Original Research Article

Epidemiological Analysis of Patients Undergoing Left Main Coronary Angioplasty.

ABSTRACT

Aims: To outline the clinical-epidemiological profile of patients submitted to angioplasty of the left main coronary artery including variables regarding sex, age, number of diseased vessels, Syntax Score, in-hospital outcome, clinical aspects, comorbidities and complications in addition to compare findings with previous studies and discuss similarities and differences.

Study design: Observational retrospective study, based on analyzes of medical records.

Place and Duration of Study: The Cardiology Service of the Hospital de Clínicas Complex of the Federal University of Paraná – Brazil, between January 2016 and December 2020.

Methodology: Data were collected from patient records undergoing angioplasty in the cardiology service. After analyzing, patients who had undergone angioplasty of the left main coronary artery were selected for the study. Information obtained was organized in the Microsoft Excel spreadsheet editor, being categorized and classified according to the analyses. For the analysis of the outcome of complications, the "t" test was performed for the continuous variables and "chi-square" test for binary variables. the value of p considered was 0.05.

Results: The study had 31 patients. Most patients (83.87%) were over 60 years old. Age ranged from 47 years to 88 years old (mean age 69.5 years). The single coronary trunk lesion left occurred in 1 patient. A total of 20 patients had a main left lesion, in addition to lesions in at least 3 vessels. The Syntax Score showed an average of 23.6. 8 patients experienced procedure complications.

Conclusion: A high Syntax Score was associated with a higher risk of complications, as well as female sex. Thus, it isconcluded that coronary intervention percutaneous intervention in the left main coronary artery showed excellent results, demonstrating safety and good success rates, consistent with the literature. A rate of cardiac and cerebrovascular events was low, which demonstrates similarity with other existing studies.

Keywords: Left Main CoronaryArtery Disease, Angioplasty, Epidemiology, Stent

1. INTRODUCTION

The left main is the first segment of the left coronary artery. It is estimated that this artery usually supplies more than 75% of the left ventricular myocardium in cases of

dominant right coronary circulation. The left main coronary artery arises from the left sinus of Valsalva, but the anomalous exit from the right sinus of Valsalva, or above it represents a relatively common anatomical variant [4].

The left coronary artery is a large diameter artery with important variability in different individuals. After an average length of 10.5 ± 5.3 mm, the left coronary artery divides into the left anterior descending artery (LAD) and left circumflex artery (LCX). The detection of atherosclerotic disease obstruction in the left coronary artery is a relatively uncommon occurrence in hemodynamic services, accounting for approximately 4% of all coronary angiograms, since isolated disease of this artery is seen in only 5-10% of these cases [13].

According to European guidelines, myocardial revascularization is indicated for patients with angiographic stenosis greater than 50% and documented of myocardial ischemia [44]. Large multicenter registries recent and prospective randomized clinical trials have consolidated the knowledge on the adequacy of percutaneous intervention to treat selected patients with unprotected left coronary disease [26].

On the other hand, according to the Guideline of the Brazilian Society of Cardiology on Percutaneous Coronary Intervention, Interventional Cardiology has had great progress in recent years, and currently the method of myocardial revascularization most used in all clinical settings, including stable coronary artery disease (CAD) and coronary syndromes (SCAs). This is due, among other factors, to the great development technological development of percutaneous devices, the evolution of treatment techniques and, mainly to the expansion of indications, which are supported by a series of robust contemporary comparative clinical trials that include assessments of clinical efficacy and safety outcomes in long-term follow-up [12].

2. METHODOLOGY

This was a retrospective observational study, based on analysis of medical records of patients undergoing left main coronary angioplasty at the Complex Hospital de Clínicas of UFPR, aiming to draw an epidemiological profile of these patients, relating the variables regarding gender, age, number of diseased vessels, Syntax Score, in-hospital outcome, clinical aspects, associated comorbidities and procedure-related complications, in addition to comparing the findings with previous studies and discussing similarities and differences.

In this sense, the data were collected from medical records of patients undergoing angioplasty in the cardiology service of the Complex Hospital de Clínicas of UFPR (CHC-UFPR) between January 2016 and December 2020. After analysis, patients who had undergone left main coronary angioplasty were selected for the study.

All patients who underwent left main coronary angioplasty in the Hemodynamic Service of the CHC-UFPR in the last five years were included in the study. Patients who underwent angioplasty with anatomical location different from the left main coronary artery were excluded from the study. The information obtained was organized in Microsoft Excel spreadsheet editor, being categorized and classified according to the analysis.

To analyze the outcome of complications the "t" test was performed for continuous variables and the "chi-square" test for binary variables. The *P* value considered was 0.05.

3. RESULTS AND DISCUSSION

Initially, 3084 records of transluminal coronary angioplasties performed between 2016 and 2020 in the service were collected. After the exclusion of duplicates, a total of 1042 medical records were obtained, which were analyzed and reviewed manually. The inclusion criteria adopted for this study were as follows: patients undergoing percutaneous angioplasty to treat a main lesion in the left main coronary artery during the analyzed period, which comprised the years 2016 to 2020, were included. Patients who did not have coronary

lesions in the left coronary artery were excluded from the study. These criteria were defined to ensure that the sample was composed of patients relevant to the research objectives and to allow for a more focused analysis of outcomes related to left main coronary angioplasty. After this, the total number of patients included in the study was 31, as described in Figure 1.

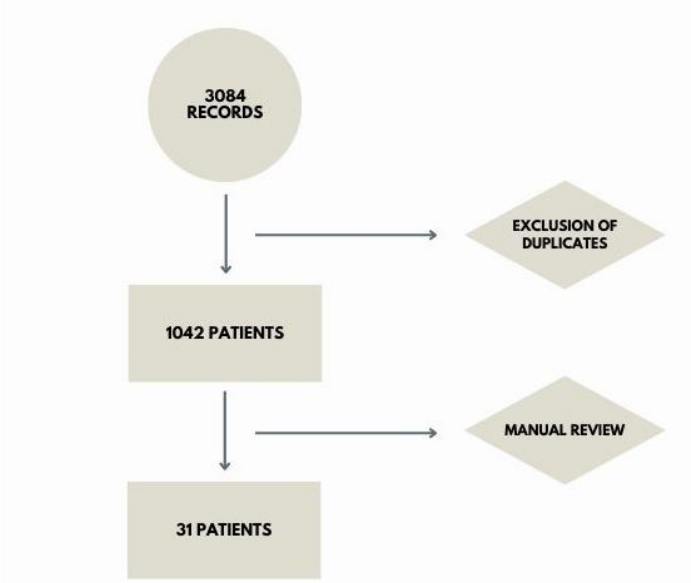

Fig. 1. Flowchart describing record selection.

The age of the patients ranged from 47 to 88 years (mean 69.51) (Table 1). Most patients were older than 60 years (83.87%) (Table 2). Single lesion of the main left coronary artery occurred in 1 patient. A total of 20 patients had main left coronary lesion, besides lesions in at least 3 vessels. And arterial disease was present in 2 or more vessels in addition to the left main coronary in 93.55% of patients (Table 3). The Syntax Score had a mean of 23.6 (Table 4).

Table 1. Ages of the patients in the study.

Measure	Value
Average	69,5
Median	70
Standard deviation	9,86
Minimum	47
Maximum	88

Table 2. Clinical features of patients.

Variable	N	%
Age greater than 60 years	26	83,87
Male	17	54,83
Diabetes mellitus	19	61,29

Hypertension	27	87,09
Hyperlipidemia	17	54,83
Chronic Kidney Disease	7	22,58
Alcoholism	3	9,67
Smoking	20	64,51
Previous heart stroke	18	58,06
Hypothyroidism	4	12,90
Cancer	6	19,4
Intra-hospital death	3	9,67

Table 3. Number of coronary arteries affected.

Coronary arteries affected	N	%
Main left	1	3,22
Main left + 1 artery	1	3,22
Main left + 2 arteries	9	29,03
Main left + 3 or more arteries	20	64,52

Table 4. Patients' Syntax Score.

Measure	Value
Average	23,6
Median	23,5
Minimum	10
Maximum	43

Peri-procedural complications occurred in 8 patients, as shown in Table 5. There were three cases of post-procedural cardiorespiratory arrest and two deaths. Two patients presented stroke, one presented left main artery dissection, one patient presented acute arterial occlusion, and stent migration occurred in one patient, who was later repositioned. It was observed that the presence of a high Syntax Score was associated with a higher risk of complications, as well as female gender (Table 6).

Table 5. Types of complications assessed in absolute numbers and frequencies.

Complication	N	%
Dissection	1	3,2
Acute arterial oclusion	1	3,2

Stroke	2	6,5
Stent migration	1	3,2
Cardiorespiratory arrest	3	9,7
Total	8	25,8

Table 6. Relationship between variables and complications.

Factor	Complication - yes	Complication - no	*P* value
Age (average + standard deviation)	68,3	72,7	0,628
Syntax Score (average + standard deviation)	23,1	24,1	0,047
Male gender	16	1	0,028
Smoking	3	1	1,000
Alcoholism	2	0	1,000
Cardiac insufficiency	6	1	1,000
Diabetes mellitus	15	4	1,000
Chronic Kidney Disease	5	2	0,642

The outcome “death” was not statistically analyzed due to the low number of events.

This study investigated the epidemiological aspects related to patients undergoing left main coronary angioplasty procedure at the Clinics Hospital Complex of the Federal University of Paraná.

The first case of treatment by percutaneous intervention of an unprotected left main coronary artery lesion in Brazil occurred in a patient with stable angina and no surgical contraindication, in whom percutaneous coronary intervention with a first-generation drug-eluting stent was chosen [30].

The SYNTAX study obtained similar results for major cardiac and cerebrovascular events and also for all-cause mortality for lesions treated via percutaneous intervention (36.9%) and by coronary artery bypass graft surgery (31.0%), with no statistical difference [24].

The PRECOMBAT study also obtained similar results, but a higher frequency of ischemia in the revascularized vessel was observed in patients who had undergone percutaneous intervention [1]. Both studies described that for patients with a SYNTAX score ≤ 32, percutaneous coronary intervention was more beneficial.

In this study, the age of the patients ranged from 47 to 88 years, with a mean of 69.51 years. Similarly, previously published studies showed a mean age of the group of patients undergoing PCI of 66 ± 9.6 years [37], 65.4 ± 9.8 years [24] 66.2 ± 9.9 years [22], 61.8 ± 10.0 years [28] and most recently 69.06 ± 10.61 [15].

In the EXCEL study, most patients (51.3%) had lesions affecting at least 2 vessels in addition to the TBI. As was demonstrated in the SYNTAX study, in which lesions of two or three vessels were present in 69.5% of patients and by Grion and collaborators, with 72.89%

[15]. Corroborating with the literature, in the present study arterial disease of 2 or more vessels other than TBI was seen in 93.55% of patients.

The EXCEL study demonstrated the non-inferiority of PCI in all outcomes over a three-year follow-up period. At five years the frequency of events remained similar. Furthermore, it pointed out that stent thrombosis was less frequent than coronary graft occlusion [37]. At the five-year follow-up of the EXCEL study, the frequency of major events remained similar between the groups [38].

On the other hand, the NOBLE study suggested superiority of revascularization surgery after five years because in the group that had undergone percutaneous intervention there was a more frequent need for revascularization [22], an outcome that was not evaluated in the other studies.

In summary, the increased risk of revascularization of the culprit lesion in percutaneous interventions found in the SYNTAX and PRECOMBAT studies was not reproduced in the more recent EXCEL and NOBLE studies.

In the present study, a mean Syntax score value of 23.6 was observed. The SYNTAX study described a mean of 29 and 30 between groups, while the EXCEL study evaluated low and medium risk patients with a mean score of 20 and the NOBLE study described a mean score of 22 between groups. Thus, it is observed that the patients in this study presented complexity of coronary lesions similar to other studies.

Grion and colleagues (2021) evaluated the results of percutaneous treatment of unprotected left main coronary artery lesion using intravascular ultrasound and described the epidemiological aspects of the patients included in the study. A total of 107 patients who had undergone percutaneous coronary angioplasty for left main coronary artery injury were included in the study.

The authors observed a mean Syntax score of 46.80 (SD: 22.95) and 70 patients (65.42%) had a Syntax score above 33 points. Peri-procedural complications occurred in 13 patients (14.95%) of whom 9 had hematoma at the puncture site, two patients had hospital-acquired pneumonia, one patient had acute pulmonary edema, and one had a coronary artery perforation. There were five cases of post-procedure myocardial infarction (4.67%) and two deaths, both in patients with high Syntax score, and there were no strokes after the percutaneous procedure during the in-hospital follow-up period. The frequency of major cardiac and cerebrovascular event in the in-hospital outcome was 6.54%. When comparing patients according to Syntax score, no difference in clinical characteristics or relevant outcomes was observed between the group of patients with high score and those with low or intermediate score [15].

Similarly, in the present study, the three deaths that occurred were in patients with intermediate and high Syntax scores. Moreover, it is observed that female gender and the Syntax score were related, in a statistically significant way, with a higher incidence of complications related to the procedure.

As described in Table 4, there were cases of patients with high Syntax score who underwent angioplasty. According to Grion and collaborators (2020), patients with Syntax score higher than 32 should benefit from the option for revascularization surgery. However, the calculation of this score does not include clinical variables that can have a major impact on the measured outcomes. Possibly, according to the authors, the EuroSCORE has a better performance as a predictor of these events. In clinical practice, when compared to patients studied in large clinical trials, patients with unprotected TBI injury usually have a higher frequency of comorbidities and worse outcomes.

The SYNTAX study revealed that female gender significantly predicted a reduction in cardiac and cerebrovascular event rates at 1 year, with an odds ratio of 0.50 (0.27, 0.91), 95% confidence interval and P = 0.02 [24]. Divergently, the present study demonstrated lower complication rates in male patients (n=1), with P = 0.028. The disagreement with the literature probably occurred because of the small sample size that possibly does not represent all the attributes of the entire population.

Prediction models are useful tools to assist in the therapeutic planning of complex coronary lesions and optimize the outcome of patients by individualized medicine. The combination of Syntax and EuroSCORE score could improve outcome prediction in the indication of percutaneous intervention for unprotected left main coronary lesions [7].

This study has some limitations that must be considered. First, the sample size is small, with only 31 patients included. This may limit the representativeness of the results and the generalization to a larger population. In addition, it is important to note that the results reflect the specific reality of a single service, which may restrict applicability in other health settings.Another relevant limitation is the retrospective nature of the study, which depends on the availability and quality of data obtained through the analysis of medical records. The accuracy and completeness of these data may vary, affecting the reliability of the results obtained.It is essential to consider these limitations when interpreting the results of this study.

4. CONCLUSION

Percutaneous coronary intervention in the left main coronary artery showed excellent results, demonstrating safety and good success rates.

The presence of a high Syntax Score was associated with a higher risk of complications, as well as female gender. The rate of cardiac and cerebrovascular events was low, which shows similarity with existing studies in the literature.

Despite the study restrictions mentioned, the findings contribute to the existing knowledge on the topic at hand. However, future studies with larger samples and prospective methodologies may be needed to confirm and extend these findings.

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