

# Predominance of STEMI and severity of coronary artery disease in a cohort of patients hospitalized with acute coronary syndrome: a report from ABC Medical School

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## SUMMARY

**Introduction:** acute coronary syndromes (ACS) represent a widely prevalent health issue with high mortality in Brazil and worldwide. The severity of ACS is not known in patients in the city of São Bernardo do Campo a municipality contiguous and adjacent to the city of São Paulo.

**Objectives:** to study the profile of coronary disease in patients hospitalized with ACS who underwent coronary angiography in the emergency room between 2012 and 2013.

**Methods:** this is an observational study that included consecutive patients with ACS admitted to the emergency room of a hospital. Data collection was performed using medical records with the following variables: sex, age, risk factors for cardiovascular disease, coronary angiography.

**Results:** the sample in this period included 131 patients, of which 64.8% were men. The most prevalent diagnosis was ST-elevation myocardial infarction (STEMI) (57.2%) followed by non-ST-elevation myocardial infarction (NSTEMI) (22.1%) and unstable angina (UA) (20.6%). There were no significant differences in the epidemiology and risk factors between the diagnoses, except that heart failure was more prevalent in patients with UA.

**Discussion:** there were no differences between groups regarding the coronaries involved; however, STEMI patients showed similar numbers of multi- and single-vessel lesions, NSTEMI patients showed more multivessel lesions, and UA patients showed more multivessel lesions or lesion-free arteries. Although multivessel lesions were prevalent in all groups, STEMI patients showed a significantly higher number of single-vessel lesions compared with the other acute coronary syndromes.

**Conclusion:** the study demonstrated a predominance of STEMI in the studied population, which differs from the usual results in ACS.

**Keywords:** acute coronary syndrome, myocardial infarction, unstable angina.

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## INTRODUCTION

Acute coronary syndrome (ACS) remains one of the leading conditions at hospital discharge in the USA and in developing countries. Data from 2001 shows approximately 1,680,000 inpatients discharged with ACS as the primary cause of treatment.<sup>1</sup>

However, the number of inpatient discharges from 2000 to 2010 with coronary heart disease as the leading diagnosis decreased from 2,165,000 to 1,346,000. This is a trend in the USA that suggests a better approach in ACS management with out-of-hospital prevention.<sup>2</sup>

A recent pooled database compared gender differences across ACS regarding the type of diagnosis and the severity of artery obstruction. Women accounted for 28% of the population, and STEMI had the highest prevalence (74.8%).<sup>3</sup>

Despite having these accurate data, the real incidence and prevalence in developing countries is still under debate. How many ACS discharges correspond to ST-elevation myocardial infarction (STEMI)? What is the arterial pattern involved in the ACS inpatient setting? These data are not known for the city of São Bernardo do Campo.

The primary aim of the study was to evaluate the profile of coronary disease in patients hospitalized with ACS who underwent coronary angiography in São Bernardo's Municipal Hospital between 2012 and 2013. The secondary objective was to analyze whether coronary involvement and risk factors are associated with STEMI, unstable angina (UA) and non-ST-elevation myocardial infarction (NSTEMI).

## METHODS

### Study design and patient selection

This is an observational study performed between 2012 and 2013 in the emergency department of São Bernardo's Municipal Hospital with ACS. The study was in accordance with the declaration of Helsinki and the local internal board committee.

All consecutive patients older than 18 years with ACS diagnosis at admission, according to the definition set by the American Heart Association, were enrolled.<sup>1</sup> All patients underwent coronary angiography. Patients with contraindications to coronary angiography were excluded. Contraindications to coronary angiography were known iodine allergy or refusal of the patient. Renal impairment was not considered a contraindication to coronary angiography, because adequate precautions to prevent nephropathy induced by contrast media were taken before the infusion of saline isotonic solution.

We defined STEMI as chest pain with ST-elevation of  $> 1$  mm in  $\geq 2$  contiguous leads or a new onset of left bun-

dle branch block with positive biomarkers. NSTEMI was defined as chest pain with no significant ST-elevation, but with myocardial injury detected with positive cardiac biomarkers. UA was defined as a typical chest pain history without myocardial injury detected by cardiac biomarkers and no ST-elevation.

### Clinical data and outcome

Patients were divided according to their diagnosis: UA, STEMI and NSTEMI. Patient records were used to access clinical information such as age, smoking status (defined as regular consumption of nicotine cigarettes), hypertension, diabetes, dyslipidemia, heart failure, and hemoglobin and *serum* creatinine levels.

The glomerular filtration rate (GFR) was estimated by the modification of diet in renal disease (MDRD) equation and expressed in mL/min/1.73 m<sup>2</sup>.<sup>4</sup> The primary outcome was defined as severe obstructive coronary disease with stenosis  $\geq 70\%$  in the left main, proximal or mid/distal left anterior descending, circumflex, or right coronary arteries. Patients were also evaluated due to the number of coexistent coronary arteries involved (0, 1, 2 or 3). Multivessel disease was defined as the involvement of at least 2 arteries. Due to the possibilities of bias caused by the correlation of health conditions other than ACS with death, mortality was not considered as an outcome in this descriptive and observational analysis.

### Statistical analysis

For quantitative variables, analysis was performed by mean and standard deviation calculations. For qualitative variables, absolute and relative frequencies were used.

The evaluation of homogeneity between the proportions of qualitative variables was performed using the chi-square test or Fisher's exact test when there were expected frequencies less than five.

For three-group comparisons, the two-way analysis of variance (Anova) was used with the Bonferroni test, and when the supposition of data normality was rejected, the nonparametric Kruskal-Wallis test was applied with Dunn's pairwise comparison test.

The significance level applied to the tests was 5%. The statistical package used in this study was SPSS, version 17.0, for Windows (IBM Corporation, Armonk, NY, USA).

## RESULTS

### General data

The sample size in the study period was composed of 131 patients, of whom 64.8% were men. All patients gave their written consent before participating. There was no loss

**TABLE 1** Population profile according to diagnosis.

Variable	UA (n=27)	STEMI (n=75)	NSTEMI (n=29)	p
Age (years)	59.44 ± 8.51	60.45 ± 9.39	58.37 ± 9.70	0.582 <sup>β</sup>
Creatinine (mg/dL)	2.64±5.79	1.66±4.55	1.44±1.38	0.555 <sup>α</sup>
Hemoglobin (mg/dL)	13.69±1.29	13.68±1.92	13.67±1.73	0.999 <sup>β</sup>
GFR (mL/min/1.73 m <sup>2</sup> )	67.41±42.81	83.72±40.15	65.64±44.22	0.165 <sup>α</sup>
Caucasians (%)	50.00	70.00	80.00	0.159*
Male (%)	51.85	72.00	58.62	0.123*
Smokers (%)	62.96	58.67	51.72	0.685*
Hypertension (%)	85.19	72.00	79.31	0.351*
Diabetes (%)	22.22	17.33	24.14	0.694*
Heart Failure (%)	22.22	5.33	10.34	0.035 <sup>μ</sup>
Dyslipidemia (%)	29.63	22.67	17.24	0.543*

\*: Chi Square Test.

α: Kruskal-Wallis non parametric test.

β: One factor variance analysis.

μ: Fisher's exact test.

of subjects in the study. As shown in Table 1, the most prevalent diagnosis was STEMI, with 75 subjects, followed by NSTEMI, in 29 patients, and UA, in 27 patients. The vast majority of patients had hypertension; however, only a few were diabetic.

GFR was higher in the STEMI group than in the NSTEMI and UA groups; nevertheless, there was no need of dialysis in the whole sample. The frequency of hypertension and diabetes was similar among the groups, although reported heart failure was significantly higher in UA patients (p=0.035).

#### Multivessel coronary disease

As previously mentioned, we analyzed the results of coronary angiography in the sample. As shown in Table 2, multivessel disease was more prevalent than single-vessel disease and no lesions were observed in any of the three possible diagnoses. Moreover, in this series, NSTEMI patients had a higher prevalence of multivessel coronary disease than STEMI patients, who otherwise had a higher proportion of single-vessel disease. Groups differed in the number of vessels involved (p=0.006).

**TABLE 2** Number of affected coronary lesions according to diagnosis.

Number of arteries with important and moderate occlusion	UA (n=27)	STEMI (n=75)	NSTEMI (n=29)	p *
One (%)	15.38	41.33	24.14	0.006
Multiple (%)	50.00	50.67	65.52	0.006
None (%)	34.62	8.00	10.34	0.006

\* Fischer's exact test

Taking into account the arteries involved, the left anterior descending and right coronary arteries were more prevalent among all three groups. As shown in Table 3, STEMI patients had 38.24% of severe lesions due to left descending artery obstruction, and NSTEMI patients had 30.77% of severe lesions due to right coronary artery obstruction.

## DISCUSSION

ACS is a matter of public health that requires a great amount of money to be spent in its prevention worldwide. Knowing the local population characteristics may help clinicians to prevent the increasing prevalence of coronary disease.

Our study population had a mean age of 59.9 years. A recent observational Egyptian study showed different patterns of coronary involvement, in which patients aged between 45 and 65 years had a higher proportion of multivessel coronary disease. However, this study included obstructions higher than 50%, which could have overestimated the final proportion.<sup>5</sup>

The OPERA registry, a multicenter French initiative that analyzed the occurrence of STEMI and NSTEMI in reference to the 2000 European Society of Cardiology and American College of Cardiology joint definition of acute myocardial infarction, showed that, despite the difference of diagnosis, both have similar independent adverse outcomes and comparable in-hospital and long-term prognoses. Our NSTEMI population had patterns of arterial involvement similar to those observed in STEMI, which emphasizes the importance of secondary prevention in these patients.<sup>6</sup>

Angiographic characteristics of STEMI and NSTEMI may have different patterns. Zaman et al. observed that the

majority of baseline lesions in STEMI had  $\leq 50\%$  obstruction. Our study showed higher STEMI prevalence and severity of coronary disease. This could be explained by poor primary attention in the setting of coronary disease risk factor prevention in an area with limited access to health services.<sup>7</sup>

Furthermore, analyzing the clinical and angiographic presentation of STEMI, in a case-control study, Colkesen et al.<sup>8</sup> showed a higher prevalence of the left descending artery in a series of 25,038 angiographic procedures including STEMI presentations and controls. There was a higher frequency of men, smokers, and family history of ischemic disease.<sup>8</sup>

This study has some limitations. It was performed at a single center, and no clinical outcomes were taken into account. Additionally, patients without clinical conditions requiring coronary angiography were excluded, because the angiography site was not inside the hospital and this could have underestimated the profile of sicker patients. However, to the best of our knowledge, this study is the first report of coronary disease in this municipality.

## CONCLUSION

In summary, during the period of observation, the profile of ACS in the city of São Bernardo do Campo showed a higher prevalence of STEMI and multivessel coronary disease. There was no relation with risk factors in this cohort.

## RESUMO

Predomínio de infarto agudo do miocárdio com supra ST e gravidade da doença arterial coronariana em uma coorte de pacientes internados com síndrome coronariana aguda: relato da Faculdade de Medicina do ABC.

**Introdução:** a síndrome coronariana aguda (SCA) é uma das principais causas de morbidade e mortalidade no Brasil e no mundo. A gravidade da coronariopatia em pacientes atendidos na cidade de São Bernardo do Campo não é conhecida.

**Objetivo:** estudar o perfil da doença coronariana em pacientes internados com SCA e submetidos à cineangiogramia entre 2012 e 2013.

**Método:** trata-se de estudo descritivo no qual se incluíram pacientes com SCA admitidos no setor de emergência do hospital. Houve consulta aos prontuários das seguintes variáveis: sexo, idade, fatores de risco para doença cardiovascular, diagnóstico e lesões coronárias. O erro alfa estabelecido foi de 5%.

**Resultados:** a amostra neste período foi de 131 pacientes, sendo 64,8% homens. O diagnóstico mais prevalente

foi o infarto agudo do miocárdio com supradesnível do segmento ST (IAMCST) (57,2%), seguido de infarto agudo do miocárdio sem supradesnível do segmento ST (IAMSST) (22,1%) e angina instável (AI) (20,6%). Não houve diferenças significativas quanto ao perfil epidemiológico e a fatores de risco entre os diagnósticos, com exceção da presença de insuficiência cardíaca, mais prevalente nos pacientes com AI.

**Discussão:** as coronárias acometidas não diferiram entre os grupos; porém, enquanto o grupo IAMCST apresentou proporção de lesões multi e uniarteriais similares, o grupo IAMSST apresentou mais lesões multiarteriais, e o grupo AI, mais lesões multiarteriais ou artérias livres de lesões. Apesar das lesões multiarteriais serem prevalentes em todos os grupos, os pacientes com IAMCST apresentaram um número significativamente maior de lesões uniarteriais em comparação a pacientes com outras síndromes coronárias agudas.

**Conclusão:** o estudo demonstrou um predomínio de IAMCST na população estudada, o que difere dos resultados habituais na SCA.

**Palavras-chave:** síndrome coronariana aguda, infarto do miocárdio, angina instável.

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