



1:1 atrial-flutter. Prevalence and clinical characteristics[☆]



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ABSTRACT

Little is known about the epidemiology of 1:1 atrial flutter (AFL). Our objectives were to determine its prevalence and predisposing conditions.

Methods: 1037 patients aged 16 to 93 years (mean 64 ± 12) were consecutively referred for AFL ablation. 791 had heart disease (HD). Patients admitted with 1/1 AFL were collected. Patients were followed 3 ± 3 years.

Results: 1:1 AFL-related tachycardiomyopathy was found in 85 patients, 59 men (69%) with a mean age of 59 ± 12 years. The prevalence was 8%. They were compared to 952 patients, 741 men (78%, 0.04), with a mean age of 65 ± 12 years (0.002) without 1:1 AFL. Factors favoring 1:1 AFL was the absence of HD (35 vs 23%, 0.006), the history of AF (42 vs 30.5%)(0.025) and the use of class I antiarrhythmic drugs (34 vs 13%)($p < 0.0001$), while use of amiodarone or beta blockers was less frequent in patients with 1:1 AFL (5, 3.5%) than in patients without 1:1 AFL (25, 15%) ($p < 0.0001$, 0.03). The failure of ablation (9.4 vs 11%), ablation-related complications (2.3 vs 1.4%), risk of subsequent atrial fibrillation (AF) (20 vs 24%), risk of AFL recurrences (19 vs 13%) and risk of cardiac death (5 vs 6%) were similar in patients with and without 1:1 AFL.

Conclusions: The prevalence of 1:1 AFL in patients admitted for AFL ablation was 8%. These patients were younger, had less frequent HD, had more frequent history of AF and received more frequently class I antiarrhythmic drugs than patients without 1:1 AFL. Their prognosis was similar to patients without 1:1 AFL.

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1. Introduction

Granada et al. [1] estimated 200,000 new cases of atrial flutter in the entire U.S. population annually. Independent clinical risk factors for atrial flutter development were found to be heart failure and chronic obstructive pulmonary disease, with relative risks being 3.5 and 1.9, respectively. Atrial flutter with 1:1 atrioventricular (AV) conduction (1:1 atrial flutter) can be associated with hemodynamic compromise and requires emergency treatment. First 1:1 atrial flutter was reported in year 1919 [2] and then 1954 [3] and 1956 [4]. Treatment with antiarrhythmic agents can provoke this disorder by decreasing the atrial rate. Recent technological advances have improved our understanding of the electrophysiologic substrate responsible for atrial flutter. Despite these technical developments, little is known about the epidemiology of 1:1 atrial flutter.

Radiofrequency (RF) ablation of atrial flutter is the actual current method of treatment because it appears as a reasonable approach regarding feasibility and effectiveness and is considered as a low

procedural risk [5–9]. Most patients presenting with atrial flutter outside acute conditions are now treated by RF isthmus ablation.

Our objectives were to determine its prevalence and predisposing conditions of 1:1 atrial flutter among a population admitted for ablation of atrial flutter.

2. Population

Our study included 1037 patients, 797 males (77%) aged from 16 to 93 years, mean age 64 ± 12 years, who were consecutively admitted for the RF ablation of atrial flutter between 2000 and September 2012 in the University Hospital of Nancy, a small town of the east of France. The indications were a recurrent atrial flutter or a poorly-tolerated atrial flutter.

Atrial flutter was considered to be present if there were visible and highly regular “F” waves at a rate ≤ 350 bpm. Highly regular “F” waves were defined as those in which the cycle to cycle atrial variability was ≤ 10 ms. Atrial flutter rate had to be greater than 190 bpm among patients receiving classes I or III antiarrhythmic agents. In all others, the lowest acceptable atrial rate was 240 bpm. The atrial flutter was a counterclockwise atrial flutter in 815 patients and clockwise atrial flutter in 222 patients.

Seven hundred ninety one patients had an underlying heart disease. Hypertension was diagnosed when blood pressure at rest was greater

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than 140/90 mm Hg (or, in a treated patient, by the use of antihypertensive medication). Coronary artery disease was diagnosed when a documented history of myocardial infarction and/or coronary revascularization was present, or if one or more significant (>70%) obstructive lesion(s) were present on a coronary angiogram. Diagnosis of valvular heart disease was made in patients with moderate to severe valvular regurgitation or on the evidence of mitral stenosis. The following heart diseases were ischemic heart disease in 172 patients (16.5%), valvular heart disease in 120 patients (11.5%), hypertensive heart disease requiring specific treatment in 209 patients (20%), dilated cardiomyopathy in 96 patients (9%), chronic lung disease in 92 patients (9%), congenital heart disease in 40 patients (4%) and various heart diseases in 62 patients (6%).

The occurrence of documented 1:1 atrial flutter was noted.

Prior medical history, symptoms, treatment history, the prescription of antiarrhythmic drugs, heart disease and other cardiac risk factors previously reported in epidemiologic studies about atrial flutter [1,9–11], the history of atrial fibrillation (AF) and physical findings were obtained from the clinical records of each patient.

3. Methods

Clinical history including the events before atrial flutter ablation, the events at the time of atrial flutter and the data of echocardiography was collected.

Ablation of atrial flutter by radiofrequency was performed by the conventional method using a "HALO" catheter placed at the coronary sinus whose poles record the activity at the coronary sinus isthmus and right lateral wall of the right atrium. Energy was delivered by a radiofrequency (RF) catheter 8 mm to use a maximum power of 70 W and a maximum target temperature of 70°. Four senior operators associated or not with fellows performed most of the ablations. The protocol was previously reported [12].

Among patients with permanent atrial flutter, sinus rhythm was obtained by applying an RF current at the right isthmus followed by obtaining an isthmus block, the latter objective was achieved for patients in sinus rhythm. The validation of the ablation was retained after cessation of atrial flutter and obtaining a stable bidirectional isthmus block at least 20 min after ablation.

In the case of induction of AF or atrial tachycardia during atrial flutter ablation, sinus rhythm was restored by cardioversion one to 3 weeks later.

Antiarrhythmic drugs were stopped in patients without history of AF and maintained in patients with history of AF. Anticoagulants were maintained in patients with heart disease and previous AF until 2004, according to CHADS2 score until 2010 if the score was ≥ 1 and then CHADS2 vasc score > 1 . The patients were followed from 3 months to 11 years (mean 3 ± 3 years) by the referent cardiologist with ECG and 24 hour Holter monitoring systematically performed one month after ablation and then every year or in case of occurrence of symptoms.

3.1. Statistical analysis

The following criteria were analyzed: age, gender, history of AF, history of heart disease (hypertensive, ischemic, valvular, congenital, dilated cardiomyopathy, chronic lung disease), and new development of AF. We used Chi2 and ANOVA methods for measuring the degree of influence of explanatory variables. Continuous variables were compared with the *t*-test. A *p* value < 0.05 was considered statistically significant. All statistical analyses were performed by using the SPSS package for Windows (version 17.0.1, SPSS Inc., Chicago, Illinois).

4. Results

4.1. Prevalence of 1:1 atrial flutter among patients admitted for ablation of atrial flutter

Eighty five patients with clinically documented 1:1 atrial flutter were collected in this retrospective study. There were 59 men (69%) and 26 women (31%), with a mean age of 59 ± 12 years (range 16–84 years). Twenty patients presented with syncopal tachycardia requiring electrical shock and cardiac defibrillator was implanted by error in one young patient with myotonic dystrophy. The retrospective diagnosis of 1:1 atrial flutter was made with the recording of defibrillator. The event occurred at exercise or after a stress in 39 patients.

The prevalence of 1:1 atrial flutter among patients admitted for ablation of atrial flutter was 8%.

Among the remaining patients without 1:1 atrial flutter, atrial flutter conducted 2 for 1 was poorly-tolerated and required electrical shock or overdose in emergency in 12 patients who had also advanced underlying heart disease.

4.2. Clinical data before atrial flutter ablation (Table 1)

Patients with 1:1 atrial flutter were younger than patients without 1:1 atrial flutter (59 ± 12 vs 65 ± 12 years) (0.0001). They tended to be more frequently males (69 vs 78%) (0.08). Underlying heart disease was less frequent in patients with 1:1 atrial flutter than in patients without 1:1 atrial flutter (65 vs 77.5%) (0.009). According to the nature of heart disease, there were no significant differences between patients with and without atrial flutter; there was a trend for a less frequent incidence of ischemic heart disease and a more frequent incidence of congenital heart disease in patients with 1:1 atrial flutter than in patients without 1:1 atrial flutter. Diabetes was less frequent in patients with 1:1 atrial flutter (0.04).

History of paroxysmal AF before atrial flutter ablation was more frequent in patients with 1:1 atrial flutter (42 vs 30.5%) (0.025). The absence of antiarrhythmic drugs was less frequent in patients with 1:1 atrial flutter than in other patients (45 vs 74%) (0.0001). Indications were usually the prevention of AF but also the treatment of atrial premature beats or ventricular tachycardia. Class of antiarrhythmic drug is reported in Table 2. The nature of antiarrhythmic drug was different among patients with and without 1:1 atrial flutter: the use of class I antiarrhythmic drug was higher in patients with 1:1 atrial flutter than in other patients (34 vs 13%) ($p < 0.0001$), while use of amiodarone or beta blockers was less frequent in patients with 1:1 atrial flutter (respectively 5, 3.5%) than in patients without 1:1 atrial flutter (respectively 25, 15%) ($p < 0.0001$, $p < 0.03$). The association of class I antiarrhythmic drug with beta blockers ($n = 7$) or amiodarone ($n = 3$) did not prevent the occurrence of 1/1 atrial flutter.

The rate of previous stroke was low in the population and did not differ among patients with and without 1:1 atrial flutter.

4.3. Data at the time of ablation (Table 3)

A short PR interval (< 0.12 s) on ECG in sinus rhythm was more frequent in patients with 1:1 atrial flutter than in other patients (6 vs 0.8%) ($p < 0.002$).

There were no differences between the group with 1:1 atrial flutter and the group without 1:1 atrial flutter. The clinical presentation with AFL-related tachycardiomyopathy was as frequent in both groups. Restoration of sinus rhythm and occurrence of a bidirectional isthmus block were as frequent in both groups. In the remaining patients the ablation was complicated by the development of a permanent AF or a left atrial

Table 1

Comparison of 1:1 atrial flutter patients and control patients (A: atrial; HD: heart disease, M: mean, SD: standard deviation, n: number).

	1:1 A flutter	No 1:1 A flutter	<i>p</i> value
Number	85 (8%)	952 (92%)	
Age (years) (M \pm SD)	59 ± 12	65 ± 12	0.0001
Male, n (%)	59 (69%)	741 (78%)	NS (0.08)
HD, n (%)	55 (65%)	736 (77%)	0.009
Ischemic HD, n (%)	8 (9.4%)	164 (17%)	NS (0.06)
Valvular HD, n (%)	8 (9.4%)	112 (12%)	NS
Hypertensive HD, n (%)	13 (15%)	196 (20.5%)	NS
Dilated cardiomyopathy, n (%)	7 (8%)	89 (9.3%)	NS
Congenital HD, n (%)	7 (8%)	32 (3.4%)	NS (0.19)
Chronic lung disease, n (%)	4 (5%)	88 (9.3%)	NS (0.16)
Various HD, n (%)	5 (6%)	55 (6%)	NS
Diabetes, n (%)	4 (5%)	115 (12%)	0.04
Hyperthyroidism	1 (1%)	29 (3%)	NS
Prior history of AF, n (%)	36 (42%)	291 (30.5%)	0.025
No antiarrhythmic drug, n (%)	38 (45%)	706 (74%)	0.0001
Prior history of stroke, n (%)	0	34 (3.6%)	NS (0.08)

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