ORIGINAL ARTICLE

Incidence and Characteristics Angiographic of Patients with Acute Myocardial

Cynthia Kallás Bachur,[1,2] José Alexandre Bachur,[1] Juliana Pereira Machado,[3] Eugenia Velludo Veiga,[2] Sarah da Silva Candido,[2] Ricardo Barbosa,[4] Julia Granado Carraro,[1] Danielle de Freitas Gonçalves,[1] Maria Georgina Marques Tonello[1]

Universidade de Franca,[1] Franca, SP - Brazil
Universidade de São Paulo,[2] São Paulo, SP - Brazil
Centro Universitário Barão de Mauá,[3] Ribeirão Preto, SP - Brazil
Hospital do Coração de Franca,[4] Franca, SP - Brazil

Abstract

Background: Acute myocardial infarction (AMI) is defined as the death of cardiomyocytes due to prolonged ischemia, caused by thrombosis and / or vasospasm on an atherosclerotic plaque.

Objective: To determine the incidence of patients with myocardial infarction undergoing primary angioplasty; characterize the anthropometric variables and identify the risk factors in this population.

Methods: This was a cross-sectional, observational, retrospective study in which we collected secondary data from medical records of a hospital in a city in the state of São Paulo, where the largest number of interventions is via Public Health System, patients with a diagnosis of Myocardial Infarction, undergoing primary coronary angioplasty, from January 2011 to December 2013.

Results: The total sample consisted of 437 subjects, 282 male and 155 female. In this study, there was predominance of myocardial infarction in the anterior descending artery ADA (45.51%), followed by right coronary artery RCA (38.46%), in carrying out the rescue angioplasty and stent implantation in 96.62% of cases. There was a predominance of high blood pressure as risk factors for 73.71%, followed by smoking with 41.66% of the sample.

Conclusion: According to the present study data, it appears a higher prevalence of infarction occurred in the ADA, with individuals performing the rescue angioplasty procedure and the placement of the stent, and a growing incidence of drug stent placement. We observed a high incidence of risk factors, prevailing hypertension. (Int J Cardiovasc Sci. 2018;31(5)527-531)

Keywords: Myocardial Infarction; Risk Factors; Angioplasty; Drug-Eluting Stents; Hypertension; Tobaco Use Disorder.

Introduction

Cardiovascular diseases (CVD) are among the leading causes of death in Brazil and acute myocardial infarction comes second on this list as being the leading cause of death in most developed countries. Estimates suggest that this will also occur in the coming decades in developing countries.[1]

Acute myocardial infarction (AMI) is defined as the death of cardiomyocytes due to prolonged ischemia, caused by thrombosis and/or vasospasm on an atherosclerotic plaque.[2] Most events are caused by sudden rupture and thrombus formation on plaques inflamed, lipid-rich and thin fibrous layers. The myocardium undergoes progressive aggression due to areas of ischemia, injury and necrosis, caused consecutively by electrolytic disturbances, reversible morphological changes and definitive damages. Clinical presentation may range from non-ST segment elevation AMI to ST-segment elevation myocardial infarction. Rapid diagnosis, immediate clearance of the coronary artery, maintenance of blood flow in the myocardium,

Mailing Address: Cynthia Kallás Bachur
Rua Alberto de Azevedo, 2020. Postal code: 14405-281, Jardim Califórnia, Franca, SP - Brazil.
E-mail: cynthia.bachur@unifran.edu.br

prophylaxis of distal embolization and prevention of complications (mechanical disorders, arrhythmias and heart failure) are necessary.[2] In the face of the advances of the last decades in medical procedures, such as the use of the stent in angioplasty procedures, the mortality rate in cases of AMI in the world fell from 50% in the 1950s to the current 6-10% in the 1980s.[3]

Percutaneous transluminal coronary angioplasty (PTCA) or salvage coronary angioplasty is used for the immediate treatment of AMI. Percutaneous revascularization is performed without previous use of thrombolytic agents, and may or may not implant the stent.[4,5] Stents generated more predictable and long-term results in the short and long term in percutaneous intervention scenarios that when operated with balloon angioplasty.[6]

The present study aimed to verify the incidence of patients diagnosed with AMI undergoing primary angioplasty, to characterize the anthropometric and angiographic variables and to identify the risk factors for CVD in this population.

Methods

This is a cross-sectional, observational, retrospective study in which secondary data were collected from medical records of patients diagnosed with AMI undergoing PTCA in a hospital in a city in the interior of the state of São Paulo. The majority of the interventions was carried out by the Unified Public Health System (SUS), from 2011 January to 2013 December.

From the medical records were collected the variables as: anthropometric data, risk factors for ischemic heart disease: arterial hypertension (HA), diabetes mellitus (DM), dyslipidemia, smoking, sedentary lifestyle, heredity and obesity; angiographic data: location of the coronary lesion; ACTP, stent implantation and implanted type. The hemodynamic and cineangiocardiographic study was performed through left cardiac catheterization, puncture of the right radial artery and puncture of the right femoral artery, under local anesthesia (lidocaine 2%). The cineangiocardiographic films and reports were interpreted by hemodynamicist cardiologists experienced in the area.

Inclusion criteria were: patients submitted to PTCA during the first 24 hours of the diagnosis of AMI. Medical records improperly filled up were excluded.

This study was approved by the research ethics committee, CAAE n° 35527714.0.0000.5495 in accordance with the Directives and Norms Regulating Researches involving Human Beings. The results will be presented in the form of absolute and relative numbers in percentages.

Results

The total sample comprised 437 individuals, 282 males and 155 females, whose anthropometric characteristics can be observed in table 1.

According to the Obesity Guidelines 2010,[7] the sample is included in the classification of pre-obese, defined by

Table 1 - Anthropometric features of patients diagnosed with acute myocardial infarction (n = 437) that underwent primary coronary angioplasty at a hospital in a city in the interior of the state of São Paulo between the years 2011 to 2013

Year	n	Age (years) m / sd	Weight (kg) m / sd	Height (cm) m / sd	BMI m / sd
Male					
2011	103	59.50 ± 10.69	80.28 ± 14.63	1.71 ± 0.07	27.40 ± 4.01
2012	104	60.03 ± 11.04	78.77 ± 16.62	1.71 ± 0.07	26.77 ± 4.96
2013	75	60.09 ± 10.86	82.16 ± 14.74	1.72 ± 0.05	27.75 ± 4.33
Female					
2011	53	59.83 ± 14.32	69.8 ± 13.9	1.60 ± 0.06	27.3 ± 4.46
2012	47	64.36 ± 11.85	70 ± 14.3	1.59 ± 0.08	27.4 ± 4.94
2013	55	64.89 ± 10.48	68.60 ± 12.53	1.60 ± 0.06	26.61 ± 4.36

M: mean; sd: standard deviation.

the BMI calculation. The high BMI ratio is a correlated risk factor for chronic diseases and a high mortality rate.

Analyzing risk factors for CVD of the sample, we observed that HTN is the predominant factor in both sexes, followed by smoking for men and dyslipidemia for women, as shown in table 2.

When considering the coronary arteries in the AMI, the anterior descending artery (ADA) is the most prominent, and its revascularization a survival factor.[8] The descriptions of the affected arteries are shown in table 3.

The stent implantation has a marked predominance when compared to the use of the balloon, it has being

mainly used in 96.62% of the angioplasties performed in 2011, 91.26% in 2012 and 92.3% in 2013.

There was a rise in the use of the pharmacological stent, increasing from 3.88% in 2011, to 4.52% in 2012 and to 10.90% in 2013, becoming more and more a priority in hospitals that perform PTCA.

Important to be considered is the high cost of the pharmacological stent, since in the sample there is a predominance of patients using SUS, being 73.17% in 2011, 82.25% in 2012 and 89.87% in 2013. Regarding the use of private health, is 27.76% in 2011, 17.87% in 2012 and 10.11% in 2013.

Table 2 - Risk factors for cardiovascular diseases in patients diagnosed with acute myocardial infarction (n = 437) who underwent primary coronary angioplasty at a hospital

Risk factor	2011				2012				2013			
	Male n%		Female n%		Male n%		Female n%		Male n%		Female n%	
Hypertension	73	70.87%	42	79.24%	69	66.34%	35	76.59%	53	70.66%	47	85.45%
Smoking	44	42.71%	21	39.62%	50	48.07%	16	34.04%	22	29.33%	22	40.0%
Dyslipidemias	31	30.09%	19	35.84%	32	30.76%	21	44.68%	24	32%	28	50.90%
Heredity	35	33.98%	20	37.73%	27	25.96%	11	23.40%	16	21.33%	17	30.90%
Obesity	25	24.27%	12	22.64%	13	12.50%	10	21.27%	18	24%	11	20%
DM	16	15.53%	7	13.20%	9	8.65%	6	12.76%	10	13.33%	16	29.09%
Sedentariness	18	17.47%	10	18.86%	6	5.76%	0	0%	1	1.33%	0	0%

DM: diabetes mellitus.

Table 3 - Arteries affected by acute myocardial infarction in diagnosed patients (n = 437), submitted to primary coronary angioplasty, in a hospital in a city in the interior of the state of São Paulo, between the years 2011 to 2013

Artery	2011				2012				2013			
	Male n%		Female n%		Male n%		Female n%		Male n%		Female n%	
ADA	46	44.66%	25	47.16%	40	41.60%	19	40.42%	33	44%	20	36.36%
RCA	39	37.86%	21	39.62%	39	37.50%	19	40.42%	27	36%	24	43.63%
CA	13	12.62%	5	5.43%	16	15.38%	7	14.89%	10	13.30%	10	13.33%
DA	5	4.85%	0	0%	7	6.73%	1	2.12%	0	0%	1	18.18%
MA	0	0%	2	3.77%	2	1.92%	1	2.12%	5	6.66%	0	0%

ADA: anterior descending artery; RCA: right coronary artery; CA: circumflex artery; DA: diagonal artery; MA: marginal artery.

Discussion

The latest advances in the treatment of AMI in centers of invasive cardiology allow angioplasty to be performed in the first hours as an immediate resource method for coronary reperfusion.[9] The early myocardial revascularization operation is indicated when there is consensus on the risks and benefits of the procedure, such as the time to revascularization after AMI. The success of the procedure is related to the preoperative risk factors such as: sex, age, Q-wave infarction and presence of cardiogenic shock. In a study by Jante et al,[10] it was verified that these risk factors determine a poor prognosis for revascularized patients exposed to them.

Evaluating percutaneous coronary intervention, there is a limitation to its efficacy and safety since there is the possibility of uncontrolled acute occlusion of the vessel under treatment and coronary restenosis. The rate of occurrence of these can be reduced by using the pharmacological stent. In 1977, in a study by Gonçalves et al,[4] restenosis rates using the balloon catheter alone ranged from 30 to 50%, up to the sixth month after the procedure.

The stent was the first percutaneous device that promoted significant reductions in rates of coronary restenosis. According to Serruys et al,[11] there was a reduction of 30 to 35%, demonstrated in controlled multicenter studies. Powel[12] analyzed the coronary angiography of patients undergoing surgery, and found that only 6% of these patients would be candidates for pharmacological stent use. However, evaluating patients with chronic coronary occlusion, 46% would be candidates for myocardial revascularization.

The use of coronary stents in AMI is a recent therapeutic option, which aims at immediate and also long term results.[10] To become an ideal option, results should be obtained with greater efficiency and spending less money, what is difficult because, as all implementation processes, demands significant additional costs, so the evaluation of the economic impact in the private sector as well as in the public sector is extremely important.[13]

According to the study by Rassi Jr. et al,[13] the calculation for replacement of the conventional stent by the pharmacological one would involve additional costs of about R$ 24 million, increasing in the SUS budget of 12.8%. Data from 2003 were used for this calculation when 30,666 coronary angioplasty procedures with conventional stent were performed by SUS.

Analyzing the cost-effectiveness of the initial hospitalization for implantation of the pharmacological stent with the use of Rapamycin, Quadro et al[14] demonstrated an increase of only US$ 309 in clinical cost in nine months, avoiding US$ 1,650 cost for a new revascularization. Clinical success was observed because of the decreasing rate in emergency myocardial revascularization surgery or death by the procedure.

The incorporation of new technologies in Brazil depends on comparative studies, aiming the reimbursement or financing of the pharmacological stent, in both the private and public sectors. The adoption of this technology in both systems is still low due to its high cost.[15]

Following the history of the evolution of the treatment and the resources spent for infarcted patients it is possible to observe, from the data of the present study, that it is necessary to raise awareness of risk factors, especially HTN, in an attempt to prevent future cardiovascular events. The lack of data in the spreadsheets can be considered a bias, such as the death index, since the lesion of greater prevalence in the individuals analyzed in this study was in the ADA. In terms of an immediate resource in the AMI treatment, the implantation of the pharmacological stent shows an effective evolution.

Conclusions

According to the results of the present study, a higher prevalence of infarction occurred in the ADA artery, with the rescue angioplasty procedure being performed, placing the stent, and an increasing incidence of the pharmacological stent placement. High blood pressure and smoking still appear as risk factors present in the sample, reinforcing the need for emphasis on medication adherence, changes in lifestyle, weight control and post-infarction follow-up in this sample.

Author contributions

Conception and design of the research: Kallás Bachur CK. Acquisition of data: Bachur JA. Analysis and interpretation of the data: Machado JP. Statistical analysis: Veiga EV. Writing of the manuscript: Candido SS. Critical revision of the manuscript for intellectual content: : Barbosa R, Carraro JG, Gonçalves DF, Tonello MGM.

Potential Conflict of Interest

No potential conflict of interest relevant to this article was reported.

Sources of Funding

There were no external funding sources for this study.

Study Association

This study is not associated with any thesis or dissertation work.

Ethics approval and consent to participate

This study was approved by the Ethics Committee of the Universidade de Franca (CEPE/UNIFRAN) under the protocol number 35527714.0.00005495. All the procedures in this study were in accordance with the 1975 Helsinki Declaration, updated in 2013.

References

1. Caluza AC, Barbosa AH, Gonçalves I, Oliveira CA, Matos LN, Zeefried C, et al. ST-Elevation Myocardial Infarction Network: systematization in 205 cases reduced clinical events in the public health care system. Arq. Bras. Cardiol. 2012;99(5):1040-8. doi: http://dx.doi.org/10.1590/S0066-782X2012005000100.

2. Pesaro AEP, Serrano CVJr, Nicolau JC. Acute myocardial infarction - acute coronary syndrome with ST-segment elevation. Rev Assoc Med Bras (1992). 2004;50(2):214-20. doi: http://dx.doi.org/10.1590/S0104-42302004000200041.

3. Baggio MA, Parizoto GM, Callegaro GD, Koerich C, Erdmann AL. Incidence and sociodemographic characteristics of patients with coronary conditions. Revista de Enfermagem. 2011;3(5):73-81. doi: http://dx.doi.org/10.12707/RIII1037.

4. Gonçalves BK, Tadeschi AL, Sena MA, Peixoto RT, Tadeschi BT. Segurança dos Stents Farmacológicos no Infarto Agudo do Miocárdio em Lesões com Trombos Visíveis à Angiografia. Rev SOCERJ. 2006;19(6):493-7.

5. Tanajura LF, Sousa JE, Sousa AG, Abizaid A, Paula JE, Albertal M, et al. Randomized intravascular ultrasound comparison between endoprostheses with and without amorphous silicon-carbide. Arq Bras Cardiol. 2004;99(nº esp):59-63. doi: http://dx.doi.org/10.1590/S0066-782X2004001900011.

6. Sousa AG, Costa R, Abizaid A, Buitrón F, Constantini C, Marchat E, et al. Patient demographics and immediate results of primary angioplasty in the SOLACI registry. Rev Bras Cardiol Invas. 2009;17(3):335-9. doi: http://dx.doi.org/10.1590/S2179-83972009000300010.

7. Associação Brasileira para Estudo da Obesidade e Síndrome Metabólica. (ABESO). Diretrizes brasileiras de obesidade 2009/2010. 3ª ed. Itapevi: AC Farmacêutica; 2009.

8. Santos Mde F, Tarbine SG, Constantini CO, Oliveira MR, Bubna MH, Souza CG, et al. Pharmacological stent deployment in the left anterior descending artery: late event indicators. Arq Bras Cardiol. 2009;92(1):2-9. doi: http://dx.doi.org/10.1590/S0066-782X2009000100002.

9. Mattos LA, Sousa AG, Neto CC, Labrunie A, Alves CR, Saad J. Primary coronary angioplasty and stent implantation in acute myocardial infarction. Comparative analysis of the in-hospital results in the CENIC/SBHCI registry. National Center of Cardiovascular Interventions members. Arq Bras Cardiol. 1999;73(6):475-84. doi: http://dx.doi.org/10.1590/S0066-782X1999001200002.

10. Jante FB, Nicolau JC, Hueb AC, Atik FA, Barafiole LM, Murta CB, et al. Prognostic factors of myocardial revascularization in acute myocardial infaction. Rev Bras Cir Cardiovasc. 2001;16(3):195-202. http://dx.doi.org/10.1590/S0102-76382001000300003.

11. Serruys PW, Van Hout B, Bonnier H, Legrand V, Garcia E, Macaya C, et al. Randomised comparison of implantation of heparin-coated stents with balloon angioplasty in selected patients with coronary artery disease (Benestent II). Lancet. 1998;352(9129):673-81. doi: http://dx.doi.org/10.1016/S0140-6736(97)11128-X. Erratum in: Lancet 1998;352(9138):1478.

12. Powel BD, Rihal C, Bell M, Zehr KJ, Holmes DH Jr. Anticipated impact of drug eluting stents on referral patterns for coronary artery bypass graft surgery: a population-based angiographic analysis. Mayo Clin Proc. 2004;79(6):769-72. doi: 10.4065/79.6.769.

13. Rassi A Jr. Economic analysis of drug-eluting coronary stents in Brazil: a choice for all or just for a few patients? Arq Bras Cardiol. 2007;88(4):376-7. PMID: 17546263. doi: http://dx.doi.org/10.1590/S0066-782X2007000400001.

14. Quadros AS, Gottschall CA, Leite RS. Cost-effectiveness of drug eluting stents in large vessels. Rev Bras Cardiol Invas. 2006;14(3):306-13.

15. Lima VC, Mattos LA, Caramori PR, Perin MA, Mangione JA, Machado BM, et al. Expert consensus (SBC/SBHCI) on the use of drug-eluting stents: recommendations of the Brazilian society of interventional cardiology / Brazilian society of cardiology for the Brazilian public single healthcare system. Arq Bras Cardiol. 2006;87(4):e162-7. doi: http://dx.doi.org/10.1590/S0066-782X2006001700037.