ESC Heart & Brain Workshop

ECG monitoring after ischemic stroke/TIA of unknown source: wide use of insertable monitors ? **Contra**

Pavel Osmančík

III[rd] internal-cardiology clinic, Charles University and

University Hospital Kralovske Vinohrady, Prague, Czech Republic

Supported by Bayer, Bristol-Myers Squibb and Pfizer Alliance, Boehringer Ingelheim, Daiichi Sankyo Europe GmbH and Medtronic in the form of educational grants. The scientific programme has not been influenced in any way by its sponsors.

Declaration of Interest

Nothing to disclose

ESC Council Stroke

CRYSTAL - AF

- 441 patients (61 years, diabetes 15%) with a history of stroke/TIA of an uknown source, and without a known history of AF
- randomized to ILR or control (ECG monitoring at the discretion of the investigator), a mean duration to randomization 38 days after stroke

Rate of detection of AF at 6 months:

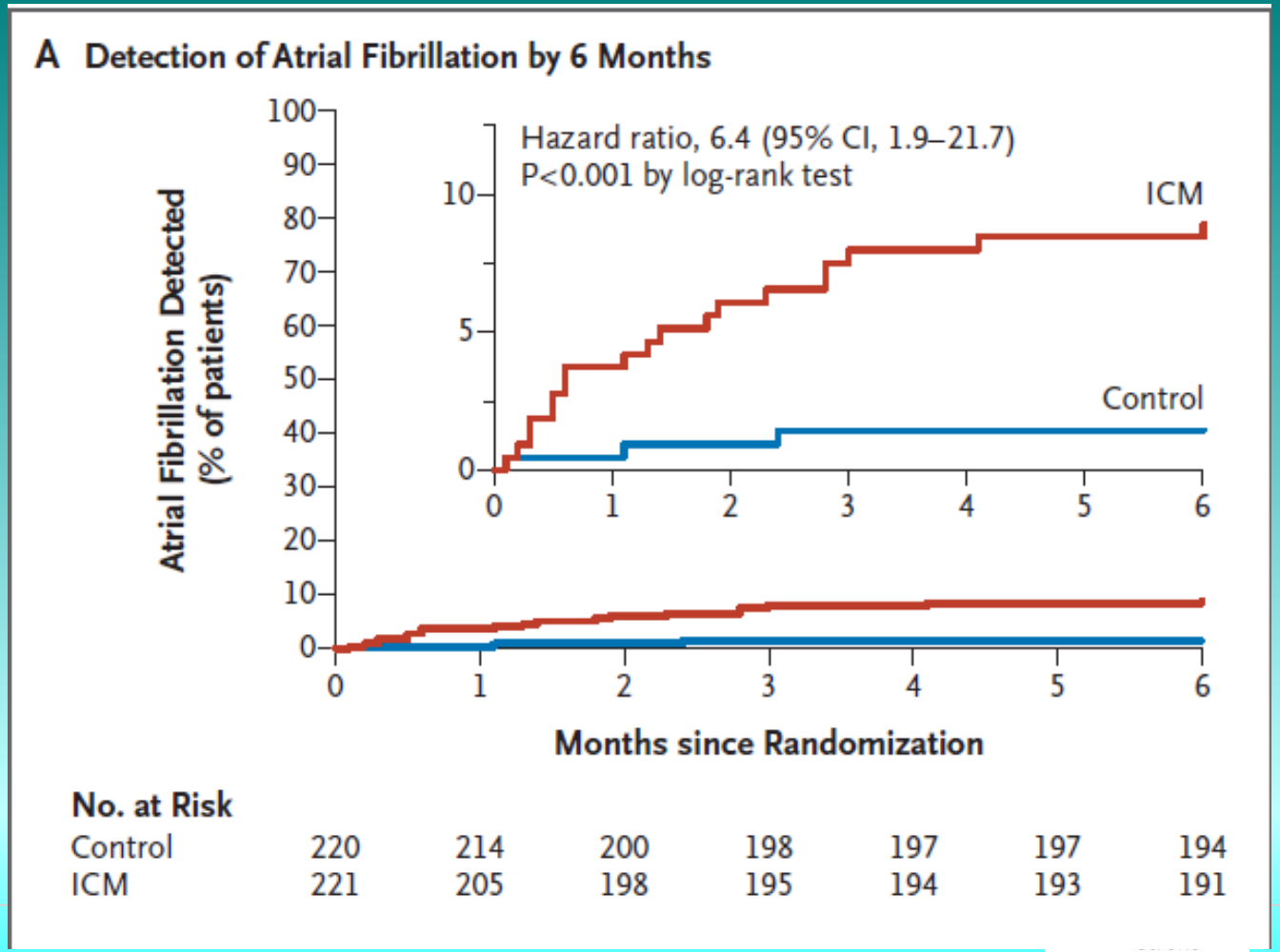
- 8.9% in the ILR group vs. 1.4% in the control group ($p<0.001$)
- AF asymptomatic in 74% patients,
- Median value for the maximum time in AF in a single day: 11 hours
- Ischemic stroke/TIA: 5.2% in ILR group and 8.6% in controls

Sanna T. et al. Cryptogenic Stroke and Underlying Atrial Fibrillation. N Eng J Med 2014

ESC Council Stroke

CRYSTAL AF - results

- 8.9% (ILR) vs. 1.4% (control)
- Median time to AF detection: 41 days (IQR 17 – 84)



Implantable vs. non-invasive ECG monitoring

- **Efficacy**
- **Costs**
- **Invasiness**
- **Ease of use: Comfort for patients**
  Comfort for physicians (user-friendly analysis)

ESC Council Stroke

EMBRACE

- 572 patients (72.5 years, diabetes 19%) with history of stroke/TIA of unknown source, and without known history of AF randomized to 30-day loop recorder (with transtelephonic transfer) or control (one 24h Holter)

Rate of AF episodes within 90 days since randomization:

- 16.1% in the loop recorder group vs. 3.2% in the control ($p<0.001$)

1. ½ AF episodes were detected within the first week, ¾ within the first two weeks after the start of monitoring
2. AF detection higher in pts. who were enrolled within 3 months after the index event compared to patients who enrolled later (18% vs. 9%)

Gladstone DJ. et al. Atrial Fibrillation in Patients with Cryptogenic Stroke. N Eng J Med 2014

ESC Council Stroke

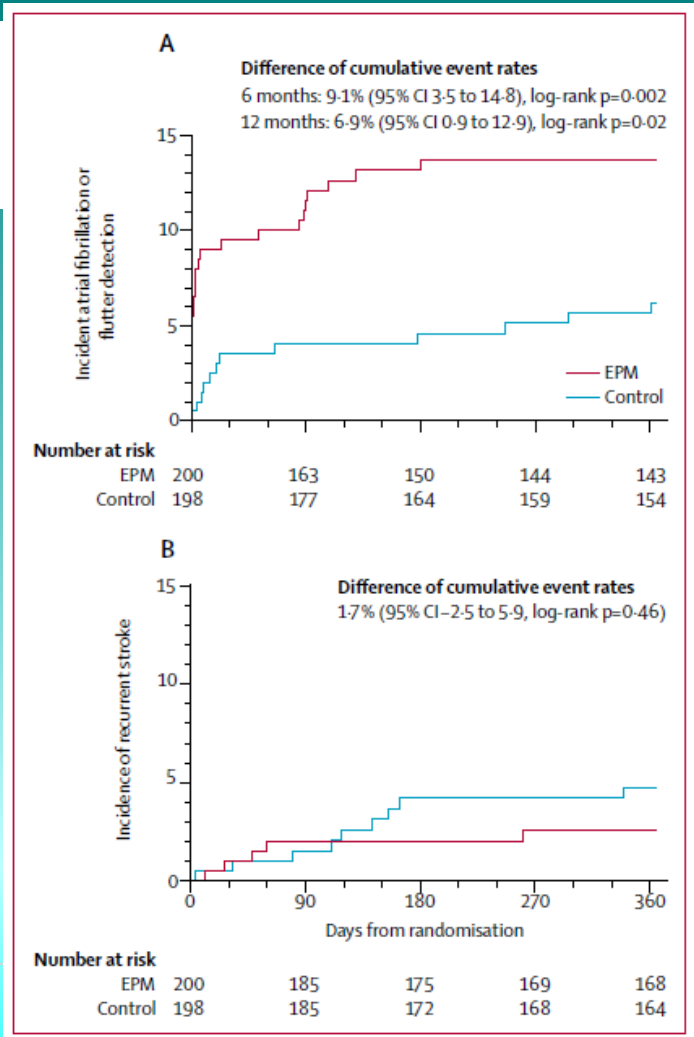
Holter-electrocardiogram-monitoring in patients with acute ischaemic stroke (Find-AF$_{RANDOMISED}$): an open-label randomised controlled trial

- 398 pts. after stroke randomized to enhanced ECG monitoring or control
- enhanced monitoring: 3 x 10-day Holter ECG monitoring (at baseline = 3.5 days after index event), at 3 and 6 m
- **AF detected more often in the enhanced monitoring group than in the control group (14% vs. 5%, p=0.002)**
- AF detected in the prolonged ECG monitoring in group in 25 patients:

18 during the first 10-day ECG Holter

6 during the second 10-day ECG Holter

1 during the third 10-day ECG Holter



Wachter R. Holter-electrocardiogram-monitoring in patients with acute ischemic stroke (Find-AF randomized): an open-label randomised control trial. Lancet Neurol 2017

Data of monitoring of Czech population after stroke of unknown source (MDT services)

Number of patients	271
Duration of monitoring (days)	26.2 ± 2.8
Number of recordings	174795,-
Number of recording per patient	645 ± 1265
Number of patients with documented AF	**35 (13%)**
AF duration (hours)	3.6 ± 5.3
Mean time from the onset of ECG recording to AF detection (days)	**8.9 ± 6.1**

Monitoring: Vitaphone 3100 BT

With courstesy of mgr. Veronika Bulkova, MDT services

ESC Council Stroke

Comparing of costs

Reveal LinQ (Medtronic): 70000,- CZK (= 2800,-EUR)

Non-invasive loop-recorder with transtelephonic ECG transmission (MDT):

4000,- CZK/ month (=160 EUR)

i.e. 480 EUR/3 months

ALiveCor Kardia Mobile (100 EUR), Smart Phones

ESC Council Stroke

Implantation procedure

Feasibility and safety of Reveal LINQ insertion in a sterile procedure room versus electrophysiology laboratory

Geoffrey R. Wong [1], Dennis H. Lau [1], Melissa E. Middeldorp, Judith A. Harrington, Simon Stolcman, Lauren Wilson, Darragh J. Twomey, Sharath Kumar, Dian A. Munawar, Kashif B. Khokhar, Rajiv Mahajan, Prashanthan Sanders *

International Journal of Cardiology 223 (2016) 13–17

Diederichsen SZ., Int J Cardiol 2017

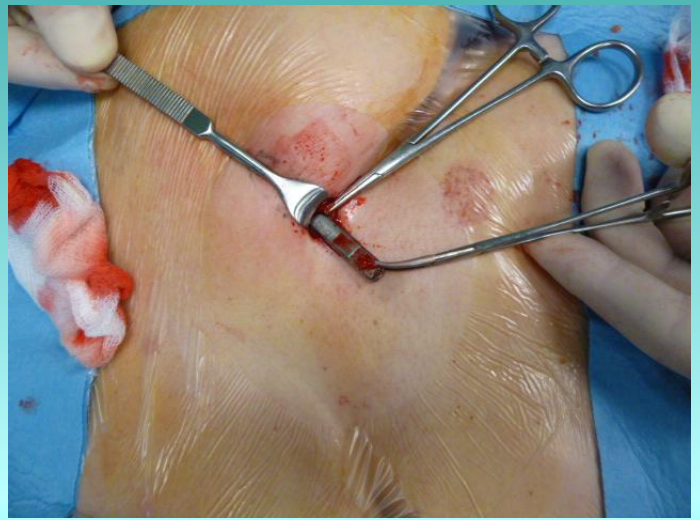
- 1420 patients implanted (53% in a procedure room and 47% in a EP room)
- adverse events in 24 (1,7%)
- Infection 12 (1.6%) in the procedure room group and 1 (0.1%) in the EP room group

Complications after implantation of a new-generation insertable cardiac monitor: Results from the LOOP study

Søren Zöga Diederichsen [a,*,1], Ketil Jørgen Haugan [a,b,1], Søren Højberg [c,1], Anders Gaarsdal Holst [a,d,1], Lars Køber [a,e,1], Kenneth Bruun Pedersen [f,1], Claus Graff [g,1], Derk Krieger [h,1], Axel Brandes [f,1], Jesper Hastrup Svendsen [a,d,i,1]

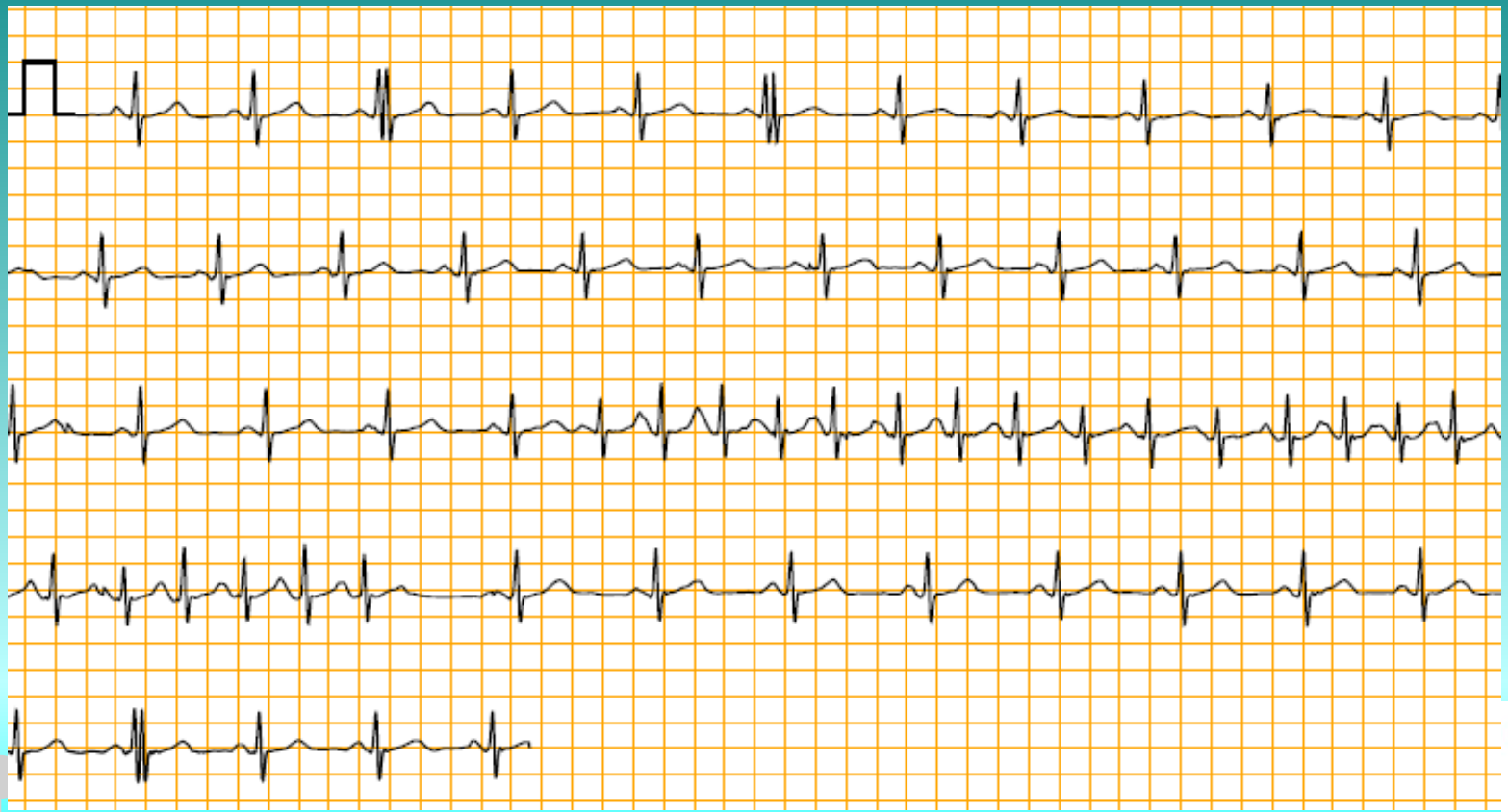
ESC Council Stroke

Explantation procedure – as easy as the implantation ?



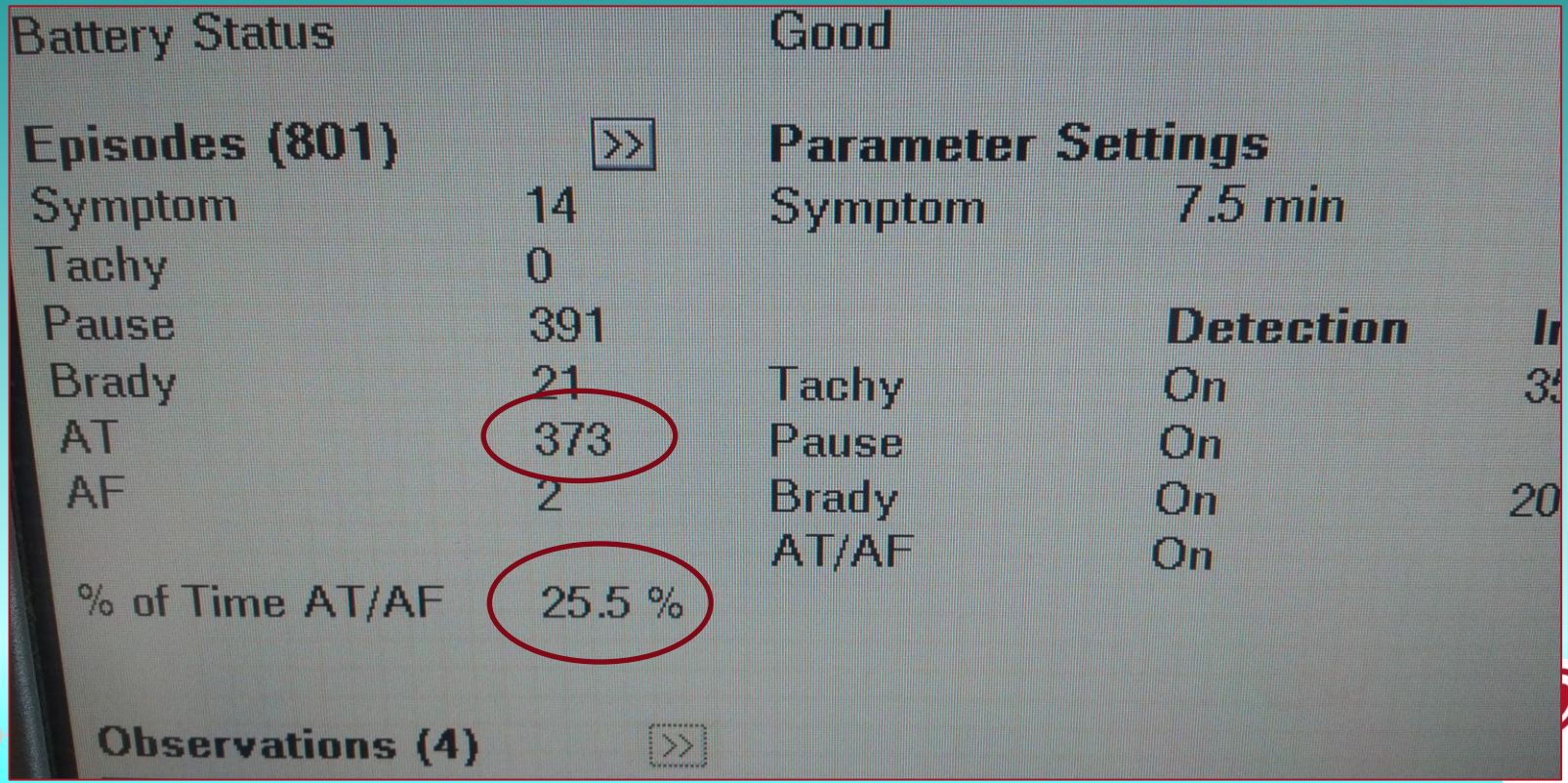
ESC Council Stroke

ECG analysis : ECG recording of AT/AF (Vitaphone 3100 BT)

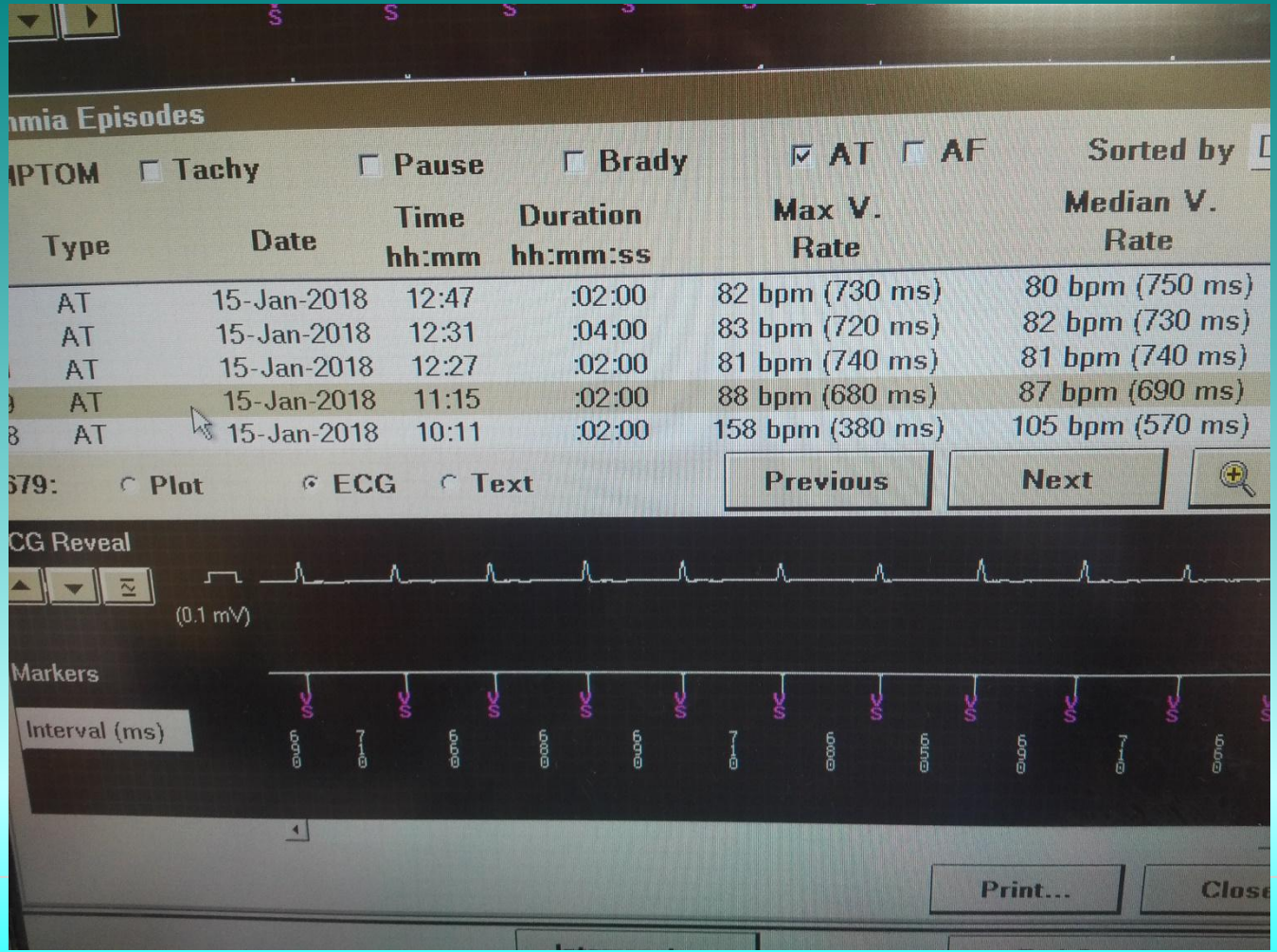


ESC Council Stroke

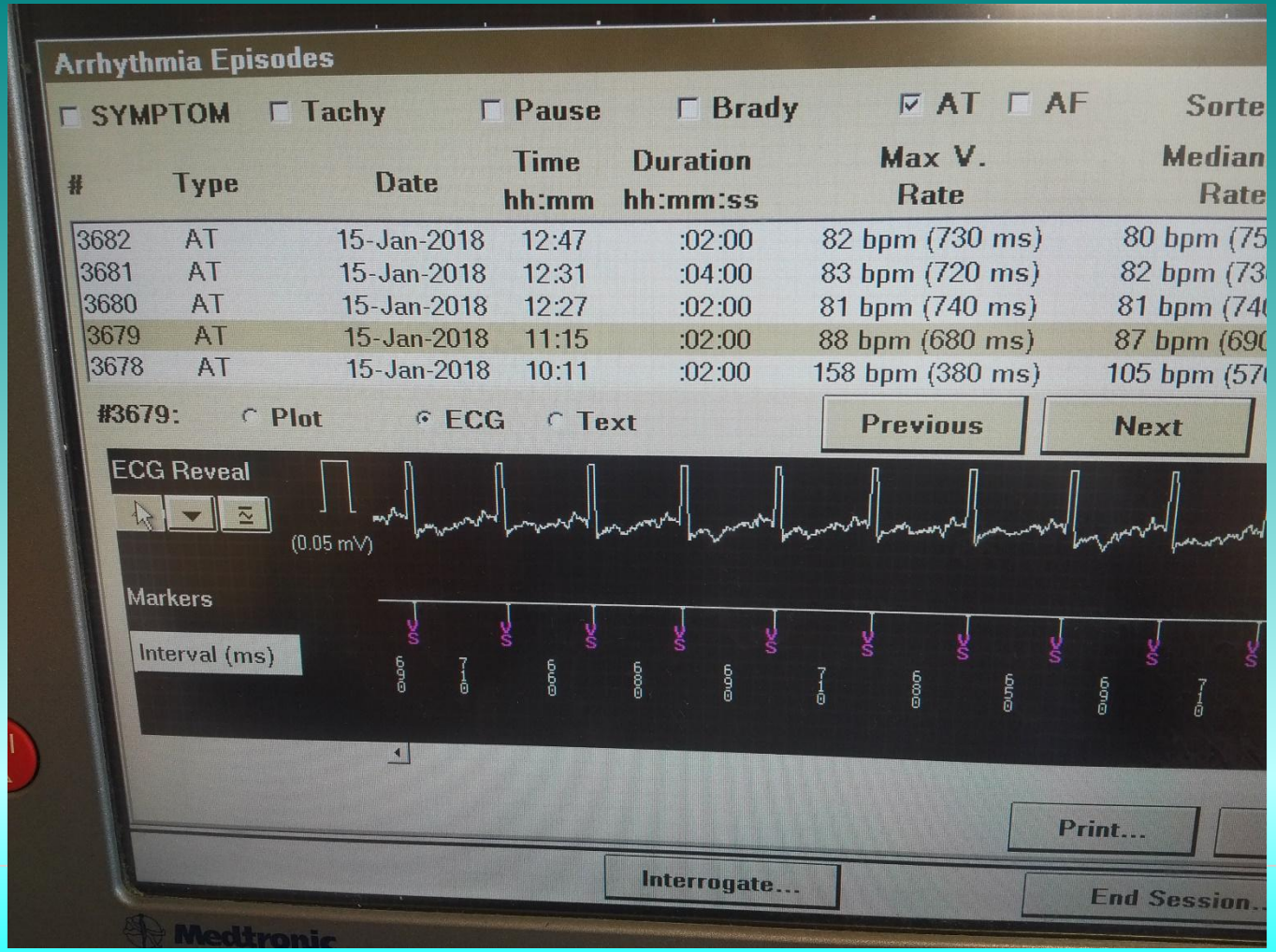
Atrial tachycardia ?



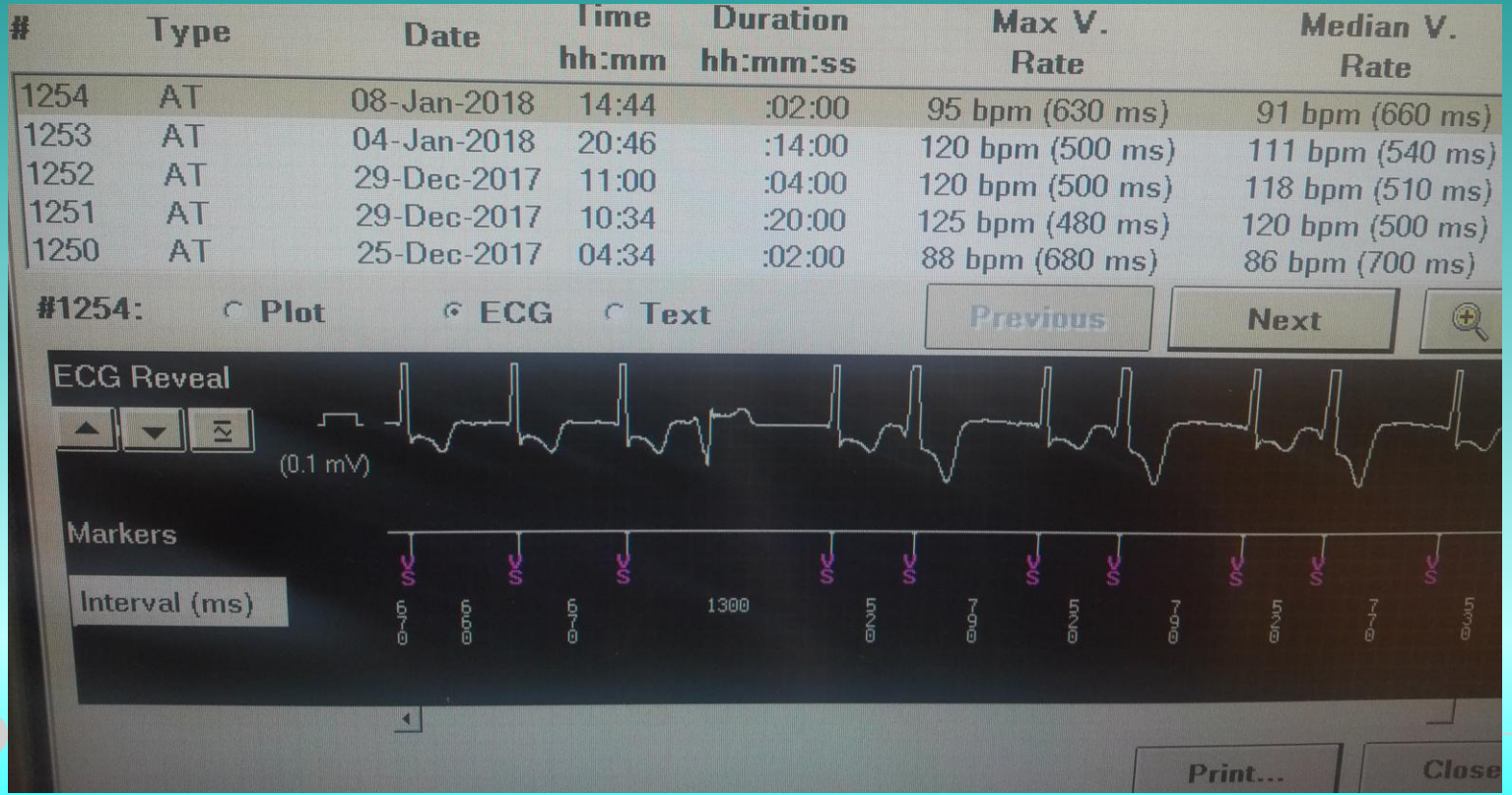
ESC Council Stroke



ESC Council Stroke


Arrhythmia Episodes
SYMPTOM
Tachy
Pause
Brady
AT
AF
Sorte
Type Date Time hh:mm Duration hh:mm:ss Max V. Rate Median Rate
3682 AT 15-Jan-2018 12:47 :02:00 82 bpm (730 ms) 80 bpm (75
3681 AT 15-Jan-2018 12:31 :04:00 83 bpm (720 ms) 82 bpm (73
3680 AT 15-Jan-2018 12:27 :02:00 81 bpm (740 ms) 81 bpm (74
3679 AT 15-Jan-2018 11:15 :02:00 88 bpm (680 ms) 87 bpm (69
3678 AT 15-Jan-2018 10:11 :02:00 158 bpm (380 ms) 105 bpm (57
#3679:
Plot
ECG
Text
Previous
Next
ECG Reveal
(0.05 mV)
Markers
Interval (ms)
Print...
Interrogate...
End Session...
Medtronic

Outpatients controls: frequent VES assessed as atrial tachycardia (AT) by implantable ECG recorder



#	Type	Date	Time hh:mm	Duration hh:mm:ss	Max V. Rate	Median V. Rate
1254	AT	08-Jan-2018	14:44	:02:00	95 bpm (630 ms)	91 bpm (660 ms)
1253	AT	04-Jan-2018	20:46	:14:00	120 bpm (500 ms)	111 bpm (540 ms)
1252	AT	29-Dec-2017	11:00	:04:00	120 bpm (500 ms)	118 bpm (510 ms)
1251	AT	29-Dec-2017	10:34	:20:00	125 bpm (480 ms)	120 bpm (500 ms)
1250	AT	25-Dec-2017	04:34	:02:00	88 bpm (680 ms)	86 bpm (700 ms)

ESC Council Stroke

Conclusions

ECG monitoring after stroke of unknown source: 24h only ECG monitoring is insufficient, and long-term ECG monitoring should be used

Non-invasive long-term ECG recording

- **easier to use („implant, explant“)**
- **ECG recording are easier to interpret**
- **less expensive**
- **offers similar results as insertable ECG recorders**

..and should be preferred for long-term monitoring after stroke of unknown source

ESC Council Stroke

ESC Council Stroke