

Acute Coronary Syndromes in Black African Women at the “Le Luxembourg” Mother-Child University Hospital Center in Bamako: About 195 Cases

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How to cite this paper: Sadik, M.G., Mamadou, T., Samba, S., Massama, K., Hamma, S., Ousmane, T., Ameri, D.M., Mariam, D., Asmaou, K., Souleyman, C. and Ichaka, M. (2026) Acute Coronary Syndromes in Black African Women at the “Le Luxembourg” Mother-Child University Hospital Center in Bamako: About 195 Cases. *World Journal of Cardiovascular Diseases*, 16, 668-681. <https://doi.org/10.4236/wjcd.2026.169062>

Received: July 20, 2026

Accepted: September 17, 2026

Published: September 20, 2026

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Abstract

Introduction: Worldwide, cardiovascular pathologies, particularly coronary heart disease, are the leading cause of death in women. In Mali and sub-Saharan Africa in general, few data exist on acute coronary syndromes (ACS) in women; hence the initiative for this study, whose main objective is to investigate the sociodemographic, clinical, paraclinical, therapeutic and evolutionary aspects of acute coronary syndrome in black women. **Methodology:** This is a descriptive, cross-sectional study with retrospective and prospective recruitment, concerning female patients admitted for acute coronary syndrome over a period of 4 years and 5 months from September 2019 to January 2024 within the interventional cardiology unit of the Mother-Child University Hospital Center in Bamako, Mali. **Results:** Of a total of 596 patients admitted for acute coronary syndrome during the period, 195 were female, representing a 32.72% hospitalization rate for ACS in women. The mean age of the patients was 59.82 ± 11.45 years [21 and 86 years], with the 45 - 65 age group the most affected. Risk factors were mainly hypertension 68.2% (n = 133), sedentary lifestyle 66.2% (n = 129), and diabetes 55.4% (n = 108). The predominant functional sign was typical chest pain in 65.1% of cases (n = 127). Clinical examination was normal in 76.92% (n = 150) of patients. Electrical findings were mainly persistent ST-segment elevation in 56.9% (n = 111). Seventy-eight percent (n

= 153) of patients were managed 12 h after first medical contact. The approach for coronary angiography was radial in 93.33%. Coronary angiography was pathological in 76.4% (n = 149). The anterior interventricular artery was the most affected artery in 65.64% (n = 128) of cases. Lesions were significant in 93.29% (n = 139) and 82.55% (n = 123) of cases of sub-occlusions and occlusions. Angioplasty was performed in 45.64% of our patients (n = 89), and active stents were used in 100% of cases. Five deaths were recorded among the complications during percutaneous coronary procedures and during in-hospital evolution. **Conclusion:** Acute coronary syndrome is not uncommon in women in sub-Saharan Africa. Typical chest pain is the most frequent symptomatology. Delayed diagnosis and treatment remain a major problem.

Keywords

Acute Coronary Syndrome, Coronary Angiography, Women,
Le Luxembourg Mother-Child University Hospital Center, Bamako

1. Introduction

ACS is a major concern in women, although before the age of 60 its frequency is lower than in men; after the age of 75, women are thought to account for the majority of patients [1].

According to the WHO in 2018, cardiovascular disease is the leading cause of death in women [2]. They are responsible for 35% of deaths worldwide [3].

In the WHO African Region in 2019, ischemic heart disease was the leading cause of death regardless of gender, with 8.41% of deaths in the 50 - 59 age group, 12.2% of deaths in the 60 - 69 age group, and 15.87% in those aged 70 and over [4].

Acute coronary syndromes encompass a range of clinical presentations, mainly differentiated on the basis of the electrocardiogram presented as ST-segment elevation ACS or non-ST-segment elevation ACS [5].

Previously considered a male pathology, data from mainly Western studies have led to advances in our knowledge of ACS in women.

ACS in women is said to have the highest complication rates and the poorest prognosis, with hospital mortality significantly higher than in men, sometimes more than twice as high, especially in young women, and more severe and/or less typical clinical presentations from the outset [6].

According to some recent studies on myocardial infarction in young women, typical chest pain was the predominant feature, traditional modifiable risk factors were the most frequent, atheromatous coronary lesions, often obstructive or even tritruncular, were found in significant proportions, and hospital mortality was not significantly different from that in men [7] [8].

In sub-Saharan Africa, data on acute coronary syndrome in women remain poor, despite the clinical, diagnostic and therapeutic knowledge acquired in recent decades.

In Senegal, a hospital study at the Principal Hospital Center in Dakar showed an increase in the prevalence of ACS in the female population, compared with previous studies, a higher prevalence of diabetes and obesity in women, atypical symptomatology and relatively longer emergency department admission times compared with ACS in men [9].

In Mali, previous hospital-based studies of ischemic heart disease in general, and acute coronary syndrome in particular, have generally concerned both sexes [10]-[14]. Few studies have focused specifically on acute coronary syndrome in women, hence the interest of this study.

2. Methodology

Our study was carried out in the interventional cardiology unit of the “Le Luxembourg” Mother-Child University Hospital Center in Bamako, Mali. It is a descriptive, cross-sectional study with retrospective and prospective recruitment of patients admitted for ACS to the interventional cardiology unit from September 01, 2019 to January 31, 2024, *i.e.*, 53 months. All patients admitted for acute coronary syndrome and who underwent coronary angiography with or without angioplasty were included. Anyone who had not undergone a diagnostic coronary angiography was excluded. A survey form was designed to collect sociodemographic data, cardiovascular risk factors, admission times, clinical, paraclinical and therapeutic data, and intra-hospital outcomes. These data were collected from patient records and during hospitalization. Acute coronary syndrome was clinically defined as any angina-like chest pain—occurring at rest or upon exertion, whether *de novo*, prolonged, or recently worsening—in a patient with or without a history of coronary artery disease; this presentation is most often associated with ECG abnormalities involving changes to the ST segment and/or T wave. This definition also encompasses atypical forms of ACS, characterized by few or no suggestive clinical signs and/or a normal ECG tracing. In the context of chest pain and for the purposes of this study, acute coronary syndrome is classified into two main types:

- ST-segment elevation acute coronary syndrome, corresponding to persistent ST-segment elevation in at least two contiguous ECG leads, accompanied by elevated troponin levels (>14 ng/L).
- Non-ST-segment elevation acute coronary syndrome, corresponding to repolarization abnormalities in at least two contiguous ECG leads—such as negative T waves, tall T waves, or ST-segment depression—or normal repolarization, accompanied by either normal (≤ 14 ng/L) or elevated (>14 ng/L) troponin levels.

Our study population—“Black African women”—comprises any female of sub-Saharan origin, regardless of age or nationality and whether or not she resides in Mali, who was admitted to the “Le Luxembourg” Mother-Child University Hospital in Bamako with acute coronary syndrome. Several variables were studied. Cardiovascular risk factors: arterial hypertension defined as systolic blood pressure ≥ 140 mmHg and/or diastolic blood pressure ≥ 90 mmHg (WHO 1999) in adults over 18 years of age; sedentary lifestyle: defined as no physical activity or

physical activity of less than 30 minutes per day or less than 3 hours 30 minutes per week; Diabetes: defined as fasting blood glucose ≥ 7 mmol/l (1. 26 mg/dl) on 2 occasions after a minimum of 8 hours fasting in a patient or a random blood glucose ≥ 2 g/l (11 mmol/l) in the presence of symptoms of hyperglycemia; Obesity: assessed according to body mass index ($BMI = \text{weight}/\text{height}^2$). Normal weight: BMI between 18.5 - 24.9 kg/m². Overweight: BMI between 25 - 29.9 kg/m². Obese: BMI 30 - 34.9 kg/m². Morbid obesity: BMI ≥ 40 kg/m²; Dyslipidemia: defined by total cholesterol > 200 mg/dl; HDL-c < 40 mg/dl; LDL-c > 150 mg/L and/or triglyceride > 150 mg/dl; Smoking: active or passive, weaned less than 3 years, whether industrial cigarette, chewing tobacco or shisha. Coronary angiography: a normal coronary angiogram: absence of any angiographic lesion that could explain the existing symptoms, Monotruncular: a single coronary artery affected; Bitruncular: two coronary arteries affected; Tritruncular: three or more coronary arteries affected; Non-significant lesion: stenosis $< 50\%$; Intermediate lesion: stenosis from 50% to 70%; Significant lesion: stenosis $\geq 70\%$ or $\geq 50\%$ if common trunk lesion; Sub-occlusion and complete occlusion: subtotal or total interruption of the orifice of a coronary artery. Regarding therapeutic management: medical treatment alone, is indicated for patients with non-significant lesions, or where the risk of angioplasty or coronary artery bypass grafting (CABG) outweighs the expected benefit, as well as—in our African context—for patients unable to undergo revascularization due to a lack of financial means and health insurance; angioplasty is indicated for patients with significant lesions and anatomy suitable for PCI, where the expected benefit outweighs the risk; and coronary artery bypass grafting is indicated for patients with complex lesions—such as multivessel disease or complex left main disease—often including diabetics, where the expected benefit outweighs the risk.

Data were entered on Microsoft Excel 2013 software and analyzed on SPSS. version 26. Patients included in the study were informed—either upon admission or via telephone—that their data would be used for research purposes, and confidentiality was maintained. The university hospital's ethics committee was informed of the study's conduct.

3. Results

3.1. Epidemiology

3.1.1. Prevalence

During the study period, 195 female patient records were collected out of 596 patients admitted for acute coronary syndromes who underwent coronary angiography, representing a hospital-based frequency of ACS among women of 32.72%.

3.1.2. Patient Age Distribution

The mean age of patients was 59.82 ± 11.45 years, with extremes of 21 and 86 years. The 45 - 65 age group was the most affected (**Figure 1**).

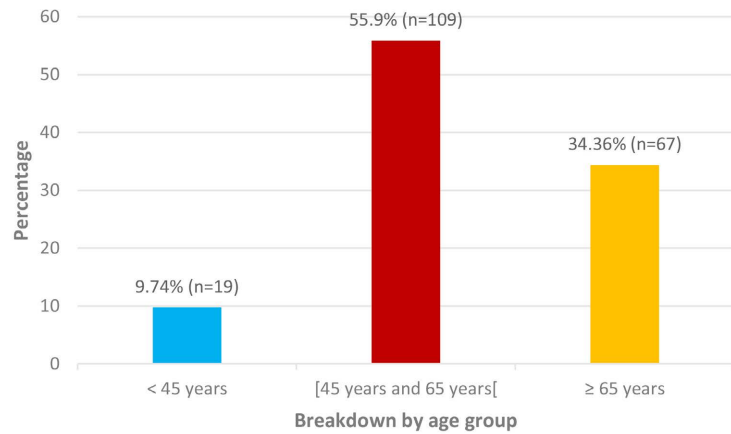


Figure 1. Patient age range.

3.2. Clinical Characteristics

3.2.1. Cardiovascular Risk Factors

Table 1. Breakdown by cardiovascular risk factors.

Cardiovascular risk factors	Number (n = 195)	Percentage (%)
Hypertension	133	68.2
Sedentary lifestyle	129	66.2
Diabetes	108	55.4
Obesity	40	20.5
Dyslipidemia	32	16.4
Tobacco	6	3.1

The predominant cardiovascular risk factors were Hypertension 68.2%, physical inactivity 66.2% and diabetes 55.4% (**Table 1**).

3.2.2. Personal History

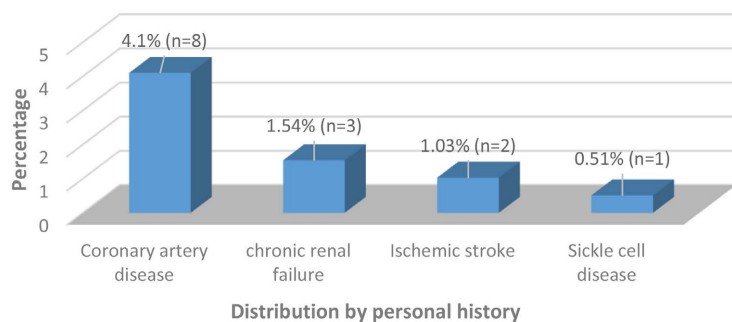


Figure 2. Distribution by personal history.

Coronary artery disease was the most common personal antecedent in 4.10% (n = 8) of cases (**Figure 2**).

3.2.3. Symptoms

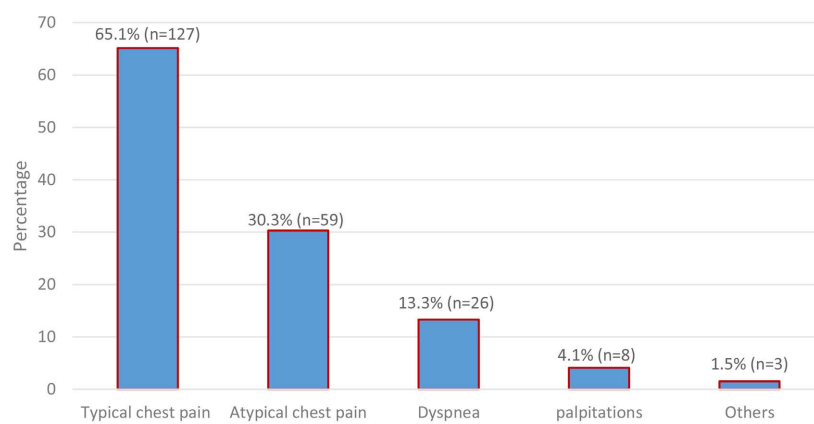


Figure 3. Distribution by symptomatology.

The main functional sign was typical chest pain, with a proportion of 65.1% (n = 127) as shown in **Figure 3**.

3.2.4. Clinical Examination

Table 2. Distribution by Killip stage on admission.

Killip Stadium	Number (n = 195)	Percentage (%)
Killip I stage	150	76.92
Killip II stage	33	16.92
Killip III stage	08	4.10
Killip IV stage	04	2.05

Clinical status was stable in the majority of cases, with 76.92% (n = 150) in Killip I stage (**Table 2**).

3.3. Paraclinical Aspects

3.3.1. Electrocardiographic Aspects of Repolarization

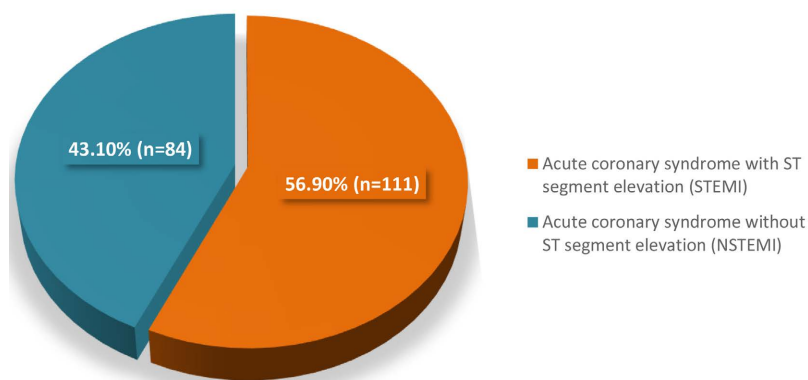


Figure 4. Distribution by ECG repolarization abnormality.

The main electrocardiographic finding was persistent ST-segment elevation in 56.9% (n = 111) of cases (**Figure 4**).

3.3.2. Coronary Angiography

Table 3. Distribution according to coronary angiography results.

Coronary angiography	Number (n = 195)	Percentage (%)
Normal coronary angiography	46	23.59
Pathological coronary angiography	149	76.41

Coronary angiography was pathological in 76.41% (n = 149) of cases, as shown in **Table 3**.

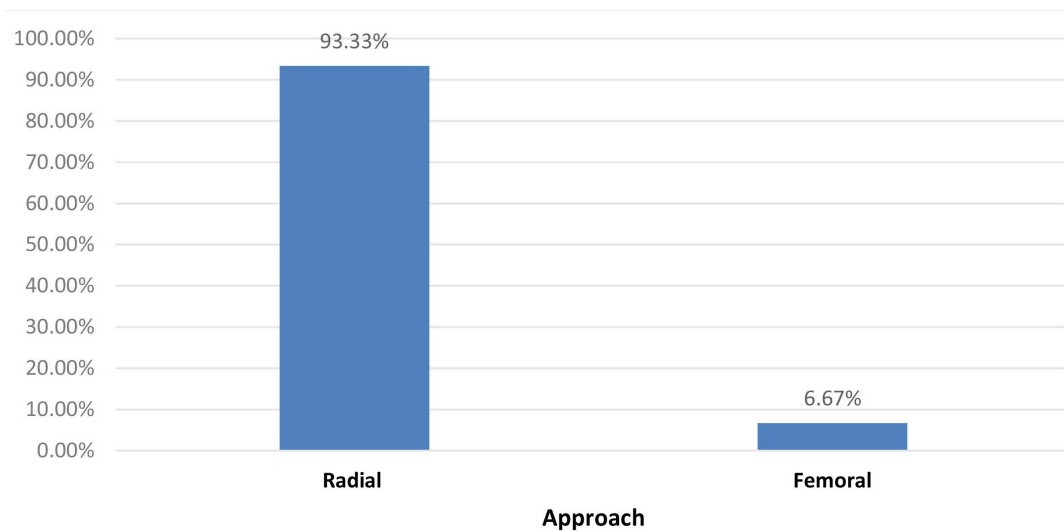


Figure 5. Distribution according to coronary angiography approach.

As shown in **Figure 5**, the approach for coronary angiography was radial in 93.33% (n = 182) of cases.

Table 4. Distribution according to coronary arteries affected.

Coronary angiography	Number (n = 195)	Percentage (%)
Anterior Interventricular Artery	128	65.64
Right coronary	90	46.15
Circonflex	81	41.54
Common core	12	6.15
Bisector	4	2.05

Anterior Interventricular Artery was the most affected artery in 65.64% (n = 128) of cases (**Table 4**).

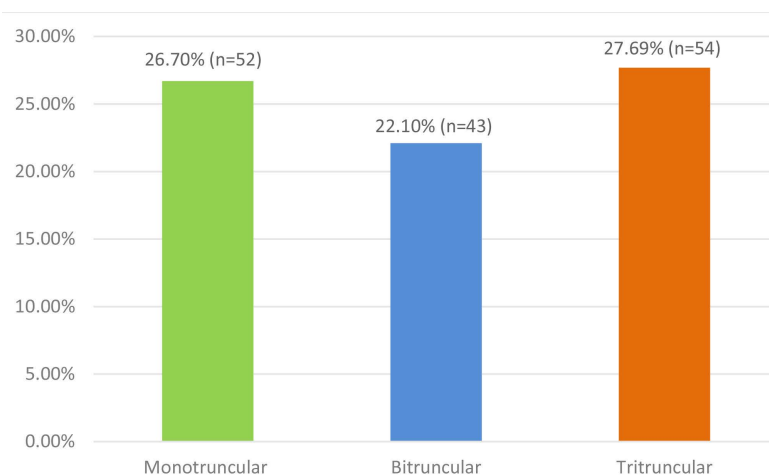


Figure 6. Distribution by trunk status.

Patients with 3 or more pathological coronaries were the most represented, accounting for 27.69% (n = 54) of cases (**Figure 6**).

Table 5. Distribution by degree of coronary artery stenosis.

Coronary angiography	Frequency (n = 149)	Percentage (%)
Non-significant lesion	22	14,77
Intermediate lesion	31	20,81
Significant lesion	139	93,29
Sub-occlusion or occlusion	123	82,55

As shown in **Table 5**, the most frequent lesions were significant lesions in 93.29% (n = 139) and sub-occlusions and occlusions in 82.55% (n = 123).

3.4. Breakdown by Time to Care

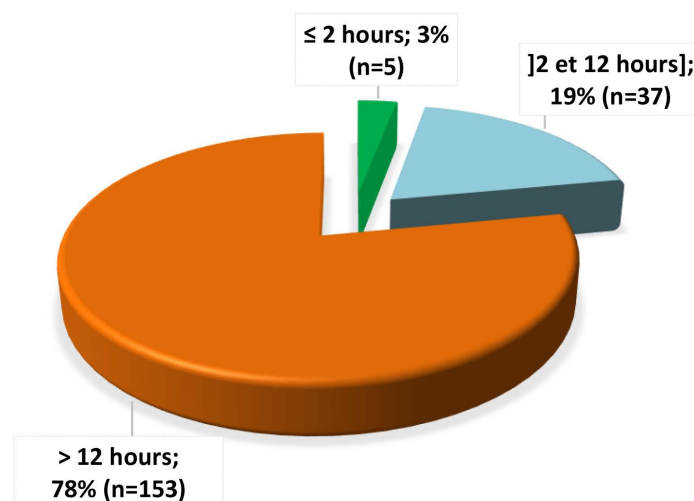


Figure 7. Time to care.

In 78.46% (n = 153) of our patients, the time to care was more than 12 hours after the first medical contact (**Figure 7**).

3.5. Myocardial Revascularization

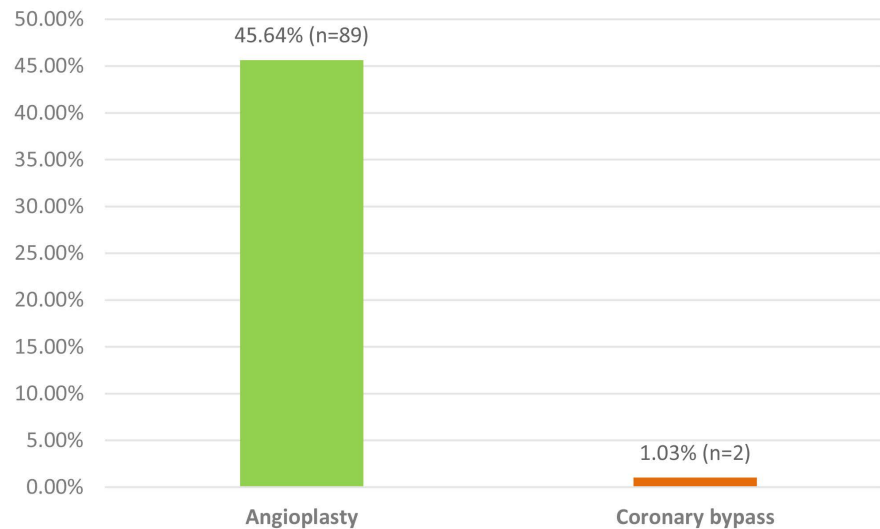


Figure 8. Type of myocardial revascularization.

Angioplasty with active stenting was performed in 45.64% (n = 89) of our series, and the stents used were active stents in 100% of cases (**Figure 8**).

3.6. Intra-Procedural Complications of Angiography/Angioplasty

Table 6. Distribution according to per-procedural complications.

Angiography/angioplasty	Frequency (n = 195)	Percentage (%)
Recovered cardiac arrest	3	1.54
Deaths	2	1.03
No complications	190	97.43

As shown in **Table 6**, the majority of percutaneous coronary procedures performed were uneventful in 97.43% of patients. Complications observed were mainly recovered cardiac arrest (1.54% of cases) and death (1.03% of cases), due mainly to coronary spasm, rhythm disorders (VT) and hemodynamic instability.

3.7. Medical Treatment

All patients received medical management in line with the current recommendations of the European Society of Cardiology: heparinotherapy, double platelet anti-aggregant, statin, beta-blocker, an ACE inhibitor or ARB.

3.8. Developments during Hospitalization

In-hospital outcomes were uneventful in 90.77% (n = 177) of cases, as shown in

Figure 9. Two patients who experienced cardiac arrest with return of spontaneous circulation and one patient with cardiovascular collapse ultimately died. This demonstrates that multiple complications can occur in the same patient.

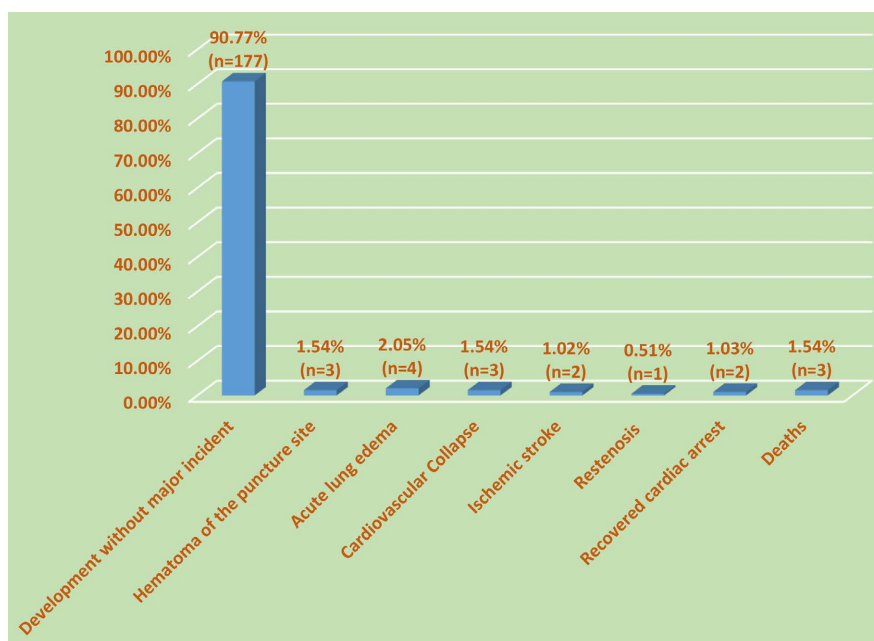


Figure 9. In-hospital course and complications.

4. Comments and Discussion

The hospital incidence of acute coronary syndrome in women in our study was 32.72%, similar to that of Gabet in France who found 32% [15], lower than the 38.1% of Ba in Dakar [16] but higher than the 20.5% of N'Guetta in Abidjan [17].

Protected by estrogen until the menopause, coronary heart disease occurs somewhat later in women [18] [19]. In our study, we found a mean age of 59.82 ± 11.45 years, a relatively young population compared with what is described in the literature. Ba *et al.* had found in Dakar a mean age of women with ACS of 68.8 ± 9.5 years [16]. In our region, women of a certain age are not accustomed to physical activity, which could explain the high percentage of sedentary patients in our study. Apart from sedentary lifestyle and menopause, hypertension and diabetes were the main cardiovascular risk factors, with 68.2% and 55.4% respectively, similar to what has been described in the literature for women with coronary heart disease [20]-[22].

Active smoking was reported in 3.1% ($n = 6$) of our patients. In Dakar, Ba *et al.* reported a frequency of 6.1% ($n = 6$) [16]. These figures reflect the low frequency of smoking among women in our countries.

Chest pain was typical in 65.1% of our patients, higher than that reported by Ba *et al.* in Dakar, who found it in 52.1% of patients [16]. This high frequency of typical chest pain in women corresponds to new knowledge acquired in recent years, although it remains lower than recent Western data [7] [8]. Atypical chest

pain was also found in 30.3% of our female patients, lower than the 47.9% reported by M'Boup in Dakar [9], but still not negligible.

In acute coronary artery disease, the physical examination is usually normal on admission. Thus, the clinical examination of our patients was normal (Killip I stage) in 76.92% (n = 150), higher than the 61.2% in the study by Ba *et al.* in Dakar [16].

The main electrocardiographic feature was persistent ST-segment elevation in 56.9% of cases, close to the 54.1% of M'Boup in Dakar [9].

The radial approach is strongly recommended by learned societies because of its association with a low risk of complication, particularly haemorrhage [23]. In our study, the radial approach was used in 93.33% of cases, higher than the 51.4% reported by Mathew in India [24].

Coronary angiography was normal in 23.6% (n = 46) of our series. In women presenting with acute coronary syndrome, the absence of coronary obstruction is observed more commonly than in men, according to Madika *et al.* [25]. In addition, the unavailability of certain paraclinical examinations in our country, such as the coronary CT scan, which is useful in certain cases of ACS without persistent ST-segment elevation, could have an impact on this rate of normal coronary angiography.

Tri-truncular and mono-truncular lesions were the most common, accounting for 27.69% and 26.7% of cases respectively. Bi-truncular involvement was noted in 21.1% of cases. In Tunisia, Abid *et al.* found mono-truncular involvement in 34% and poly-truncular involvement in 67% of women [26].

In our observation, the majority of lesions were significant lesions in 93.29% (n = 139) and sub-occlusions and occlusions in 82.55% (n = 123) of cases. Chetoui A. *et al.* in Marrakech had also reported tighter lesions in women than in men [27].

In 78.46% of our patients, the time to care was more than 12 hours after the first medical contact. This reflects the late diagnosis and management of our patients. This situation is due to the absence of a diagnostic and management circuit for chest pain in our country, as well as the high cost of coronary angiography and angioplasty procedures. According to MBoup in Dakar, the longer admission times are due to a lack of awareness and financial resources [9].

During this period, 89 of our patients with a significant lesion (45.64%) benefited from invasive endo-coronary treatment (stenting), after balloon predilatation, and 3rd-generation active stents were used exclusively. In the Tunisian series by Abid *et al.*, angioplasty with active stenting accounted for just 4%, and significant restenoses were recorded in bare stents in 61.7% of cases, with a mean delay of 8.53 ± 12 months [26]. Our exclusive choice of active stents is in line with the review by Perdoncin E. *et al.* [28] and the ESC recommendations, which advocate drug-eluting stents with better performance and fewer late restenoses [29].

We recorded five cases of per-procedural complications, including 2 deaths, and eighteen complications during hospitalization, with 3 deaths. In contrast,

Chetoui A. *et al.* in Marrakech reported only three complications in their series, with no deaths recorded during the procedures, nor during intra-hospital evolution [27].

5. Conclusion

Acute coronary syndrome is not uncommon in women in sub-Saharan Africa, but few data exist to better determine its prevalence. Recent studies around the world have led to a better understanding of this disease in women and to the deconstruction of certain preconceived ideas. In our context, the traditional modifiable cardiovascular risk factors were largely present, and typical chest pain is the most frequent symptomatology. Coronary lesions in women have been shown to be severe, and angioplasty with active stenting is the most common form of revascularization. However, delays in diagnosis and management remain a major problem.

Author Contributions

All authors contributed to the development of the data collection form, analysis of the data, and critical revision of the manuscript for important intellectual content.

Conflicts of Interest

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

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