Advanced interatrial block may be a useful parameter for determining a clinically relevant subgroup of heart failure patients with preserved ejection fraction - a pilot study

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Background: An advanced interatrial block (aIAB) is seen on the ECG as the combination of a P wave duration >120 ms and biphasic P wave morphology in the inferior leads. It is considered a marker of an electromechanically dysfunctional left atrium (LA) and hence a risk factor for supraventricular arrhythmias and heart failure (HF).¹ The aim of our pilot study is to explore aIAB as a potential marker for determining a clinically relevant subgroup of HF patients.

Patients and Methods: An echocardiogram and a surface ECG were performed on a total of 51 HF patients in sinus rhythm (31 (61%) with HF with preserved ejection fraction (HFpEF), 20 (39%) with HF with reduced ejection fraction (HFrEF)) diagnosed per the current guidelines, and 20 sex-matched healthy controls. Echocardiographic parameters of LA structure and function were measured. ECG measurements were performed digitally with an electronic calliper.

Results: Prevalence of aIAB was 11% (n=8) in the studied group, significantly greater in HFpEF patients, compared to HFrEF patients and healthy controls (88% vs. 0% vs. 12%, $p=0.025$, **Figure 1**). The HFpEF patients formed an aIAB HFpEF subgroup (n=7) that was compared to two control groups, both without P wave duration >120 ms or biphasic P wave morphology in the inferior leads: age- and sex- matched HFpEF patients (n=7) and sex-matched healthy controls (n=12). Based on this subanalysis, the aIAB patients had a significantly higher occurrence of paroxysmal atrial fibrillation (healthy controls vs. HFpEF controls vs. aIAB: 0% vs. 43% vs. 86%, $p<0.0001$, **Table 1**). This subgroup also had the largest LA volumes (26.6 (18.7, 29.6) vs. 37.6 (32.7, 54.1) vs. 46.4 (41.4, 50.6) ml/m², healthy controls vs. HFpEF controls vs. aIAB, respectively, $p<0.0001$, **Table 1**) and lowest LA ejection fraction (57.8 (46.4, 66.7) % vs. 39.7 (31.0, 41.3) % vs. 34.6 (31.8, 44.6) %, healthy controls vs. HFpEF controls vs. aIAB, respectively, $p=0.004$, **Table 1**).

Conclusion: This pilot study relates aIAB to the HFpEF part of the HF spectrum. Significant differences in LA structural and functional characteristics suggest that aIAB may be a useful parameter for determining a clinically relevant subgroup of HFpEF patients, however an analysis of a larger patient cohort would be required to further establish these findings.

FIGURE 1. Selection of the heart failure subgroups based on left ventricular ejection fraction, P wave duration and biphasic P waves in the inferior leads (n=51).

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TABLE 1. Baseline clinical and echocardiographic characterises of the studied patient subgroups.

	Biphasic P wave in inferior leads and P wave > 120 ms			P values		
	Yes	No		aIAB	aIAB	HFpEF controls
	aIAB	HFpEF controls	Healthy controls	vs	vs	vs
	(n=7)	(n=7)	(n=12)	HFpEF controls	Healthy controls	Healthy controls
Male sex – no. (%)	1 (14)	1 (14)	4 (33)	1	0.603	0.603
Age (IQR) –years	74 (71-81)	75 (67-82)	54 (51-55)	1	<0.0001	0.010
Paroxysmal AF – no. (%)	6 (86)	3 (43)	0 (0)	0.266	<0.0001	0.036
LVEF (IQR) - %	68 (60-70)	52 (40-65)	60 (52-64)	0.026	0.100	0.351
LAVI (IQR) - ml/m ²	46.4 (41.4-50.6)	37.6 (32.7-54.1)	26.6 (18.7-29.6)	0.318	<0.0001	0.001
LAA (IQR) - cm ²	26.8 (23.9-32.0)	21.6 (21.0-25.5)	18.2 (15.0-20.3)	0.073	<0.0001	0.007
LAEF (IQR) - %	34.6 (31.8-44.6)	39.7 (31.0-41.3)	57.8 (46.4-66.7)	0.902	0.013	0.005
V max (IQR) - ml	85.0 (81.0-109.0)	71.0 (61.0-92.0)	51.5 (35.5-59.5)	0.259	<0.0001	0.005
V min (IQR) - ml	53.0 (35.0-75.0)	42.0 (38.0-51.0)	20.5 (12.3-28.8)	0.456	0.001	0.0001
preA volume (IQR) - ml	64.0 (52.0-86.0)	59.0 (46.0-65.0)	38.0 (22.2-28.8)	0.456	<0.0001	0.010
aIAB – advanced interatrial block; HFpEF – heart failure with preserved ejection fraction; IQR – interquartile range, AF – atrial fibrillation; LVEF – left ventricular ejection fraction; LAVI – left atrial volume index; LAA – left atrial area; LAEF – left atrial ejection fraction; V max – maximal volume of the left atrium; V min – minimal volume of the left atrium; preA volume – volume of the left atrium at start of P wave on ECG. Variables in the table are described with a percentage or with the median and interquartile range.						

LITERATURE

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