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Clinical, electrocardiographic and echocardiographic predictive index of paroxysmal atrial fibrillation recurrences

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Acronyms
AF: atrial fibrillation
HBP: high blood pressure
IAB: interatrial block
PAF: paroxysmal atrial fibrillation
Pd: P-wave dispersion

On-Line Versions:
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ABSTRACT

Introduction: Atrial fibrillation has been defined as the most frequent supraventricular tachyarrhythmia in clinical practice. Its current prevalence in developed countries is approximately 1.5-2.0% of their general population and the average age has been gradually increasing, so nowadays it stands between 75 and 85 years. Regarding prevalence, predictions indicate that it is likely to double within the next 50 years. According to current statistics this arrhythmia is associated to a 5 times higher risk of ictus, a 3 times higher incidence of congestive heart failure, and higher mortality. Recurrence plays an important role therein.
Objective: To design and validate a predictive index, integrating prognosis factors in order to evaluate the recurrence risk in patients with paroxysmal atrial fibrillation.
Method: The index design included: selecting variables and searching for considerations. In this phase 145 patients diagnosed with paroxysmal atrial fibrillation were studied. The statistic validation included satisfactory validation aspects.
Results: An index with two alternatives was obtained, a qualitative and a quantitative ordinal one respectively with three levels of recurrence risk for paroxysmal atrial fibrillation.
Conclusions: The obtained index was considered appropriate to be performed in the setting and to reduce the recurrence of paroxysmal atrial fibrillation.
Key words: Paroxysmal atrial fibrillation, Recurrence, Predictive index, Validation studies

Índice predictivo clínico, electrocardiográfico y ecocardiográfico de las recurrencias de la fibrilación auricular paroxística

RESUMEN

Introducción: La fibrilación auricular se ha definido como la taquiarritmia supraventricular más frecuente en la práctica clínica. Su prevalencia actual en el mundo desarrollado es de aproximadamente un 1,5-2,0% de la población general, y la

media de edad ha ido en aumento, de tal forma que actualmente se sitúa entre los 75 y 85 años. Con respecto a la prevalencia, las previsiones indican que por lo menos se doblará en los próximos 50 años. Las estadísticas vigentes muestran que esta arritmia está asociada a un riesgo 5 veces mayor de accidente cerebrovascular, una incidencia 3 veces mayor de insuficiencia cardíaca congestiva y mayor mortalidad. En este tópico las recurrencias juegan un importante papel.

Objetivo: Diseñar y validar un índice predictivo, con la integración de factores pronósticos, con vistas a evaluar el riesgo de recurrencia de los pacientes con fibrilación auricular paroxística.

Método: La construcción de este índice incluyó: la selección de variables y la búsqueda de ponderaciones, en esta etapa se estudiaron 145 pacientes con diagnóstico de fibrilación auricular paroxística. La validación estadística incluyó elementos de validez que fueron satisfactorios.

Resultados: Como resultado se obtuvo un índice con dos alternativas, una cualitativa y otra cuantitativa ordinal, con tres niveles de riesgo de recurrencias para la fibrilación atrial paroxística: bajo, moderado y alto.

Conclusiones: El índice obtenido, por tanto, se consideró adecuado para aplicar en el contexto de actuación y reducir la recurrencia de la fibrilación auricular paroxística.

Palabras clave: Fibrilación atrial paroxística, Recurrencia, Índice predictivo, Estudios de validación

INTRODUCCIÓN

Atrial fibrillation (AF) has been defined as the most frequent supraventricular tachyarrhythmia in clinical practice[1]. Currently, its prevalence in the developed world is approximately 1.5-2% of the general population, and mean age of affected patients has gradually increased, taking up between 75 and 85 years[2,3]. Reports predict this prevalence will double over the next 50 years[3,4]. It affects approximately 2.3 million adults in the United States and is projected to increase from 5.6 to 15.9 million by 2050[5].

AF has a 5-fold increased risk of stroke, a 3-fold increased incidence of congestive heart failure and increased mortality[6]. The proportion of stroke associated with AF shows an increase of 1.5% between 50 and 59 years of age, and may reach 23.5% between 80 and 89 years[7]. In the latter age group, AF is an independent predictor of stroke, as is high blood pressure (HBP) and heart failure, because in patients with heart failure, the incidence increases by 8 to 20 times[8].

In developed countries, stroke is the third cause of death, and the first cause of permanent disability in adult patients[6]. It is estimated that between 6-34% of ischemic strokes are due to cardioembolic origin, and non-valvular AF is the most frequent cause, responsible for approximately 45%. Other authors report that, probably, 75% of AF-associated ischemic strokes are due to cardiac origin embolism[6].

Paroxysmal atrial fibrillation (PAF) is defined as the clinical presentation of atrial fibrillation that terminates spontaneously or with intervention within the first seven days of onset. Its episodes may recur with variable frequency[1]. These new recurrences can increase the frequency and duration of paroxysms, favoring nonhomogeneous local atrial electrical activity persistence; this way, AF develops and increases its risk complications and progression to other clinical presentation patterns.

These results prove AF to be an independent and important risk factor associated with the development of cardioembolic stroke, which incidence increases with age, so the following scientific problem is formulated: How to establish the risk of recurrence in patients with PAF?

This research was carried out to create a predictive index which would allow to stratify the recurrence risk in patients with a history of PAF; controlling the appearance of new episodes, their progression to persistent or permanent patterns and thus, decreasing or avoiding the aforementioned complications.

METHOD

Research classification

Prospective longitudinal cohort study.

Population of study and sample

One hundred and forty five patients with a diagnosis of PAF, attending arrhythmia consultations at the *Hospital General Universitario Vladimir Ilich Lenin* from Holguín, and the *Hospital Clínico Quirúrgico Hermanos Ameijeiras* from La Habana, Cuba, were studied from 1 July 2013 to 31 December 2014.

Inclusion criteria

All patients aged 18 years or older, from both sexes, with clinical and electrocardiographic diagnosis of PAF were included, despite the type of ventricular response or whether it was their first episode or a recurrence, and without antiarrhythmic treatment.

Exclusion criteria

All patients with episodes of PAF related to surgical interventions, pregnancy, pacemakers or other cardiac pacing device were excluded; in AF forms of persistent, permanent, blocked, and with slow ventricular response. Those caused by alcohol ingestion, digitalis intoxication, hydroelectrolytic disorders, hyperthyroidism, cardiomyopathies, heart failure, valvular disease, valvular prosthesis, pericarditis, and in the course of an acute coronary syndrome were also excluded.

Variables

- Clinical: age and HBP.
- Electrocardiographic:
  - P-wave dispersion (Pd): defined as the difference between the maximum and the minimum P-wave duration in a 12-lead electrocardiogram.
  - Maximum P-wave amplitude: longest P-wave within the 12-lead electrocardiogram.
  - Interatrial block (IAB): interatrial conduction disturbance, manifested on the surface electrocardiogram by a P-wave ≥ 120 msec, which may be associated with a positive/negative morphology in the inferior leads.
  - P-wave terminal force in V_1: is the multiplication of the duration, in milliseconds, of the negative deflection of the P-wave in V_1, by its depth in millimeters.
- Echocardiographic: Left atrial size. It is this cardiac chamber´s size, obtained in its left parasternal long axis view, during diastole.

Twelve-lead electrocardiogram records were performed at a scanning speed of 25 mm/sec, after standardization. P waves were measured with a millimeter ruler, where 1 mm represented 40 msec; so that 5 mm corresponded to 200 msec. P waves distorted by artifacts in the isoelectric line or in their size (excessively flat ≤ 0.1 mV), were discarded for measurement, as it made it impossible to identify their beginning and end; electrocardiographic records having less than 10 measurable leads were also excluded.

Statistical analysis

For the estimate sample (145 patients), a univariate analysis was performed with the variables considered to be part of the index to identify the risk of developing PAF recurrences. These were: age, HBP, maximum P-wave amplitude, Pd, P-wave terminal force in V_1, IAB and left atrial size.

Mann-Whitney U-test was used to compare average ages, due to size differences in patient samples with (n=118) and without (n=27) recurrences. Comparison of proportions was performed through chi-square test (χ^2) with correction, and Fisher's exact test in the case of 25.0% of expected frequencies less than 5.

After performing the univariate analysis and previously evaluating collinearity (very strong correlation above 0.8) among the different variables, it was decided to perform the multivariate analysis with those which were significantly associated with PAF recurrences, and others that −although not significant− were considered important in order to develop the suggested index. It was decided not to include the “left atrial size” variable, because only three patients had a size greater than 40 mm (as patients with cardiac conditions that increase with this size were ruled out); besides, it was not significantly associated with the risk of PAF recurrences. However, it is important to note that this variable remains critical when evaluating this type of patients, since there will be a greater probability for PAF recurrences to happen whenever its value exceeds 40 mm.

We used a multivariate logistic regression function with a dichotomous response, which dependent

variable was recurrence and independent variables were age, HBP, maximum P-wave amplitude, Pd, P-wave terminal force in V_1 and IAB. Odds ratios were estimated exact and at 95% confidence intervals. Significance level of 0.05 was set in every hypothesis tests.

All of the analyzes were performed using an electronic spreadsheet, from the SPSS version 20 statistics software for Windows 10.

Predictive index design

From the logistic regression results, the ORs were rounded to a single figure as weights or estimates for each variable; this way, the resulting magnitude was composed of a global index having a linear combination:

$I = x_1w_1+x_2w_2+...+x_kw_k$, where I is the suggested in-dex; k, the number of variables, x_k is the predictive variable; and w_k, the weight chosen for such vari-able in the index.

$$I = x_1w_1 + x_2w_2 + \cdots + x_kw_k = \sum_{i=1}^{k} x_iw_i$$

Risk stratification

The index value for each patient was calculated and (in order to search for different risk strata), percentiles 25 and 50 of the empirical distribution from the index values were determined, being 57.5 and 71.0, respectively[9,10]; thus, three categories were formed (**Box 1**):

- Low or mild risk < 57.5
- Moderate risk between 57.5 and 71.0
- High risk > 71

Predictive index validation

Validation consisted on the initial determination of the risk level in a new sample, according to the predictive index. After its stratification, patients were observed for one-year follow-up protocol. Once this time was over, the risk level was reevaluated through the aforementioned index; thus a comparison between both results was obtained. The validation process was divided into two stages when estimating the risk of recurrence in order to achieve better organization.

Box 1. Predictive index obtained.

Variable	Score
Age	1
High blood pressure	0
Interatrial block	2
Maximum P-wave amplitude P > 120 mseg	2
P-wave dispersion P ≥ 45 mseg	5
P-wave terminal force in V_1 > 40 mm/mseg	0

Final score	Risk of recurrences
< 57.5	Low
57.5 – 71.0	Moderate
> 71	High

First estimate

Consisted of a primary estimate on the recurrence risk, as determined by the predictive index in the new sample formed by the first 66 patients who presented successively to the reference consultations with a diagnosis of PAF, and who also met the same criteria used in the first sample. The predictive index value for each patient was then calculated and their risk stratified. The relationship between the presence of recurrence and the proposed index was evaluated. Finally, the follow-up protocol was implemented (**Box 2**). This was done from January 1, 2015, through March 31, 2016. The distribution of patients by age group and sex are shown in **table 1**.

The general association between index and recurrence was assessed through the chi-square test (χ^2) while the strength of the association was explored with Kendall's Tau-c coefficient, because the index proposed by strata is an ordinal variable.

Second estimate

It was based on a second estimate of the recurrence risk determined by the predictive index, applied to the same sample used during the first estimate when the follow-up protocol was over. The results obtained were compared with those in the first estimate in order to evaluate the effectiveness of the proposed index.

Box 2. Second stage-attendance protocol for the patients' follow-up.

Score	Risk	Follow-up
< 57.5	Low	- At 30 days. - **Without new recurrences and keeping a low risk:** Follow-up every 3 months during the first 6 months. - **Without new recurrences and keeping a low risk:** Follow-up every 6 months.
57.5 – 71.0	Moderate	- Every 15 days during the first month. - **Without new recurrences and keeping a moderate risk:** Follow-up every 2 months for the first 6 months. - **Without new recurrences and keeping a moderate risk:** Follow-up every 6 months.
> 71	High	- Weekly during the first month. - **Without new recurrences and keeping a high risk:** Monthly follow-up during the first 3 months. - **Without new recurrences and keeping a high risk: F**ollow-up every 3 months.

Patients will be summoned after a week whenever there are new recurrences and follow-up will depend on the level of risk determined.
After a year follow-up, stratification will be performed again, and follow-up will depend on the new level of risk determined.

Another tool used to validate this index was the Kaplan Meier method, which allowed determining the recurrences-free period.

Another important step in the validation process was the main indicators analyzed during the follow-up protocol (**table 2**).

RESULTS

As shown in **table 3** univariate analysis revealed that significant differences were only found between the two groups for the presence of IAB (56.8% vs. 25.9%, p= 0.007) and Pd (78.0% vs. 40.7%, p= 0.001). This table also includes the statistical tests performed for each case.

The variables that were independently associated with recurrence (when the rest of them remain constant) were (**Table 4**): age (p=0.023), history of HBP (p= 0.044), Pd (p=0.005) and P-wave terminal force in V_1 (p=0.028). Age is a risk factor, since its OR recurrence increases as it grows older, and the OR recurrence is approximately 5 times greater in those with a Pd ≥ 45 msec compared to those having lower values. HBP and P-wave terminal force in V_1 were protective factors, because their ORs are lower than 1. This result corresponds to what was already described in the univariate analysis, since a discrete predominance of

Table 1. Distribution of patients by age group and sex. Sample belonging to the predictive index design.

Age groups	Sex				Total	
	Female		Male			
	Nº	%	Nº	%	Nº	%
≥18 – 29	0	0.0	0	0.0	0	0.0
30 – 39	0	0.0	1	1.5	1	1.5
40 – 49	3	4.5	4	6.0	7	10.6
50 – 59	17	25.8	6	9.0	23	34.8
60 – 69	9	13.6	11	16.7	20	30.3
70 – 79	5	7.6	9	13.6	14	21.2
89 – 89	0	0.0	1	1.5	1	1.5
≥90	0	0.0	0	0.0	0	0.0
Total	34	51.5	32	48.5	66	100

Table 2. Validity in the application of the follow-up protocol in the reference consultations (n=66).

Parameters	Results
Incidence of recurrences before protocolization (I_{ap})	56/65
Incidence of recurrences after protocolization (I_{dp})	26/65
Absolute risk before protocolization (RA_{ap})	0.61
Absolute risk after protocolization (RA_{dp})	0.13
Relative risk (RR) = (RA_{dp}) / (RA_{ap})	0.21
Relative risk reduction (RRR) = 1 - RR x 100	79%
Absolute Risk Reduction (RRA) = (RA_{ap}) - (RA_{dp}) x 100	48%
Number of patients needed to treat (NNT) = 1 / RRA x 100	2.80

Table 3. Univariate analysis results.

Variables	Recurrencia		p
	Sí (n=118)	No (n=27)	
Age (years)	62.7 ± 13.2	58.0 ± 15.9	0.286[a]
High blood pressure	80 (67.8)	19 (70.4)	0.976[b]
Interatrial block	67 (56.8)	7 (25.9)	**0.007**[b]
Maximum P-wave amplitude > 120 mseg	36 (30.5)	3 (11.1)	0.070[b]
P-wave dispersion ≥ 45 mseg	92 (78.0)	11 (40.7)	**<0.001**[b]
PTF-V_1> 40mm/mseg	55 (46.6)	16 (59.3)	0.331[b]
LA size > 40mm	1 (0.8)	2 (7.4)	0.089[c]

LA, left atrium; TF, terminal force.
[a] Mann-Whitney U-Test, [b] Chi-square test (χ^2) with correction, [c] Fisher exact test.
Data express n (%) or mean ± standard deviation.

HBP and with P-wave terminal force in V_1 > 40 mm/sec in whom did not present recurrences was observed, although they were not significantly different.

According to the logistic regression results, adjusting the ORs with the standardized variables, Pd (OR=2.025) and age (OR=1.889) stood in order of importance.

The predictive index (using a global index in the form of a linear combination) was obtained as a final result from this research level (see predictive index design). The equation is as follows:

I = age*1 + HBP*0 + IAB*2 + AMP*2 + Pd*5 + PTF-V_1*0

It was decided to describe a patient with the following variables for a better understanding of the analysis: age = 65, with history of hypertension, IAB, AMP < 120 msec, Pd ≥ 45 msec and P-wave terminal force in V_1 ≤ 40, this case, its value would be:

Table 4. Logistic regression results.

Variables	OR	CI of 95%	OR standardized	p
Age	1.047	1.006-1.090	1.889	**0.023**
High blood pressure	0.284	0.083-0.968	0.555	**0.044**
Interatrial block	2.277	0.707-7.329	1.511	0.168
Maximum P-wave amplitude > 120 mseg	1.585	0.343-7.331	1.227	0.556
P-wave dispersion ≥ 45 mseg	4.713	1.590-13.974	2.025	**0.005**
PTF-V_1 > 40 mm/mseg	0.322	0.117-0.883	0.566	**0.028**

TF, terminal force; OR, odds ratio

I = 65*1 + 1*0 + 1*2 + 0*2 + 1*5 + 0*0 = 72

The weights or estimates of the designed predictive index are shown in **box 1**, where 72 indicates stratification involves a high risk for the development of PAF recurrences.

Validation results

The patients' sample used to validate the predictive index was mostly composed by patients 55 years of age or older (69.6%) where 86.3% were hypertensive.

Changes in the risk of recurrence, before and after applying the follow-up protocol demonstrated the predictive index efficacy; as in the first risk estimate (**Table 5**), 84.5% of patients with recurrence showed risks between mean (51.7%) and high (32.8%). It is important to clarify that no hypothesis test was performed, because the statistical test is not valid for the small number of patients who did not present recurrences. After the protocol application, in the second risk estimate (**Table 6**), it was observed that out of 8 patients who did not have recurrence after the first estimate, 39 were reached in the second, and a large percentage of them were between low and moderate risk categories, which was generally significant (p=0.002) and, according to the Kendall Tau-c coefficient (0.317), there was a strong association between the index value by categories and the presence of recurrence.

With the Kaplan Meier method (**Table 7**), a 12-month recurrence-free period was estimated for low-risk cases; 11.647 months for moderate risk and 11.379 months for high risk. The overall mean was 11.631 months without recurrences, suggesting that as the recurrence risk increases, the relapse-free period decreases. In this way, it was possible to extend the recurrences-free period, to avoid its complications, and its evolution to either persistent or permanent pattern.

On the other hand, the incidence of patients with recurrences before applying the protocol was 0.61, and a value of 0.13 was reached after its application (**Table 2**). The relative risk (RR) was lower than one (0.21). This showed that for each patient with recurrence before implementing the protocol, 0.21 were recorded after applying it. In conclusion, for every 100 recurrences before applying the protocol, 21 were subsequently recorded.

Results show that the predictive index can be applied to another population having the same object of study. In this sense, other authors mention the benefits from the implementation of studies, based on clinical results supported by their statistical significance[11,12].

Table 5. Distribution of patients according to recurrence and risk, obtained in the first estimate on risk of recurrences.

Risk	Recurrence				Total	
	Yes		No			
	Nº	%	Nº	%	Nº	%
Low	9	15.5	2	25.0	11	16.7
Moderate	30	51.7	2	25.0	32	48.5
High	19	32.8	4	50.0	23	34.8
Total	58	100	8	100	66	100

Table 6. Distribution of patients according to recurrence and risk, obtained in the second estimate on risk of recurrences.

Risk	Recurrence				Total	
	Yes		No			
	Nº	%	Nº	%	Nº	%
Low	12	44.4	3	7.7	15	22.7
Moderate	8	29.6	22	56.7	30	45.5
High	7	25.9	14	35.9	21	31.8
Total	27	100	39	100	66	100

Chi square test (χ^2): p=0.002
Kendall's Tau-c=0.317; p=0.016

DISCUSSION

Different reports have indicated that AF is more frequent after age 55, with a prevalence of 0.6-1% of the population, and increases with age up to 8% in patients over 80 years. Estimates indicate that about 2.3 million people in North America and 4.5 million in the European Union suffer from paroxysmal or persistent atrial fibrillation[13]. Other publications de-

Table 7. Survival function by strata of recurrence-risk categories (Kaplan Meier method).

Levels	Nº Total	Nº of Events	Measured		ST (months)	Statistics
			Nº	%		
Low	27	0	18	94.7	12.000	Log-Rank (8.37) p<0.05
Moderate	35	2	16	94.1	11.647	
High	4	7	22	75.9	11.379	
Global	66	9	56	86.2	11.631	

TS, survival time

fined age as the most important predictor and, in turn, uncorrectable. Aging affects the structural properties of the atria, leading to fibrosis, myocytic dystrophy, myolysis, dedifferentiation, apoptosis, cell hypertrophy, and disorganization of gap junctions. These conditions generate a shortening in the action potential and the refractory period, which favors the persistence of AF[14,15]. These reports support the statistical significance found in our research, between age and recurrences.

It is known that HBP affects 26.4% of the population over the age of 19 and its risk of morbidity and mortality is exacerbated by association with cardiac arrhythmias[1]. Its prevalence is double in patients who have suffered AF, and HBP has been identified as the main risk factor for developing it, which doubles the risk of mortality and five-fold increases that of stroke[16]. Other authors have found that the probability of developing AF was 1.8 times more frequent in hypertensive patients than in the rest of the non-hypertensive population[17,18]; however, it was found that HBP was a protective factor where making the estimation. This finding may be due to the fact that the selected sample consisted of a greater number of hypertensive patients who did not present recurrence, than those who did recur and were not hypertensive. It is true that HBP plays a determining role in the genesis of PAF, but its estimate in the studied population did not keep this relation. This could be conditioned by the exclusion of a large number of cardiac conditions, besides the sample was formed by a considerable number of young patients who had recurrences and were not hypertensive.

In behalf of this result, the American Heart Association published the results of an observational study within Framingham to determine the associations between AF recurrences and its long-term morbidity, depending on whether the first episode occurred after a secondary precipitant. Finally, they concluded that AF presents recurrences in most people, regardless of whether or not they presented a precipitant[19].

Gunduz *et al.*[20] demonstrated that Pd is a non-invasive marker to determine AF recurrence risk; This is because such dispersion is closely related to an interruption of the atrial impulse, coupled with a greater heterogeneity of the atrial electrical activity. Dilaveris and Stefanadis[21], when evaluating this variable, found intra- and interatrial conduction delay in patients with recurrent PAF. Likewise, the maximum P-wave duration was evaluated, as it was included in the Pd calculation, and responded to the same phenomenon. The results obtained in our study proved the usefulness of Pd and maximum P-wave amplitude, as predictors of the risk of PAF recurrences.

In a study by Agarwal *et al.*[22], they found a IAB prevalence of 52% in the group that had AF episodes, compared to 18% in the group that maintained a sinus rhythm (p<0.001), thus identifying IAB as predictors of PAF. Other authors[23] have shown that these blocks produce electrical remodeling of the atria, favoring atrial conduction time prolongation and, consequently, the onset of arrhythmias such as AF. Considering these reports, our research demonstrated the relationship between rhythm disorder and PAF recurrences.

Different publications have suggested that the arrhythmogenic substrate of the P-wave terminal force in V_1 could be an electrical or structural remodeling of both types in the left atrium. These alterations lead to lack of homogeneity, delayed conduction and electrical decoupling in the atrial excitable tissue, which facilitates the development of FA[24-28]. Martín *et al.*[29], provided as new evidence that this variable is a predictor of recurrences, regardless

of the left atrial size; on the other hand, significant differences have been found in the values of the P-wave terminal force in V_1 between patients with isolated AF and those from the control group[30]. However, we find no correspondence between these approaches and ours. In our opinion, more studies are needed to analyze its behavior as a predictive marker of PAF recurrences.

Regarding the predictive models, Jahangir and Murarka[31], using a multivariate analysis, identified the following variables as predictive factors for the progression of paroxysmal to persistent clinical pattern: HBP, age greater than 75 years, antecedents of transient cerebral ischemia and stroke, chronic obstructive pulmonary disease, and heart failure; they called this model HATCH Index. When compared to ours, we found that it constitutes an important tool to predict the conversion of AF from paroxysmal pattern to persistent; however, it does not allow to determine the risk of recurrences for new episodes.

Llic and Goldenberg[32] stated that, regardless of whether the HATCH index predicts the stroke risk level in every form of AF, it also has a direct relationship with the AF-free period; because they found, related to this index, an AF-free period of 37.7 months. In conclusion, this model does not constitute a specific tool to predict the risk of PAF recurrences. These reasons explain the importance of our proposed index, by clearly establishing the stratification of risk levels to develop recurrence.

Another sign of the significance reached came up from comparing these results with those of other studies, such as the Pharmacological Intervention in Atrial Fibrillation (PIAF), which showed 90% recurrence during one-year follow-up, and the Strategies of Treatment of Atrial Fibrillation (STAF), which reported a 89% year and a half follow-up, as stated by the American-European Consensus[33]

CONCLUSIONS

This predictive index is a new tool which integrating predictive variables feasibly and accurately allow to identify the risk level that patients with paroxysmal atrial fibrillation may have to develop recurrences; this way, it also permits to control the appearance of new recurrences, its progression to persistent or permanent patterns and, thus, to diminish or to avoid its complications.

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