



Characterization of Patients Undergoing Off-pump Myocardial Revascularization Surgery at the Cardiocentro in Santiago de Cuba

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Abstract

Introduction: Coronary revascularization surgery is the treatment of choice for a Introduction: Coronary artery bypass grafting (CABG) is the treatment of choice for a wide range of patients with coronary artery disease, which is the leading cause of death worldwide and in Cuba.

Objective: To characterize patients treated with CABG according to epidemiological, clinical, and surgical variables of interest.

Method: A descriptive, cross-sectional observational study was conducted. The study population consisted of all patients who underwent CABG at the Santiago de Cuba Cardiocenter from January 2017 to December 2023. Using simple random sampling, the sample consisted of 187 patients who underwent CABG at the Santiago de Cuba Cardiocenter during this period.

Results: Patients over 60 years of age predominated, accounting for 109 (58%) of the total study sample, and men predominated over women. The most common postoperative complications were severe anemia (54.55%), followed by low cardiac output (29.41%), and arrhythmias (19.79%). Mixed blood ducts and aortic cross-clamping (108%) were the most frequently used. Antiplatelet agents were used in 181 patients (96.79%), and there were no cardiovascular events.

Conclusions: Off-pump coronary artery bypass grafting (OPBG) was a safe technique for patients undergoing revascularization at the Santiago de Cuba Cardiocenter, making it a therapeutic option applicable to a large number of patients.

Keywords: Ischemic Heart Disease; Extracorporeal circulation; Myocardial Revascularization

Introduction

Myocardial revascularization (CAB) surgery, also called coronary *bypass* surgery, is a medical-surgical procedure to treat blockage or narrowing of the blood vessels that supply blood to the heart [1].

Cardiovascular diseases are currently the leading cause of death worldwide and, among these, ischemic heart disease is the most represented with 9.44 million deaths in 2021 and more than 185 million years of life lost due to illness, disability or death, according to data from a study published by the Global Burden of cardiovascular disease [2].

In Cuba, by 2023, heart disease is also the leading cause of death in both sexes, with a rate of 313.5 per 100,000 inhabitants, with ischemic heart disease occupying first place with a rate of 81.7 per 100,000 inhabitants in the age range between 30-69 years, which occurs just at the moment of greatest productivity of life. when the economic and social impact is more substantial [3].

In this sense, coronary revascularization surgery is the treatment of choice for this wide spectrum of patients with coronary heart disease that are currently impacting, whose efficacy has been widely demonstrated. Traditionally, surgery requires extracorporeal circulation (ECC), although coronary surgery without Extracorporeal Circulation has been implemented as an alternative to potentially reduce the risks that could be triggered [4].

The first attempt to mechanically improve the perfusion of an ischemic myocardial territory was made by Vineberg and Millar in 1951 and consisted of the direct implantation of the internal mammary artery in the myocardium [5].

Since the resurgence of coronary surgery without CPB in the 70s, thanks to the impetus of Benetti and Buffolo, it has allowed access to coronary surgery in countries where CPB was not available or its cost was prohibitive, also generating two opposing groups; one in favor based on the reduction of postoperative morbidity, and another against based on the difficulties that appear when performing it with the heart beating: complicated learning curve, suboptimal anastomoses and incomplete revascularization [4].

In recent years, percutaneous treatment of coronary heart disease has gained ground, but myocardial revascularization (REM) surgery continues to be widely used, because its results translate into a good long-term prognosis [6].

Several factors have been implicated in the morbidity and mortality of conventional coronary surgery, among the causes we can point to the pathophysiological complications triggered by Extracorporeal Circulation, which have been fundamentally related to the appearance of Systemic Inflammatory Response Syndrome (SIRS), micro and macroembolic phenomena, global ischemic damage during cardiac arrest and those related to aortic clamping. the median sternotomy, among others [7], associated with the higher cost of the essential technical support in this modality, it must be assumed that a growing number of patients will benefit from the technique without Extracorporeal Circulation in the future; a situation that supports the execution of research since controversies persist regarding the therapeutic adherence to this method, in some of the cardiovascular surgical care services in the country, so the present research aims to characterize those patients treated by coronary revascularization surgery according to epidemiological, clinical and surgical variables of interest.

Method

A cross-sectional descriptive observational study was conducted in patients who underwent coronary artery bypass surgery at the Cardiocentro in Santiago de Cuba, from January 2017 to December 2023.

The study population consisted of all patients who underwent coronary revascularization surgery at the Cardiocenter of Santiago de Cuba who met the following condition.

Coronary artery bypass surgery, without the use of extracorporeal circulation, as well as the performance of other types of associated procedures.

Patients for whom the primary data were not fully available were excluded from the study.

In this way, through a simple random sampling, the sample was made up of 187 patients who underwent Coronary Revascularization Surgery at the Santiago de Cuba Cardiocenter.

The variables studied were: age (two age groups were identified, under 60 years of age identified as non-elderly patients and in those over 60 years of age identified as elderly patients); Sex (According to gender, male or female); Personal pathological history of interest (high blood pressure, obesity, smoking, carotid disease, peripheral artery disease, advanced age, previous acute myocardial infarction, peptic disease, urgency of surgery, chronic obstructive pulmonary disease, asthma, previous peripheral vascular accident, recent thrombolysis, recent stent implantation, diabetes mellitus); technique used (arterial blood ducts, without aortic clamping; Mixed blood ducts, Partial aortic clamping); Complications (Severe Anemia, Low Cardiac Output, Arrhythmias, Acute Myocardial Infarction, Respiratory Complications, Infectious Complications; Use of Antiplatelet Agents and Occurrence of AMI (YES, NO).

An extensive bibliographic review was carried out regarding the topic of study and the objectives proposed in the remote databases LILACCS' Pubmed' Medline, Google Scholar. All data were obtained from medical records, anesthetic forms and operative reports in coordination with the Archives Department of the "Saturnino Lora" Provincial Hospital.

The information was processed in a computerized way, using a Core i3 PC, in which a database with the collected values was used, using the statistical program SPSS Statistics version 22, as well as the Microsoft Office 2010 package for Windows, in order to prepare the contingency tables, graphs and text of the final report.

In the descriptive statistical analysis, measures of central tendency (arithmetic mean and median) were used as synthesis parameters. For the presentation of the results, tables were prepared, the results of which were duly analyzed, then they were discussed, comparing them with similar national and international studies. Finally, the interpretation and analysis of the results through a deductive and inductive process made it possible to reach conclusions and issue recommendations in this regard.

Ethical principles

The requirements established by good clinical practices were met and governed by the ethical principles that have their origin in the Declaration of Helsinki and the International Ethical Standards for Biomedical Research in Human Subjects. The research was approved by the Scientific Council of the hospital.

Results

The most frequent group was the elderly, with 109 for 58% of the total number of patients in the sample. Similarly, the male sex prevailed with 157, which represents 84% of the total number of patients studied.

Older age	Female		Male		Total	
	Yes	%	Yes	%	No (%)	
Yes	0	0,00	78	42,00	78	42,00
Yes	30	16,00	79	42,00	109	58,00
Total	30	16,00	157	84,00	187	100,00

Table 1: Distribution of patients according to age group and sex. Cardiocentro Santiago de Cuba period 2017 – 2020.

Source: Medical History.

Table 2 shows the personal antecedents of interest, found in the study, being notable arterial hypertension (77.54%), obesity (71.12%), smokers (64.71%) and carotid and peripheral disease,

both with a (58.29%). Other factors became less common, coinciding with the bibliography consulted.

Background	Yes	Percent
High blood pressure	145	77.54
Obesity	133	71.12
Smoking	121	64.71
Carotid disease	109	58.29
Peripheral artery disease	109	58.29
Older age	108	57.75
Recent previous IMA	73	39.04
Peptic disease	36	19.25
Urgency of the surgery	37	19.79
Chronic Obstructive Pulmonary Disease	31	16.58
Asthma	30	16.04
Previous peripheral vascular accident	30	16.04
Recent thrombolysis	30	16.04
Recent stent implantation	13	6.95
Diabetes Mellitus	7	3.74

Table 2: Distribution of patients according to preoperative history of interest.

Source: Medical History.

Technique used	Yes	Percent
Arterial only blood ducts	79	42.25
No aortic clamping	79	42.25
Mixed blood products	108	57.75
Partial aortic clamping	108	57.75

Table 3: Distribution of patients according to technique used.

Table 3 shows the predominance of the use of mixed blood ducts and partial aortic clamping, both with 108 cases for 57.75%.

Complications	Yes	Percent
Anemia Severa	102	54.55
Low Expense	55	29.41
Arrhythmias	37	19.79
THERE IS	7	3.74
Respiratory complications	6	3.21
Infectious complications	6	3.21

Table 4: Distribution of patients according to postoperative complications.

Source: Medical History.

Table 4 shows the most observed postoperative complications were severe anemia with 54.55%, followed by low cardiac output with 29.41% and arrhythmias for 19.79%.

Antiplatelet agents	There is		But there is		Total	
	Yes	%	Yes	%	No %	
Yes	6	3.21	0	0.00	6	3.21
Yes	1	0.53	180	96.26	181	96.79
Total	7	3.74	180	96.26	187	100.00

Table 5: Distribution of patients according to AMI and use of antiplatelet agents.

Table 5 shows the patients according to the use of antiplatelet therapy and the occurrence of perioperative AMI, where 96.79% of the patients were indicated for this therapy and did not suffer

ischemic events. It was also observed that all patients who did not receive preoperative antiplatelet therapy suffered this type of cardiovascular event.

Antiplatelet agents	There is		But there is		Total	
	Yes	%	Yes	%	No %	
Yes	6	3.21	0	0.00	6	3.21
Yes	1	0.53	180	96.26	181	96.79
Total	7	3.74	180	96.26	187	100.00

Table 5: Distribution of patients according to AMI and use of antiplatelet agents.

Discussion

Ischemic heart disease is a cause of surgical intervention in a considerable group of patients each year, with myocardial revascularization being the second in terms of frequency, according to the study by Polo Gutiérrez., *et al.* [8].

It is one of the most relevant cardiovascular conditions from a public health point of view that will possibly continue to increase in the next decade due to the growing epidemic of obesity, type 2 diabetes and metabolic syndrome, which, in turn, can increase the risk of premature coronary heart disease in young people [9].

Death rates from ischemic heart disease increase exponentially with age, due to genetic or lifestyle factors that cause plaques to grow in the arteries as you age. This begins to take center stage among the causes of death, among men from the age of 45 and in women who are around 55 years of age [10].

The general characteristics of the patients in the present study do not differ significantly from international reports, the incidence of mortality was low in the period studied.

Coronary surgery without CPB is a safe technique for revascularized patients at the Santiago de Cuba Cardiocenter; which makes it a therapeutic option applicable to a large number of patients.

The authors consider that the fact that men are more exposed to cardiovascular risk factors and on the other hand, less protected from a hormonal point of view, has been related to the higher incidence of cardiovascular diseases in this gender.

This is consistent with the results of the study and with reports by Radice., *et al.* [11] where they indicate that males have twice the risk of coronary involvement than females. However, the greater longevity of women means that, at very advanced ages, the disease is seen with similar frequency in both sexes. Hence, age and sex are considered essential elements for the selection of the most appropriate revascularization method for each patient.

Significant associations have been found between ischemic heart disease and cardiovascular risk factors analogous to those of vascular atherosclerosis, given by increased serum cholesterol concentration, low-density lipoprotein (LDL), diabetes mellitus, tobacco, male sex and arterial hypertension, related to inflammatory markers and components of metabolic syndrome [12].

These risk factors have been verified by several studies Figueroa., *et al.* [5], Alustiza., *et al.* [6], Sepúlveda., *et al.* [13] who expose among the main antecedents of these patients Arterial Hypertension, Diabetes Mellitus, Smoking, Dyslipidemia, which coincides with the findings of the research

The present study agrees with González., *et al.* [14] and García [15], in which he endorses the important advantages exhibited by arterial ducts, which determined a significant increase in the use of two or more arterial bridges and the use of the mammary artery in the patients of his study, in our setting, despite the predominance of the use of mixed blood ducts, arterial blood ducts only had a non-negligible utility due to the advantages they present over venous ones.

Among the main complications, our study differs from other authors such as Figueroa, *et al.* [5] that show that patients undergoing the procedure without CPB had pulmonary complications more frequently and in 22.5% de novo postoperative atrial fibrillation.

Taking into consideration that contractility and rhythm disorders are the two most frequent forms of expression of ischemic damage suffered during the period of coronary vascular occlusion, it is not surprising that Low Cardiac Output predominates as one of the most frequent postoperative complications and shows similarity with the reports of Alustiza, *et al.* [6].

Perioperative AMI is one of the most feared complications with a poor prognosis in coronary surgery. Although the incidence of this event has decreased with the development of technologies and the improvement of surgical technique, the variability in the frequency of occurrence of this event reported by the different studies may be due to the difficulty in establishing the diagnosis and the time of presentation after surgery. Perioperative IMA is considered to be one that occurs during the surgical procedure and up to 30 days after it [16].

Antiplatelet therapy is used in different cardiac entities, either in the treatment of the acute phase or to prevent cardiovascular events. In Ischemic Heart Disease, treatment with antiplatelet agents is basic and the choice of antiplatelet agents depends on their risk stratification, and according to our study, patients to whom this therapy was indicated did not suffer ischemic events.

Conclusions

In the study carried out, the older age group predominated at the expense of the male sex; the most frequent antecedents were arterial hypertension and obesity; The most common complications were anemia followed by low cardiac output. In this way, it can be stated that Coronary Surgery without Extracorporeal Circulation was a safe technique for revascularized patients at the Santiago de Cuba Cardiocenter; which makes it a therapeutic option applicable to a large number of patients.

Declaration of Conflict of Interest

The authors declare no conflict of interest in the preparation of this research.

Funding Declaration

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