

Coronary Angiography in Dilated Cardiomyopathy: A Cross Sectional Study in A Cameroonian Population

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Abstract

Introduction: Coronary angiography remains the gold standard for identifying coronary artery disease in patients with ischemic-like cardiomyopathy. In Cameroon, data on the angiographic features of dilated cardiomyopathies (DCM) are still lacking, hence the importance of our study.

Patients and Methods: We conducted a prospective cross-sectional study over three years, from November 8, 2022, to November 8, 2025, including all patients admitted to the coronary angiography suite for etiological investigation of dilated cardiomyopathy who provided informed consent.

Results: Over 115 patients admitted in our Laboratory, 51 presented with DCM. The mean age of the study population was 60.9 ± 9.25 years, and the male-to-female ratio was 4.67. Hypertension was the predominant condition (88.2%), followed by dyslipidemia (62.7%) and type 2 diabetes (45.1%), with 7.8% having a history of coronary artery disease. One-third of patients had already progressed to heart failure (33.3%), reflecting the advanced stage of the disease at the time of the investigation, and 72.0% presented with reduced left ventricular ejection fraction. Acute coronary syndromes, particularly STEMI (45.1%), were the main indication for coronary angiography. We found no statistically significant association between clinical characteristics and abnormal coronary angiography findings.

Conclusion: This study highlights a high frequency of coronary abnormalities in patients with dilated cardiomyopathy who underwent coronary angiography in Yaoundé, suggesting a major and probably underestimated contribution of coronary artery disease in this population. Most importantly, this pioneer work is reflecting the unaccessibility to interventional management of coronary syndromes for our population.

Keywords

Dilated cardiomyopathy, Ischemia, Coronary artery disease, Heart failure, Yaounde.

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Introduction

Heart failure is a major public health problem, with high morbidity and mortality, particularly in low- and middle-income countries.

In sub-Saharan Africa, it represents one of the primary reasons for hospitalization in cardiology and affects relatively young subjects, resulting in a significant socio-economic impact. This situation is

explained by the ongoing epidemiological transition and the high prevalence of cardiovascular risk factors, notably hypertension, diabetes, and dyslipidemia [1,2].

In industrialized countries, ischemic heart disease is the main cause of heart failure and dilated cardiomyopathy. In contrast, in sub-Saharan Africa, dilated cardiomyopathies (DCM) have long been considered essentially non-ischemic. Data from the THESUS-HF registry report a low proportion of ischemic heart disease among the causes of heart failure, which is likely underestimated due to limited access to coronary explorations [3].

Coronary angiography remains the reference exam for identifying coronary involvement in patients with DCM. It allows for the distinction between ischemic and non-ischemic forms, assesses the extent and severity of lesions, and guides therapeutic strategy, particularly myocardial revascularization [4].

Recent African studies have shown a significant proportion of coronary abnormalities in DCM patients. The study by N'Guetta et al. reported coronary abnormalities in more than a third of patients, highlighting the likely underdiagnosis of ischemic heart disease in sub-Saharan Africa [5].

In Cameroon, data on the angiographic aspects of DCM remain limited, even though patients frequently present with an accumulation of cardiovascular risk factors. This study aimed to describe the results of coronary angiography in patients with DCM in a Cameroonian population and analyze their diagnostic and therapeutic implications.

Materials and Methods

Setting and Type of Study

We conducted a descriptive and analytical cross-sectional study at the Yaoundé General Hospital, the main reference center for interventional cardiology in Cameroon. Yaoundé houses the country's first and only functional cardiac catheterization suite, operational since November 2022. The suite is equipped with a SIEMENS Artis One angiography machine.

Study Period

The study took place over a three-year period, from November 8, 2022, to November 8, 2025.

Study Population

The population included all patients admitted to the catheterization suite of the Yaoundé General Hospital during the study period who underwent coronary angiography for suspected ischemic dilated cardiomyopathy.

Inclusion Criteria

We included all patients:

- Aged 18 years and older;
- Presenting with dilated cardiomyopathy defined by echocardiography as a left ventricular dilation > 55mm

associated with systolic dysfunction (LVEF < 50%);

- Who underwent diagnostic coronary angiography during the study period;
- Whose clinical, echocardiographic, and angiographic data were usable.

Exclusion Criteria

We excluded:

- Patients who did not provide consent;
- Patients with severe valvular, congenital, or pericardial heart disease as the obvious cause of ventricular dysfunction;
- Patients with incomplete or unusable files;
- Uninterpretable coronary angiographies.

Data Collection

Data came from the Yaoundé Registry of Interventional Cardiology Achievements (DÉRICA). We supplemented these data from medical records, coronary angiography reports, and echocardiographic exams.

Variables Studied

- Sociodemographics (age, sex);
- History and cardiovascular risk factors (hypertension, diabetes, dyslipidemia, smoking, coronary history);
- Clinical data (indications, LVEF, comorbidities);
- Angiography results: state of arteries, number of vessels involved, lesion location, ACC/AHA classification;
- Therapeutic strategies (angioplasty, bypass, optimal medical treatment, Heart Team).

Obstructive coronary involvement was defined by a stenosis \geq 70% of a major epicardial coronary artery or \geq 50% of the left main trunk.

Patients with indication of angioplasty underwent a stress test via Magnetic Resonance Imaging (MRI) performed by the same skilled operator in order to assess the viability of the myocardium. All the MRI were achieved with the same equipment (Siemens Magnetom 1.5 Tesla) in the Department of Medical Imaging at Yaoundé General Hospital.

Statistical Analysis

Data were analyzed using SPSS version 26.0. Qualitative variables were compared using the χ^2 test or Fisher's exact test. Associations were estimated by calculating odds ratios (OR) with 95% confidence intervals. The significance threshold was set at $p < 0.05$.

Ethical Considerations

The study adhered to the ethical principles of the Declaration of Helsinki. Data were collected anonymously from hospital registries. Authorization from the department heads and hospital administration was obtained prior to data processing and analysis.

Results

We received 115 patients in the coronary angiography unit, and among these patients, 51 with dilated cardiomyopathies.

Sociodemographic Characteristics

Dilated cardiomyopathy primarily affected middle-aged patients, with a peak frequency between 51 and 60 years (35.3%), followed by the over-70 age group (17.6%). No cases were observed before the age of 40. The mean age of the study population was 60.9 ± 9.25 years, with a minimum age of 41 and a maximum age of 76.

The population showed a strong male predominance (82.4%), with a sex ratio of 4.67.

The different age groups were not significantly associated with the presence or absence of coronary lesions.

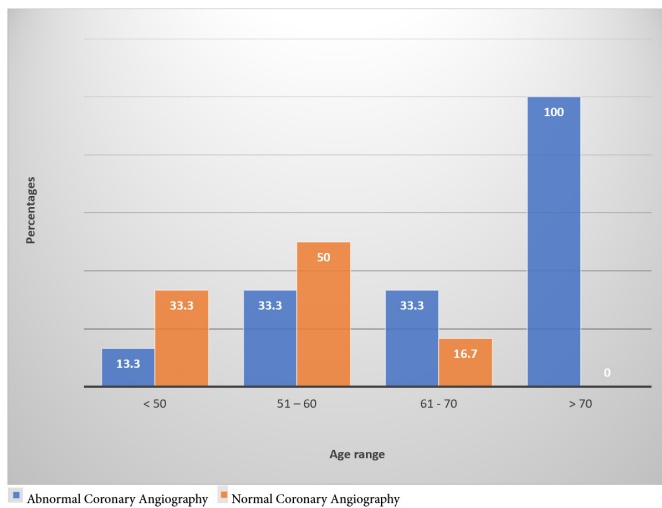


Figure 1: Sociodemographic characteristics of patients with dilated cardiomyopathy explored by coronary angiography.

A higher frequency of pathological coronary angiography was noted among male patients; however, this trend was not statistically significant.

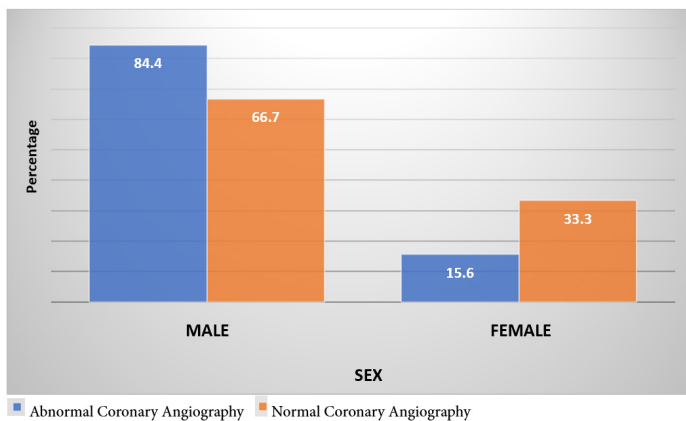


Figure 2: Distribution by sex according to coronary angiography results in the study population.

Clinical characteristics

The patients presented a high burden of cardiovascular risk factors.

Arterial hypertension was the most prevalent (88.2%), followed by dyslipidemia (62.7%) and type 2 diabetes (45.1%).

One-third of the patients had already progressed to heart failure (33.3%), reflecting the advanced stage of the disease at the time of exploration. Documented coronary history remained infrequent (7.8%). The table of medical history below represents these cardiovascular risk factors.

All patients were receiving dual antiplatelet therapy, and more than three-quarters were already on optimal medical therapy (OMT), indicating that initial management was compliant with guidelines prior to coronary angiography.

We did not observe any statistically significant associations between cardiovascular history and abnormal coronary angiography results. However, certain trends deserve to be highlighted: arterial hypertension and dyslipidemia showed an increased risk of coronary lesions, without reaching the threshold of significance ($p = 0.141$ and $p = 0.179$, respectively). The table below describes the associations between medical history and coronary angiography findings.

Table 1: Cardiovascular history and associated risk factors in patients with dilated cardiomyopathy within the study population.

Variables	Count (%) N=51	Abnormal angiography (N=45)	Normal Coronary Angiography (N=6)	p value	OR (IC à 95%)
Coronary History	4 (7,8)	3 (6,7)	1 (16,7)	0,404	0,36 (0,03 - 4,12)
HBP	45 (88)	41 (91,1)	4 (66,7)	0,141	5,12 (0,71 - 37,26)
T2DM	23 (45,1)	21 (46,7)	2 (33,3)	0,678	1,75 (0,29 - 10,54)
Dyslipidemia	32 (62,7)	30 (66,7)	2 (33,3)	0,179	4,00 (0,66 - 24,369)
Smoking	5 (9,8)	5 (11,0)	0	1,00	
Heart Failure	17 (33,3)	15 (33,3)	2 (33,3)	1,00	1,00 (0,16 - 6,09)
Medical treatment before admission					
DAPT	51(100)	45 (100)	6 (100)		
OMT	40 (78,4)	35 (77,8)	5 (83,3)	1,00	0,7 (0,07 - 6,70)

HBP: high blood pressure, T2DM: Type 2 diabetes mellitus, DAPT: dual antiplatelet therapy, OMT: Optimum medical therapy.

Impaired left ventricular ejection fraction affected nearly three-quarters of the patients (72.0%), confirming the major functional impact of dilated cardiomyopathy in this population.

More than half of the patients tested showed elevated Lp (a) levels, suggesting an underlying atherogenic profile.

Acute coronary syndromes, particularly STEMI (45.1%), were the primary indication for coronary angiography. The majority of patients were explored within a period of less than one month, reflecting relatively early management following the event.

Table 2: Clinical and paraclinical characteristics and indications for coronary angiography prior to exploration.

Variables	Frequency N (%) N=51	Abnormal coronary angiography (n=45)	Normal coronary angiography (n=6)	p value	OR (IC à 95%)
Comorbidities					
HIV infection	2(3,9)	2 (4,4)	0	1,00	
Elevated LP(a) mg/dl (≥ 50)	18(56,3)	18 (60,0)	0	0,183	
Impaired LVEF (< 50)	36(72,0)	31 (70,5)	5 (83,3)	0,663	0,48 (0,05 – 4,49)
Indications					
STEMI	23(45,1)	21 (46,7)	2 (33,3)	0,678	1,75 (0,29 – 10,54)
NSTEMI	4(7,8)	4(8,9)	0	1,00	
Others	24(47,1)	20 (44,4)	4 (66,7)	0,402	0,40 (0,07- 2,41)
Time from event (months)					
< 1 month	35(68,6)	31 (68,9)	4 (66,7)	1,00	1,11 (0,18 – 6,78)
[1-3] months	7(13,7)	7 (15,6)	0	0,578	
> 3 months	9(17,6)	7 (15,6)	2 (33,3)	0,284	0,37 (0,06 – 2,41)

LVEF: Left Ventricular Ejection Fraction (standard English for FEVG), Lp(a): Lipoprotein(a), OR (95% CI): Odds Ratio (95% Confidence Interval), STEMI: ST elevation myocardial infarction, NSTEMI: Non ST elevation myocardial infarction.

We found no statistically significant association between clinical characteristics and abnormal coronary angiography findings. The table below describes these clinical characteristics.

The radial approach was the primary access route (76.5%), confirming its increasing adoption for safety and patient comfort. Coronary angiography revealed coronary involvement in 88.2% of cases, highlighting the strong association between dilated cardiomyopathy and coronary artery disease in this population.

The lesions were most often single-vessel disease, but nearly one-third of patients presented with double- or triple-vessel involvement, reflecting diffuse coronary disease. The left anterior descending artery (LAD) was the most frequently affected vessel (70.6%), consistent with its central role in left ventricular function.

Table 3: Coronary angiography results and characteristics of coronary lesions in patients with dilated cardiomyopathy.

Variables	Count (N=51)	Percentage (%)
Coronary Angiography Access Site		
Femoral	12	23,5
Radial	39	76,5
Coronary angiography aspects		
Normal	6	11,8
Abnormal	45	88,2
Number of Involved vessels		
Single-vessel disease	28	62,2%
Double-vessel disease	5	9,8
Triple-vessel disease	12	23,5
Vessels with Obstructive Lesions		
Left Main	6	11,8
Left Anterior Descending	36	70,6
Circumflex	17	33,3
Right coronary artery	16	31,4
ACC/AHA classification		
A	10	19,6
B1	5	9,8
B2	6	11,8
C	10	19,6
NI	18	35,3

ACC: American College of Cardiology, AHA: American Heart Association.

Complex lesions (ACC/AHA B2 and C) represented a significant proportion, suggesting potential technical difficulty for revascularization. The table below illustrates these characteristics.

Bypass surgery (CABG), exclusive optimal medical therapy, and Heart Team discussion each involved approximately one-fifth of the patients, highlighting the need for individualized management based on the extent of the lesions and the clinical profile.

Discussion

This study describes the angiographic aspects of dilated cardiomyopathy in a Cameroonian population investigated via coronary angiography in the country's sole interventional cardiology center. The results show a high frequency of coronary abnormalities, observed in 88.2% of patients, suggesting a major contribution of coronary artery disease to the genesis or exacerbation of dilated cardiomyopathy in this context.

The relatively high mean age of the study population, combined with a clear male predominance, is consistent with African and international data reporting greater exposure of men to cardiovascular risk factors and coronary artery disease [1,2]. The high prevalence of hypertension, diabetes, and dyslipidemia observed in this series reflects the ongoing epidemiological transition in sub-Saharan Africa and reinforces the hypothesis of an underlying atherogenic profile [6],

The high proportion of abnormal coronary angiograms in our study significantly exceeds that reported by N'Guetta et al. in Ivory Coast, where approximately one-third of patients with dilated cardiomyopathy presented with coronary abnormalities [5]. This difference could be explained by a selection of more symptomatic patients, a frequent indication for coronary angiography in the context of acute coronary syndrome, as well as a higher burden of cardiovascular risk factors in our population.

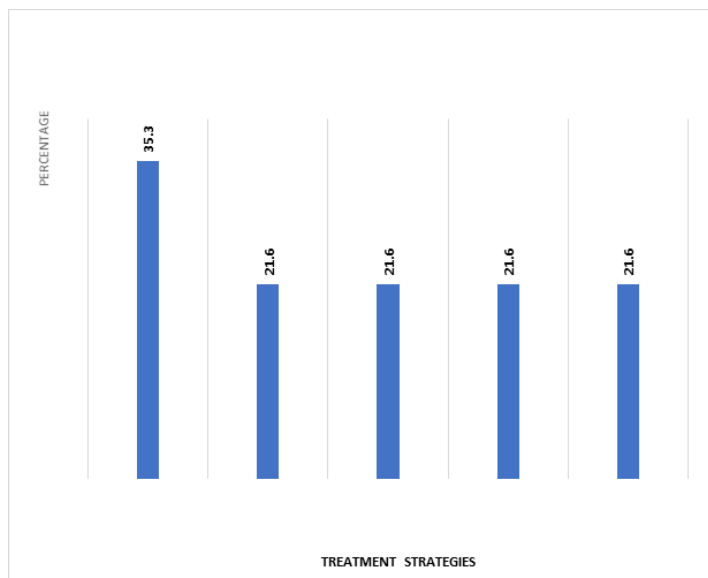


Figure 3: Therapeutic strategies and revascularization modalities following coronary angiography.

The predominant involvement of the left anterior descending artery observed in our series aligns with literature data, which emphasize the central role of this vessel in left ventricular perfusion and its frequent implication in severe systolic dysfunction [7,8]. The non-negligible proportion of double- and triple-vessel lesions reflects diffuse coronary disease, which is likely to worsen ventricular remodeling and impair long-term prognosis.

Contrary to some African studies, no statistically significant association was found between cardiovascular risk factors and the presence of coronary abnormalities. This result could be explained by the limited sample size and the high overall prevalence of risk factors in the study population, which reduced the discriminant power of the analysis.

The therapeutic implications of these results are major. More than one-third of the patients underwent coronary angioplasty, while a significant proportion required bypass surgery or Heart Team discussion, in accordance with international recommendations on myocardial revascularization in patients presenting with left ventricular dysfunction [4,9].

These data highlight the importance of systematic coronary investigation to adapt the therapeutic strategy and improve functional and vital prognosis.

This study has certain limitations, notably its single-center nature, the relatively modest sample size, and the selection bias related to restricted access to coronary angiography. However, it provides original data from the first interventional cardiology registry in Cameroon and highlights the likely underestimated burden of ischemic heart disease in dilated cardiomyopathies.

Conclusion

This study highlights a high frequency of coronary abnormalities among patients with dilated cardiomyopathy investigated by coronary angiography in Yaoundé, suggesting a major and likely underestimated contribution of coronary artery disease in this population. More important, this pioneer study set the foundation for addressing the important matter of accessibility to interventional management of our patients presenting with acute coronary syndromes.

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