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RESEARCH ARTICLE

HEART FAILURE WITH PRESERVED EJECTION FRACTION IN A WAR ZONE APROPOS OF 61 CASES IN TOMBOUCTOU (MALI)

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ABSTRACT

Introduction: Heart failure with preserved ejection fraction is a common condition the diagnosis of which is difficult because it predominates in elderly subjects with other pathologies. **Objective:** To describe the epidemiological, clinical, paraclinical and therapeutic aspects of this condition in the medical department of Tombouctou hospital in Mali. **Methods:** This is a descriptive, cross-sectional study carried out over 24 months and relating to the analysis of 61 files of patients hospitalized for clinical heart failure with isolated diastolic dysfunction of the left ventricle on cardiac echodoppler. **Results:** The study involved sixty-one patients with isolated diastolic dysfunction of the left ventricle with preserved ejection fraction out of 266 cases of heart failure, i.e. a prevalence of 23%. The average age was 52.6 ± 18.8 years with extremes of 18 and 90 years. There was a female predominance with a sex ratio of 1.2. Cardiovascular risk factors were dominated by arterial hypertension (52.5%), tobacco (21.3%) and obesity (9.8%). The electrocardiogram showed complete arrhythmia by atrial fibrillation with 34.4% frequency and left ventricular hypertrophy with 14.8% frequency. Transthoracic cardiac echo-Doppler revealed left ventricular hypertrophy and dilatation of the left atrium in (13%) and (75.4%) of the patients, respectively. Mitral flow was restrictive, pseudo-normal, or of the relaxation type disorder in 25 (41%), 18 (29.5%) and 18 (29.5%) patients, respectively. **Conclusion:** Heart failure with preserved ejection fraction is a condition increasingly encountered in daily practice in Africa. It is characterized in our context by the precocity of its occurrence in subjects with a long history of unbalanced arterial hypertension and chronic stress.

INTRODUCTION

Heart failure is a major public health problem. Heart failure with preserved ejection fraction (ICFEP) is a frequent form the diagnosis of which is difficult because it predominates in elderly subjects with other pathologies (Pérez de Isla, 2009). The results of recent studies show that the prognosis of ICFEP is poor with an annual survival close to that of heart failure due to systolic dysfunction of the left ventricle (Bhatia, 2006). Its prevalence in Canada is around 31% (Bhatia, 2006). However, in Africa, little work has been done on this type of heart failure. A study carried out in Senegal found a prevalence of heart failure with preserved LVEF at 28.8% (Mouhamed Cherif Mboup, 2013); in Abidjan, Traore in his study had found a prevalence of 25% (Traore, 2017). In Mali, we do not have local data for this clinical entity, hence the interest of our study.

Objective: To describe the epidemiological, clinical, paraclinical and therapeutic aspects of this condition in the medical department of Tombouctou hospital in Mali.

MATERIAL AND METHOD

This was a descriptive, cross-sectional study with a retrospective collection of data from January 01st, 2020 to December 31st, 2021 at the level of the medical department of the Tombouctou hospital, during which we included 61 patients. The volunteers were patients hospitalized for heart failure.

Collection of data: Data collection was done from hospital records.

The data collected were sociodemographic, clinical (functional signs, physical signs), cardiovascular and paraclinical risk factors (echocardiography, electrocardiogram and biology).

Judging criteria: Clinical: patients with symptoms suggestive of heart failure. The positive diagnosis of heart failure with preserved ejection fraction was based on: A clinical syndrome of heart failure with diastolic dysfunction of the left ventricle and a preserved left ventricular ejection fraction (greater than 50%).

Operational definitions: Heart failure (HF) is therefore defined by the inability of the heart muscle to provide normal systemic blood flow with a normal filling pressure regime. Signs of heart failure (HF) were dyspnea (according to NYHA), crackles, left canter sound for left IC and hepatalgia, right canter sound, hepatomegaly, edema of the lower limbs (OMI), turgidity of the jugular veins for the right IC. The diagnosis of diastolic dysfunction was based on the recommendations of the European Society of Cardiology. Diastolic dysfunction was retained when the ratio between the maximum velocity of the transmitral protodiastolic filling flow of the left ventricle in pulsed Doppler (Em) and that collected in pulsed tissue Doppler at the level of the mitral annulus in protodiastole (Ea) was greater than 15. A left ventricular mass greater than 115g/m² in men and 95g/m² in women; atrial fibrillation on the electrocardiogram. Exclusion criteria were left ventricular ejection fraction less than 50%, pericarditis, and mitral stenosis.

Variables: Data were collected using the medical observation record and recorded in a questionnaire. This questionnaire was written by the scientific manager and the principal investigator and included. The statistical population studied was patients with clinical heart failure with left ventricular diastolic dysfunction on echocardiography. Echocardiographic parameters were obtained using a Mindray equipped with a 3.5 MHz adult probe and a tissue Doppler function.

The variables studied were

- Quantitative includes the age of patients, the seniority of hypertension and diabetes.
- Qualitative included sex of patients, symptoms, description of echocardiographic doppler, electrocardiographic and biology abnormalities.

The Excel 2016 software was used for data entry and then analyzed by SPSS 24 software. The demographic, clinical and paraclinical characteristics of the patients were described. The qualitative data were presented by their proportion, expressed as a percentage, and the quantitative data by their median or their mean (plus or minus standard deviation).

Ethics: Informed consent was obtained with strict confidentiality.

RESULTS

We included 61 patients with isolated diastolic dysfunction of the left ventricle on cardiac echo-Doppler out of 266 cases of heart failure, i.e. a prevalence of 23%.

Clinical aspects: The average age was 52.6 ± 18.8 years with extremes of 18 and 90 years. There was a female predominance with a sex ratio of 1.2 in favor of women. Chronic heart failure and diabetes were the medical history found with 6.5% and 8.2% respectively. The cardiovascular risk factors were dominated by arterial hypertension (52.5%) with an average duration of evolution of 4 ± 2.7 years, tobacco 21.3%, obesity (9.8%) with an average body mass index (BMI) of 35.5 kg/m² and diabetes 8.2%. Functional signs were dominated by dyspnea (81.9%), cough (50.8%) and lower limb edema (39.3%). Physical examination revealed signs of left ventricular failure (49.2%) followed by congestive heart failure (45.9%). The clinical examination data are summarized in (Table 1).

Table 1. Distribution of patients according to clinical examination

Physical examination	Effectives	Percentage
Left ventricular failure	30	49.2%
Congestive heart failure	28	45.9%
Right ventricular failure	3	4.5%
Total	61	100

Paraclinical aspects: The electrocardiogram showed complete arrhythmia due to atrial fibrillation with 34.4% frequency and left ventricular hypertrophy with 14.8% frequency (Table 2). On biology, there was anemia (36.1%), moderate to severe renal insufficiency 24.6%. Transthoracic cardiac echo-doppler revealed left ventricular hypertrophy in eight patients (13%), an average left ventricular mass of 114.6 ± 32.3. Dilatation of the left atrium with an average area of 20.77 ± 8.42 cm². Mitral flow was restrictive, pseudo-normal, or of the relaxation type disorder in 25 (41%), 18 (29.5%) and 18 (29.5%) patients, respectively. The Em/Ea ratio greater than 15 was present in all our 61 patients, allowing us to retain the diagnosis of heart failure with preserved systolic function. Pulmonary arterial hypertension was found in 25 (41%) patients with mean systolic pulmonary arterial pressure at 48.4 ± 10.6 mmHg as shown in (Table 3).

Table 2. Distribution of patients according to the results of the electrocardiogram

Electrocardiogramme	Effectives	Percentage
ACFA	21	34.4%
LVH	9	14.8%
ESV	5	8.2%
SCA ST+	2	3.3%

Table 3. Distribution of patients according to echocardiography results

Echocardiography parameters	Mean	Standard Deviation
Left ventricular ejection fraction	62.03	10.2
End-diastolic diameter of the left ventricle (mm)	50.57	9.19
End-systolic diameter of the left ventricle (mm)	32.31	7.09
Left atrium area (cm ²)	20.77	8.42
Indexed left atrium volume (ml/m ²)	42.5	3.4
Indexed left ventricle mass (g/m ²)	114.6	32.3
PAPS	48.4	10.6
Surface of the right atrium (cm ²)	16.06	5.6
E/E'	16.4	3.6

Therapeutic aspects and evolution: The medical treatment of heart failure with preserved ejection fraction remains poorly codified. Our patients benefited from furosemide at 83.6% frequency. In combination with furosemide, ACE inhibitors and beta-blockers were used in 47 (77%) and 43 (70.5%) patients respectively. VKAs and calcium channel blockers were prescribed in 18 (29.5%) and 2 (3.3%) patients respectively. The medical treatment of fractional heart failure preserved ejection is shown in (Table 4). The evolution was favorable in the majority of cases (96.7%) with an average hospital stay of 6 days. We recorded two cases of death, i.e. a fatality rate of 3.3%.

Table 4. Distribution of patients according to treatment

Treatment	Effectives	Percentage
Furosemide	51	83.6%
ACE	47	77%
Beta-blockers	43	70.5%
AVK	18	29.5%
Amlodipine	2	3.3%
Aldomet	2	3.3%
ARB	1	1.6%
BASIC	1	1.6%
Insuline	1	1.6%

DISCUSSION

In our work, 23% of patients hospitalized for heart failure had isolated diastolic dysfunction. This prevalence of ICFEP is close to that found in similar American studies 24 to 55% (Malki, 2005; Vaccarino, 2002) and in African studies, in particular that of Mouhamed Chérif in Senegal who found 28% (3), Traore alongside of ivory and Adebayo in Nigeria which found 25% and 39.5% (Traore, 2017; Adebayo, 2009). However, in this study, certain parameters of the diastolic dysfunction had not been evaluated, such as the tissue Doppler ratio E/E' between 8 and 13 or the pulmonary venous flow and could account for an underestimation of the frequency of this pathology in our dispute. The average age was 52.6 ± 18.8 years, relatively young, in accordance with the African literature (3, 4,7). But remains lower than those found in European and North American series. In these studies, the mean age was 78 ± 10 years and 75.1 ± 13.1 years respectively in France and the United States of America (8,9). This difference could be linked on the one hand to the lower life expectancy in Africa and especially to the inaccessibility of the majority of the population to health facilities in relation to the security dispute. Our study, like that of Senegal, confirms the female predominance of ICFEP with a sex ratio of 1.2 (Mouhamed, 2013). Arterial hypertension was the most described risk factor 52.5% in line with most African studies (Mouhamed Cherif Mboup, 2013; Traore, 2017), but also African-American and European studies on heart failure (Nurcan, 2006; Lenzen, 2004). The long evolution (mean duration of evolution of 4 ± 2.7 years) of unbalanced arterial hypertension leads to the occurrence of hypertensive heart disease. It is characterized by the appearance of left ventricular hypertrophy with increased arterial and ventricular stiffness, and impaired relaxation (Diamond, 2005).

We recorded a diabetes rate 8.2% lower than that found by Mouhamed Cherif and Nurcan with 45% and 42.3% respectively. It has been shown that the presence of diabetes was a factor of poor prognosis in patients hospitalized for ICFEP. Its presence was associated with a 5-year survival of 32% and an increase in mortality of 60% compared to the group of non-diabetic patients (13). Functional signs were dominated by dyspnea (81.9%), and physical examination revealed signs of left ventricular failure (49.2%) followed by congestive heart failure (45.9%) comparable to that of Mouhamed Cherif (2013). In our series, heart failure with preserved ejection fraction was associated with two other comorbidities: renal failure and anemia. Severe renal failure (24.6%) in these patients multiplies the risk of cardiovascular complications through structural changes in the myocardium, anemia and intolerance to excess salt (8, 14). The prevalence of anemia in our work (36.1%) was lower than that found in the study by Mouhamed Cherif (47%) and Shamagian et al (46%) (Mouhamed Cherif, 2013; Shamagian, 2006). Left ventricular hypertrophy and dilatation of the left atrium are the two echocardiographic morphological abnormalities most frequently found in our patients and in the literature (Berry, 2005). There was a dilation of the left atrium in 75.4% of our patients, testifying to the chronicity and severity of the diastolic dysfunction of the left ventricle (Danzmann, 2008; Maeder, 2009). It promotes the occurrence of atrial fibrillation present in 34.4% of our patients. The prevalence of atrial fibrillation in patients hospitalized for ICFEP is significant both in epidemiological studies (30% to 40% (19, 20)) and in randomized studies (20% to 30% (McMurray, 2008; Yusuf, 2003). In the work of Fung et al, atrial fibrillation (29%) was associated with a high NYHA functional class, impaired 6-minute walk test, and dilatation of the left atrium (Fung, 2007). Tachycardia, loss of atrial systole, and irregular cardiac cycles are all mechanisms that may explain the negative impact of atrial fibrillation in patients with heart failure with preserved ejection fraction (Fung, 2007). ACE inhibitors or ARBs and beta-blockers may be potentially beneficial in patients with heart failure with preserved ejection fraction who also have other indications for these agents, such as coronary artery disease, diabetes or hypertension (9). Therefore, our patients benefited from furosemide at 83.6% frequency. In combination with furosemide, ACE inhibitors and beta-blockers were used in 47 (77%) and 43

(70.5%) patients respectively. The duration of hospitalization was similar to that of the OPTIMIZE-HF registry, with an average of 6 days (9). We recorded two cases of death, giving a lethality rate of 3.3% comparable to that of the OPTIMIZE-HF register (Fonarow, 2007).

The limits of our study: The small size of our sample. Failure to produce BNP or NT-proBNP due to lack of a technical platform. Financial difficulties and the security situation linked to the rebellion in the area prevented patients from being consulted at the hospital. Pulsed Doppler mitral A wave measurements and pulmonary A wave measurements are not available on our ultrasound system.

CONCLUSION

Heart failure with preserved ejection fraction is a condition increasingly encountered in daily practice in Africa. It is characterized in our context by the precocity of its occurrence in subjects with a long history of unbalanced arterial hypertension and chronic stress. This shows the importance of screening and management of arterial hypertension, which must be integrated into a global program to combat cardiovascular disease.

Contribution of the authors: All the authors also contributed to the conduct of this research work. All authors have read and approved the final version of the manuscript.

Conflicts of interest: The authors declare no conflict of interest.

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