

Peripartum Cardiomyopathy: Epidemiological, Clinical, Para-Clinical and Therapeutic Aspects at the Tombouctou Hospital

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Abstract

Introduction: Peripartum cardiomyopathy (PPCM) is a heart failure whose etiology is still unknown. The aim of work was to study peripartum cardiomyopathy in its epidemiological, clinical, paraclinical and therapeutic aspects at the Tombouctou hospital. **Methods:** This is a descriptive cross-sectional study carried out in the Medicine Department of the Timbuktu hospital from January 1 to December 31, 2019. It concerned patients who presented heart failure between the 8th month of pregnancy and the first 5 months postpartum. **Results:** During the study, 23 patients were collected. Average age of the patients was 23.50 ± 3.50 years with extremes of 16 and 34 years. Incidence of Peripartum cardiomyopathy (PPCM) was 1/345 pregnancies. Average parity was 3.20 with extremes of 1 and 8. Symptoms appeared at postpartum with 87% of cases. A significant delay in diagnosis was observed. Global heart failure was the mode of decompensation with 70%. Electrocardiographic signs were mainly sinus tachycardia (87%) and left ventricular hypertrophy (83%). Cardiac ultrasound showed in all cases dilated cardiomyopathy and it was associated with thrombus in left ventricle cavity for three cases. Left ventricular ejection fraction was severely impaired in 70% of cases. Pulmonary hypertension was significant in 52%. Most commonly drugs we used in our series at acute stage were diuretics: furosemide 100% and spironolactone 70% (100%

and 70%) and ACE inhibitors (90%). Beta-blockers (bisoprolol and carvedilol) were used in 15 patients. Bromocriptine (prolactin inhibitor) was used for 2 patients. **Conclusion:** Peri partum cardiomyopathy is a serious cardiac complication of pregnancy of unknown cause, common in the African population.

Keywords

Heart Failure, Cardiomyopathy, Peripartum, Treatment

1. Introduction

Peripartum cardiomyopathy (PPCM) or Meadows syndrome is an apparently primary heart failure with a dilated heart occurring between the eightieth month of pregnancy and the first five months after childbirth in women with previously healthy hearts [1] [2]. It is a pathology whose etiology remains unknown today, hence its name of idiopathic or primary cardiomyopathy [3] [4]. Globally, this disease is more common in Sub-Saharan-Africa than in other regions. It accounts for less than 1% of cardiovascular problems associated with pregnancy in developed countries and overall incidence is estimated at in 3 to 4000 births with a wide geographical variety [5]; but it would be more frequent in black women and particularly in black Africa [6] [7]. A study from Togo showed incidence of Peripartum cardiomyopathy (PPCM) was 1/362 pregnancies [8]. According to a study carried out at the Gabriel Touré University Hospital from Mali Peripartum cardiomyopathy represented 6.8% of hospitalizations in the cardiology department and 11.4% of hospitalizations for heart failure in women [9].

Aim of the Study

To study the cardiomyopathy of the peripartum in its epidemiological, paraclinical and therapeutic aspects at the Timbuktu hospital.

2. Patients and Methods

This is a descriptive cross-sectional study that took place over a 12-month period from January 1 to December 31, 2019 in the Medicine Department of Tombouctou Hospital.

Were included in the study women who presented with heart failure (HF) between the eightieth month of pregnancy and the first five months postpartum without a found etiology and in whom dilated cardiomyopathy (DCM) was diagnosed at the cardiac ultrasound doppler. Women with onset of heart failure before the eightieth month of pregnancy or after the first six months postpartum, women with known heart disease or any other cause of heart failure were not included in the study. In addition to the absence of a cause of heart failure, the following ultrasound criteria were essential to retain the diagnosis of peri-

partum cardiomyopathy: dilation of the left ventricle (telediastolic diameter of the left ventricle $> 32 \text{ mm/m}^2$ of body surface area) with left ventricular systolic dysfunction *i.e.* lower left ventricular ejection fraction (LVEF) under 0.45 and/or shortening fraction $< 30\%$.

2.1. Operational Definition

Heart failure is a complex clinical syndrome. It is the inability of the heart (right and/or left) to maintain sufficient flow at rest and exertion to meet the metabolic needs of the body; or the heart can only do so at the cost of increased ventricular filling pressures

Criteria for defining socioeconomic level:

- Low: laborers, low-income farmers, retail traders and casual workers (Low income).
- Middle: middle state executives (high school teachers, senior health technicians, etc.) and/or from the private sector and middle traders (average income).
- High: senior officials of the State and/or the private sector and import-export traders (High income).

2.2. Collection of Data

A pre-established survey sheet was used to collect demographic data, data from antenatal consultations, cardiovascular risk factors, the mode of occurrence or decompensation of HF, the mode and course of childbirth. Chronology of signs of HF in relation to childbirth, and data from the physical and paraclinical examination.

Paraclinical data were obtained from the following examinations: chest x-ray, electrocardiogram, cardiac echodoppler, biology (complete blood count, glycaemia, creatinemia, uricemia, proteinuria, ionogram blood, HIV serology).

2.3. Data Entry and Analysis

Word and Excel 2013 software were used for data entry and SPSS11 and Epi Info 3.3.2 software for their analysis. The statistical test used was Ki2 with a significance level of 5%.

2.4. Ethics

Informed consent was obtained with strict respect for confidentiality.

3. Results

3.1. Epidemiological Aspects

We recorded 23 cases of peripartum cardiomyopathy with an incidence of 1/345 pregnancies. Average age was 23.50 ± 3.50 years (range from 16 and 34). Women aged between 20 - 29 years were 52%; 22% of cases were at least 30 years old and 26% of patients were under 20 years old. Peripartum cardiomyopathy ac-

counted for 3.36% of hospitalizations in the medical department, 18% of heart failure and 33% of heart failure in women. Unemployed women represented 78% of the sample. Women were of unfavorable socio-economic conditions in 91%. Multiparas were the most represented in our series with 61%. Average parity was 3.45 (range from 1 to 8). **Table 1** summarizes data of the socio-demographic characteristics.

3.2. Clinical Aspects

In 87% of cases symptoms appeared in the postpartum period (**Figure 1**). A delay in consultation was noted in all patients with an average delay of 43 days (range from: 5 to 105 days). Symptoms were dominated by dyspnea on exertion (**Table 2**). Decompensation was done in the mode of isolated left heart failure in 30% of cases and in the mode of global heart failure in 70% of cases. **Table 3** summarize data from the physical examination.

Table 1. Socio-demographic characteristics.

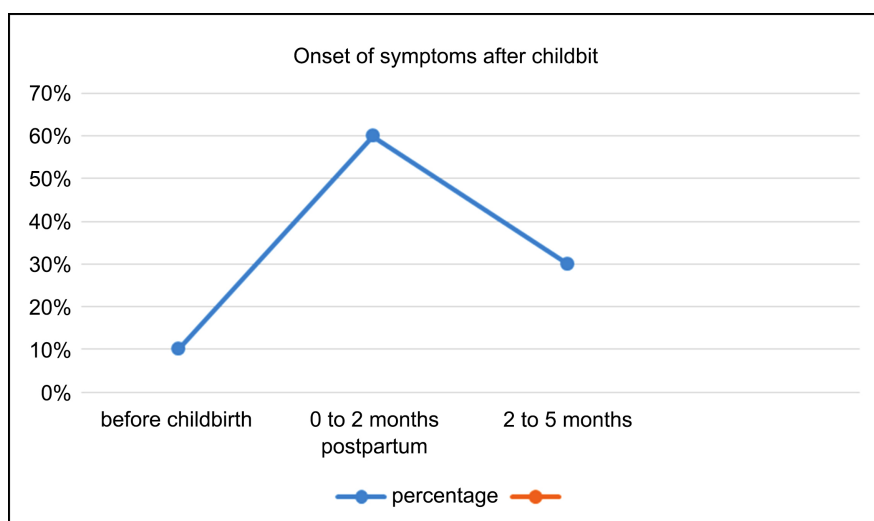
Age	Effective	Frequency (%)
Under 20	12	26
20 - 29 years	6	52
30 ans and over	5	22
Total	23	100
Parity		
4 à 8	14	61
2-3	6	26
1	3	13
Total	23	100,0
Socioeconomic level		
Low	21	91
Middle	2	9
High	0	0
Total	23	100

Table 2. Functional signs.

	Number	Percent%
Dyspnea NYHA stage IV	14	61
Dyspnea NYA stage III	9	39
Cough	17	74
Oedema of the lower limbs	16	69
Palpitations	8	35
Precordial pain	5	22

Table 3. Min anomalies of physical examination.

	Number	Percent%
Tachycardia	20	87
Galopping noise	19	83
jugular turgescence	16	69
Systolic murmur	15	65
Hepatomegaly	13	56
Hepato-jugular reflux	15	65

**Figure 1.** Onset of symptoms after childbirth.

3.3. Paraclinical Aspects

The frontal chest X-ray: had objectified cardiomegaly in 20 patients (87%) with an average cardio-thoracic index of 0.58 (extreme 0.55 to 0.78).

Electrocardiogram: found sinus tachycardia in 87% of cases, left ventricular hypertrophy in 19 patients (83%). Fifteen patients (65%) had left atrial hypertrophy and 26% of patients had bi-ventricular hypertrophy. There were no atrioventricular conduction disturbances. We noted a case of complete left bundle branch block with QRS at 160 ms. In 13 cases (56%), nonspecific repolarization disorders were noted associated with ventricular hypertrophies. The electrocardiogram was normal in 2 cases.

3.4. Transthoracic Echocardiographic Data

Left ventricle was dilated in all patients with a tele diastolic diameter ranging from 33.6 to 43 mm/m² body surface area (57.8 to 80 mm). Left atrium was dilated in 19 patients (83%), Right ventricle was dilated in 15 patients (65%). Average Left ventricle ejection fraction (EF) was 0.30 (range 0.18 and 0.40). Ejection fraction was severely impaired in 69% of cases. Systolic myocardial wave (Sa) was lowered in all patients with a mean of 0.39 (range 0.20 and 0.65). All

patients presented with global parietal hypokinesia. Cardiac Doppler ultrasound revealed a thrombus in left ventricle cavity for 3 patients (13%). Functional mitral insufficiency was found in 69%. Left ventricular filling pressures were increased for 18 patients (78%). Pulmonary arterial hypertension was significant in 52% of cases with an average of 43.40 mmHg (range from: 37 and 70 mmHg).

3.5. Therapeutic Aspects

Most drugs used in patients for our at acute stage were diuretics: furosemide and spironolactone diuretics (furosemide 100% and spironolactone 69%) and ACE inhibitors (90%). Beta-blockers (bisoprolol and carvedilol), were used for 15 patients. Bromocriptine (prolactin inhibitor) was used for 2 patients. Low molecular weight heparin (LMWH) curative dose anticoagulation was performed during hospitalization in 3 (13%) patients with intracavitary thrombus. All these patients benefited from a relay with Vitamin K antagonist (VKA). Moreover, all of our patients received heparinotherapy at a preventive dose or a curative dose during hospitalization.

Family planning was discussed with 18 patients before discharge from hospital. It was only effective with 7 patients (6 patients benefited from an mechanical method and one from subcutaneous method norplant).

Average length of stay at hospital for our patients was 7 days (range from 4 to 20 days). Twenty-one patients (91%) had recovered clinically with disappearance of the signs, two patients (9%) had developed irreducible heart failure. The hospital case fatality rate was zero.

4. Discussion

4.1. Our Study Suffered from Certain Limitations, Particularity

- Financial difficulty for patients to do initial consultation and security difficulty for patients who came from outside the city Tombouctou to do initial consultation,
- Small sample size.

4.2. Epidemiological and Clinical Aspects

Incidence of peripartum cardiomyopathy was 1/345 pregnancies in our study. In Africa the incidence of peripartum cardiomyopathy is variable [4] [6] [8] [9]. In West Africa disease seems less frequent with an incidence from 1/3000 to 1/15,000 [7]. These results confirm that peripartum cardiomyopathy is a pathology that is most prevalent in black women [10] [11]. Other associated factors are advanced maternal age [12]. In this study, Average parity was 3.45 (range from: 1 and 8) with 61% multiparas. This testifies to the frequency of this affection in multiparous women [12]. In addition, 91% of the patients were from low socio-economic conditions. We share with authors that low socioeconomic level is also a risk factor for peripartum cardiomyopathy [13].

Multiparity and unfavorable socio-economic conditions are risk factors for peripartum cardiomyopathy founded in this study. Other factors such as notion of chronic arterial hypertension and prolonged use of tocolytics, twin pregnancies [12] cannot be formally retained in this study.

We observed a great delay in consultation among our patients. Dyspnea on exertion was the master symptom with an advanced stage of NYHA classification. Same findings were reported in African literature [4] [6] [8] [9] [13]. These are actually patients in whom the symptoms start earlier but ignorance and poverty are the causes of consultation delays and most of the patients are found in a stage of global heart failure with a state of hydrops. Women considered edema of the limbs as a normal fact related to pregnancy and when they had dyspnea with increase of intensity majority of patients done consultation. Other symptoms founded were precordial pain and cough. Precordial pains ranged from a simple precordial tingling to angina-like pain with a feeling of chest tightness. Their frequency varies according to the authors [6] [8] [9] [11] [13]. These chest pains associated with coughing pose a real diagnostic problem because they can raise suspicion of pulmonary embolism. Due to the limited diagnostic resources, five of our patients were put on an anticoagulant at a curative dose due to a strong suspicion of pulmonary embolism and the rest of the patients were on the preventive dose during hospitalization. Tachycardia with galloping noise, systolic murmur of mitral insufficiency and crackling rales were the most frequent auscultatory data found in our patients. Several authors have reported the same data from physical examination but at widely varying rates [4] [6] [8] [9] [13]. Statistical disparities are explained by the subjective nature of the clinical examinations, hence the need for paraclinical examinations.

4.3. Paraclinical Aspects

Cardiomegaly was noted at chest X-ray in 87% of cases in this study. Cardiomegaly is constant in heart failure but remains nonspecific [14]. Chest X-ray is essential in our regions where cardiac ultrasound doesn't exist in medical care centers.

On electrocardiogram, arrhythmias are reported in the literature. Ferrière [15] on 11 observations noted 1 case of ventricular tachycardia. This is a ventricular tachycardia detected by holter ECG recording. Sinus tachycardia, left ventricular hypertrophy and nonspecific repolarization disorders are the electrical abnormalities frequently found [6] [8] [9] [13]. In our series we objectified a complete left bundle branch block.

In from a recent childbirth woman who complains of dyspnea, discovery of cardiomegaly at Chest X-ray associated with sinus tachycardia and left ventricular hypertrophy at EKG should lead to peripartum cardiomyopathy until proven otherwise. Cardiac Doppler ultrasound will only come to confirm diagnosis and appreciate impact and complications of disease.

Echocardiographic signs are one of the defining criteria for peripartum car-

diomyopathy and global parietal hypokinesia is the constant disorder found [2] [15]. Cavity dilation as well as systolic left ventricular dysfunction were severe in our patients. These are the consequences of delayed consultation and diagnosis. Peripartum cardiomyopathy is a highly embologenic pathology [8] [10]. Reasons are multiple: hypercoagulability of the blood during pregnancy [16], dilated cardiomyopathy which appears in a recent childbirth woman, reduced maternal mobility during the last months of pregnancy, compression of the inferior vena cava by the fetus.

4.4. Therapeutic and Evolutionary Aspects

Treatment in acute stage is dominated by diuretics (furosemide and spironolactone). ACE inhibitors were the second most widely used drugs in our study. This therapeutic attitude is found in several studies [20] [21]. In our series beta blockers were used after acute stage of disease which is consistent with the data in the literature [5]. On the other hand, bromocriptine, a prolactin inhibitor which has been shown to be effective in a randomized controlled trial [22], is little used in our series.

Evolution of peripartum cardiomyopathy is unpredictable [17]. Inter-reproductive interval depends on the time it takes for systolic function to recover normal function. When heart failure persists beyond sixtieth month after childbirth, mortality at one year is 28% in one year and at 5 years is 85% [2] [3]. Resistant forms to medical treatment in the literature represent 10% of cases [17] in our series, two patients (9%) presented with this form. When peri partum cardiomyopathy is healed, risk of recurrence in a subsequent pregnancy cannot be excluded. Advice for patients is therefore adapted to each case. Some characteristics are considered to have a poor prognosis. These are of African origin, age greater than 30, a delay in onset of symptoms greater than 3 months, persistence of clinical signs 6 months after the onset of the disease, cardio-thoracic index at chestx-ray greater than 0.6 and the characteristics of the left ventricle at trans-thoracic echocardiography like: dilation (end diastolic diameter of the left ventricle <55 - 60 mm), an ejection fraction <30%, a shortening fraction less than 20% at the time of diagnosis [2] [16]. If we consider these factors, we will say that all of our patients had a poor prognosis.

Prognosis of the disease is unpredictable. In the literature many patients die despite treatment, while others progress quite favorably, and after 6 to 12 months of treatment, complete recovery is observed [2] [16]. Between healing and death, the course is from chronic heart failure to dilated cardiomyopathy [18]. The obstetric prognosis is poor. Heart failure occurs in 50% - 80% of cases in subsequent pregnancies, with mortality reaching 60% [19]. Given a very high mortality during subsequent pregnancies, we agreed with our multiparous patients to opt for a contraindication for permanent pregnancy. First-time mothers wishing to have another pregnancy are followed up and decisions, that is to say the normalization of cardiac function.

5. Conclusion

Peripartum cardiomyopathy is a serious cardiac complication of pregnancy. It is common in Timbuktu as in other black African countries. It occurs preferentially in the postpartum period. Risk factors were: maternal age over 30 years, multiparity and unfavorable socio-economic conditions. There was a significant delay in diagnosis. Clinical picture was global heart failure with significant dilation of the heart chambers and severe impairment of myocardial performance.

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Conflicts of Interest

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

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Survey Sheet

Number Survey Sheet:.....

I. Socio-Demographics Data

Last Name:.....

First Name.....

Age.....

Profession.....

Socioeconomic level: low / / middle / / High / /

≠Criteria for defining socioeconomic level:

- Low: laborers, low-income farmers, retail traders and casual workers (Low income).
- Middle: middle state executives (high school teachers, senior health technicians, etc.) and/or from the private sector and middle traders (average income).
- High: senior officials of the State and/or the private sector and import-export traders (High income).

II. Past Medical History

1) Personal history

a) Medical

- Hypertension: yes / / no / /
- Diabetes: yes / / no / /
- Heart failure: yes / / no / /
- Asthma: yes / / No / /
- Drepanocyt: yes / / Non / /
- Dysthyroidism: yes / / No / /
- Other (s) to be specified:

b) Obstetric history

Number of pregnancies:

- Twin pregnancy: yes / / Number:..... No / /
- Prenata consultation: yes / / No / /
- Other (s) to be specified:.....

2) Family history

- Arterial hypertension: yes / / No / /
- Diabetes: yes / / No / /
- Heart failure: yes / / No / /
- Other (s) to be specified:.....

III. Socioeconomic Level

Socioeconomic level: Low / / Middle / / High / /

IV. Clinical Examinations

1) Onset of symptoms

Peripartum: Ante-partum yes / / no / / if yes month of pregnancy [.....]
 Post-partum yes / / no / / if yes number of days after childbirth [...]

2) Functional signs

- NYHA of dyspnea stage:

Stage I / / Stage II / / Stage III / / Stage IV / /

- cough: yes / / No / /
- Hemoptysis: yes / / No / /
- Precordial pain: yes / / No / /
- Palpitations: yes / / No / /

3) General signs

a) General condition: Good / / Fair / / Impaired / /

b) Conjunctiva: Colored / / Few colored / / Pale / /

c) Weight:kg Size:.....metre

d) Blood pressure:.....mm hg

4) Physical signs

- a) Tachycardia: yes / / No / /
- b) Galloping noise: yes / / No / /
- c) Deviated peak shock: yes / / No / /
- d) crackling groans: yes / / No / /
- e) Hepatomegaly: yes / / No / /
- f) Jugular turgescence yes / / No / /
- g) Hepato-jugular reflux: yes / / No / /
- h) Oedema of the lower limbs: yes / / No / /
- i) Murmur of MI: yes / / No / /
- j) Murmur of TI: yes / / No / /

k) Other (s) to be specified:

5) Type of the heart failure

- a) Left: yes / / No / /
- b) Global: yes / / No / /

V. Additional Tests

1) Electrocardiogram

- Sinus tachycardia: yes / / No / /
- Signs of ischemia: yes / / No / /
- Atrial fibrillation: yes / / No / /
- Extrasystoles: yes / / No / /

if yes type:

- Left ventricular hypertrophy: yes / / No / /
- Right ventricular hypertrophy: yes / / No / /
- Left atrial hypertrophy: yes / / No / /
- Right atrial hypertrophy: yes / / No / /
- Atrioventricular block: yes / / No / /

if yes Type:

- Left bundle branch block: Yes / / No / /
- Right bundle branch block: Yes / / No / /
- QRS duration:.....ms
- Repolarization: normale / / Anormal/ /
if abnormal: type.....and territory.....

2) Trans-Thoracic Echocardiography

- VG diameter in mm/m² body surface area:mm/m²
- LV diastolic tele diameter in mm:mm
- Anteroposterior diameter of the left atrium:mm
- Left atrium area:cm², Left atrium volume:.....ml/m² of body surface area
- Diameter of the ventricle at the level of the tricuspid ring:mm
- Right atrium area:cm²
- Diameter of the septum in tele diastole:mm
- Posterior wall diameter in diastole:mm
- Global kinetics: normal:..... Global hypokinesia.....
- Segmental kinetics disorder: present:..... Absent:.....
- LV ejection fraction:
- Transmitral flow: normal / / relaxation disorder / / Restrictive / /
- Tissue Doppler: E'/A' = S wave velocity (basal) in cm/second:
- Appearance of the valves:
- Normal mitral valve..... Remodeled..... calcified..... Leak.....
- If Yes type: Rank:
- Normal Aortic Valve..... Remodeled..... calcified..... Leak.....
- If Yes type: Rank:
- Normal Tricuspid Valve..... Remodeled..... calcified..... Leak.....
- If Yes type: Rank:
- Normal Pulmonary Valve..... Remodeled.....calcified..... Leak.....
- If Yes type: Rank:
- PAPS: mmHg
- Pericardial effusion yes / / no / /
- Presence of intracavitary thrombus: Yes / / no / /
if Yes Location

3) chest x-ray

- Cardiomegaly: Yes / / CTI:..... No / /
- Signs of veno-capillo-pulmonary hyperpressure Yes / / No / /
- Alveolar syndrome: Yes / / No / /
- Interstitial syndrome: Yes / / No / /
- Other (s) to be specified:

4) Blood count

- Anemia: YES / / No / / Hemoglobin level....
- Hyperleukocytosis: Yes / / No / /
- Leukopenia: Yes / / No / /
- Thrombocytopenia: Yes / / No / /

5) Biochemistry

- Blood creatinine: Normal / / High / /
- Blood sugar: Normal / / Low / / High / /
- Blood Ionogram: Normal / / Abnormal / /
- Uricemia: Normal / / High / /
- HIV serology: Negative / / Positive / / if positive type:
- Other (s) to be specified:.....

VI. Treatment

- Hygienic-dietetic measure: Yes / / No / /
- Diuretics: Furosemide Yes / / No / /
 Spironolactone Yes / / No / /
- Converting enzyme inhibitor: Yes / / No / /
 if yes Type
- Anti-platelet agents: Yes / / No / /
 if yes Type
- Anticoagulant: Yes / / No / /
 if yes Type
- Bromocriptine: Yes / / No / /
- Beta blockers: Yes / / No / /
 if yes Type
- Other (s) to be specified:.....
- Complication and Evolution
Complications during hospitalization
- MVTE: TVP / / EP / /
- Cerebrovascular accident: Yes / / No / /
- Rhythm disorder: Yes / / Type..... No / /
- Chronic heart failure: Yes / / No / /
- Other (s) to be specified:.....

VII. Evolution during Hospitalization

- Favorable: Yes / / No / /
- Stationary (persistence of signs of heart failure: Yes / / No / /
- Death: Yes / / No / /