Short and long-term outcomes of patients presenting with Acute Coronary Syndrome without ST-segment elevation (NSTE -ACS): findings from a Tunisian Register: the ReSCUS Register

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Abstract

Background: Chest pain is one of the most common complaints in the emergency department. Acute coronary syndrome with ST-segment elevation remains the ultimate medical emergency. However, acute coronary syndrome without ST-segment elevation (NSTE -ACS) has an equivalent prognosis risk. The major challenge of the emergency physician is the rapid and accurate identification of patients with ACS who would benefit from immediate care.

Objective:

Evaluation of our practices according to European Recommendations for the management of NSTE-ACS and assessment of short and long-term prognosis for major cardiovascular events (MACE).

Methods: This is an analytical study, involving 850 patients treated for NSTE-ACS for 2 years in the emergency department. Data were collected from the acute coronary syndromes' local register (ReSCUS register). The main results were: the different delays in medical care, length of stay in the emergency department, short-term complications, and the occurrence of MACE registered at one month, six months, and one year later.

Results: The average age of our patients was 64 +/- 11 years. The sex ratio was 2.2. Hypertension and diabetes are the two most common risk factors in our population. NSTE-ACS was inaugural in almost a third of the cases. Only 7% of the patients have been referred to the ED by a medical team. In 16.2% of cases, the initial ECG found no repolarization disorder. The average first medical contact delay was 24.4 +/- 30.2 min. The average first qualifying ECG delay was 30 +/- 0.6 min. The average length of stay in the emergency department before admission to the cardiology department was 24.1 +/- 21.3 hours. More than half of the sample (68%) had their angiograms within 48 hours. Among the 500 followed-up patients, 12 were completely lost. Patients who presented at least one MACE were at one month: 58 patients (11.6%) at 6 months: 112 patients (22.4%), and at 1 year 136 patients (27.2%).

Conclusion: Cardiovascular disease is the leading cause of death worldwide. Assessment of our practices is important to improve prognosis. Registers offer a guarantee of methodology and are a real mirror of our medical care.

Keywords: Acute coronary syndrome; Emergency department; Management; Delay.

INTRODUCTION

Cardiovascular disease (CVD) is the leading cause of death worldwide, especially in low-income and middle-income countries. It is now admitted that there is a strong association between CVD morbimortality and socioeconomic status. This has been attributed to higher prevalence, poor control of cardiac risk, and unequal access to healthcare facilities. However, most of these studies were carried out in high-income countries, and only a few studies from low- and middle-income countries have the highest burden of CVD. In Tunisia, a developing country, acute coronary syndromes (with and without ST-segment), are the most interesting CVD in emergency practice. But the data according to their characteristics, management and outcomes are lacking. In this paper, we will try to analyze the epidemiological profile of patients, the strategy, and the different delays for medical care of NSTE-ACS from our local register as well as their short and long-term outcomes.

It is now admitted that adherence to guidelines has been correlated with improved patient outcomes in ACS, including reduced mortality, short- and long-term outcomes, and reduced healthcare costs (1, 2).

METHODS

This is a cross-sectional study in the Emergency Department of Sahloul University Hospital. We analyzed data from patients diagnosed with an acute coronary syndrome without ST-segment elevation (NSTE-ACS) during the study period (from 01/01/2015 to 31/12/2016). Data were from the local registry of acute coronary syndromes (ReSCUS). In brief, this registry is a continually ongoing mono-center registry that prospectively collects data regarding all patients presenting with Acute Coronary Syndrome managed in this emergency department (STEMI and NSTE-ACS). Only data from patients with NSTE-ACS were selected for this study.

We included all patients consulting for chest pain and for whom the diagnosis of NSTE-ACS was retained according to the definition established by the European Society of Cardiology (ESC). This definition is based on clinical, electrical, and biological criteria.

Non-inclusion criteria: Patients with an STMI or other etiologies of chest pain.

The primary endpoint was to identify predictors of major cardiovascular events (mortality, recurrence of NSTMI, STEMI, Acute congestive heart failure) in the short and long term.

The secondary endpoint was to describe the epidemiological characteristics of these patients and the quality of medical care in the emergency department. The data were collected on pre-established sheets (appendix 1)

TIMI risk score was as follows: low risk = TIMI score: 0 to 2; intermediate risk = TIMI score: 3 to 4; high risk =TIMI score: 5 to 7.

Statistical analysis: The data's normal distribution was verified. Data reported in the text and tables indicate the mean ± standard deviation for numeric variables and percentages

or ranges for categorical variables. We compared the MACE group of patients to the group with no MACE on 1, 6, and 12 months of the ED visit. To compare qualitative variables, we used the Pearson Chi-square test and Fisher's exact test. To compare numerical variables, we used a student's t-test. Student's t-test (normally assumption-verified) and the chi-square ($\chi 2$), or Fisher's exact test (when $\chi 2$ assumption of low expected cells was verified) were used to compare the group of patients with and those without MACE. All variables with a significant correlation in univariate analysis were entered into the model. Odds ratios (OR) were estimated from the b coefficients obtained, with respective 95% confidence intervals (CI 95%). The significance level was a two-sided $p < .05$ for all the used tests.

RESULTS

A total of 850 patients were assessed for eligibility. Twelve patients were lost to follow-up, and only 500 patients were enrolled because of incomplete data. The average age was 64 ± 11 years. The majority of the patients were over 40 years (99%), and those over 65 years accounted for 44.8%. The sex ratio was 2.2. Hypertension and diabetes were the two most common risk factors in our population (Table 1). Twenty-two patients had a history of chronic kidney disease (4.4%). Five patients had a history of ischemic stroke or obliterating arterial disease of the lower limbs.

Table 1: Clinical and demographic characteristics of the population

		Value
Age; mean±SD (years)		64 ±11
Gender; n(%)	Male	586(69)
	Female	264(31)
Risk factors; n(%)	Hypertension	481(56.6)
Risk factors; n(%)	Diabetes	427(50.2)
	Smoking	354(41.6)
Coronary history; n(%)	Dyslipidemia	199(23.4)
Coronary history; n(%)	None	345(40.6)
	NSTEMI	355(41.8)
Other medical conditions ; n(%)	STEMI	145(17)
Other medical conditions ; n(%)	Renal failure	37(4.4)
Chest pain Score ; n(%)	Stroke/ arteriopathy of the lower limb	2(0.2)
Chest pain Score ; n(%)	Between 0 et 1	0(0)
	Between 2 et 4	560(67)
TIMI Risk Score ; n(%)	>= 5	281(33)
TIMI Risk Score; n(%)	Low-risk	172(20.2)
	Intermediate risk	352(41.4)
ECG data	High risk	326(38.4)
ECG data; n(%)	Normal	138(16.2)
	ST-segment depression	568(66.8)
Troponins	Negative T wave	162(19)
Troponins; mean±SD	Troponin 1	0.12 (0.04-0.5)
	Troponin 2	0.35 (0.07-1.32)
Blood tests; mean±SD	Delta troponin	0.1 (0-0.85)
Blood tests; mean±SD	Creatinin (meq/l)	95.9 ± 60.07
Echocardiographic data	Glycemia (mmol/l)	10,31 ± 5.2
Echocardiographic data; n(%)	Ejection Fraction> 40%	812(95.5)
Treatment	Ejection Fraction ≤ 40%	20(2.4)
Treatment; n(%)	Dl-lysine acetylsalicylate 250 mg	850(100)
	Clopidogrel 300 mg or 75 mg	850(100)
Orientation	Heparin	850(100)
Orientation; n(%)	Admission to a cardiology department	835(98.2)
Angio-graphic data	Home Discharge	15(1.8)
Angio-graphic data; n(%)	Monotruncular	406(47.8)
	Bitruncular	105(12.4)
	Tritruncular	54(6.4)

Only 7% of patients have been referred to the ED by a Mobile Emergency and Resuscitation Service team, while the majority (93%) came to the ED by their means of transport or by a B-type ambulance.

In 81 patients (16.2%) the initial ECG found no repolarization disorder (Table 1). All the patients included in the study underwent echocardiography within the two first days of admission to the cardiology department. The majority (95.5%) had an ejection fraction> 40% and 12 patients (2.4%) had an ejection fraction ≤ 40%. Table 1 details the treatment procedures.

Most of the patients (98.2%) were transferred to the cardiology department. Table 2 details the delays of management in the ED. The coronary status of patients undergoing angiography was: mono-trunk involvement in 47.8%, bi-trunk involvement in 12.4%, and tri-trunk involvement in 6.4% but in 33.4% the angiography was normal (or infiltrated arteries without significant stenosis).

Table 2: Time delay of in-hospital care

Time from the occurrence of chest pain to arrival at the first care facility (min); mean±SD	248.7± 212.1
First medical contact delay (min); mean±SD	24.4 ± 30.2
Time to qualify ECG (min); mean±SD	30 ± 0.6
Length of stay in the emergency department (hours); mean±SD	24.1 ± 21.3
Time to perform angiography/angioplasty (hours); n(%)	<48 h : n(68)
	48 h- 7 days: n(24.4)
	>7 days: n (7.6)

The MACE rates at 30 days, 6, and 12 months are shown in table 3.

Table 3: Major cardiovascular events at 01, 06, and 12 months

Major Acute Cardiovascular Events (MACE)	01 month	06 month	01 year
Total rate ; n(%)	(11.6)	(22.4)	136 (27.2)
Lost to follow up; n(%)	(2.4)	_	_
Mortality at one month; n(%)	(0.8)	(2.3)	17 (3.4)
Myocardial infarction; n(%)	(4.4)	(3.2)	6 (1.2)
Anginal recurrence; n(%)	(5)	(10)	79 (15.8)
Acute congestive heart failure; n(%)	(1.4)	(5.6)	34 (6.8)

The rate of MACE according to time from the occurrence of chest pain to arrival at the first care, to the first medical contact, and to delay of angiography/angioplasty are detailed in Table 4.

Tableau 4: Rate of MACE
Rate of MACE according to the time from the occurrence of chest pain to the arrival at the first care facility

		MACE	No MACE	P
Duration (min)	Average	239.9±197.9	258.6±225.2	0.33
	Median	180(99.5-333.7)	195.5(118.7-337.5)	
Delay (min)	<120min	63	66	0.59
	120-360min	108	141	
	>360min	51	59	
Rate of MACE according to the first medical contact				
		MACE	No MACE	P
Duration (min)	*Average*	20.83±20	26.71±35	0.03
	Median	15 (5-30)	15 (5-31)	
Delay (min)	*<10min*	71	94	0.01
	10-30 min	115	105	
	>30min	36	67	
Rate of MACE according to time to perform angiography/angioplasty				
		MACE	*No MACE*	*P*
Duration (days)	*Average (DS)*	*3.29±5.83*	*2.89±5.66*	*0.45*
	Median (IQR)	*2 (0-3)*	*1(0-3)*	
Delay (hours)	*≤ 48 h*	*152*	*181*	*0.92*
	>48h	*70*	*85*	

The independent predictors of MACE occurrence within the first year were TIMI Risk SCORE > 3, chest pain SCORE, age ≥ 65 years, and a history of coronary artery disease (Table 5).

Table 5: Predictors of MACE within one year of follow–up

Predictors of MACE	P	OR CI (95%)
Age ≥ 65 years	<0.001	2.514 (1.744-3.625)
Renal failure	0.007	3.783 (1.353-10.579)
Diabetes	0.011	1.592 (1.112-2.279)
Dyslipidemia	0.009	1.745 (1.146-2.657)
Hypertension	0.050	1.423 (0.991-2.044)
History of bypass/ Angioplasty	0.002	1.771 (1.232-2.546)
TIMI Score >3	<0.001	2.745 (1.680-4.485)
Chest Pain Score	<0.001	3.014(1.950-4.657)
History of coronary disease	0.001	1.819 (1.256-2.634)

DISCUSSION

The average age, in the *French FAST-MI 2015 register*, was 68±14 years (4). According to *Eisenmann et al.*, age is an important risk factor for cardiovascular disease (3). The epidemiology of our sample is also similar. In western countries, hypertension is the first cardiovascular risk factor. In the USA, it was found in 24% of patients suffering from coronary diseases (4). This prevalence was two-fold higher in our sample (56.6%). For diabetes, numerous studies have concluded that patients with diabetes presented more frequently with tri-truncular involvement with a poor-quality downstream bed. In our series, 50.2% of patients were diabetic. Thus, the majority of Tunisian studies report the high prevalence of this risk factor. *The United Kingdom Prospective Diabetes Study (UKPDS)* was the largest study interested in diabetic patients. This study, conducted between 1977 and 1991, analyzed 5102 patients aged from 25 to 65 years with type 2 diabetes, according to the American Diabetic Association criteria. These patients have been followed for 20 years. In this study, the authors have shown that coronary artery disease is the main cause of death in type 2 diabetes and 11% of patients developed myocardial infarction or angina over a median of 8 years (5). In our study, the average consultation time was 249 minutes. This delay is relatively long compared to those observed in the European, North American, and Middle Eastern registers. We found a delay of 145 minutes in the *European Heart Surveys 2*, 150 minutes in the *SPACE register* (6,7), and 180 min in the *PRAISE-UK register* (8, 9, 10). This can be improved by raising public awareness about the importance of early presentation to the ED, particularly in the presence of cardiovascular risk factors. The HAS recommends a delay of fewer than thirty minutes (11). In our study, the average time for triage was 24.42 min. There was a significant difference between the group with MACE and the group without MACE during one year of follow-up with a p = 0.029 but no significant difference between the group of survivors and the group of nonsurvivors. It is recommended to perform an ECG within 10 min

of the first medical contact (12). In our study, this delay was 30 minutes.

In our study, 68% of patients had their angioplasty realized within the first 48 hours. Experts noted that the decision on the invasive or conservative strategy of NSTE-ACS and the timing of angiography is based on the patient's risk stratification.

According to the AHA recommendations, an invasive strategy is indicated within 72 hours after the onset of symptoms in the presence of a criterion of high risk and/or recurrence of symptoms (Grade I-A). In case of very high ischemic risk (refractory angina, acute heart failure, threatening ventricular disorders, hemodynamic instability), a coronary angiography must be performed within 2 hours (Grade I-C). In addition, an early invasive strategy (<24h) is recommended in the event of a GRACE score> 140 or in the presence of at least one high-risk criterion (Grade I-A) (13). If we follow the ESC recommendations, an invasive strategy, when decided, should be completed within 72 hours. By comparing ourselves to the recommended deadlines, our results are generally satisfactory, regardless of the risk to our patients.

Our study is subject to several limitations. It is a single-center study. Our observations relate to the practices observed, within the emergency department of Sahloul University Hospital and a large group of patients was excluded because of incomplete data.

CONCLUSION

The objectives of this work were the assessment of our practices compared to those recommended and the assessment of short and long-term prognoses regarding major cardiovascular events. The statistical analyzes carried out in our study do not allow us to establish a causal link between most of the risk factors and mortality or MACE. There is an urgent need for a national register to generalize our results and compare them with international registers for evaluation. Efforts remain to be made to improve our overall management of NSTE-ACS and to further improve the long-term prognosis of our patients.

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