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Epidemiological, Clinical and Etiological Profile of Rhythmic Emergencies at the University Hospital of Brazzaville, Republic of Congo

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Abstract

Objectives: To describe the epidemiological, clinical and etiological aspects of rhythmic emergencies at the University Hospital of Brazzaville. **Patients and Methods:** This was a retrospective descriptive study conducted in the cardiology and internal medicine department of the University Hospital of Brazzaville from January 1, 2014 to June 30, 2016. Were included, all patients admitted for a severe rhythm disorder diagnosed on the surface electrocardiogram. Rhythmic emergency was defined as a severe rhythm disorder of abrupt onset and required rapid management. Data entry and analysis were performed with Epi Info software version 3.5.1. **Results:** During the study period, 2269 patients were hospitalized, including 138 for a rhythmic emergency. The frequency of rhythmic emergencies was 6.1%. The patients were divided into 76 women and 62 men (sex ratio = 0.81). The mean age of the patients was 63.1 ± 16.9 years (extremes: 17 and 91 years). The socio-economic level was low for 103 patients (74.6%), medium for 26 (17.7%), and high for nine (6.6%). The average time to consultation was 13.7 ± 12.3 days. On admission, the signs were: heart failure (103 cases; 74.6%) including 22 acute cases; dyspnea (94 cases; 68%); palpitations (38 cases; 27.5%); functional impotence (13 cases; 9.4%); collapse (nine cases; 6.5%); chest pain (two cases; 1.4%). The type of rhythmic emergency was: rapid atrial fibrillation (103 cases; 74.6%), ventricular tachycardia (14 cases; 10.1%), junctional tachycardia (10 cases; 7.2%), rapid atrial flutter (10 cases; 7.2%), tachysystole (one case; 0.7%). The context of occurrence was: hypokalemia (8 cases; 5.8%), drun-

kenness (two cases; 1.4%), acute gastroenteritis (one case; 0.7%). Cardiovascular risk factors were: hypertension (62 cases; 45.2%), smoking (17 cases; 12.1%), dyslipidemia (12 cases; 8.7%), diabetes (11 cases; 8%), obesity (10 cases; 7.2%). Underlying heart disease was: dilated cardiomyopathy (40 cases; 29%), hypertensive cardiomyopathy (26 cases; 18.8%), valvulopathy (24 cases; 17.4%). Ischemic heart disease, chronic pulmonary heart disease, and cardiothyreosis were noted equally (n = 5; 3.6%). No heart disease was noted in 24 patients (17.4%). **Conclusion:** Rhythmic emergencies are frequent in Brazzaville. They are dominated by atrial fibrillation and often occur on heart disease.

Keywords

Cardiac Rhythm Disorders, Atrial Fibrillation, Dilated Cardiomyopathy, Brazzaville

1. Introduction

Cardiovascular disease is the leading cause of death in the world, ahead of infections and cancers, responsible for 17.3 million cases of death [1]. Comparing the years 1990 to 2013 in sub-Saharan Africa, cardiovascular disease deaths have increased significantly, accounting for 5.5% of deaths worldwide [2]. One explanation for this is population growth and epidemiological transition. However, the majority of these deaths were due to stroke. These are, in 20% - 30% of cases, due to atrial fibrillation and sudden cardiac death is in the majority of cases related to a severe ventricular rhythm disorder [3].

Thus, cardiac rhythm disorders can be severe, presenting as rhythmic emergencies and putting at risk the vital prognosis of patients. In Black Africa, rhythmic emergencies have been little reported. Their frequency, compared to cardiovascular emergencies, was 36% in Dakar [4], 10.5% in Kinshasa [5], 1.3% between 2010 and 2013 in Abidjan [6]. In Congo, rhythm disorders represented 22% of admissions to the emergency department of the Centre Hospitalier Universitaire de Brazzaville in 2006, and atrial fibrillation ranked first [7]. At the same hospital, rhythmic emergencies accounted for 14% of cardiovascular emergencies in the cardiology department in 2015, ranking third, after heart failure (73.2%) and hypertensive emergencies (19.7%) [8]. In order to study specifically rhythmic emergencies, we have carried out this retrospective study from medical records of patients hospitalized in the department, in order to describe the epidemiological, clinical and etiological profiles.

2. Patients and Methods

We carried out in a retrospective way, a descriptive study on medical records of hospitalized patients in the cardiology and internal medicine department of the University Hospital of Brazzaville, between January 1, 2014 and June 30, 2016

(30 months). The records of patients admitted for a severe or symptomatic rhythm disorder were retained. A pre-established form was used to collect data. The variables studied were: socio-demographic (occupation, socio-economic level), epidemiological (age, sex, frequency), clinical (time and reason for consultation, context of arrhythmia occurrence, clinical signs, associated cardiovascular risk factors), paraclinical: electrocardiogram (type of arrhythmia and heart rate), echocardiogram-Döppler (underlying heart disease, left ventricular ejection fraction, dimensions of the heart chambers), biology (blood glucose, creatinine, kalemia, cholesterol and its fractions). Data entry and analysis were performed with Epi Info software version 3.5.1.

Operational definitions [9]

Rhythmic emergency was defined as any situation in which a rhythm disorder was life-threatening to the patient.

—A rhythm disturbance was rapid if the heart rate was greater than 100 beats per minute.

—A rhythm disorder was symptomatic if it was associated with functional signs (dyspnea, chest pain, syncope, functional impotence) or heart failure.

—Hemodynamic tolerance was considered poor if there was at least one of the following: syncope, angina, arterial hypotension, heart failure, cardiogenic shock.

—Rapid atrial fibrillation was considered if the isoelectric line oscillations replaced P waves and if the QRS complexes were unequal and rapid.

—Atrial flutter was considered in the presence of tachycardia with fine QRS and sawtooth F waves without return to the isoelectric line.

—Atrial tachycardia (tachysystole) was considered in the presence of tachycardia with fine QRS and visible P waves, different from the sinus P wave with return to the isoelectric line.

—Junctional tachycardia was considered when there was a regular fine QRS tachycardia with as many P waves as QRS complexes and a heart rate between 100 and 250 beats per minute.

—Ventricular tachycardia was considered when there was regular tachycardia with wide QRS complexes with or without capture or fusion phenomena. Data were analyzed with Epi info 3.5.1 software.

3. Results

During the study period, 2269 patients were hospitalized in the department. Of the patients hospitalized for a rhythmic emergency, 138 medical records were retained. The frequency of rhythmic emergencies was 6.1%. The distribution of patients by age and sex is shown in **Table 1**. The mean age was 63.1 ± 16.9 years (extremes: 17 and 91 years). The study population included 76 female (55.1%) and 62 male (44.9%) subjects; sex ratio = 0.81. The age groups 60 - 69 and 70 - 79 years included a large proportion of patients (26.8 and 27.9%, respectively).

The occupation of the patients and the clinical signs at admission are shown

in Table 2. Patients with no occupation were the most numerous (n = 60; 43.5%). The percentage of those working in the informal sector and the retired were 27.5 and 15.9% respectively. The socioeconomic level of the patients [10] was: low for a salary ≤ 150,000 CFA francs ($241.935) in 103 patients (74.6%). It was average for a salary between 150 and 300,000 CFA francs ($483.870) in 26 patients (18.8%) and high above 300,000 CFA francs, for nine patients (6.6%). It should be noted that the SMIG (Minimum Interprofessional General Salary) is 90,000 CFA francs ($145,161) in Republic of Congo.

The average time to consultation was 13.7 ± 12.3 days. It was 14 ± 13 days for patients of low or medium socioeconomic level, and 8.2 ± 7.6 days for those of high socioeconomic level. Delay in consultation was not related to socioeconomic level (p = 0.3).

Table 1. Distribution of patients by age and sex.

	Men	Women	Total	%
<30	3	7	10	7.3
30 - 39	2	6	8	5.8
40 - 49	-	5	5	3.6
50 - 59	11	8	19	13.8
60 - 69	17	20	37	26.8
70 - 79	21	17	38	27.5
≥80	8	13	21	15.2
Total	**62 (44.9%)**	**76 (55.1%)**	**138**	**100**

Table 2. Patients occupation and clinical signs at admission.

Profession	n	%
None	60	43.5
Informal sector workers	38	27.5
Retired	22	15.9
Civil servants	14	10.1
Private sector worker	2	1.4
Clinical signs		
Heart failure	103	74.6
Dyspnea	94	68.1
Palpitations	38	27.5
Neurological signs	15	10.8
Cardiogenic shock	9	6.5
Chest pain	4	2.9

Heart failure was noted in 103 patients and was acute in 22 cases (15.9%). In five cases (3.6%), heart failure was part of a cardiothyreosis. Dyspnea was the most common functional sign (68.1%), followed by palpitations (27.5%). The neurological signs observed in 15 patients were: functional impotence associated with dysarthria (13 cases), convulsion (one case), syncope (one case). Chest pain occurred in four patients, including two (1.4%) in a state of intoxication. The mean systolic blood pressure was 120.5 ± 39.7 mmHg; the mean diastolic blood pressure was 74.2 ± 22.6 mmHg. In 67 cases (48.5%), the blood pressure was normal. Collapse was noted in all nine patients admitted in shock.

3.1. Types of Rhythmic Emergencies, Heart Rate on Admission, Underlying Heart Disease

The surface electrocardiogram highlighted the types of rhythmic emergency. They are listed in Table 3. The most frequent were, in descending order: rapid atrial fibrillation (103 cases), ventricular tachycardia (14 cases), rapid atrial flutter, and junctional tachycardia (10 cases each). Atrial tachysystole was noted in 1 case.

The mean heart rate on admission was 141 ± 27.9 beats per minute. A heart rate above 150 beats per minute was a factor in hemodynamic instability ($p < 0.026$).

The echocardiogram-Döppler performed in the 138 patients, allowed to highlight the underlying cardiopathies represented on the Table 4, and dominated by the cardiomyopathies which were: dilated (28.9%), hypertensive (18.8%). They were followed by valvulopathies (17.4%). Ischemic heart disease, chronic pulmonary heart disease and cardiothyreosis were observed in the same proportions (3.6%). In 37 cases (27%), the heart disease was previously known. The left atrium was dilated in 63 cases (45.6%). Left ventricular systolic dysfunction was noted in 28 patients (20.3%). The left ventricular ejection fraction was preserved in 54 cases (39.1%). The echocardiogram was normal in 24 cases (17.4%).

3.2. Arrhythmia Tolerance, Associated Cardiovascular Risk Factors

Poor arrhythmia tolerance was noted in 27 patients (19.6%). These were: 1) acute heart failure (n = 22), occurring on a "presumed healthy" heart 13 times and as cardiogenic shock nine times; functional angina following drunkenness (twice); 3) syncope (once).

Table 3. Type of rhythmic emergency observed.

	n	%
Rapid atrial fibrillation	103	74.6
Ventricular tachycardia	14	10.1
Rapid atrial flutter	10	7.3
Junctional tachycardia	10	7.3
Atrial tachysystole	1	0.7
Total	**138**	**100**

Table 4. Observed heart disease.

	n	%
Dilated cardiomyopathy	40	28.9
Hypertensive cardiomyopathy	26	18.8
*Valvular heart disease	24	17.4
Ischemic heart disease	5	3.6
Chronic pulmonary heart disease	5	3.6
**Other heart diseases	5	3.6
Cardiothyreosis	5	3.6
Myocarditis	4	2.9

*Valvulopathy: mitral = 16; **Other heart diseases: atrial septal defect = 2; arrhythmogenic right ventricular dysplasia = 1; acute pericarditis = 1; chronic constrictive pericarditis = 1.

The associated cardiovascular risk factors were, in decreasing order: arterial hypertension (62 cases; 44.9%), smoking (17 cases; 12.3%). Dyslipidemia, diabetes, and obesity were noted in 12 cases (8.7%), 11 cases (8%), and 10 cases (7.2%) respectively.

3.3. Biological Examinations

The biological workup revealed: renal failure (22 cases, 15.9%), diabetes and dyslipidemia in the proportions mentioned above. Eight patients (5.8%) showed hypokalemia.

4. Discussion

4.1. Limitations of the Study

This study has several limitations. It was based on retrospectively analyzed data from the records of patients hospitalized during the study period. This constitutes an information bias with missing data. The study is mono-centric, concerning patients admitted only to the cardiology department. The number of patients is relatively small, in contrast to international registries [11]. Nevertheless, this preliminary work on the epidemiological, clinical and etiological profile of rhythmic emergencies will provide data in cardiology in Brazzaville. However, it needs to be pursued prospectively and more extensively.

4.2. Sociodemographic Characteristics

The frequency of rhythmic emergencies was noted at 6.1% in our retrospective, single-center hospital study, with the selection bias that this implies. This result obtained on small numbers reveals the morbidity of rhythmic emergencies in our department. This frequency is slightly higher than those of some African and French series [5] [10] [11], ranging from 1.3% to 4.7%. In Dakar [4], rhythmic emergencies collected in several departments of the same hospital represented

37.3% of cardiovascular diseases. As reported by other authors [7] [8] [10], rapid atrial fibrillation was the most frequently observed rhythm disorder in our patients (74.6%). Other rhythmic emergencies noted were, in decreasing order: ventricular tachycardia, rapid atrial flutter, junctional tachycardia, atrial tachysystole. The same chronology was observed in Abidjan [6]. The frequency of ventricular tachycardia can be explained by the presence of dilated cardiomyopathy, a major cause of rhythm disorders [1] [10], as in 35.5% of our patients.

The average age of our patients was 63.1 years, close to the 67 years noted by Cahun-Giraud *et al.* [12]. For the Ivorian authors [6], the most represented age group was between 60 and 79 years. It is established that the incidence of rhythm disorders increases with age, whether or not there is heart disease, the risk being multiplied by 4 at 60 years of age or 9 at 80 years of age for atrial fibrillation [3]. Our youngest patient was 17 years old and had mitral insufficiency. This underlines the importance of rheumatic valve diseases in our country [13].

The predominance of sex is variously appreciated: female in our work, as well as in Senegal [14] and Cameroon [15], contrary to the Ivorian series which included more males [6]. The predominance of female arrhythmias can be explained by the loss of hormonal protection at menopause. This situation induces the shortening of the action potential with the lengthening or shortening of the PR space according to the variations of the calcium flow at the origin of the rhythm disorders [3].

In our work, 43.5% of patients were not gainfully employed. The series of Lugero *et al.* in Uganda [16] included 47.1%, comparable data. In addition, nearly three quarters of our patients had a low socioeconomic level. The average delay of consultation of our patients noted at 1.37 days was an illustration. This is double the average time reported by Bertrand *et al.* [17] in a multicenter study on cardiovascular emergencies in sub-Saharan Africa. Consequently, it is important to improve the standard of living of the Congolese population for better accessibility of patients to hospitals.

4.3. Reasons for Consultation and Associated Cardiovascular Risk Factors

Dyspnea was the most common functional sign in our study, as well as in Côte d'Ivoire and Cameroon [6] [15]. The predominance of dyspnea in our patients (68%) was also the fact of heart failure observed in 74.6% of cases on admission. In Uganda [16] and Tunisia [18], palpitations were the first sign of call. Arterial hypertension, the main risk factor for arrhythmias, was noted in 48% to 84% of cases in other series [11] [16] [17] [18] [19]. Almost 45% of our patients were hypertensive. Smoking, the second risk factor that we observed in 12.3% of cases, has been reported in varying proportions in other series: 4% in Uganda [16], 36% of 64 cases of arrhythmias in Egypt [20]. Smoking has a direct role in the genesis of supraventricular arrhythmias and through ischemic heart disease, another powerful factor in atherosclerosis [9]. Risk factors such as obesity, di-

abetes and dyslipidemia, which we have noted in proportions ranging from 7.2% to 8.7%, have also been reported by several authors [3] [15] [21]. They act by accelerating the atherosclerotic process. Obesity is also an extrinsic factor in the occurrence of arrhythmias because of the adipose infiltration of the atrial myocardium [9].

4.4. Clinical Signs

The coexistence of heart failure with an arrhythmia, as in 74.6% of our patients, is known [9], and has been reported in other series in Africa [15] [16]. A rhythm disorder such as atrial fibrillation, by reducing cardiac output by about 30%, can promote the onset of heart failure all the more rapidly when there is underlying heart disease [9] [12]. Hemodynamic instability is life-threatening in the short term, thus requiring rapid management. The mean heart rate of our patients was 159 beats per minute and the mean age was 63.1 years. Unstable arrhythmias were faster for Perruchoud *et al.* [22]: 184 beats per minute on average for supraventricular, versus 198 beats per minute on average for ventricular. In addition, their patients were older (average age 74 years). In our work, an increase in heart rate beyond 150 beats per minute was an independent factor for the occurrence of hemodynamic instability. However, heart failure may occur in an acute mode, as in 22 of our cases, with arrhythmia, or as a consequence of advanced heart disease. Indeed, 45.6% of our patients had a dilated left atrium and 20.3% had left ventricular systolic dysfunction. Moreover, heart rate acceleration is a poor prognostic factor, especially in the context of chronic heart failure [9]. It should be emphasized that atrial fibrillation can, in addition to hemodynamic instability, lead to embolisms [9] [16]. These were exclusively cerebral in 9.4% of our patients.

Atrial fibrillation, the most frequent rhythm disorder [3] [9] [23] [24] [25], was noted in 74.6% of our patients. We observed other rhythmic emergencies in 10.7% of cases for ventricular tachycardia and 7.2% for rapid atrial flutter, versus 13.4% and 11.8% respectively in Abidjan [6]. However, arrhythmia can occur in a patient without cardiac disease as in the 24 in our series, a fact also observed in other series [3] [6] [9] [15] [16]. Dilated cardiomyopathy noted in 28.9% of our cases was the first cause of rhythmic emergency, followed by hypertensive cardiomyopathy. In Abidjan [6], the same chronology was observed. However, it should be noted that rheumatic heart disease still occupies a significant place among the causes of arrhythmias: 17.4% in our work, 22.5% in Spain [26], 34% in Uganda [16], 47% in India [20]. Ischemic heart disease, a major source of rhythm disorders [9] [12] [17], was observed in 3.6% of our patients. However, in the absence of coronary angiography in our hospital, it is possible that genuine cases of ischemic cardiomyopathy were considered as cardiomyopathies with healthy coronary arteries. Hyperthyroidism, an extracardiac cause of arrhythmias, with atrial fibrillation at the top of the list, was noted in 3.6% of our cases and reported by several authors [2] [13] [14] [16] [20] [27]. Excessive al-

cohol consumption is another cause of arrhythmias, reported in 30% of partygoers [28]. Indeed, there is a strong association between massive alcohol consumption and the occurrence of rhythm disorders. Alcohol, by dilating the vessels and increasing the heart rate, stimulates the sympathetic system and favors the secretion of catecholamines. However, individual vulnerability also plays a role, depending on whether the heart is healthy or not.

4.5. Biological Aspects

The reported renal failure is generally functional, as a consequence of renal hypoperfusion related to hemodynamic instability [9]. The 22 cases in our series and the 23 in that of Lugero *et al.* [16] are an illustration. Hypokalemia, which causes arrhythmias by increasing cardiac automatism and delaying repolarization, requires management [9]. It was noted in eight of our patients.

5. Conclusion

Rhythmic emergencies are frequent in cardiology at the University Hospital of Brazzaville. They predominate in relatively young and female subjects. The coexistence of heart failure is frequent. The different types observed are: rapid atrial fibrillation and flutter, ventricular tachycardia, junctional tachycardia and tachysystole. These rhythmic emergencies most often occur in the setting of heart disease, the main ones being: dilated cardiomyopathy, hypertensive heart disease and rheumatic valve disease.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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