Journal of Nursing
Revista de Enfermagem
UFPE On Line
ISSN: 1981-8963

ORIGINAL ARTICLE

POSTOPERATIVE COMPLICATIONS IN PATIENTS SUBMITTED TO MYOCARDIAL REVASCULARIZATION SURGERY

COMPLICAÇÕES PÓS-OPERATÓRIAS EM PACIENTES SUBMETIDOS A CIRURGIA DE REVASCULARIZAÇÃO MIOCÁRDICA

COMPLICACIONES POSTOPERATORIAS EN PACIENTES SOMETIDOS A CIRUGÍA DE REVASCULARIZACIÓN MIOCÁRDICA

Nyagra Ribeiro de Araujo[1], Raul Amaral de Araújo[2], Regina Célia de Oliveira[3], Simone Maria Muniz da Silva Bezerra[4]

ABSTRACT

Objective: to identify the postoperative complications in patients submitted to myocardial revascularization. ***Method:*** this is a descriptive, exploratory, and retrospective research with a quantitative approach carried out in a university hospital in Recife, Pernambuco, Brazil, through the analysis of 183 medical records, after approval by the Research Ethics Committee, under the CAAE 0169.0.106.000-11. The variables were analyzed through the software STATA/SE 9.0, using descriptive statistics, and presented in table and figure form. ***Results:*** complications were found in 44.8% of patients, standing out the cardiovascular (23.5%), pulmonary (21.9%), renal (8.7%), and neurological (7.7%) ones. Other complications (9.3%), such as surgical wound infection, mediastinitis, bleeding, and subcutaneous emphysema, were also observed; 10.4% evolved to death. ***Conclusion:*** knowing complications in the postoperative period of myocardial revascularization surgery is important, because it favors the implementation of proactive actions, avoiding harms and/or sequels to the patients assisted through the nursing process instrumentalization. ***Descriptors:*** Cardiovascular Surgical Procedures; Myocardial Revascularization; Postoperative Complications; Perioperative Nursing.

RESUMO

Objetivo: identificar as complicações pós-operatórias em pacientes submetidos a cirurgia de revascularização miocárdica. ***Método:*** trata-se de pesquisa descritiva, exploratória e retrospectiva com abordagem quantitativa realizada em um hospital universitário de Recife-PE por meio da análise de 183 prontuários, após aprovação do Comitê de Ética em Pesquisa, sob o CAAE n. 0169.0.106.000-11. As variáveis foram analisadas por meio do software STATA/SE 9.0, utilizando estatística descritiva, e apresentadas em forma de tabela e figura. ***Resultados:*** complicações foram encontradas em 44,8% dos pacientes, destacando-se as cardiovasculares (23,5%), pulmonares (21,9%), renais (8,7%) e neurológicas (7,7%). Outras complicações (9,3%), como infecção de ferida operatória, mediastinite, sangramento e enfisema subcutâneo, foram observadas; 10,4% evoluíram a óbito. ***Conclusão:*** o conhecimento das complicações no pós-operatório da cirurgia de revascularização miocárdica é importante, pois favorece a implementação de ações proativas, evitando danos e/ou sequelas aos pacientes assistidos a partir da instrumentalização do processo de enfermagem. ***Descritores:*** Procedimentos Cirúrgicos Cardiovasculares; Revascularização Miocárdica; Complicações Pós-Operatórias; Enfermagem Perioperatória.

RESUMEN

Objetivo: identificar las complicaciones postoperatorias en pacientes sometidos a cirugía de revascularización miocárdica. ***Método:*** esta es una investigación descriptiva, exploratoria y retrospectiva con abordaje cuantitativo realizada en un hospital universitario de Recife, Pernambuco, Brasil, por medio del análisis de 183 prontuarios, después de la aprobación del Comité de Ética en Investigación, bajo el CAAE 0169.0.106.000-11. Las variables fueron analizadas por medio del programa STATA/SE 9.0, utilizando estadística descriptiva, y presentadas en forma de tabla y figura. ***Resultados:*** complicaciones fueron encontradas en 44,8% de los pacientes, se destacando las cardiovasculares (23,5%), pulmonares (21,9%), renales (8,7%) y neurológicas (7,7%). Otras complicaciones (9,3%), como infección de heridas quirúrgicas, mediastinitis, sangrado y enfisema subcutáneo, también fueron observadas; 10,4% evolucionaron a muerte. ***Conclusión:*** el conocimiento de las complicaciones en el postoperatorio de la cirugía de revascularización miocárdica es importante, pues favorece la implementación de acciones proactivas, evitando daños y/o secuelas a los pacientes atendidos desde la instrumentalización del proceso de enfermería. ***Descriptores:*** Procedimientos Quirúrgicos Cardiovasculares; Revascularización Miocárdica; Complicaciones Postoperatorias; Enfermería Perioperatoria.

[1]Nurse, MS student at the Associate Graduate Nursing Program of Universidade de Pernambuco (UPE). Recife (PE), Brazil. Email: nyagra.ra@hotmail.com; [2]Nurse. MS student at the Graduate Nursing Program of Universidade Federal de Pernambuco (PPGEnf/UFPE). Recife (PE), Brazil. Email: raul.amaral@ufpe.br; [3]Nurse. Post-PhD degree in Nursing. Professor at the undergraduate and graduate courses of Faculdade de Enfermagem Nossa Senhora das Graças (Fensg). Recife (PE), Brazil. Email: reginac_oliveira@terra.com.br; [4,5]Nurses. Post-PhD degree in Nursing. Professors at the Undergraduate and Graduate Courses of Faculdade de Enfermagem Nossa Senhora das Graças/Fensg. Recife (PE), Brazil. Email: simonemunizm2@gmail.com

INTRODUCTION

Myocardial revascularization surgery (MRS) is the most effective therapeutic method for treating coronary artery disease (CAD) in certain subgroups of patients, particularly those at higher risk for cardiovascular, multiarterial, and diabetic events.[1]

Although there're other forms for treating CAD, such as clinical treatment and percutaneous transluminal angioplasty (PTA), MRS is an option with accurate indications and good results in the medium and long run, being one of the most frequently used surgical procedures nowadays.[2]

Due to improved diagnostic and therapeutic methods and life habits increasingly harmful to health, such as a hypercaloric diets, rich in sugars, smoking, and sedentary lifestyle, the characteristics of patients who undergo MRS have changed. It's being indicated later or in patients with more severe injuries, resulting in a greater number of risk situations and increased complexity, such as re-operations, advanced age, and associated diseases (diabetes, arterial hypertension, nephropathy).[3,4]

The procedures alternative to MRS often enable or delay it by allowing a more favorable clinical evolution. However, when one procrastinates a surgery indication, there's the prospect of future surgery of an older patient, the onset or severity of comorbidities, the progression of coronary disease, and worsening of the left ventricular function, conditions which increase operative risk and complications.[5]

Within this context, some conducts which may rapidly vary are required, leading to decision making by the medical and nursing team aiming at interventions grounded on specific methods and procedures with surgical patients during their preparation in pre-, intra-, and postoperative periods.

Within nursing, the nurse who is attentive to the individual's signs and symptoms in the postoperative period know her/his profile and the treatment evolution in the pre and trans-operative periods of myocardial revascularization and she/he may be able to predict and implement procedures in an objective and safe way, as well as based on scientific fundamentals.[6]

Given the above and taking into account knowing the changes which may occur in the post-MRS period provides the health team with better conditions to predict undesirable situations and avoid emergency situations and/or harms were the reasons which led this study to be conducted, whose aim consists in identifying the postoperative complications in patients who underwent MRS.

METHOD

Descriptive, retrospective, and exploratory research with a quantitative approach, carried out at the Cardiological Emergency Hospital of Pernambuco Professor Luiz Tavares of Universidade de Pernambuco (PROCAPE/UPE), through analysis of medical records of patients who underwent MRS within the period from March 2011 to February 2012.

PROCAPE/UPE is located in Recife, Pernambuco, Brazilian Northeast, and it's part of the Health Complex of UPE, and it's characterized as a medium-sized hospital, offering medium and high complexity services in Cardiology, currently enrolled in the Unified Health System (SUS). It's regarded as a tertiary reference institution in Cardiology in the state of Pernambuco, as well as the country's North/Northeast regions.

The population of this study consisted of individuals admitted to PROCAPE/UPE who underwent MRS. For defining the sample, the following inclusion criteria were used: age over 18 years, MRS alone and on an elective basis. One excluded individuals with valvar disease who underwent valvuplasty or valve replacement concomitantly to MRS. Thus, the study sample consisted of 183 individuals.

Data were collected within the period from April to June 2012, through an instrument developed by the authors and subdivided into five groups: personal data, health history, CAD manifestation at the admission time, intraoperative data, and postoperative complications.

The personal data evaluated were age, gender, town, and state of origin. The medical background factors addressed were systemic arterial hypertension (SAH), diabetes mellitus (DM), history of smoking, alcoholism, peripheral vascular disease (PVD), cerebrovascular accident (CVA), renal insufficiency (RI), chronic obstructive pulmonary disease (COPD), and dyslipidemias. One also observed the body mass index (BMI), the presence of a positive family history of CAD (HF-CAD), and history of acute myocardial infarction (AMI), PTA, and MRS.

Regarding the manifestation form of coronary artery disease at the admission time, one identified the following forms: asymptomatic, stable angina (SA), unstable angina (UA), acute myocardial infarction with no ST-segment elevation (AMIWNSTSE), and acute myocardial infarction with ST-segment elevation (AMIWSTSE). The intraoperative data evaluated were surgery time, use of

extracorporeal circulation (ECC), and ECC time and the number of grafts used for revascularization.

As a facilitating factor for analysis, the postoperative complications were divided into six items: absence of complications, cardiovascular, pulmonary, renal, neurological, and other kinds of complication. One also analyzed the length of hospital stay in the pre- and postoperative period, as well as the total length of hospital stay and the outcome of cases (hospital discharge or death).

The instrument was pre-tested in ten medical records for determining its usefulness and capacity to generate valid information. The pre-test analysis showed there's no need for changes in the instrument for data collection, and one opted to include the patients whose medical records were used in this stage.

The variables were tabulated and analyzed through the software STATA/SE 9.0, and one used as the main tool descriptive statistics. The results were presented in table and figure form with their respective absolute and relative frequencies, and the numeric variables were represented by central tendency and dispersion measures.

This study is part of the work entitled "Clinical and surgical characterization of patients who underwent myocardial revascularization surgery" and it was approved by the Research Ethics Committee of the Complex Oswaldo Cruz University Hospital/Cardiological Emergency Hospital of Pernambuco (HUOC/PROCAPE), under the CAAE 0169.0.106.000-11 and the Protocol 125/2011.

RESULTS

One observed among the study subjects the minimum age of 33 years and the maximum age of 85 years, with a predominance of individuals from the age group ≥ 60 years (62.3%). The average age of patients undergoing MRS was 62.04 years (± 9.6). Regarding sex, there was a predominance of males (61.7%). Most patients were from Recife and the Metropolitan Region of Recife (59%) (Table 1).

Table 1. Demographic characteristics of patients undergoing MRS within the period from March 2011 to February 2012, Recife, Pernambuco, Brazil.

Variables	N	%
Age		
< 60	69	37.7
≥ 60	114	62.3
Sex		
Female	70	38.3
Male	113	61.7
Residence		
Recife	60	32.8
Metropolitan Region of Recife	48	26.2
State countryside	75	41.0
Total	183	100%

The average BMI of all study patients was 26.7 (± 3.8) kg/m^2. Analyzing this value according to the BMI categories (Table 2), one realizes that no individual fit in thinness or grade III obesity and that most of them actually had overweight (48.1%).

Regarding the manifestation form of CAD at the admission time, one visualized a predominance of AMIWNSTSE (41.5%), followed by SA (23%), IA (22.4%), and AMIWSTSE (11.5%). In three patients (1.6%), the disease silently manifested itself, being diagnosed during elective exams for evaluating the health levels.

Table 2. BMI and manifestation form of CAD at the admission time of patients undergoing MRS within the period from March 2011 to February 2012, Recife-PE.

Variables	n	%
BMI		
Grade II thinness	1	0.5
Grade I thinness	2	1.1
Eutrophy	55	30.1
Overweight	88	48.1
Grade I obesity	33	18.0
Grade II obesity	4	2.2
Diagnosis		
AMIWNSTSE	76	41.5
SA	42	23.0
IA	41	22.4
AMIWSTSE	21	11.5
Asymptomatic	3	1.6
Total	183	100%

The health history of the study patients can be observed in Table 3. All patients had at least one risk factor for ischemic heart disease, SAH was the most prevalent (93.4%), followed by dyslipidemia (54.6%), history of smoking (52.5%), and DM (45.4%).

These individuals also presented a positive history, though less frequently, with regard to alcoholism and pathologies such as RF (8.7%), CVA (8.2%), COPD (5.5%), and PVD (1.1%). Family history of ischemic heart disease was observed in 27.3% of individuals. Among the sample patients, 41% had already suffered acute myocardial infarction, 13.1% had already undergone PTA and only 1.1% had already undergone MRS.

Table 3. Health history of patients undergoing MRS within the period from March 2011 to February 2012, Recife, Pernambuco, Brazil.

Background	n	%
SAH	171	93.4
Dyslipidemia	100	54.6
History of smoking	96	52.5
DM	83	45.4
Alcoholism	30	16.4
RF	16	8.7
CVA	15	8.2
COPD	10	5.5
PVD	2	1.1
FH-CAD	50	27.3
AMI	75	41
PTA	24	13.1
MRS	2	1.1
Total	183	100%

According to Table 4, among the 183 subjects who underwent MRS, 68.7% did it using ECC for a mean time of 94.46 ± 33.51 minutes. Regarding the number of grafts used, one observed that most patients used 3 grafts (41%) or 2 grafts (36.1%), with a mean of 2.48 (± 0.84) grafts by patient. The mean surgery time was 259.75 (± 67.90) minutes.

Table 4. Operative variables of patients undergoing MRS within the period from March 2011 to February 2012, Recife, Pernambuco, Brazil.

Variables	Mean (± standard deviation)	
Surgery time	259.75 (± 67.90)	
ECC time	94.46 (± 33.51)	
Use of ECC	N	%
Yes	124	67.8
No	59	32.2
Number of grafts		
1 graft	24	13.1
2 grafts	66	36.1
3 grafts	75	41.0
4 grafts	18	9.8

One observed that 44.8% of patients presented some kind of complication, and the most prevalent were the cardiovascular and pulmonary ones (Figure 1). Among the cardiovascular complications, one found out that atrial fibrillation (AF) was the most frequent (8.7%), followed by cardiorespiratory arrest (CRA) (7.7%), low cardiac output syndrome (LCOS) (6.6%), left ventricular dysfunction (LVD) (5.5%), acute myocardial infarction (2.7%), cardiogenic shock (2.2%), and early graft occlusion (2.2%).

In a lower number one found complications such as pericardial effusion, pericarditis, total atrioventricular block (TAVB), and paroxysmal supraventricular tachycardia (PSVT). Given these complications, 11 patients who underwent implantation of intra-aortic

balloon (IAB) and 4 underwent PTA with stent to keep the grafts pervious.

Regarding pulmonary complications, what draws attention is the high number of respiratory infection, which was observed in more than half of individuals with pulmonary complications (11.5%). In smaller numbers one found pleural effusion (9.3%), respiratory failure (6%), and pneumothorax (2.2%). One also found complications such as hydropneumothorax and acute pulmonary edema.

There were two kinds of renal complication, and acute renal failure (ARF) is more frequent (6.6%) than urinary tract infection (3.8%). Among the neurological complications one identified CVA (4.4%), seizures (2.2%), and transient ischemic attack in 1.6% of patients.

Among the other complications, surgical wound infection of saphenectomy calls attention due to its high prevalence (7.7%), followed by surgical wound infection in the chest (3.8%), mediastinitis (2.2%), bleeding (1.6%), and subcutaneous emphysema (1.6%). Three out of the four mediastinitis cases underwent reoperation, as well as all bleeding cases. The other complications didn't require an invasive approach.

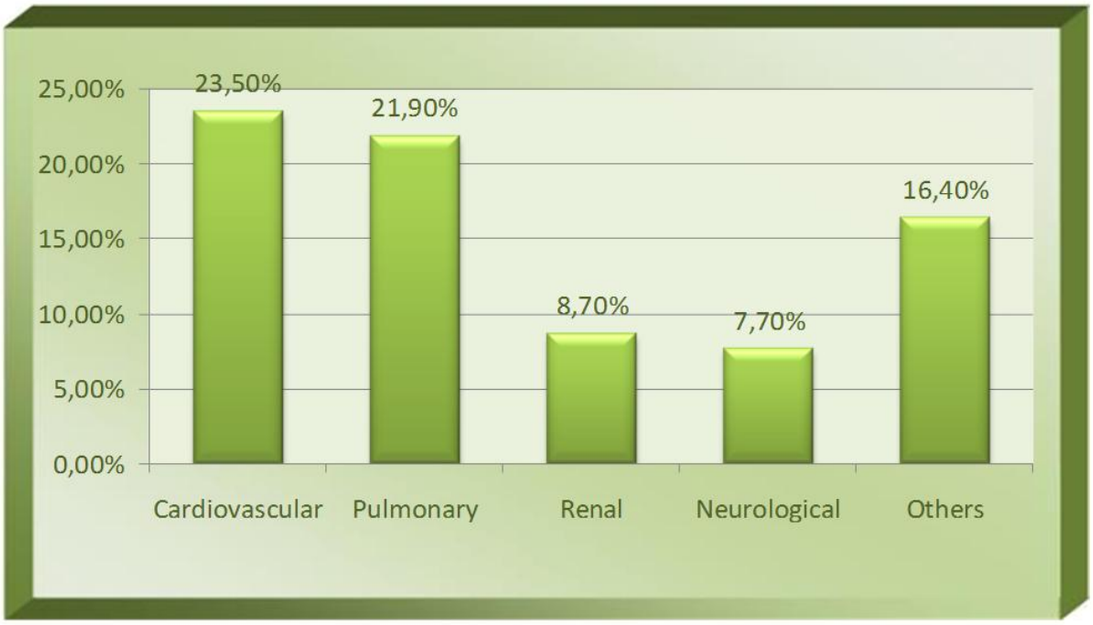

Figure 1. Main postoperative complications in patients who underwent MRS within the period from March 2011 to February 2012, Recife, Pernambuco, Brazil.

In the preoperative period, the length of hospital stay ranged from 1 to 49 days, with an average of 15.39 (± 11) days. In the postoperative period there was a variation from 0 to 79 days and an average of 13.07 (± 11.93) days. When one analyzed the total length of hospital stay, a minimum of 2 days and a maximum of 96 days was identified and an average of 28.42 (± 16.77) days.

Most of the patients (89.6%) who underwent the surgical procedure was discharged, however, 19 (10.4%) evolved to death.

DISCUSSION

The findings of this study revealed that most patients who underwent MRS are men, elderly people, and overweight, and they present the classic risk factors for ischemic heart disease, such as hypertension, dyslipidemia, smoking, and diabetes. This information corroborates the findings of a similar study that also had a sample made up of a majority of men, whose average age was around 60 years, most of them had hypertension and dyslipidemia.[7]

MRS was less usual in women, corroborating other studies.[7,8] And when women underwent MRS, they were older than men, since CAD is manifested, on average, 10 years later than in men, due to the protective effect of estrogens, however, a worse prognosis becomes evident due to the fact that women present a greater number of risk factors when they had a heart attack, such as arterial hypertension, diabetes, obesity, and hypercholesterolemia.[9]

A fact which stands out is that despite the high average age, one found a minimum age of 33 years among the patients who underwent the procedure, indicating that although rare in young adults, CAD aggressively happens and it may lead young people to undergo high-risk procedures, such as MRS.

The prevalence of early coronary disease in developed countries is around 10%, while in developing countries, such as Brazil, this

percentage doubles. This difference seems to relate to a sedentary lifestyle and changes in nutritional habits, mostly observed in developing countries, in addition to the classic risk factors for atherosclerosis. In youth people, the main factors associated to ischemic events are dyslipidemia, smoking, and excessive weight.[10]

Regarding BMI, which had an average of 26.7 kg/m^2 in the study sample, it's possible to establish a correlation to other study[11], whose patients had an average BMI of 28.9 (± 4.1) kg/m^2, similar to data of this study. This is important, since it's known that overweight and obesity may contribute to increase in unfavorable outcomes in the postoperative period of cardiovascular surgeries.[7] The prevalence of AMIWNSTSE when compared to the other manifestations of CAD at the admission time was shown in this study, however, in other works read, IA was the most frequent event.[7,12] This demonstrates that patients of this study sought the hospital unit and underwent the surgical intervention motivated by a more advanced clinical condition.

The medical history of patients of this study are similar to those found in another study with regard to the risk factors which are more prevalent for CAD, where the main values were arterial hypertension, diabetes, dyslipidemia, and smoking.[8] However, the values related to smoking and diabetes slightly differed, being higher in this research, arterial hypertension affecting 93.4% of patients, followed by dyslipidemia (54.6%), smoking (52.5%), and DM (45.4%).

These risk factors were found in the following distribution: hypertension (88%), dyslipidemia (54.7%), diabetes (36%), and smoking (30.7%) in another literature.[7] Both studies found the discrete prevalence of alcoholism, CVA, kidney failure, COPD, and peripheral vascular disease; one also found positive family history of ischemic heart disease (27.3%) and high incidence of AMI prior to MRS (41%), facts which converge with a study where the family history of ischemic heart disease was observed in 20.7% of individuals and the occurrence of AMI before the surgical procedure in 34.5% of the study subjects.[11]

Revascularization procedures prior to MRS were found in 14.1% of individuals, mainly consisting of angioplasty (13.1%). Similar findings were obtained in a study aiming to identify the profile of patients who undergo MRS, where the presence of prior angioplasty was observed in 15.5%.[11] However, other authors observed prior angioplasty in 35.4% of patients.[7]

The complex clinical condition of patients who underwent a surgery, represented by old age, higher prevalence of comorbidities such as diabetes, SAH, dyslipidemia, smoking, overweight, previous infarction may be explained by the higher referral of patients with lower risk for angioplasty, which is a less invasive procedure and, therefore, with less chance of posterior complications.[5]

ECC was used in most of the surgical procedures (67.8%), however, in a similar study only 54% of patients were operated with ECC, fewer than in this study, since some authors point out a decrease in the frequency of ECC use in cardiac revascularization surgery.[11,13] The average use of ECC found in this study was 94.46 (± 33.51), also higher than that obtained in another study, who had a mean time of 84.90 (+30.20) minutes.[11] One found an average ECC time of 78.7 (± 56) minutes for individuals < 70 years and 77.1 (± 67) minutes for those ≥ 70 years in a similar study.[14]

This information is important, because despite having solved the obstacles hindering a better performance of surgical techniques, the use of ECC and a lengthen time of it revealed a myriad of complications coming from the body's response to aggressions posed by the devices, making the surgical patient more complex and susceptible to adversities, requiring greater attention on the part of the health and nursing team.[15] In this service, the lengthen time of ECC may be related to the operated patients' clinical and surgical complexity and because it's a school hospital, constituting the learning and improvement field of many training professionals.

The average number of grafts per patient in this study was 2.48 (± 0.84). One found 2.8 (± 0.8) grafts per patient in a study read.[16] In another research, corroborating this (50.8%), it was observed that in most patients (53.6%) three or more grafts were used.[17] The prevalence of complications in the postoperative period of MRS in this study (44.8%) was similar to that found in the another study (41%), as well as the kind of complications, which had a predominantly cardiovascular and respiratory nature.[18]

The most common cardiovascular complication was AF, as in other works, the literature states that its incidence can reach from 10% to 50% of patients, being more likely males, those > 70 years, with SAH, COPD, coronary stenosis, need for mechanical ventilation support in the second and third postoperative days.[11,19]

The most incident complications in a similar research included respiratory infection (16%), AF (15.4%), pericarditis (9.1%), and AMI (7.9%).[20] infections, particularly those of the respiratory tract, are the main infectious complications, as noticed in a study whose objective was determining the incidence of infection in the postoperative period of MRS; in this study 19.1% developed infection (62% respiratory, 25% superficial surgical wound, 9.5% urinary, 3.6% deep surgical wound).[21]

The prevalence of ARF in the postoperative period of a study whose objective was determining the prevalence, predisposing factors and the clinical outcome of patients who underwent MRS and presenting ARF was 30.6% (7% required dialysis). This work revealed that the ARF was a frequent postoperative and severe complication associated to higher mortality and length of intensive care unit stay, whose risk factors observed were lengthened ECC time and anoxia, mechanical ventilation > 24 hours and hemodynamic instability.[22]

A prevalence of 10.3% was found in a similar study while this study obtained 4.4%.[11] The previous history of cerebrovascular diseases, SAH, and DM showed they're important predictors for the occurrence of higher neurological dysfunction in the postoperative period of MRS, thus, in patients with these characteristics, adequate control of blood pressure (avoiding hypertension and hypotension periods), identification of possible emboligenic sources, and the evaluation and careful manipulation of the aorta are measures which may possibly contribute to reduce the incidence of CVA after MRS.[23]

All these complications reported delay health recovery and increase the length of hospital stay. Among the complications which increase the length of hospital stay stand out, especially, those related to respiratory function, COPD and smoking, lung congestion, lengthened mechanical ventilation time, infections, renal failure, CVA, and hemodynamic instability, such as arterial hypertension, arrhythmias, and AMI.[24]

In this study, there was a lengthened hospital stay in the pre- and postoperative period, as well as in the total length of hospital stay, with an average of 28.42 (± 16.77) days. In another study, the length of hospital stay was 11 (± 9) days, where those with low EuroSCORE (operative risk score adopted by the European Society of Cardiology) had a hospitalization time significantly shorter, 8 (± 4) days, than those with moderate, 12 (± 10) days, and high EuroSCORE, 15 (± 10) days.[25] According to the data of SUS, the operative mortality of MRS in Brazil is 7.0%, a lower number than that found in this study. However, these are administrative data of services which perform surgery throughout Brazil, where it isn't possible to adjust the operative mortality due to the severity of patients.[25]

CONCLUSION

Men are those who most frequently underwent MRS. In this study, the prevalence of the elderly population was marked, with 62.3% of subjects ≥ 60 years, with a mean patient age of 62.04 (± 9.6) years. When undergoing the procedure, these individuals were overweight and presented classic risk factors for ischemic heart disease, such as hypertension, dyslipidemia, smoking, and diabetes and they were admitted due to AMIWNSTSE, having a more severe clinical condition than in other studies read, besides, 41% of the study subjects had already infarcted.

These characteristics associated to intraoperative variables interact and affect the postoperative period, with the emergence of predominantly cardiovascular (23.5%), pulmonary (21.9%), and renal complications (8.7%). Out of the total subjects studied, 19 evolved to death.

Despite the major advances in cardiac surgery, its success will depend on a set of actions involving the preoperative preparation and, especially, the post-operative care, still in the surgery center and, later, in the intensive care unit and the medical clinic.[26]

Knowing the characteristics of revascularized patients and the potential complications provide means for the work of all members of the multidisciplinary team involved in the recovery of health and well-being of patients who underwent MRS, especially for the nursing team, which becomes more confident for planning their care and acquires more empowerment to work in face of the adverse conditions that the patients can present.

REFERENCES

1. Andrade PJN, Medeiros MM, Andrade AT, Lima AAG. Coronary angioplasty versus CABG: review of randomized. Arq Bras Cardiol [Internet]. 2011 Sep [cited 2012 Nov 28];97(3):60-9. Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0066782X2011001200021&lng=en.

2. Garbossa A, Maldaner E, Mortari DM, Biasi J, Leguisamo CP. Effects of physiotherapeutic

instructions on anxiety of CABG patients. Rev Bras Cir Cardiovasc [Internet]. 2009 July-Sep [cited 2012 Mar 2];24(3):359-66. Available from: http://www.scielo.br/pdf/rbccv/v24n3/v24n3a16.pdf.

3. Pego-Fernandes PM, Gaiotto FA, Guimarães-Fernandes F. Coronary artery bypass graft: state of the art. Rev Med (São Paulo) [Internet]. 2008 Apr-June [cited 2012 Mar 13];87(2):92-8. Available from: http://www.revistademedicina.org.br/ant/87-2/87-2p92-98.pdf.

4. Strabelli TMV, Stolf NAG, Uip DE. Practical use of a risk assessment model for complications after cardiac surgery. Arq Bras Cardiol [Internet]. 2008 Nov [cited 2012 Oct 21];91(5):342-7. Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0066-782X2008001700010&lng=en.

5. Andrade PJN, Silva RP, Lima AAG, Andrade AT, Sobrinho CRMR. Stents farmacológicos versus cirurgia: meta-análise de ensaios clínicos prospectivos. Rev Bras Cardiol [Internet]. 2012 May-June [cited 2012 Apr 13];25(3):210-7. Available from: http://www.rbconline.org.br/wp-content/Archives/v25n3/v25n03a06.pdf.

6. Pivoto FL, Lunardi Filho WD, Santos SSC, Almeida MA, Silveira RS. Nursing diagnoses in patients in the postoperative period of cardiac surgery. Acta Paul Enferm [Internet]. 2010 [cited 2012 Nov 19];23(5):665-70. Available from: http://www.scielo.br/pdf/ape/v23n5/13.pdf.

7. Tonial R, Moreira DM. Clinical, epidemiological and surgical profile of patients undergoing coronary artery bypass grafting at Instituto de Cardiologia de Santa Catarina, São José–SC. ACM Arq Catarin Med [Internet]. 2011 [cited 2012 June 9];40(4):42-6. Available from: http://www.acm.org.br/revista/pdf/artigos/894.pdf.

8. Lima FET, Araújo TL, Lopes MVO, Silva LF, Monteiro ARM, Oliveira SKP. Risk factors of coronary disease in patients who have undergone myocardial revascularization. Rev RENE [Internet]. 2012 [cited 2012 Oct 28];13(4):853-60. Available from: http://www.revistarene.ufc.br/revista/index.php/revista/article/view/1080/pdf.

9. Scherr C, Ribeiro JP. Gender, age, social level and cardiovascular risk factors: considerations on the Brazilian reality. Arq Bras Cardiol [Internet]. 2009 Sep [cited 2012 Dec 1];93(3):54-6. Available from: http://www.scielo.br/pdf/abc/v93n3/a22v93n3.pdf.

10. Silva SY, Rincón MY, Dueñas RE, Chaves AM, Camacho PA, Arenas MA, et al. Overweight is a determinant factor in the presentation of acute coronary syndrome in Colombian young adults. Rev Colomb Cardiol [Internet]. 2008 Dec [cited 2012 Dec 1];15(6):255-62. Available from: http://www.scielo.org.co/scielo.php?script=sci_arttext&pid=S0120-56332008000600002&lng=en.

11. Fernandes MVB, Aliti G, Souza EN. Profile of patients undergoing coronary artery bypass grafting: implications for nursing care. Rev Eletrônica Enferm [Internet]. 2009 Dec [cited 2012 Nov 1];11(4):993-9. Available from: http://www.fen.ufg.br/fen_revista/v11/n4/pdf/v11n4a25.pdf.

12. Silva AMRP, Campagnucci VP, Pereira WL, Rosa RF, Franken RA, Gandra SMA, et al. Off-pump myocardial revascularization in the elderly: analysis of morbidity and mortality. Rev Bras Cir Cardiovasc [Internet]. 2008 Mar [cited 2012 Mar 15];23(1):40-5. Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-76382008000100008&lng=en.

13. Campagnucci VP, Pinto e Silva AMR, Pereira WL, Chamlian EG, Gandra SMA, Rivetti LA. EuroSCORE and the patients undergoing coronary bypass surgery at Santa Casa de São Paulo. Rev Bras Cir Cardiovasc [Internet]. 2008 Apr-June [cited 2012 Dec 1];23(2):262-7. Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-76382008000200017&lng=en&nrm=iso.

14. Alves Júnior L, Rodrigues AJ, Évora PRB, Basseto S, Scorzoni Filho A, Luciano PM, et al. Risk factors in septuagenarians or elderly patients undergone coronary artery bypass grafting and/or valves operations. Rev Bras Cir Cardiovasc [Internet]. 2008 Dec [cited 2012 Dec 1];23(4):550-5. Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-76382008000400016&lng=en.

15. Mota AL, Rodrigues AJ, Évora PRB. Adult cardiopulmonary bypass in the twenty-first century. Science, art or empiricism? Rev Bras Cir Cardiovasc [Internet]. 2008 Jan-Mar [cited 2012 Sep 13];23(1):78-92. Available from: http://www.scielo.br/scielo.php?pid=S0102-76382008000100013&script=sci_arttext.

16. Antunes PE, Oliveira JF, Antunes MJ. Risk-prediction for postoperative major morbidity in coronary surgery. Eur J Cardiothorac Surg [Internet]. 2009 Feb [cited 2012 Oct 24];35(5):760-8. Available from: http://rihuc.huc.min-saude.pt/bitstream/10400.4/532/1/Risk-

prediction%20for%20postoperative%20major%20morbidity%20in%20coronary%20surgery.pdf.

17. Carvalho MRM, Silva NAS, Oliveira GMM, Klein CH. Intra-operative factors in coronary artery bypass graft (CABG) surgery in government hospitals, Rio de Janeiro, Brazil. Rev Bras Cardiol [Internet]. 2010 July-Aug [cited 2012 Nov 18];23(4):215-23. Available from: http://sociedades.cardiol.br/socerj/revista/2010_04/a2010_v23_n04_01marciocarvalho.pdf .

18. Vegni R, Almeida GF, Braga F, Freitas M, Drumond LE, Penna G, et al. Postoperative cardiac artery bypass graft complications in elderly patients. Rev Bras Ter Intensiva [Internet]. 2008 [cited 2012 Nov 13];20(3):226-34. Available from: http://www.scielo.br/pdf/rbti/v20n3/v20n3a04.pdf.

19. Silva RG, Lima GG, Guerra N, Bigolin AV, Petersen LC. Risk index proposal to predict atrial fibrillation after cardiac surgery. Rev Bras Cir Cardiovasc [Internet]. 2010 Apr-June [cited 2012 Nov 12];25(2):183-9. Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-76382010000200009&lng=en&nrm=iso&tlng=en .

20. Mezzomo A, Bordin Junior OL, Portal VL. Preoperative C-reactive protein predicts respiratory infection after coronary artery bypass graft surgery. Arq Bras Cardiol [Internet]. 2011 Sep [cited Nov 16];97(5):365-71. Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0066-782X2011001400002&lng=en&nrm=iso&tlng=en .

21. Ledur P, Almeida L, Pellanda LC, Schaan BD. Predictors of infection in post-coronary artery bypass graft surgery. Rev Bras Cir Cardiovasc [Internet]. 2011 Apr-June [cited 2012 Nov 20];26(2):190-6. Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-76382011000200008&lng=en&nrm=iso&tlng=en

22. Brito DJA, Nina VJS, Nina RVAH, Figueiredo Neto JA, Oliveira MIG, Salgado JVL, et al. Prevalence and risk factors for acute renal failure in the postoperative of coronary artery bypass grafting. Rev Bras Cir Cardiovasc [Internet]. 2009 July-Sep [cited 2012 Nov 30];24(3):297-304. Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S010276382009000400007&lng=en.

23. Oliveira DC, Ferro CR, Oliveira JB, Malta MM, Neto PB, Cano SJF, et al. Risk factors for stroke after coronary artery bypass grafting. Arq Bras Cardiol [Internet]. 2008 [cited 2012 Nov 15];91(4):234-7. Available from: http://www.scielo.br/pdf/abc/v91n4/05.pdf.

24. Laizo A, Delgado FEF, Rocha GM. Complications that increase the time of hospitalization at ICU of patients submitted to cardiac surgery. Rev Bras Cir Cardiovasc [Internet]. 2010 Apr-June [cited 2012 Nov 19];25(2):166-71. Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-76382010000200007&lng=en&nrm=iso&tlng=en .

25. Mesquita ET, Ribeiro A, Araújo MP, Campos LAA, Fernandes MA, Colafranceschi AS, et al. Indicators of healthcare quality in isolated coronary artery bypass graft surgery performed at a tertiary cardiology center. Arq Bras Cardiol [Internet]. 2008 May [cited 2012 Nov 26];90(5):350-4. Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0066-782X2008000500008&lng=en&nrm=iso&tlng=en .

26. Lamas A, Soares E, Silva R. Challenges in the assistance of nursing to the aged in the postoperative of cardiac surgery. Rev Enferm UFPE On Line [Internet]. 2008 Dec [cited 2012 Nov 28];3(1):91-4. Available from: http://www.revista.ufpe.br/revistaenfermagem/index.php/revista/article/view/266.

Submission: 2013/03/11
Accepted: 2013/04/05
Publishing: 2013/05/01

Corresponding Address

Simone Maria Muniz da Silva Bezerra
Rua Teles Junior, 155 / Ap. 301
Bairro Rosarinho
CEP: 52041-361 – Recife (PE), Brazil