

RISK FACTORS FOR ATRIAL FIBRILLATION IN PATIENTS WITH EMBOLIC STROKE OF UNDETERMINED SOURCE (ESUS)

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Background

Cardiac embolism is the second most frequent cause of ischemic stroke, accounting for about 25-30% of cases. Since the publication of embolic stroke of undetermined source (ESUS) criteria, it has not been possible to determine at admission which patients suffer from yet undetermined atrial fibrillation (AF). The aim of our study was to investigate the factors associated with AF detection and search for criteria that identify patients who will have a high probability of AF detection by invasive ECG-recording with insertable loop recorders.

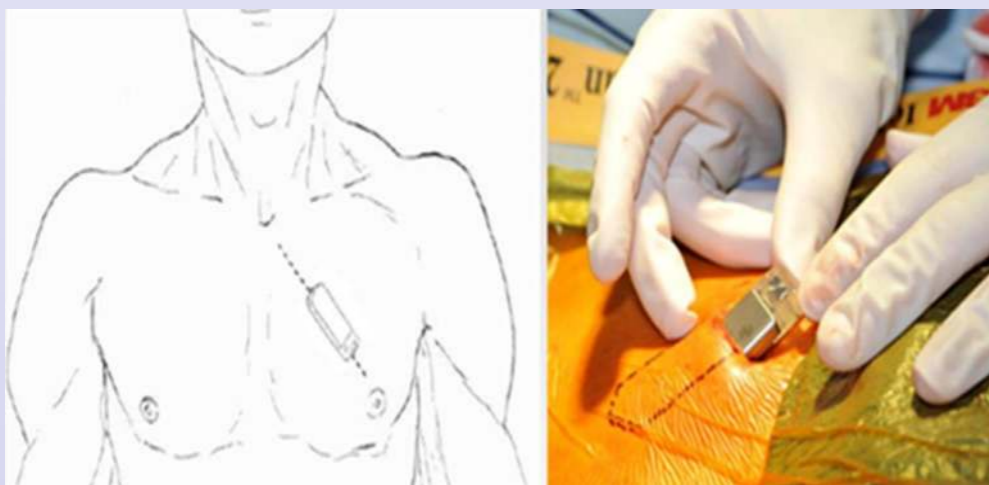


Fig. 1: The insertable loop recorder is an electro-cardiographic monitoring system that is implanted subcutaneously in a fast and minimally invasive manner. Image source: Heart.org, Medscape, Cost-effective Approaches to Diagnosing Syncope.

Methods

We reviewed records of 100 consecutive patients who fulfilled ESUS criteria and therefore underwent insertion of insertable loop recorders (ILR, Medtronic Reveal LINQ) in our Department in 2016. Especially the following examinations had been unremarkable regarding potential high embolic risks:

- 12-lead ECG
- Holter-ECG of at least 24 hours
- ECG rhythm monitoring on our Stroke Unit
- Transthoracic and transoesophageal Echocardiography
- Colour coded Doppler-sonography

We calculated CHA₂DS₂VASc-Score and a newly composed Arrhythmia Score consistent of characteristics enhancing the chance of AF (i.e. diabetes, left atrial fibrillation, arterial hypertension, and high risk alcohol consumption, fig 2).

Results

Within a mean observation time of 362 days, AF was detected in 17 of 100 patients. Patients with AF more often were ≥75 years old (52.9% vs. 27.7% of those without AF, p=0.0088), and more often had left atrial dilatation (58.8% vs. 25.3%, 0.0065) than patients without AF (n=83). They also were more often men (70.9% vs. 52.9%) and more often had current alcohol abuse (23.5% vs. 9.6%) but this did not reach statistical significance.

Tab. 1: Logistic Regression Adjusted for Age and Sex, Odds Ratios for Atrial Fibrillation

	Odds Ratio (95% Confidence Interval)	p-value
Arterial Hypertension	1.41 (0.15-13.28)	0.77
Heart failure (ejection fraction <55%)	1.34 (0.32-5.67)	0.69
Diabetes mellitus	1.30 (0.39-4.39)	0.67
History of Stroke	1.19 (0.62-2.30)	0.60
Vascular disease (CAD, MI, or POAD)	1.91 (0.47-7.76)	0.36
Hypercholesterolemia	1.17 (0.36-3.84)	0.80
Current smoker	0.93 (0.16-5.28)	0.93
Obesity (BMI >30 kg/m ²)	1.24 (0.37-4.11)	0.73
Stenosis of the ICA ≥50% (NASCET)	0.61 (0.07-5.71)	0.66
Left atrial dilatation	3.12 (1.002-9.708)	<0.05
High risk alcohol consumption and addiction, current drinking	7.96 (1.51-41.85)	<0.05

In multiple logistic regression models controlling for age and sex, AF was significantly associated with left atrial dilatation (OR 3.12 (95%CI 1.002-9.708) and alcohol abuse (OR 7.96, 1.51-41.85).

Fig. 3: The odds ratio relating AF with a 1-point increase on the arrhythmia score on the CHA₂DS₂VASc score was 1.53 (1.09-2.15).

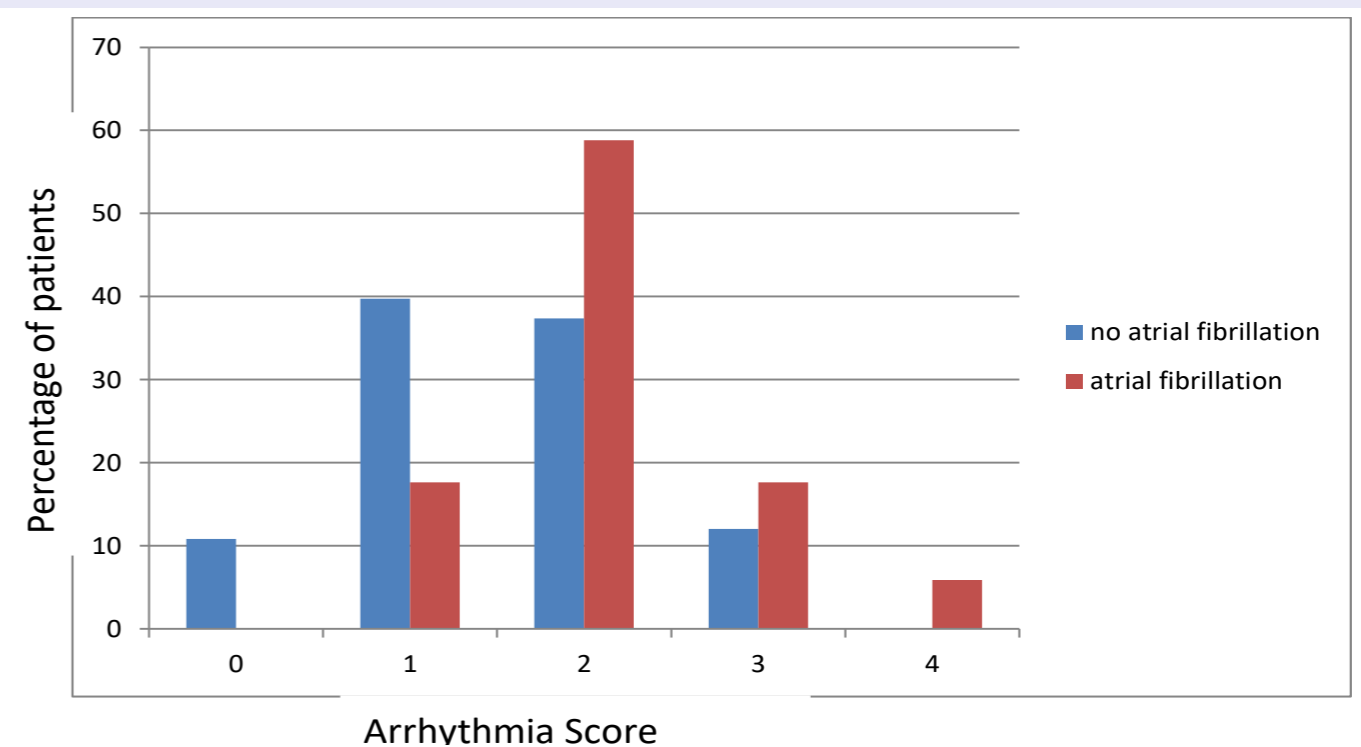
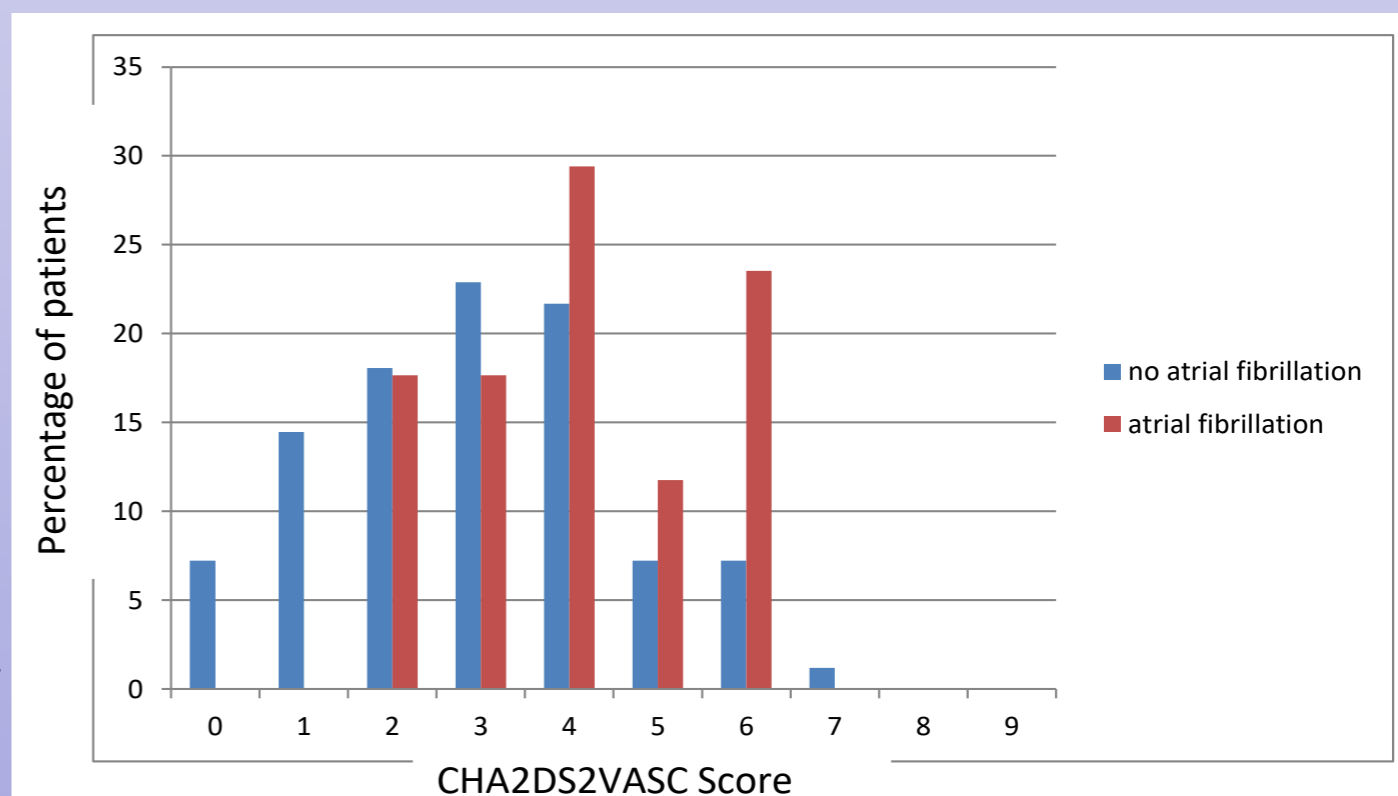


Fig. 2: The percentage of patients in whom AF was detected progressively increased with higher Arrhythmia Scores. The **Arrhythmia Score** was calculated as follows: if present, a patient received one point for each of the following characteristics: (1) left atrial dilatation, (2) high risk alcohol consumption or addiction, (3) diabetes mellitus, (4) arterial hypertension. OR relating AF with a 1-point increase on the Arrhythmia score was: 2.42 (95%CI 1.23-4.78), p=0.11.



Conclusions

Higher age, atrial dilatation, and current alcohol abuse are associated with AF detection in patients with ESUS. This may help to better choose patients who benefit from AF detection by insertable loop recorders.