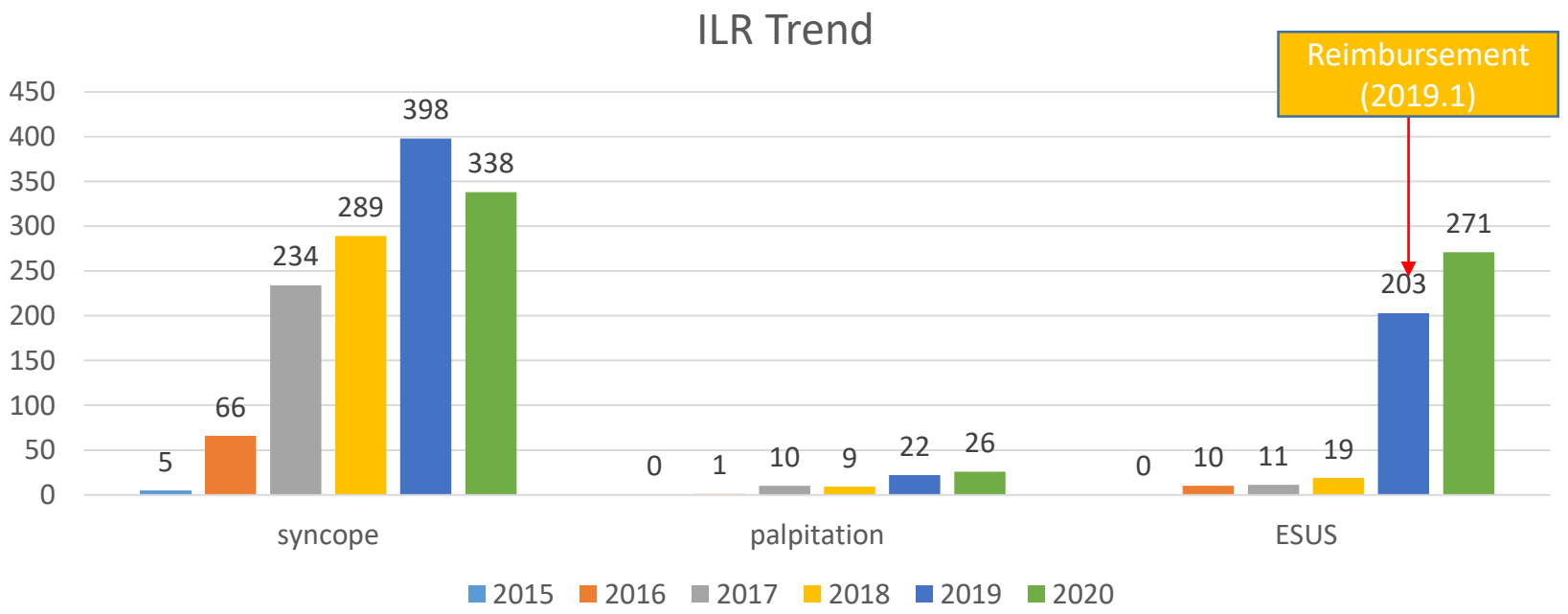
- 15 centers, total 795 patients

ILR trend (nationwide)

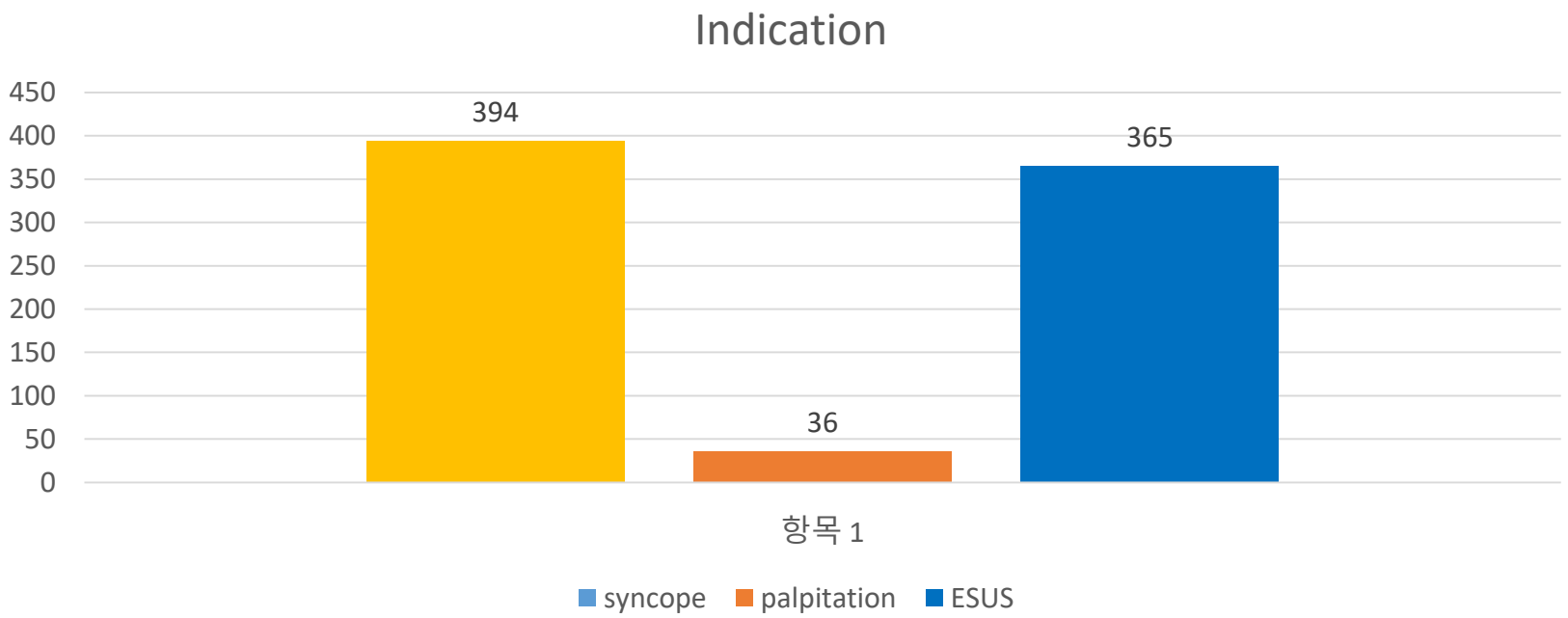


opendata.hira.or.kr

Trend according to the indication



Korean registry



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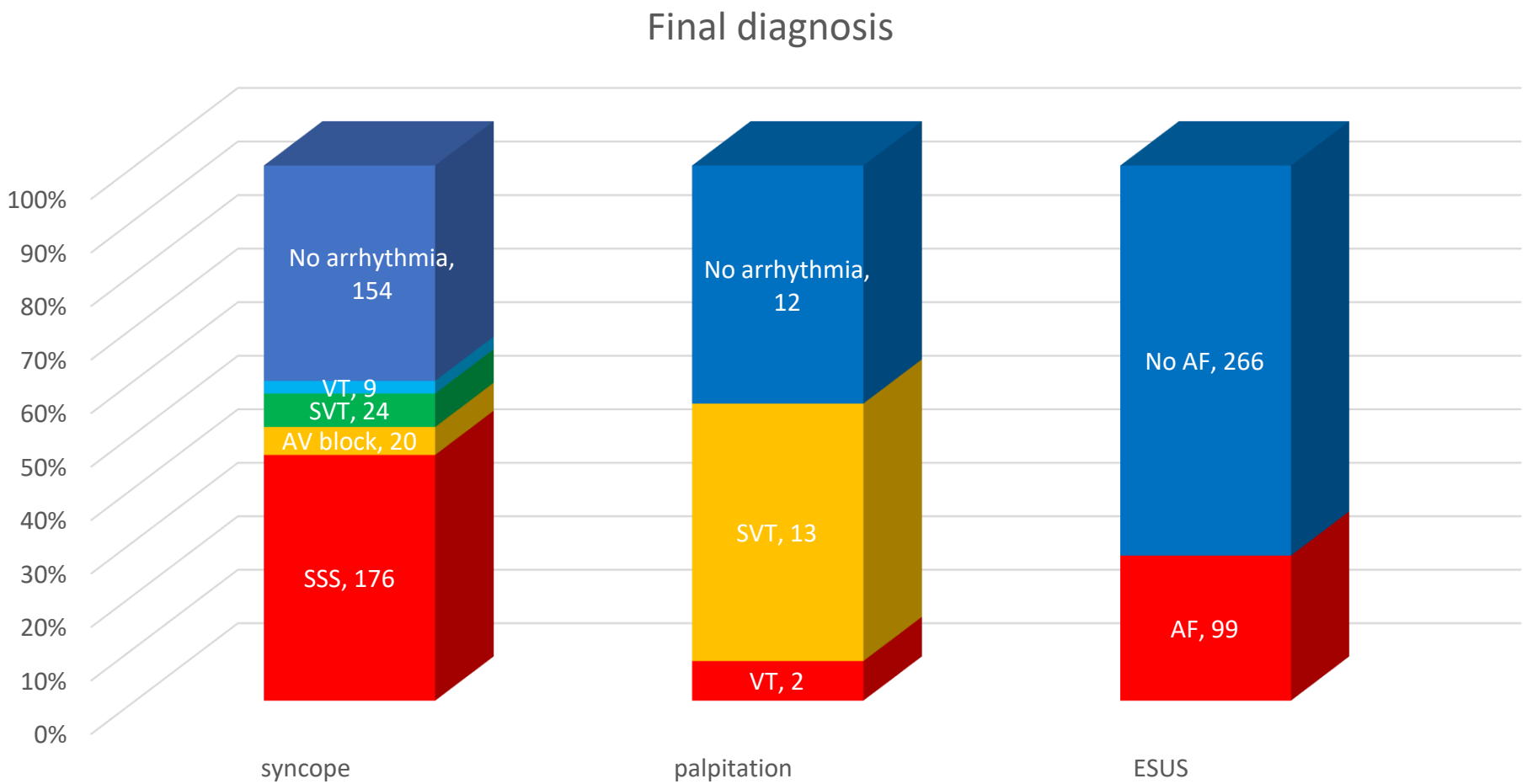

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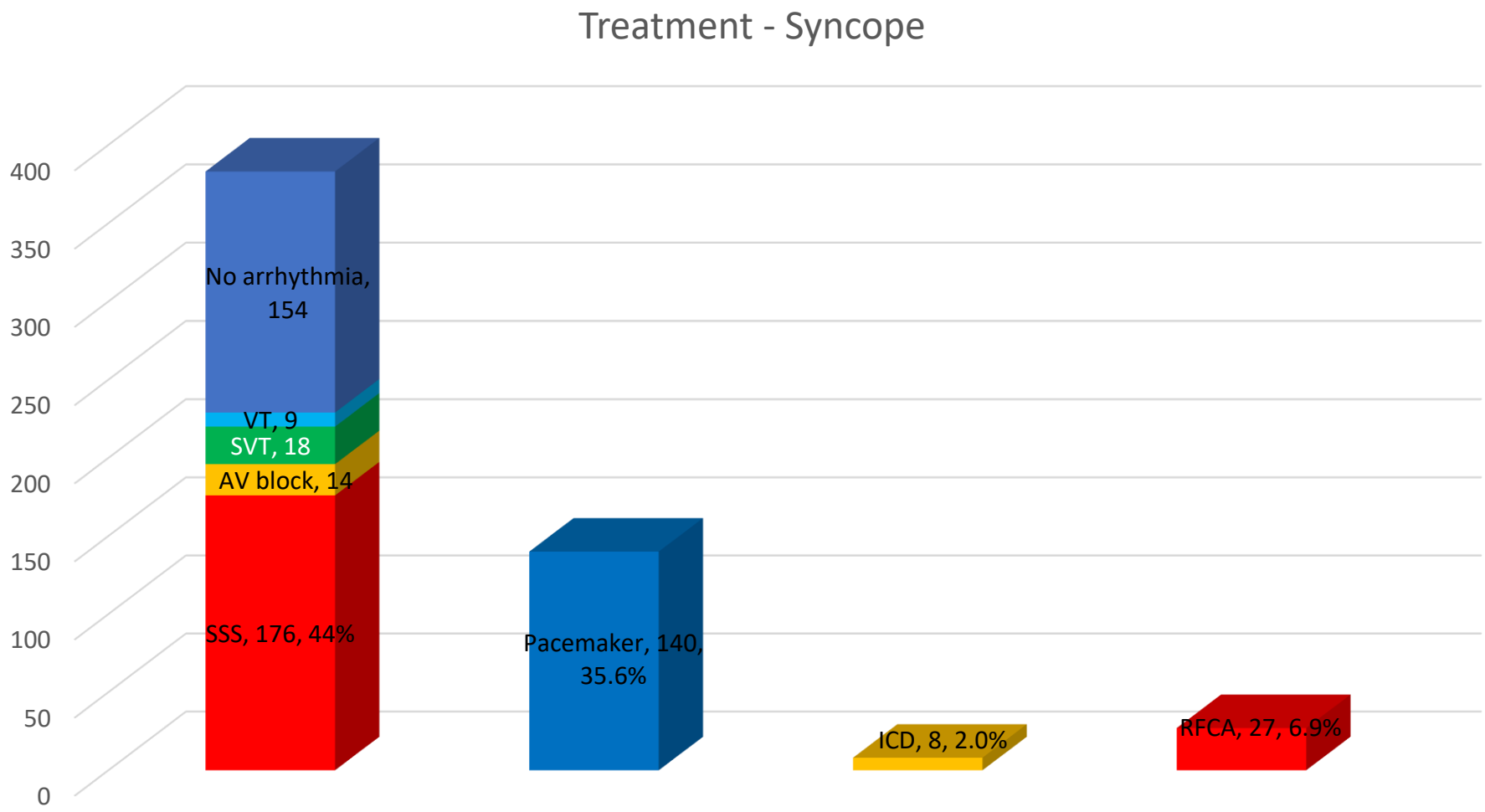

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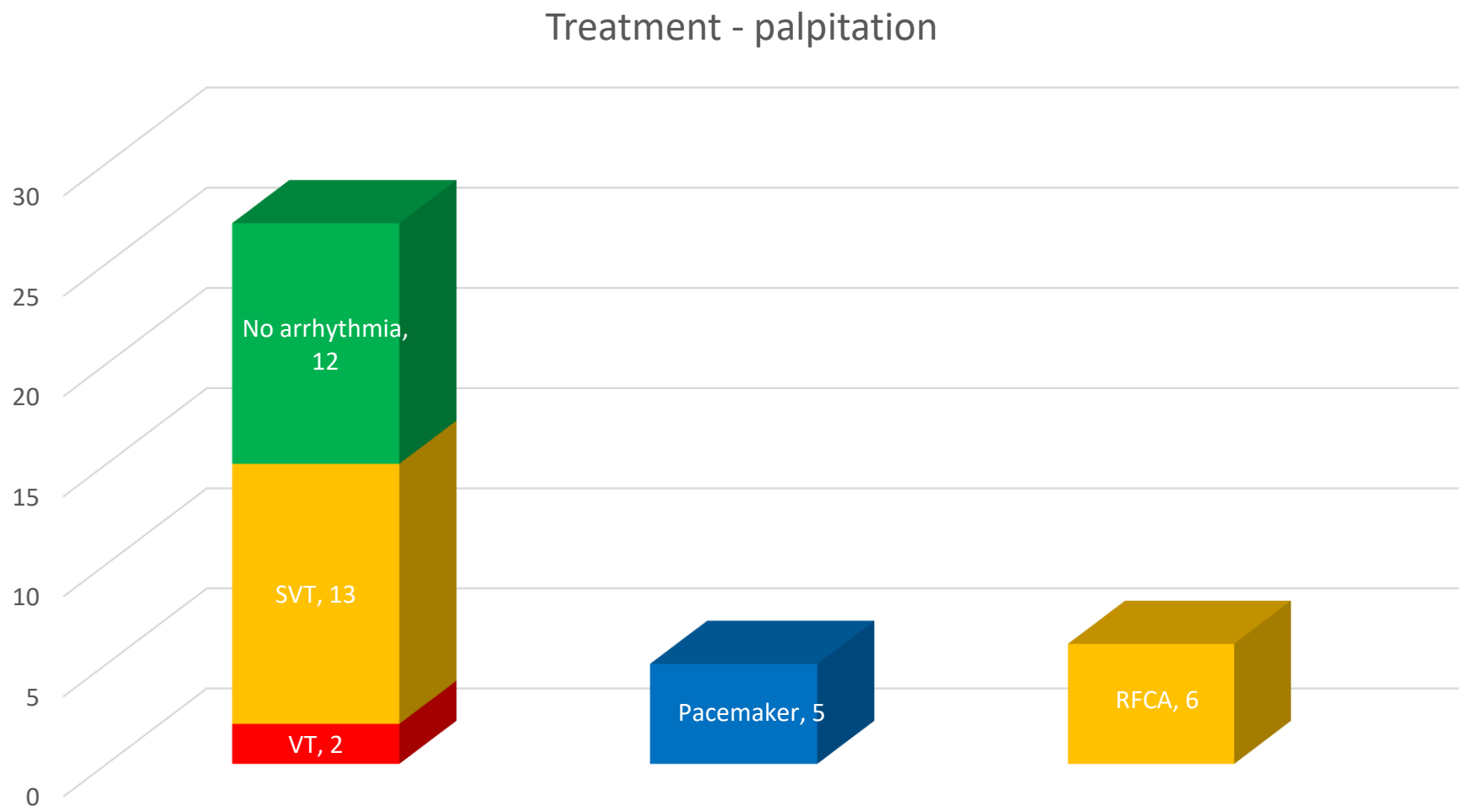

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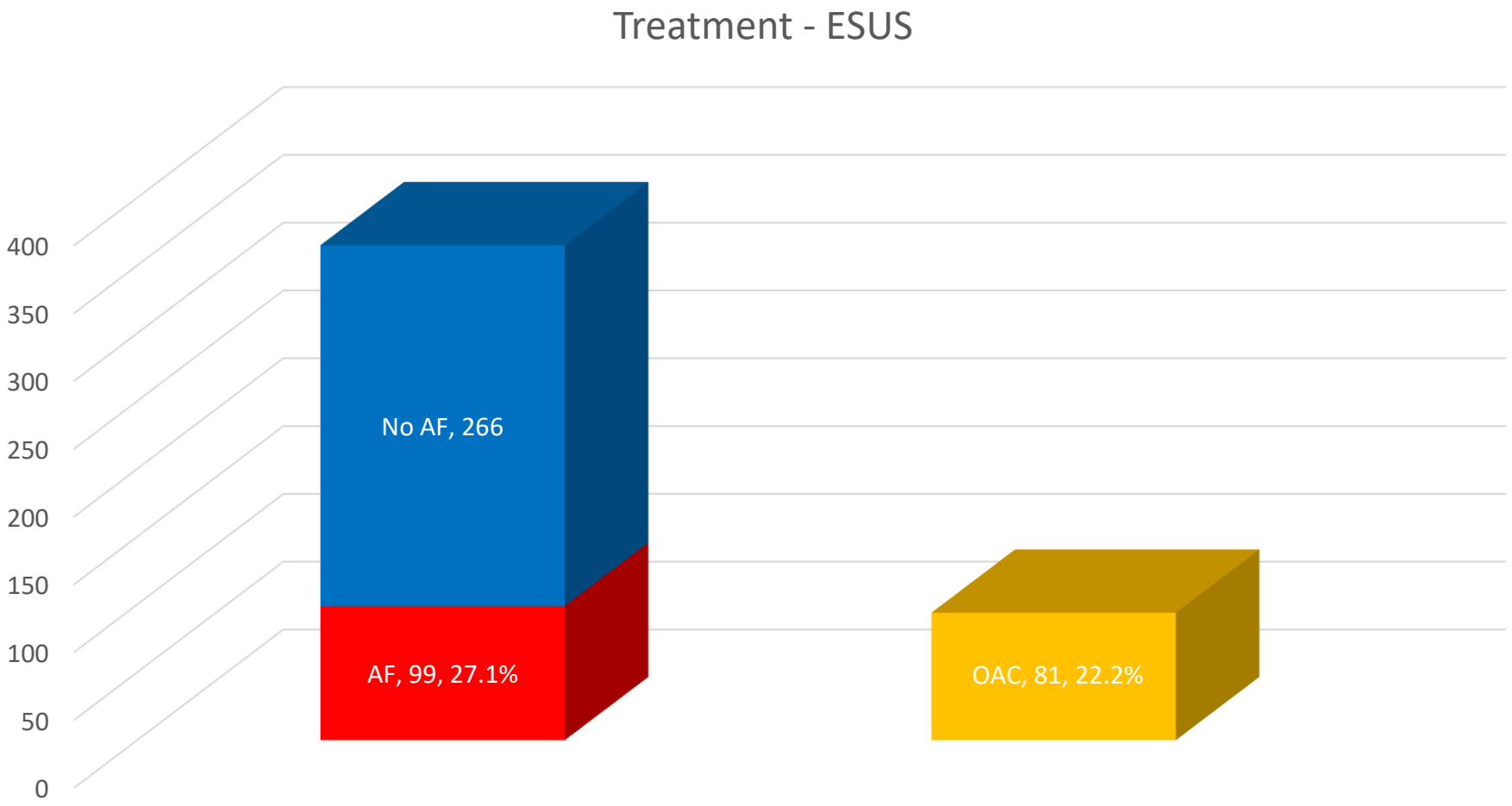
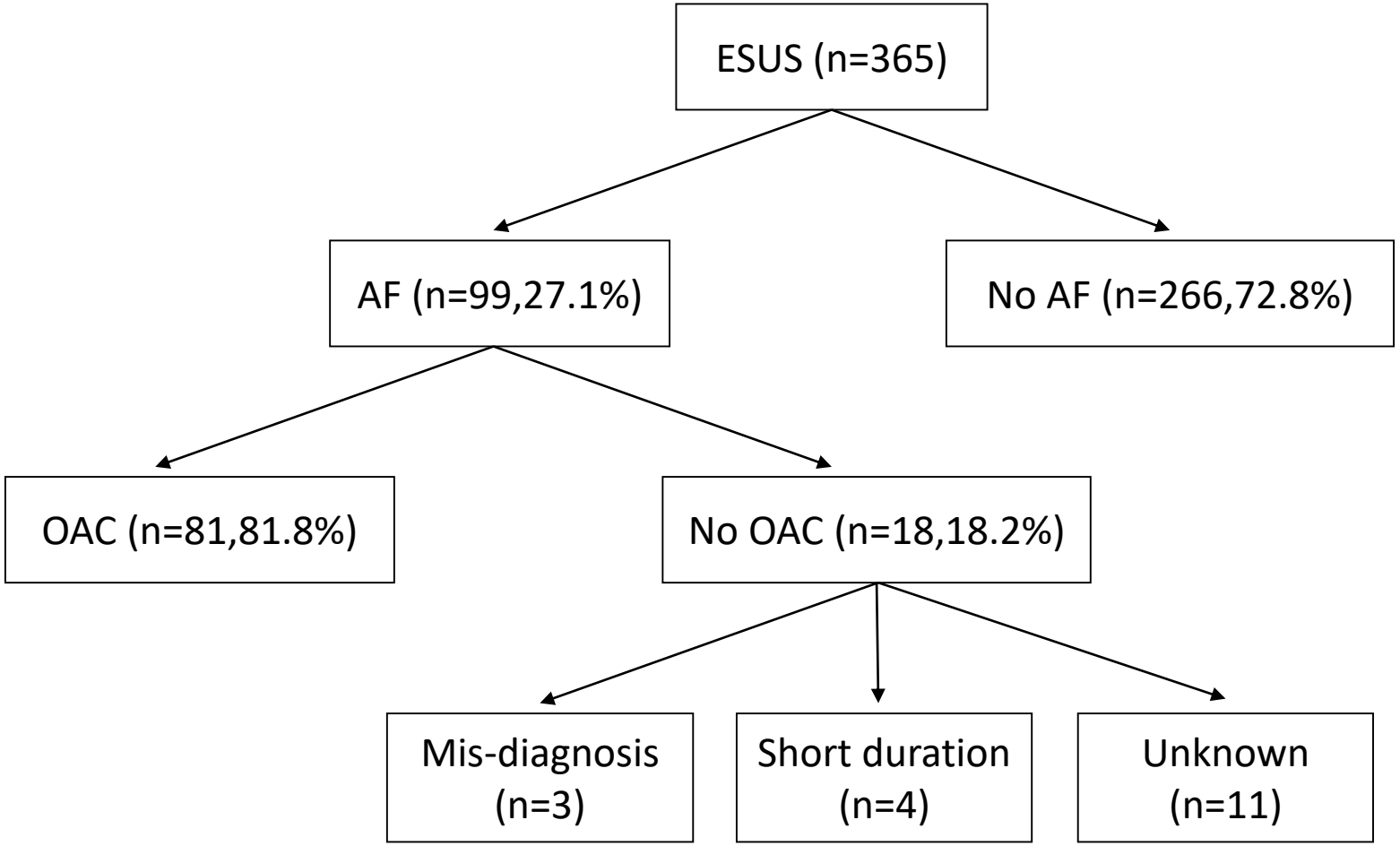


AF treatment in ESUS

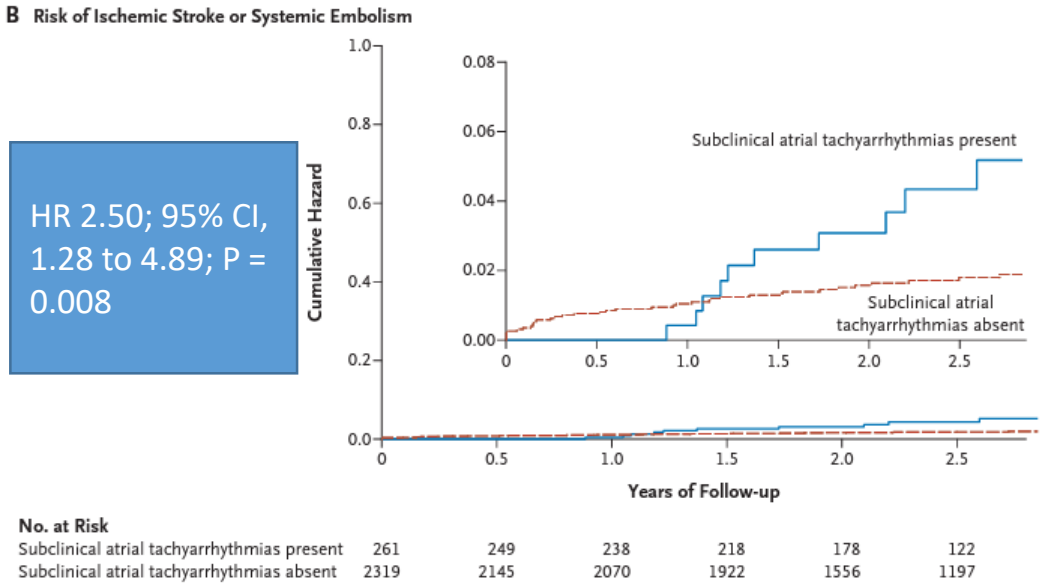


The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

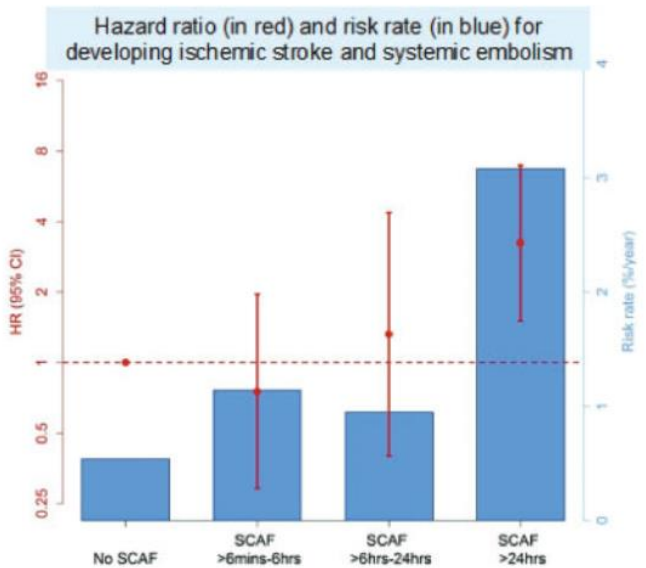
Subclinical Atrial Fibrillation and the Risk of Stroke

- A subclinical atrial tachyarrhythmia was defined as an episode of rapid atrial rate (190 beats or more per minute), lasting more than 6 minutes, that was detected by the pacemaker or defibrillator.



European Heart Journal (2017) **38**, 1339–1344
doi:10.1093/eurheartj/ehx042

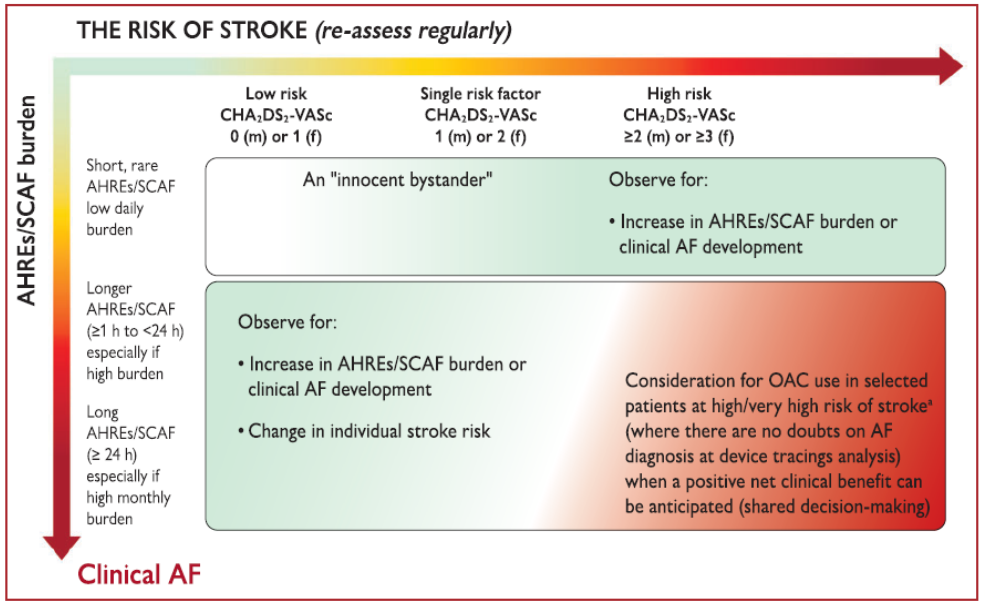
Duration of device-detected subclinical atrial fibrillation and occurrence of stroke in ASSERT



Summarizing Figure SCAF >24 h is associated with comparable risk of ischemic stroke and systemic embolism as clinical AF. In this figure the hazard ratio from time dependent Cox model (long term effect, red) and the risk rate from the landmark analysis (blue) of ischemic stroke and systemic embolism are depicted.

Management of subclinical atrial fibrillation

- The use of OAC may be considered in selected patients with longer durations of AHRE/subclinical AF (>_24 h) and an estimated high individual risk of stroke, accounting for the anticipated net clinical benefit.



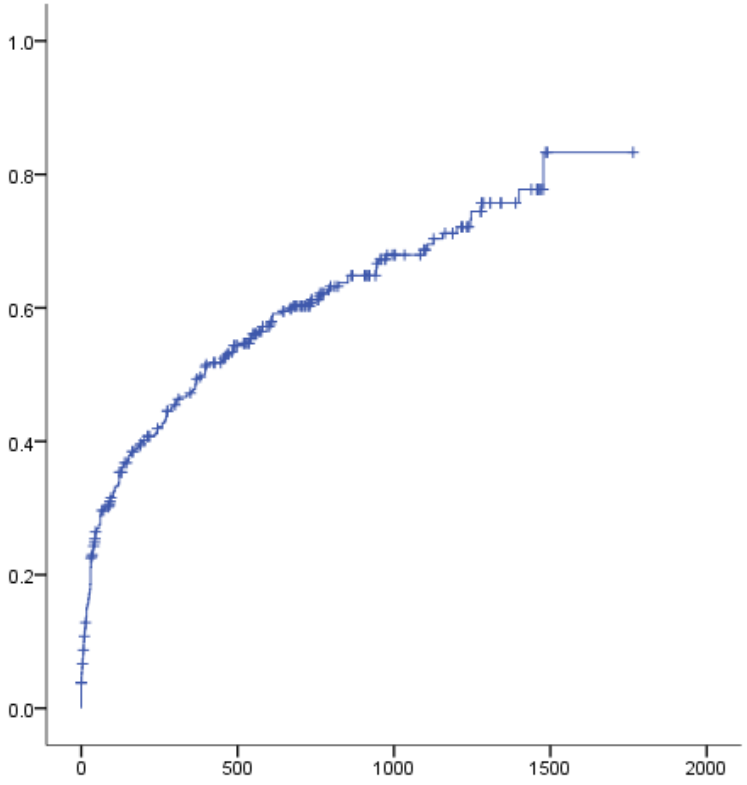
- When should OAC be started for patients who have ILR as an indication for ESUS?

  at least 30secs or more than (5-6 mins…. 24hrs…..)

Korean registry

- Time to diagnosis
  (SSS, AV block, SVT, AF, VT)
  (syncope indication)

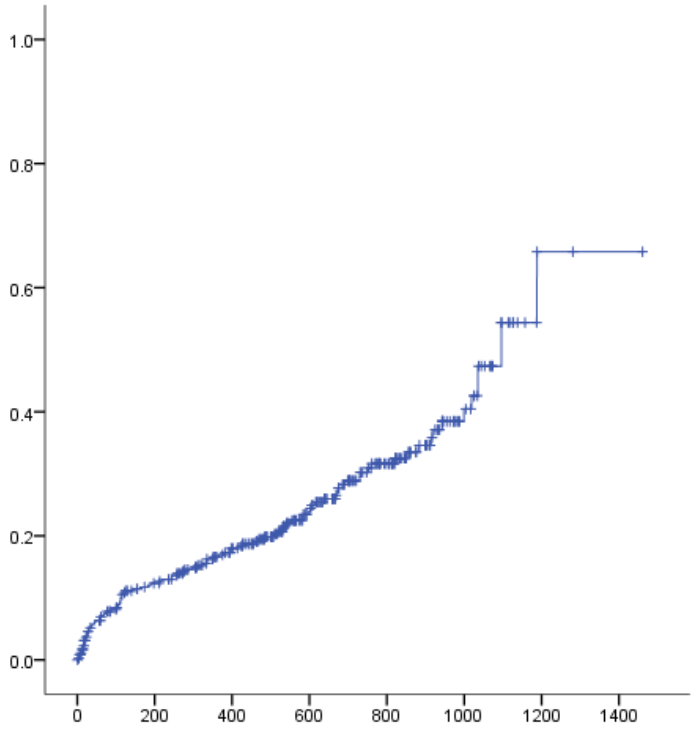
- Mean 405.0±425.1 days



Korean registry

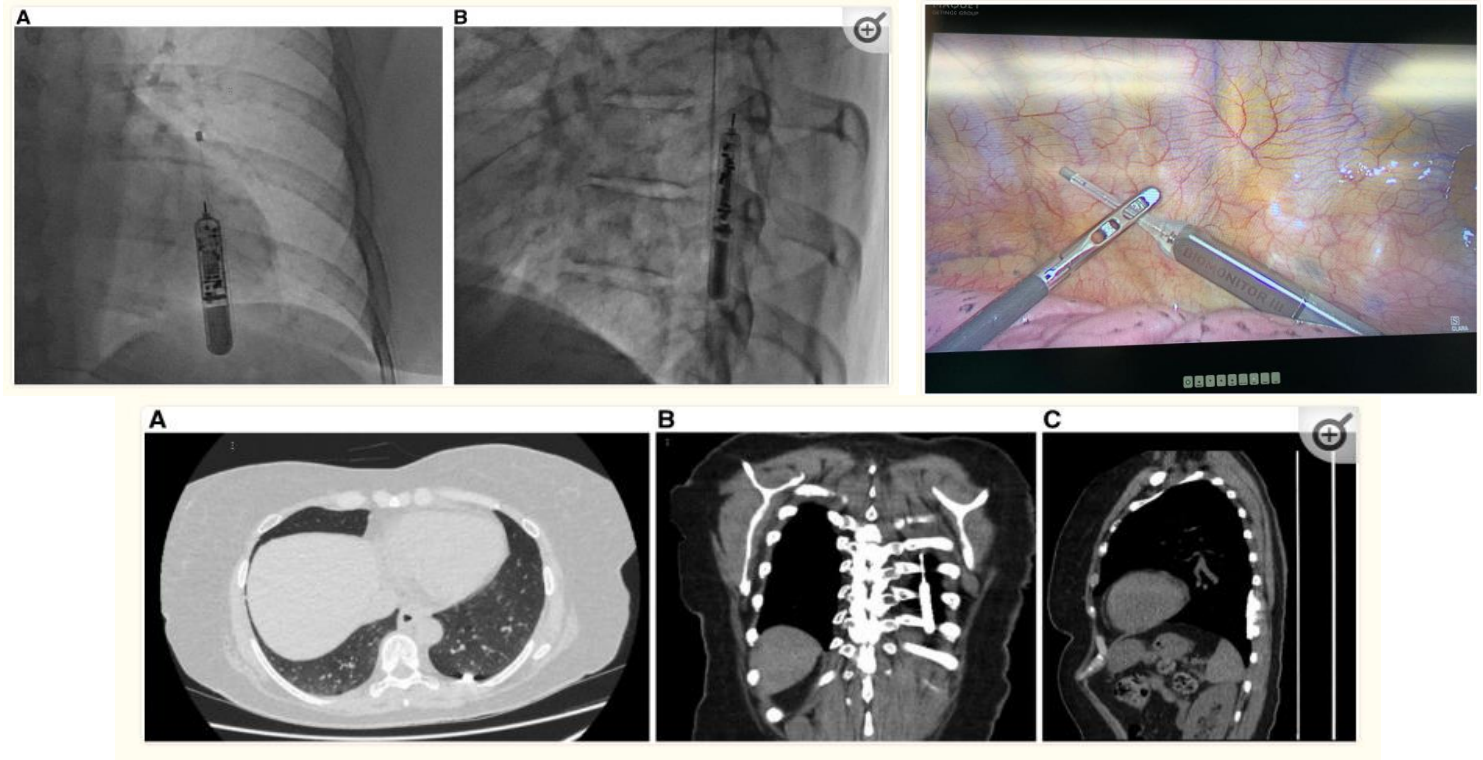
- Time to AF diagnosis
  (ESUS indication)

- Mean 531.7±330.2 days
- 1yr 16.9%, 2yr 29.6%
- Event rate 18.8 %/yr



Complication

- None reported in Korean registry



European Heart Journal - Case Reports, Volume 5, Issue 2, February 2021, ytab043

Summary

- The number of ILR implantation is steadily increasing
- Especially, the number of implants for ESUS indications has increased significantly.
- In addition, indications for AF screening or follow up after rhythm control may be considered.

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Thank you
for your attention