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Predictive value of interatrial block for atrial fibrillation in elderly subjects enrolled in the PREDICTOR study☆

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ABSTRACT

Aims: The principal aims of this prospective multicentre study were to relate the presence of interatrial block (IAB) with a late occurrence of atrial fibrillation (AF) and to demonstrate the independence of the IAB effect on risk of AF from structural cardiac alterations.
Methods: This prospective study was the follow-up of subjects included in the PREDICTOR cross-sectional population-based study. Subjects were divided into groups according to IAB status. Socio-demographic and health characteristic were collected during enrolment in the PREDICTOR along with ECGs, echocardiograms and NT-proBNP dosages. Follow up was performed on administrative data. The mean time of follow up was 6.6 years.
Results: 1626 subjects were included in the analysis. Four hundred-fifteen subjects out of 1626 (25.5%) had IAB. The survival analysis suggests an association between IAB alone and AF (HR = 1.50, $p = 0.058$) and, in normal-weight subjects, IAB strongly predicted AF indicating more than triple the risk (HR = 3.05; $p = 0.002$ 95% CI: 1.51–6.18). The association seems to be independent of possible confounders such as history of IHD, left ventricular hypertrophy, CHA2DS2-VASc, left atrial dimension, or NT-proBNP dosage.
Conclusion: Our analysis suggests that IAB is an electric condition that can increase the risk of AF independently of any structural cardiac alterations, at least in normal-weight subjects.

Introduction

In 1979, Bayés de Luna described atrial conduction blocks and classified them as interatrial and intra-atrial [1]. Interatrial block (IAB) has been defined as a conduction delay between the atria in the area of Bachmann's bundle, with P wave duration ≥120 msec. IAB has been defined as advanced when a negative final component of P wave is present in the inferior leads [2].

IAB is underappreciated but highly prevalent electrocardiographic abnormality [3]. It is a very frequent condition especially in the elderly, reaching 40% in septuagenarians [4,5]. IAB is strongly associated with supraventricular arrhythmias (especially atrial fibrillation – AF) in many clinical settings [6–8]. This association is termed "Bayés syndrome" [9].

Furthermore, Bayés syndrome has been identified as a risk factor for cardioembolic ischemic stroke and dementia [10].

It is known that, among ECG variables, the atrium-related ECG parameter can express the arrhythmogenic substrate for AF [11]. AF is one of the most common cardiac rhythm disorders, especially in the elderly. It has an estimated prevalence in the general population of 1.4–2% [12], increasing to 10% for those ≥80 years [2,13]. AF is also one of the most common preventable causes of stroke [13] and is linked with an increased risk of heart failure and death [14,15]. AF may lead to serious clinical consequences and is expected to exert a higher clinical impact in the coming years due to the aging of the population [13].

The principal aim of this study was to relate the presence of IAB with late occurrence of AF (in terms of incident hospitalization or death due to AF) resulting from the regional administrative database from a large aging cohort in Central Italy (the PREDICTOR study population) and the

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possible relationship of IAB with other cardiovascular or general conditions.

Methods

Design, study population, and procedures

The PREDICTOR study is a population-based cross-sectional study that aimed to assess the prevalence of both preclinical and clinical heart failure (HF) in 65–84 year-old residents in the Lazio region, in Italy. The population underwent a physical examination, electrocardiography, echocardiography and laboratory tests; the administrative follow up is still ongoing [16].

This new prospective analysis derived from the follow-up of subjects included in the original PREDICTOR cross-sectional population-based study. Socio-demographic and health characteristic were collected during enrolment in the PREDICTOR along with ECGs, echocardiograms and N-terminal pro-brain natriuretic peptide (NT-proBNP) dosages.

Subjects were excluded from the present analysis if they had poor quality or no ECG recordings or if they had AF at study entry.

Subjects included in the current analysis were divided into 3 groups: group 1, normal P-wave duration, <120 msec; group 2, partial interatrial block with P-wave duration >120 msec without biphasic (±) morphology in the inferior leads (II, III and aVF); and group 3, advanced interatrial block with P wave duration >120 msec with biphasic (±) morphology in the inferior leads.

Methods of ECG and ECHO readings in the PREDICTOR study

All ECG printouts were magnified and reviewed after magnification. Readers evaluated the length of the P-wave by using a dedicated calliper. They also analyzed the morphology of the ECG P-wave. ECHOs analyses were performed by measuring left atrium (LA) volumes, LA diameters and areas. As specified in the main publication, cardiologists and nurses were trained locally according to standardized methodologies. Before enrolment began, all participating centres were required to perform and send an echo-test to the Core Lab to verify the correctness of the acquisition procedure [16].

All ECGs and ECHOs were read by an independent and validated Core laboratory by personnel blinded to clinical outcome.

Variables

Demographic and clinical variables, physical findings, medications recording procedures, as well as NT-proBNP measurement procedure, echocardiography and electrocardiography protocols, have been explained in detail previously [16].

In addition, the “Congestive heart failure, Hypertension, Age ≥ 75 years, Diabetes mellitus, Stroke, Vascular disease, Age 65–74 years, Sex category” (CHA2DS2-VASc) score was calculated to assess the risk of stroke.

Follow-up and outcome

Follow up was performed on administrative data, using an anonymous identifier that linked the study population to the Regional Health Information System; if the identifier was unavailable, the subject was excluded from the study. Participants were followed for hospitalization and visits to the emergency room due to AF (principal or secondary diagnoses of atrial fibrillation (ICD9CM: 427.31) up until December 31, 2015, or their death. The mean time of follow up was 6.6 years.

The association of IAB and AF was considered in detail. Furthermore, predictive variables of IAB and AF were addressed (the list of variables is available in Tables 2 and 4).

Statistical analysis

Socio-demographic and clinical characteristics of the study population were tabulated and the prevalence of IAB was calculated. People in the group 3 (advanced IAB) were only 13, for this reason group 3 was analyzed together with group 2. Chi-squared test was used to compare distributions of categorical variables and *t*-test was used to compare the difference in means of continuous variables in subjects with and without IAB.

Crude and adjusted logistic regression models were used to evaluate the baseline socio-demographic and clinical characteristics associated with IAB.

Cox proportional hazard models, with age as the time scale and baseline hazard function stratified by sex, were used to study the association between IAB and AF.

In studying the role of IAB on hospital access for AF, the possible role of confounders was evaluated in multivariate regression analysis by adjusting the model for those factors that resulted associated with IAB in the multivariate logistic regression. The role of possible effect modifiers was evaluated by comparing the models with and without an interaction term using the log likelihood ratio test.

Cox proportional hazard models, with age as the time scale and stratified by sex, were used to study the sociodemographic and clinical factors independently associated with AF.

Results

In total, 2001 subjects were enrolled in the PREDICTOR study. Of these, $N = 22$ subjects were excluded from the analysis as their ECGs were not available, $N = 27$ were excluded because of documented AF during baseline examination, $N = 52$ were excluded because analysis of p-wavelength was missing and $N = 274$ subjects were excluded because of lack of follow up data. The remaining 1626 subjects had a 12 leads ECG of good quality and were included in the analysis. The subjects included in the analysis were similar to those excluded with respect to all the characteristics (Supplementary Table S1), except for “hypertension” that was more prevalent in the included subjects (59%) than in the excluded (53%) ones ($p = 0.016$).

Four-hundred-fifteen subjects out of 1626 (25.5%) had IAB. Among the subjects with IAB, 402 (97%) had a partial IAB (group 2) while 13 (3%) had an advanced IAB (group 3). The advanced IAB cases were too few to be analyzed alone, so they were analyzed together with the partial IAB group, resulting in a 2-groups analysis, with or without IAB.

The sociodemographic and clinical characteristics of the population (overall and by IAB presence) are shown in Table 1.

The logistic regression analysis, adjusted for sex and age, showed that male gender, obesity, ischemic heart disease and left ventricular hypertrophy were the main independent predictors of having IAB (Table 2).

AF was detected in 34 out of 415 patients with IAB and in 66 out of the 1211 subjects without IAB. The crude rate of AF incidence was 13.1 per 1000 person-years (95% CI: 6.7–10.8) in subjects with IAB and 8.5 per 1000 person-years (95% CI: 9.3–18.3) in subjects without IAB ($p = 0.0394$).

The survival analysis, adjusted for age and sex, suggests an association between IAB alone and AF (HR = 1.50, $p = 0.058$). BMI was found to affect the association between IAB and AF (p-LR test = 0.0163). In normal-weight subjects (i.e. BMI < 30), IAB strongly predicted AF (HR = 3.05; $p = 0.002$ 95% CI: 1.51–6.18), independently of possible confounders such as history of IHD, left ventricular hypertrophy, CHA2DS2-VASc, left atrial dimension, or NT-proBNP dosage (Table 3).

The variables predictive of AF are shown in Table 4. In our analysis, CHA2DS2-VASc did not predict AF and was not a confounder or effect modifier of the association between IAB and AF.

Table 1
Clinical and sociodemographic characteristics of the study population with and without interatrial block (IAB).

	IAB	With IAB		Without IAB		Total	
	Prevalence	N	%	N	%	N	%
Total	25.5	415	100	1211	100	1626	100.0
Sex ($p < 0.001$)							
Men	31.7	268	64.6	578	47.7	846	52.0
Women	18.8	147	35.4	633	52.3	780	48.0
Age class ($p = 0.889$)							
65–69	26.2	134	32.3	378	31.2	512	31.5
70–74	26.1	140	33.7	396	32.7	536	33.0
75–79	24.6	96	23.1	294	24.3	390	24.0
80–84	23.9	45	10.8	143	11.8	188	11.6
Level of education ($p = 0.076$)							
Low	22.6	125	30.1	428	35.3	553	34.0
Medium	24.7	90	21.7	274	22.6	364	22.4
High	28.1	199	48.0	508	41.9	707	43.5
Smoking ($p = 0.320$)							
Never	24.4	192	46.3	594	49.1	786	48.3
Ever	26.6	223	53.7	616	50.9	839	51.6
Alcohol consumption ($p = 0.020$)							
No	22.5	150	36.1	516	42.6	666	41.0
Yes	27.6	265	63.9	694	57.3	959	59.0
Physical activity ($p = 0.808$)							
No	25.3	240	57.8	708	58.5	948	58.3
Yes	25.8	175	42.2	502	41.5	677	41.6
Dyslipidemia ($p = 0.064$)							
No	27.3	240	57.8	639	52.8	879	54.1
Yes	23.2	164	39.5	542	44.8	706	43.4
BMI category ($p = 0.002$)							
<25	21.8	137	33.0	491	40.5	628	38.6
25–29	26.0	184	44.3	523	43.2	707	43.5
≥30	32.9	92	22.2	188	15.5	280	17.2
Diabetes ($p = 0.700$)							
No	25.4	340	81.9	1001	82.7	1341	82.5
Yes	26.5	72	17.3	200	16.5	272	16.7
Hypertension ($p = 0.447$)							
No	24.5	160	38.6	494	40.8	654	40.2
Yes	26.1	251	60.5	709	58.5	960	59.0
Family history of CVD ($p = 0.251$)							
No	25.0	318	76.6	956	78.9	1274	78.4
Yes	28.0	95	22.9	244	20.1	339	20.8
IHD ($p = 0.014$)							
No	24.5	346	83.4	1067	88.1	1413	86.9
Yes	32.4	69	16.6	144	11.9	213	13.1
Other cardiovascular disease ($p = 0.535$)							
No	25.2	347	83.6	1028	84.9	1375	84.6
Yes	27.1	68	16.4	183	15.1	251	15.4
Heart failure ($p = 0.871$)							
No	25.2	368	88.7	1091	90.1	1459	89.7
Yes	24.5	24	5.8	74	6.1	98	6.0
Diastolic LV dysfunction ($p = 0.369$)							
No	24.2	195	47.0	610	50.4	805	49.5
Yes	26.3	178	42.9	500	41.3	678	41.7
Left Ventricular hypertrophy (ECG) ($p = 0.229$)							
No	23.5	333	80.2	1084	89.5	1417	87.1
Yes	73.2	82	19.8	30	2.5	112	6.9
CHA2DS2-VASc (p = 0.229)							
1	31.4	59	14.2	129	10.7	188	11.6
2	26.0	138	33.3	393	32.5	531	32.7
3	24.9	129	31.1	389	32.1	518	31.9
4	23.9	68	16.4	216	17.8	284	17.5
5+	20.0	21	5.1	84	6.9	105	6.5
NT-proBNP pg/mL ($p = 0.544$) (median, p25–p75)		179	45–183	164	46–171	168	45–186

IHD: angina pectoris, or myocardial infarction, or revascularization procedures.
Other CVD diseases: Either atrial fibrillation, or peripheral vascular disease, or valve disease.
p-Values: difference in the distribution (chi-squared test) or difference in the means by presence of IAB (*t*-test).

Concerning the echocardiographic variables, left diastolic dysfunction was not predictive of IAB, while the atrium dimensions (measured as left atrium anteroposterior systolic dimension by 2D, LA2D) showed a significant association with IAB in the general population ($N = 1588$; mean 3.7 (SD 0.6) OR 1.41 $p < 0.004$) and in normal weight subjects ($N = 637$; 3.5 (0.5) OR1.52, $p < 0.035$) but not in overweight/obese subjects. LA2D was also predictive of AF in the general population and in all BMI groups (all $p < 0.001$).

Finally, concerning the risk of stroke, CHA2DS2-VASc was a predictor of hospitalization due to cerebrovascular event and overall mortality, in particular for score > 4 (data not shown).

Discussion

The present analysis of the PREDICTOR population aimed at detecting the predictive value of IAB on AF. We also explored the relationship

Table 2
Risk factors of interatrial block, results from logistic regression.

	Crude OR	p-Value	95% CI		Adj OR	p-Value	95% CI	
Sex								
Men	1.00				1.00			
Women	0.50	<0.001	0.40	0.63	0.50	<0.001	0.40	0.63
Age class								
65–69	1.00				1.00			
70–74	1.00	0.985	0.76	1.31	0.99	0.915	0.75	1.30
75–79	0.92	0.595	0.68	1.25	0.93	0.663	0.69	1.27
80–84	0.89	0.548	0.60	1.31	0.87	0.500	0.59	1.29
Level of education								
Low	1.00				1.00			
Medium	1.12	0.458	0.82	1.53	1.02	0.888	0.75	1.40
High	1.34	0.026	1.04	1.74	1.17	0.247	0.90	1.53
Smoking								
Never	1.00				1.00			
Ever	1.12	0.320	0.90	1.40	0.85	0.179	0.66	1.08
Alcohol consumption								
No	1.00				1.00			
Yes	1.31	0.020	1.04	1.65	1.07	0.577	0.84	1.37
Physical activity								
No	1.00				1.00			
Yes	1.03	0.808	0.82	1.29	0.95	0.640	0.75	1.19
Dyslipidemia								
No	1.00				1.00			
Yes	0.81	0.065	0.64	1.01	0.88	0.296	0.70	1.12
BMI category								
<25	1.00				1.00			
25–29	1.26	0.073	0.98	1.62	1.14	0.330	0.88	1.47
≥30	1.75	<0.001	1.28	2.40	1.76	<0.001	1.28	2.42
Diabetes								
No	1.00				1.00			
Yes	1.06	0.700	0.79	1.43	1.01	0.967	0.75	1.36
Hypertension								
No	1.00				1.00			
Yes	1.09	0.447	0.87	1.37	1.12	0.322	0.89	1.42
Family history of CVD								
No	1.00				1.00			
Yes	1.17	0.251	0.89	1.53	1.27	0.086	0.97	1.68
IHD								
No	1.00				1.00			
Yes	1.48	0.014	1.08	2.02	1.38	0.049	1.00	1.89
Other cardiovascular disease								
No	1.00				1.00			
Yes	1.10	0.535	0.81	1.49	1.16	0.337	0.85	1.58
Heart failure								
No	1.00				1.00			
Yes	0.96	0.871	0.60	1.55	0.97	0.903	0.60	1.58
Diastolic LV dysfunction								
No	1.00				1.00			
Yes	1.11	0.370	0.88	1.41	1.18	0.194	0.92	1.50
Left Ventricular hypertrophy (ECG)								
No	1.00				1.00			
Yes	1.75	0.007	1.17	2.61	2.03	0.001	1.34	3.07
CHA2DS2-VASc								
1	1.00				1.00			
2	0.77	0.155	0.53	1.10	1.02	0.908	0.70	1.49
3	0.73	0.086	0.50	1.05	1.22	0.339	0.81	1.85
4	0.69	0.075	0.46	1.04	1.44	0.152	0.87	2.36
5+	0.55	0.037	0.31	0.97	1.20	0.577	0.63	2.32
NT-proBNP 100 pg/mL	1.01	0.555	0.98	1.03	1.01	0.546	0.98	1.03

IHD: angina pectoris, or myocardial infarction, or revascularization procedures.
Other CVD diseases: Either atrial fibrillation, or peripheral vascular disease, or valve disease.
Adj OR: adjusted for age and sex.

Table 3
The prognostic value of IAB on AF.

	HR	p-Value	95% CI	
The role of IAB on AF	1.50	0.058	0.99	2.29
The role of IAB on AF by BMI category				
Overweight or obese	1.04	0.877	0.61	1.79
Normal weight	3.05	0.002	1.51	6.18
The role of possible confounders in the association between IAB and AF in normal-weight subjects				
Adjusted for IHD	2.89	0.003	1.42	5.90
Adjusted for LVH	2.95	0.004	1.42	6.13
Adjusted for other CVD	2.77	0.005	1.37	5.62
Adjusted for CHA2DS2-VASc	3.19	0.001	1.56	6.51
Adjusted for NT-proBNP	3.24	0.001	1.60	6.59
Adjusted for left ventricular dimension	2.87	0.007	1.34	6.13

IHD Ischaemic Heart Disease.
LVH Left Ventricular Hypertrophy.
Cox models with age as the time scale, and baseline hazard function stratified by sex.

between clinical and echocardiographic variables with IAB and AF occurrence.

Interestingly, the prevalence of IAB in our population was 25.5%, which is lower than that reported in the literature for the general population. In fact, it has been reported that IAB is frequently present in the elderly [17]; the prevalence in subjects between 70 and 79 years has been reported to be at least 40% and increases to 50% in subjects over 80 years old [18].

As subjects examined in the PREDICTOR study were over 65 years old and as almost 60% of the individuals showed structural heart disease to some extent, we expected a higher prevalence of IAB. Interestingly, we also found a negative correlation between the prevalence of IAB (even when corrected by sex) and age, an evidence that is not consistent with the data available in the literature [4,5,18].

As the incidence of IAB depends on age and on associated heart disease [18], we could not exclude a selection bias in our population. Regarding the predictive role of IAB on the onset of AF, the results of our analysis are consistent with those already available in literature. Several studies have in fact shown the association between IAB and AF in various clinical scenarios [19–21] and in the general population [22]. The REGICOR registry (REgistre GIroní del CO) recruited a total of 9380 participants from 1999 to 2005 and demonstrated that a P-wave longer than 110 msec increases the risk of AF [23]. Furthermore, a recent meta-analysis that included 18,204 patients with a mean follow-up period of 15.1 years showed that IAB is a significant predictor of both new-onset AF and AF recurrence [24].

The association between IAB and AF has been demonstrated particularly in patients with advanced IAB [2]. We cannot confirm this evidence; we did not find any linear relationship between P-wave length and incidence of AF, as the REGICOR registry did [23], probably due to the small number of subject with advanced IAB in our population ($n = 13$).

The survival analysis, taking account of effect modifiers, shows a strong association between IAB and incidence of AF in normal-weight subjects, and no association in subjects with a high BMI. Although our study failed to show any effect of BMI on the risk of AF, obesity remains a major risk factor for the occurrence of AF. Consistently a recent meta-analysis estimates a 3.5–5.3% increased risk of AF for each unit increase of BMI [25].

In addition to the evaluation of the P wave, this analysis identified clinical and echocardiographic variables associated with IAB and with a predictive value on the risk of AF. Our results suggest an association between left atrial dilatation and both AF and IAB. There is evidence in the literature of a link between IAB and atrial remodeling. The atrial remodeling leads to slowing of the conduction velocity and/or dilatation of the atrium, constituting an arrhythmogenic basis, and consequently leads to AF [11,22].

To investigate this hypothesis we evaluated the possible confounding effect of atrial dilatation on the IAB/AF association. Surprisingly we showed that, in normal weight subjects, the effect of IAB on AF is independent of atrial enlargement.

Table 4
Risk factors for hospital access due to AF.

	N	N cases	HR	p-Value	95% CI	
Sex						
Men	846	58	1.00			
Women	780	42	0.76	0.175	0.51	1.13
Age class						
65–69	512	29	1.00			
70–74	536	30	0.93	0.836	0.47	1.84
75–79	390	28	1.34	0.561	0.50	3.60
80–84	188	13	1.20	0.781	0.33	4.37
Level of education						
Low	553	40				
Medium	364	20	0.70	0.198	0.41	1.20
High	707	40	0.73	0.167	0.46	1.14
Smoking						
Never	786	41	1.00			
Ever	839	59	1.33	0.191	0.87	2.05
Alcohol consumption						
No	666	27	1.00			
Yes	959	73	1.81	**0.011**	1.14	2.86
Physical activity						
No	948	54	1.00			
Yes	677	46	1.16	0.467	0.78	1.72
Dyslipidemia						
No	879	60	1.00			
Yes	706	39	0.81	0.311	0.54	1.22
BMI category						
<25	628	32	1.00			
25–29	707	51	1.38	0.157	0.88	2.16
≥30	280	16	1.14	0.677	0.62	2.07
Diabetes						
No	1341	85	1.00			
Yes	272	14	0.80	0.441	0.45	1.41
Hypertension						
No	654	30	1.00			
Yes	960	70	1.62	**0.027**	1.06	2.49
Family history of CVD						
No	1274	75	1.00			
Yes	339	23	1.18	0.487	0.74	1.89
IHD						
No	1413	78	1.00			
Yes	213	22	1.92	**0.007**	1.19	3.11
Other cardiovascular disease						
No	1375	61	1.00			
Yes	251	39	3.94	<**0.001**	2.63	5.90
Heart failure						
No	1459	86	1.00			
Yes	98	9	1.57	0.202	0.78	3.16
Diastolic LV dysfunction						
No	805	39	1.00			
Yes	678	51	1.51	0.060	0.98	2.31
Left Ventricular hypertrophy (ECG)						
No	1417	90	1.00			
Yes	112	6	0.90	0.797	0.39	2.06
CHA2DS2-VASc						
1	188	9	1.00			
2	531	31	1.65	0.198	0.77	3.52
3	518	32	2.09	0.072	0.94	4.68
4	284	20	2.40	0.061	0.96	5.99
5+	105	8	2.41	0.112	0.82	7.15
NT-proBNP						
100 pg/mL	1622	100	1.02	<**0.001**	1.01	1.03

HR adjusted for age (as time scale), stratified by sex (with the exception of the sex variable).
Bold characters indicate statistically significant p values.

Moreover, among the clinical variables considered, the variable "other cardiovascular diseases" was associated with AF but not to IAB. Therefore, it is possible that the predictive value of IAB on AF is independent of other pathological conditions in our population.

A previous study, analyzing ECG and conventional cardiovascular risk factors in 5667 Finns who were followed up for incident atrial fibrillation (AF), showed that despite older age, higher BMI and higher blood pressure were associated with incident prolonged P-wave duration, during follow-up, only prolonged P-wave duration predicted AF. The author concluded that modifiable risk factors associate with P-wave abnormalities may represent intermediate steps of atrial cardiomyopathy on a pathway leading to AF [26].

To further confirm the independence of IAB from other conditions, we analyzed the association between CHA2DS2-VASc and AF and between CHA2DS2-VASc and IAB, and we evaluated the possible confounding effect of CHA2DS2-VASc on the IAB/AF association. Our analysis did not suggest any effect of the CHA2DS2-VASc score on the IAB/AF association, otherwise, CHA2DS2-VASc score is a predictor of cerebrovascular events and overall mortality. This result supports the hypothesis that IAB is an independent predictor of AF and that CHADSVASC is instead a thromboembolic risk factor, in particular in the case of a score 4. Lastly, the effect of IAB on AF seems to be independent of left ventricular hemodynamic function, measured by NT-proBNP.

These findings let us speculate that IAB is an electric condition that can increase the risk of developing AF independently of any structural cardiac alterations, at least in normal-weight subjects.

The association between IAB and AF is not evident in overweight and obese subjects in our population. The correlation between obesity and AF is well known. Although the physiopathology that binds obesity and AF has not yet been fully understood, the implication of the alterations of cardiovascular hemodynamics and cardiac structure and function that characterize the obese subject has been demonstrated [27]. In the presence of obesity, anatomical (structural) and functional changes of the atrial and ventricular myocardium (left ventricular hypertrophy/ventricular remodeling, atrial remodeling or dilatation) or changes in the filling pressures, develop [27]. Based on these premises, we could state that these conditions could be overwhelming with respect to the electrical alterations that in our analysis are present in normal-weight subjects, and may precede the development of such alterations. Therefore, we can hypothesize that overweight and obese subjects have AF for reasons other than IAB, which instead is more relevant in normal-weight subjects in which structural alterations are not so evident.

The limitations of this study essentially lie in the characteristics of the administrative databases in which only those patients who have been hospitalized or who have entered the emergency room due to AF are included. It is plausible that the percentage of AF was therefore underestimated because those patients with asymptomatic or paroxysmal episodes or those who turned to their doctor without resorting to health facilities were not included.

Conclusions

IAB can be easily detected and has a well-known predictive value. Given the importance of the sequelae of AF, the identification of subjects at higher risk could lead to a more precocious prevention strategy to avoid severe complications. Our study confirmed previous findings, showing that IAB detection could be useful to highlight patients at greater risk of AF, especially among normal-weight subjects without other cardiovascular diseases. Furthermore, our study demonstrates an independence of IAB from other pathological conditions and atrial or ventricular structural changes, suggesting its electrical origin.

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Conflict of interest

None declared.

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