R-R variability to identify patients at high risk of atrial fibrillation in acute ischemic stroke

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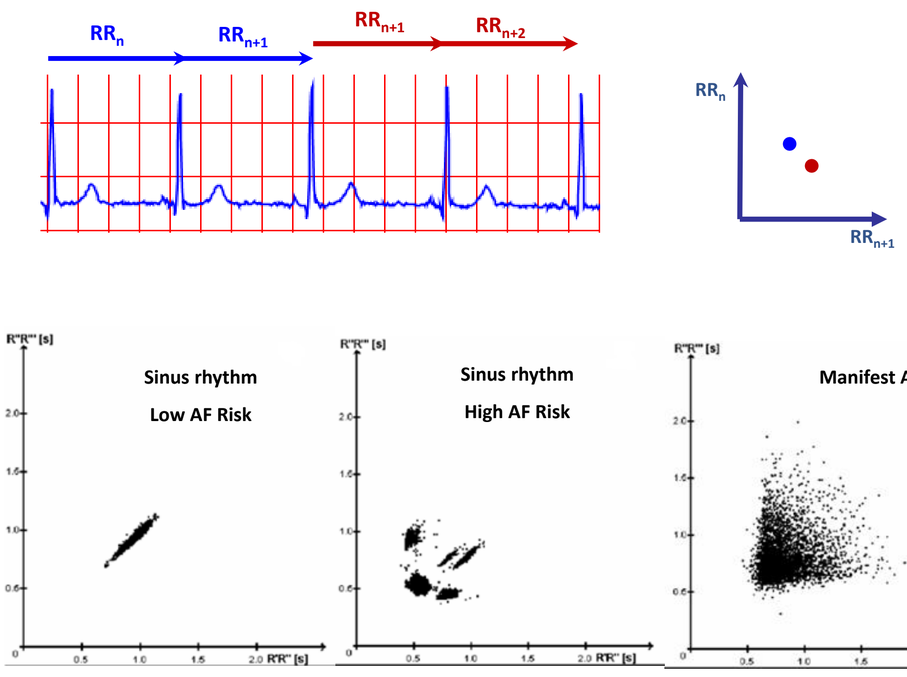
Introduction: Detection of Atrial Fibrillation (AF) in ischemic stroke patients impacts the choice for the antithrombotic regimen for secondary stroke prevention. Altered R-R interval dynamics on Continuous Cardiac Monitoring (CCM) is associated with a greater AF risk[1]. In this study we investigated if analysis of R-R dynamics identified acute ischemic stroke patients presenting with sinus rhythm but at high risk of AF during Stroke Unit (SU) hospitalization.

Method: Acute ischemic stroke patients underwent CCM using standard bedside monitors within the first 48 hours of SU admission. Cardiac monitoring tracks were analyzed using the Stroke Risk Analysis (SRA) (http://www.apoplexmedical.com) service. This technology identifies QRS complexes on source ECGs to create a matrix of R-R-intervals. RR intervals are subsequently used to calculate various, mostly nonlinear, mathematical parameters and determine the AF risk[2]. Based on R-R dynamics, the SRA algorithm stratifies the risk for AF as follows: low risk for AF; high risk for AF; presence of manifest AF. For each patient, all available CCM strips, standard ECG or 24hour Holter ECG were inspected to determine the presence of AF during the whole SU hospitalization.



Results: Two hundred patients (40% females, mean age 71±16 years) were included. The SRA algorithm rated 111 patients (56%) as low risk, 52 (26%) as high risk, while 37 patients (18%) exhibited manifest AF at admission 48 hours CCM.

During the whole SU hospitalization paroxysmal AF was detected in 20 (38,5%) patients classified as high risk on initial CCM while in only 1 low risk patient. A low SRA risk score was associated with a low probability of AF (1/111, 0.9%, 95% CI 0-4.3%). A high SRA risk score predicted an increased probability of AF detection (20/52, 38.5% (95%CI 25-52%). AF was associated with well known risk factors (Table).

On multivariate analysis, the SRA risk score remained an independent predictor for a final diagnosis of AF (HR 70.1, 95%CI 7.8-632, p<0.0001).

Patient characteristics	Low AF risk N=111	High AF risk N=52	Manifest AF N=37	P
Age, Y	65 ± 14	80 ± 8	80 ± 12	**<0.001**
Sex, female	39 (35)	22 (42)	19 (51)	0.202
Current smoking	20 (18)	1 (2)	3 (8)	**0.009**
Hypertension	70 (63)	42 (81)	33 (89)	**0.003**
Diabetes	15 (13)	12 (23)	8 (22)	0.249
Dyslipidemia	44 (40)	17 (33)	10 (27)	0.338
Previous AF diagnosis	6 (5)	7 (13)	5 (13)	0.140
Antiarrhythmic drugs	24 (22)	22 (42)	18 (50)	**0.001**
CHA2-DS2-Vasc				**<0.001**
Median	4.5	5	6	
25th Percentile	3	5	5	
75th Percentile	6	6	6	
NIHSS	4 ± 5	5 ± 6	11 ± 8	**0.009**
QTc (msec)	430 ± 34	448 ± 29	462 ± 33	**<0.001**
Thrombolysis	17 (15)	6 (12)	12 (33)	0.023
Left Atrial Volume				**<0.001**
Severely enlarged (>45 L/m^2)	8 (7)	13 (25)	15 (41)	
Left Atrial Diameter				0.095
Severely enlarged (>50 mm)	5 (5)	5 (12)	4 (11)	
Final Heart Rhythm				**<0.001**
Sinus rhythm	110 (99)	32 (61.5)	0	
Paroxysmal AF	1 (1)	20 (38.5)	12 (32)	
Permanent/Persistent AF	0	0	25 (68)	

Conclusion: using standard bedside SU monitors and a commercial software algorithm, we have found that acute ischemic stroke patients with increased R-R variability are at high risk for AF. The yield of further long term monitoring for AF may be the highest in patients with altered R-R dynamics[3].

References

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