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ST-Elevation Myocardial Infarction (STEMI) in Diabetics Patients in Four Dakar Cardiology Departments

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Abstract

Introduction: Diabetes is an independent risk factor for coronary heart disease worldwide. But few data exist in our developing countries. The objective of this study was to study the particularities of STEMI in diabetic patients in Dakar.

Methodology: It was a retrospective, multicenter and descriptive study, carried out over a period of one year in four cardiology centers in Dakar. Included was any diabetic patient admitted for STEMI. Data analysis was done with the SPSS (Statistical Package for Sciences Socials) software.

Results: A total of 87 diabetic patients were included, for a prevalence of 29.7%. The average age of patients was 60 years. The predominance was male with a sex ratio of 1.1. Diabetes was mostly type 2 (99%) and most patients were on oral antidiabetics (56%). Glycemic imbalance was noted in 24.1% of patients. The associated cardiovascular risk factors were hypertension (51%), dyslipidemia (51%) and physical inactivity (41.4%). Chest pain was typical in 76% of cases. The average time between onset of pain and first medical contact was 47 hours. The electrocardiogram had reached mainly the anterior (25%) and inferior (27%) territories with necrosis Q waves in 37.9% of cases. The coronary angiography was done for 63 patients and found one hundred and twenty-three significant lesions distributed in three-vessel (48%), single-vessel (33%) and two-vessel (14%) disease. Percutaneous coronary intervention (PCI) was performed in 37 patients (42.2%) and thrombolysis in 7 patients. The evolution was favourable in most cases (82%). The reported complications were: 4 cardiogenic shocks, 3 rhythm disorders, 2 conduction disorders and 2 strokes. Four patients had died during hospitalization, for a hospital mortality of 4.59%.

Conclusion: STEMI in diabetics are diagnosed with considerable delay in Dakar. The coronary involvement is severe. Their support under optimal. Improving management requires a multidisciplinary approach involving the diabetologist, emergency physician and cardiologist.

Keywords: Myocardial Infarction, Coronary Artery Disease, Diabetics, STEMI

Introduction

Coronary artery disease is caused by a decrease in blood flow in the coronary arteries. It is due to atherosclerotic lesions in the majority of cases. ST-elevation myocardial infarction is the severe form because there is occlusive coronary thrombosis responsible for myocardial necrosis. This is the ultimate stage in the evolution of coronary artery disease with an estimated prevalence of 2-6% of all myocardial infarctions in the literature [1,2]. It is associated with cardiovascular risk factors including diabetes, which is the leading cause of morbi-mortality in the world [3]. The World Health Organization predicts a prevalence of 55% in 2025 [4]. In Senegal, the prevalence is 10.4% [5].
This association often reveals some peculiarities with an often atypical presentation that is at the origin of the delay diagnosis. Coronary involvement is severe and management is sub-optimal. The main objective of this study carried out in Dakar was to evaluate the particularities of STEMI in diabetic patients.

The specific objectives were to:
- Analyze the epidemiological profile
- Describe clinical and para-clinical features
- Evaluate the therapeutic strategy and evolutionary elements.

Methodology

It was a retrospective, multicentric and descriptive study carried out over a period of 12 months from 19 September 2019 to 19 September 2020 in the cardiology departments of the Aristide Le Dantec Hospital, Principal Hospital of Dakar, Idrissa Pouye General Hospital and Fann National University Hospital. Were included all diabetic patients admitted to the four cardiac centers for STEMI delayed in the presence of chest pain associated with electrocardiographic changes ST segment offset (2/10 millivolts in precordial leads; 1/10 millivolt in peripheral leads) or recent full left branch block. Patients with incomplete records were not included in the study.

We analyzed epidemiological data (age, gender and financial support), diabetes data (type, duration of progression, treatment and follow-up) and associated cardiovascular risk factors. We analyzed the intake times. Clinical data (chest pain, dyspnea and other signs), paraclinical data (electrocardiogram, biology, echocardiography) as well as therapeutic strategies (PCI, thrombolysis and drug treatment) and progressive hospital modalities were also listed.

The data collected was captured using an electronic questionnaire and captured using Microsoft Excel 2016. The data were analysed using the Statistical Package for Sciences Socials (SPSS) software. The significance threshold was set at 5%.

Results

In total, during the study period 292 patients were admitted for STEMI of which 87 were diabetics with a prevalence of 29.7%. The predominance was male with a sex ratio of 1.1. The average age of patients was 60 years. The 60-69 age group was the most represented. The majority of patients (77.8%) lived in urban areas. In 81% of cases, patients were managed on their own. Diabetes was mostly type 2 (99% of cases). It was known in 95% of patients and recent discovery in 5%. For the antidiabetic treatment, patients were mostly on oral antidiabetics (56%), insulin therapy (23%) and a combination of insulin and oral antidiabetics (8%). A single regimen was noted in 13% of patients. Less than half of the patients (40%) had regular follow-up.

The main risk factors identified for diabetes were hypertension (51%), dyslipidemia (51%) and physical inactivity (41.4%).

Chest pain was the master of symptoms found in 92% of patients. It was typical in 76% of cases and atypical in 24% of cases. Dyspnoea was found in 12.6% of patients. The epidemiological and clinical characteristics of the patients are summarized in Table 1.

Table 1: Epidemiological and clinical characteristics of patients

Epidemiological and clinical characteristics	Number	Percentage (%)
Total number of patients	87	-
Prevalence	29,7	
Middle age	60 years	-
Sex-ratio	1,1	-
Type of diabetes (1/2)	(1 / 86)	(1% / 99%)
Diabetes follow-up (regular / irregular)	47 35/12	54% (40% / 14%)
Hypertension	44	51
Dyslipidemia	35	41
Physical inactivity	36	41,4
Pain Typical / Atypical	80 66 / 21	92% 76% / 24%
Dyspnea	11	12.6

The average time between pain onset and first medical contact was 47 hours. The mean time between onset of pain and admission to cardiology was 3.5 days. The mean time between pain onset and cath admission was 5 days.

Blood glucose imbalance was found in 21 patients (24.1%) with fasting blood glucose averaging 1.87 g/L and glycated hemoglobin averaging 10.2%. Dyslipidemia was noted in 44.5% of patients with elevated total cholesterol (58%) and elevated LDL cholesterolemia (38%).

The electrocardiogram showed lesions mainly of the anterior territory (25%) and inferior territory (27%). A necrosis Q-wave was found in 37.9% of cases.

Echocardiography had objectified disorders of the segmental kinetics of the left ventricle type of hypokinesia in 38.7% of cases, akinesia in 38.2% of cases and dyskinesia in 38.5% of cases. The ejection fraction of the left ventricle was impaired in 56% of cases. Left intraventricular thrombus was found in 7 patients (8%).

Coronary angiography was performed in 63 patients (72%). The radial access was the most used (85%). One hundred and twenty-three significant lesions were found, divided into three-vessel (48%), two-vessel (14%) and single-vessel (33%) lesions. Figure 1 shows the case of a patient with three-vessel lesions.
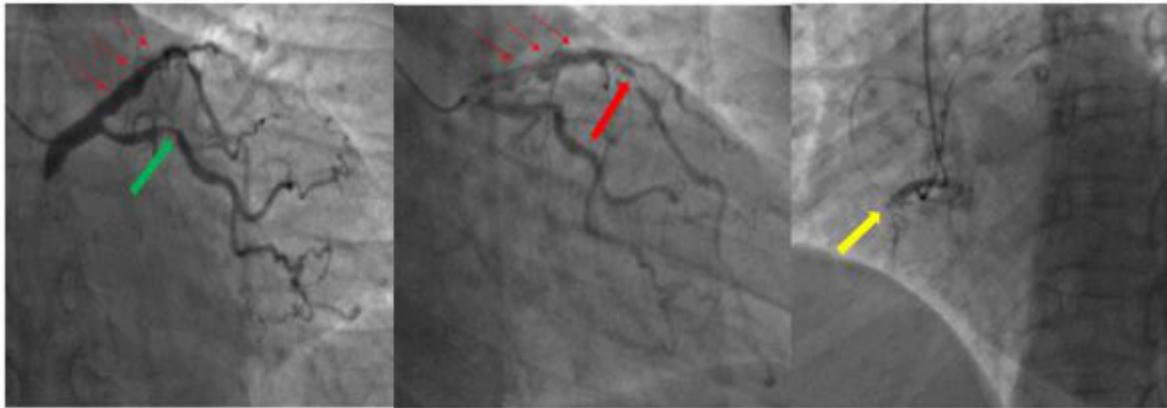
Figure 1: Coronary images of a diabetic patient showing three-vessel lesion with a significant, calcified and aneurysm lesion of the proximal left anterior descending artery (red arrows), a very close lesion of 1st segment of the circumflex artery (green arrow) and occlusion of the right coronary artery at the upper knee (yellow arrow)

Therapeutically, thrombolysis was performed in 7 patients, 2 of which were successful. Percutaneous coronary intervention (PCI) was performed in 37 patients (42.2%) including 35 primary PCI and 2 rescue PCI. Drug-eluting stents (DES) were used in 21 patients. Drug therapy consisted of beta blockers (49 %), aspirin (85 %), clopidogrel (86 %), statin (71 %), angiotensin-converting enzyme (ACE) inhibitors (63%) and aldosterone antagonists (2%).

The evolution was favourable in the majority of cases (82%). Some complications were reported: a cardiogenic shock in 4 patients, rhythm and conduction disorders in 3 and 2 patients respectively and a stroke in 2 patients. The average length of hospitalization was 9 days. Four patients had died during hospitalization due to rhythmic or hemodynamic complications, resulting in hospital mortality of 4.59%. Therapeutic and evolutionary data are summarized in Table II.

Table 2 : Angiographic, Therapeutic and Evolutionary Patient Data

Angiographic, Therapeutic and Evolutionary Data	Number	Percentage (%)
Patient admitted to coronary angiography	63	72
Radial access	53	85
Single-vessel disease	22	33
Two-vessel disease	09	14
Three-vessel disease	32	48
PCI	37	42
Primary PCI	35	38
Rescue PCI	02	2,2
Thrombolysis	7	8
Medical treatment	61	70
Complications	11	12
Cardiogenic shock	4	4,5
Rhythm disorders	3	3,4
Conduction disorders	2	2,2
Ischemic stroke	2	2,2
Death	4	4,6
Average length of stay	9 days	-

PCI : Percutaneous coronary intervention

Discussion

Our study reveals that the prevalence of diabetes remains high (29.79%) in patients with STEMI. This is a confirmation of the heavy morbidity associated with this pathology as it was found in previous studies such as the FAST MI 2004 study [6] and the CORONAFRIC II study (31%) [7]. Diabetes is often associated with other risk factors such as hypertension, dyslipidemia and sedentary lifestyles. The presence of these factors promotes the development of atherosclerosis and the occurrence of its acute complications including myocardial infarction [8,9].

Myocardial infarction is the most severe evolution of coronary artery disease. This pathology must be systematically sought in the diabetic patient because of its atypical or silent character. This contributes to longer diagnostic and management times. In our study, the average time between pain onset and first medical contact was 47 hours, and the average time between pain onset and cath admission was 5 days.

These delays are greatly lengthened, while the whole issue in this context is to re-canalize the artery responsible for ultimately reperfuser the myocardium that depends on it as soon as possible [10].

Myocardial reperfusion of any type is the cornerstone of the treatment of myocardial infarction and is a race against time. The speed and efficiency of this reperfusion are the two factors that determine the immediate and long-term mortality. In our study, reperfusion was performed by PCI in 37 patients (42%) of whom 35 were primary PCI and thrombolysis in 07 patients (8%). These revascularization rates are relatively low. In Europe, according to FAST-MI 2015, primary PCI was performed in 76% of patients [11]. This rate was 40% in the ACCESS study [12]. These best results observed in developed countries are supported by a well-organized management network including the Emergency Medical Assistance Service (EMS) and a wider range of healthcare services. We are also making significant progress in reducing these management delays and making these means of reperfusion much more accessible.

Mortality was 4.9% in our study. As a reminder, the relative risk of coronary death is at least three times higher in diabetic patients known for more than 10 years than in non-diabetic patients of comparable age [13,14]. Hence the interest of prevention which must go through a good control of diabetes and other cardiovascular risk factors but also a systematic electrocardiogram in front of any atypical symptoms.

Conclusion

STEMI in diabetics are diagnosed with much delay in Dakar. The coronary involvement is severe. Their support under optimal. Improving management requires a multidisciplinary approach involving the diabetologist, emergency physician and cardiologist.

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