

# Ventilatory profile of patients undergoing CABG surgery

*Perfil ventilatório dos pacientes submetidos a cirurgia de revascularização do miocárdio*

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## Abstract

**Objective:** To assess the ventilatory, radiological and clinical profile of patients undergoing elective CABG in a cardiology reference hospital in South Brazil.

**Methods:** This study included 108 patients undergoing elective CABG surgery, in the period between April 2006 and February 2007 at the Cardiology Institute of Rio Grande do Sul (IC-FUC). The surgical procedure involved median sternotomy, and the saphenous vein and/or internal mammary artery were used for grafting. Lung volume and capacity, as well as the possible existence of ventilatory changes, were assessed by spirometry, and the ventilatory muscle strength was assessed using a vaccum manometer. All evaluations were performed on the preoperative period and on the sixth postoperative day.

**Results:** Preoperative levels of FEV<sub>1</sub> and FVC were significantly reduced on the 6<sup>th</sup> postoperative day ( $P<0.001$ ) when compared to the preoperative levels. A significant decrease of ventilatory muscle strength, expressed as maximum inspiratory and expiratory pressures (MIP and MEP), was also observed from the pre- to the sixth postoperative day ( $P<0.001$ ). Pulmonary events were more frequent on the 6<sup>th</sup> postoperative day (78%) than on the 1<sup>st</sup> postoperative day (40%).

**Conclusions:** Patients undergone CABG surgery present important reduction in pulmonary volume and capacity, as well as on the ventilatory muscle strength during the postoperative period.

**Descriptors:** Myocardial revascularization. Spirometry.

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### Resumo

**Objetivo:** Avaliar o perfil ventilatório, radiológico e clínico dos pacientes submetidos a cirurgia eletiva de revascularização do miocárdio em hospital de referência em cardiologia no sul do Brasil.

**Métodos:** A amostra foi composta por 108 indivíduos submetidos a cirurgia eletiva de revascularização do miocárdio no Instituto de Cardiologia do Rio Grande do Sul (IC-FUC), no período de abril de 2006 a fevereiro de 2007. A abordagem cirúrgica realizada foi a da esternotomia mediana e os enxertos foram com ponte de safena e/ou artéria mamária interna. Os volumes e capacidades pulmonares, bem como a presença de distúrbios ventilatórios, foram avaliados por meio da espirometria e a força muscular ventilatória da manovacuometria. As avaliações foram realizadas no período pré-operatório e no sexto dia de pós-operatório.

**Resultados:** Observou-se redução significativa do VEF<sub>1</sub> e da CVF quando comparados os valores pré-operatórios com os do sexto dia de pós-operatório ( $P < 0,001$ ). O mesmo ocorreu com a força muscular ventilatória expressa em PiMáx e PeMáx do pré para o 6º dia de pós-operatório ( $P < 0,001$ ). A incidência de complicações pulmonares na amostra foi maior no 6º dia de pós-operatório (78%) quando comparados ao 1º dia de pós-operatório (40%).

**Conclusões:** Pacientes submetidos a cirurgia de revascularização do miocárdio apresentam redução importante nos volumes e capacidades pulmonares, assim como da força muscular ventilatória no período pós-operatório.

**Descritores:** Revascularização miocárdica. Espirometria.

## INTRODUCTION

Since 1965, numerous studies have been performed attempting to achieve the relation of heart diseases with respiratory system and their influence on it, noting that the cardiac commitment and the surgical procedure determine pulmonary complications, one of the most common causes of morbidity and mortality in the postoperative period of heart surgery [1-3].

General anesthesia, surgical incision, cardiopulmonary bypass (CPB), ischemia time, intensity of the surgical manipulation and number of pleural drains may predispose the patient to the change in lung function [1,2,4-6]. After surgery, there is reduction of residual volume (RV), total lung capacity (TLC), vital capacity (VC) and functional residual capacity (FRC), leading to the formation of atelectasis, with changes in the ventilation-perfusion ratio (V/Q), the partial pressure of carbon dioxide in arterial blood (PaCO<sub>2</sub>) and partial pressure of oxygen in arterial blood (PaO<sub>2</sub>) [2].

The median sternotomy, the most used approach to the procedure of CABG surgery, promotes significant changes in pulmonary function by the consequent instability of the upper chest and leads to changes in mechanical ventilation and ineffective coughing [7]. The use of CPB and absence of pulmonary ventilation during this period are also determining factors in the development of pulmonary complications after heart surgery, probably by changes in mechanical properties of the respiratory system resulting from changes in pulmonary compliance and resistance [8,9]. Moreover, the anesthetic procedure, the use of internal mammary artery and stay on mechanical ventilation contribute to pulmonary complications [5,8,10]. The lack of

lung inflation during CPB increases the rate of microatelectasis and infections [9]. The CPB was considered for many years as the main responsible for lung damage. Currently, with establishment of off-pump CABG surgery, this idea begins to be questioned, since the lung damages are also considerable with such surgery [5].

Pulmonary function is impaired in the postoperative period of heart surgery, due to several factors common to this major surgery that will predispose the patient to develop respiratory complications such as atelectasia and pneumonia [7]. Thus, physiotherapy plays an important role in the treatment of patients undergoing heart surgery, both preoperatively and in postoperative period, aiming to prevent or minimize the respiratory complications [11]. The care includes various techniques such as ventilatory patterns, early deambulation, Kinesiotherapy, positioning and cough stimulation [12]. The techniques used in respiratory therapy vary with the countries and the practice of each Service [13].

The aim of this study was to assess the ventilatory, radiological and clinical profile of patients undergoing coronary artery bypass grafting in a reference cardiology hospital in southern Brazil.

## METHODS

This study is a cohort, prospective, longitudinal study, consisting of patients undergoing elective CABG surgery using saphenous grafts and/or internal mammary artery through median sternotomy during the period of April 2006 to February 2007, in the Institute of Cardiology of Rio Grande do Sul/University Cardiology Foundation IC-FUC.

### Sample

The study was performed with 108 patients undergoing elective surgery for coronary artery bypass grafting, using cardiopulmonary bypass (CPB), operated from Mondays to Fridays by the Unified Health System (SUS). Patients who underwent coronary artery bypass grafting (CABG) associated with the valve replacement and/or repair, left ventricular aneurysm, patients with prior CABG and those who, in the postoperative period, remained in the postoperative unit (POU) on the second assessment or who returned to such unit during this period did not participate in this study.

Initially, 123 patients were assessed. Of these, eight died, one underwent off-pump CABG and the remaining six patients did not complete all the steps and were considered a loss of the study.

The study was approved by the Research Ethics Committee of the IC/FUC. All participants signed the written informed consent prior to entering the study.

There was a preoperative assessment consisting of collection of data, identification of the patient, detailed information about risk factors and associated diseases, such as advanced age, smoking, obesity, presence of pneumopathy, arterial systemic hypertension, diabetes mellitus, angina, heart failure and classification of the New York Heart Association, acute myocardial infarction and stroke. It was also verified assessment of lung volume and capacity, presence of ventilatory disorder through spirometry and respiratory muscle strength through pressure manovacuometry. Patients follow-up consisted of information of the characteristics of the surgical procedure, postoperative pulmonary complications through the radiology Service, evaluation of lung volume and capacity, evaluation of the ventilatory disorder, evaluation of ventilatory muscle strength and clinical evolution of patients until the hospital discharge.

Radiographs obtained preoperatively were assessed in the first and sixth postoperative day, as radiological finding analyzed by the radiology Service. Preoperatively and on the sixth postoperative day, patients underwent radiological examination in the sitting position; on the first postoperative day the examination in postoperative unit was in a dorsal decubitus position, without the presence of the orotracheal tube. Pulmonary complications were identified, such as: de-aerated areas and/or consolidation, pleural effusion and pneumothorax.

In this study, patients of advanced age (aged  $\geq 65$  years) were accepted. Overweight was defined as body mass index (BMI)  $\geq 25.0$  to  $29.9$  kg/m<sup>2</sup>, obesity as BMI  $\geq 30.0$  to  $34.9$  kg/m<sup>2</sup> and morbid obesity BMI  $\geq 40.0$  and above  $40.0$  kg/m<sup>2</sup>. The patients were divided into smokers and nonsmokers and the smokers were further categorized according to the number of years/pack of cigarettes smoked, regardless if the smoking is current or previous.

The evaluation of lung volume and capacity, as well as the presence or absence of ventilatory disorder, was performed at the Pulmonology Service of the IC-FUC, using portable spirometer (Microloop® - Micro Medical Limited). The spirometry was performed preoperatively and on the sixth postoperative day. We evaluated the forced vital capacity (FVC), forced expiratory volume in 1 second (FEV<sub>1</sub>), in their absolute values and percentages for patients with the same age, gender, weight and height. Spirometry was performed following the standards of the American Thoracic Society and the Brazilian consensus on spirometry [14].

After performing the tests, the reports were issued by the pneumologist responsible for the Service, using the values obtained for FVC and FEV<sub>1</sub> and the diagnosis of spirometry. The spirometric tests were performed with patients in the sitting position, being asked to inspire deeply, and then expire completely the air as quickly as possible, and continue expiring. The approach occurred three times, with one-minute intervals, by choosing the highest value obtained during the test. Patients on the 6<sup>th</sup> postoperative day were in the open unit.

The assessment of ventilatory muscle strength was also found in preoperative times and on the 6<sup>th</sup> postoperative day, in the pulmonary function laboratory, by measuring the maximal inspiratory pressure (MIP) and maximal expiratory pressure (MEP) through a device aneroid-type manometer, with operating range of + 150 to - 150 cmH<sub>2</sub>O (Suporte® - Brazilian Industry). The patients underwent evaluation in the sitting position, and the highest value after three efforts was considered.

Other verifications performed include mechanical ventilation time, length of stay in the postoperative unit and hospital stay. At the time of mechanical ventilation, prolonged ventilation in patients who remains for a longer period than 24 hours was considered.

All patients received physiotherapy care, preoperatively and postoperatively, twice daily by the physiotherapy service at the IC-FUC. Preoperatively, guidance on surgery, immediate postoperative period, ventilatory exercises and cough were performed. In the immediate postoperative period, monitoring of mechanical ventilation, weaning and extubation, and with the patient on spontaneous ventilation, conventional respiratory physiotherapy (ventilatory exercises, positioning in bed, maneuvers of vibration and chest compression, stimulation of coughing and de-ambulation) was performed until hospital discharge.

### Statistical analysis

In this study, a descriptive analysis with continuous variables expressed by mean, median, interquartile intervals 25-75 and standard deviation, and the categorical variables by frequency and percentage were performed. In the

comparison of tests of lung function in pre- and postoperative period, the Student's t test was used for paired samples. When comparing the time of hospitalization and stay in the intensive care unit, we used the nonparametric Mann-Whitney test, considering an alpha critical value of 0.05. For calculation was used the software Statistical Package for Social Sciences (SPSS) 15.0.

**RESULTS**

We assessed 108 patients, with mean age of  $62.2 \pm 9.6$  years, who had undergone coronary artery bypass grafting using cardiopulmonary bypass (CPB), with 74% males. The mean height of the group studied was  $1.65 \pm 0.1$  m, weight of  $75.0 \pm 12.5$  kg, and body mass index (BMI) was  $27.3 \pm 4.3$  kg/m<sup>2</sup>. Ejection fraction with a mean of  $63.3 \pm 14.4$  ml.

Of the 108 patients, 97 (89.8%) underwent coronary artery bypass grafting using internal mammary artery and 11 (10.2%) only saphenous vein grafting. All of them used mediastinal drain, and the 97 patients with internal mammary artery graft used pleural drain with insertion in the subxiphoid region.

The distribution of functional class according to the New York Heart Association of the sample was I, 48%, class II, 37%, Class III, 9% and Class IV, 5%. As for diseases associated with heart disease, 75% of the sample presented systemic arterial hypertension. As for the symptoms of angina, the most prevalent was at rest, 35%, 44% presented prior myocardial infarction, and 9% presented previous history of stroke.

Regarding co-morbidities in the sample, 72.2% of patients were smokers, and were divided into groups by year/pack (less than 20 years, 15.7%, from 20 to 40 years, 31.5%, and more than 40 years, 25.0%). We found that 52% of the sample were overweight, 38% were in advanced age, 4.6% presented with asthma, 2.8% with COPD, and 29.6% presented diabetes mellitus.

Transoperative variables were: duration of surgery,  $267 \pm 0.6$  min, time of ischemia,  $54.0 \pm 18.5$  min, CPB time of  $78.3 \pm 27.1$  min. Hypothermia was recorded with a mean of  $34.2 \pm 0.7^\circ\text{C}$  and, for the number of grafts, the 25% percentile was two, 75% percentile was three and the median was three grafts.

The mean time of mechanical ventilation (MV) was of  $17.5 \pm 29.7$  hours, with a median of 11 hours. It was noted that 93.5% of patients remained on MV for a time less than 24 hours, while 6.4% remained over 24 hours.

Twenty-two (20.4%) patients presented atrial fibrillation in the postoperative period, and two (1.8%) developed mediastinitis.

Table 1. Spirometry

Sample (n=108)	FEV <sub>1</sub>			FVC		
	Preoperative	Postoperative	P	Preoperative	Postoperative	P
L/min.	$2.4 \pm 0.7$	$1.4 \pm 0.5$	$< 0.001$	$2.9 \pm 0.7$	$1.7 \pm 0.6$	$< 0.001$
% predicted	$89.8 \pm 20.6$	$50.0 \pm 15.6$	$< 0.001$	$88.4 \pm 17$	$49.2 \pm 15.8$	$< 0.001$

FEV<sub>1</sub> - Forced expiratory volume in 1 second. FVC - Forced vital capacity. Mean values  $\pm$  Standard deviation.  $P < 0.001$

**Spirometry**

When compared spirometric values of the preoperative period to postoperative period, they were, respectively: FEV<sub>1</sub>  $2.4 \pm 0.7$  liters to  $1.4 \pm 0.5$  liters and FVC  $2.9 \pm 0.6$  liters to  $1.7 \pm 0.5$  liters. In the 6th postoperative day, the values decreased significantly ( $P < 0.001$ ). The values of spirometry in liters/minute and the percentage of predicted can be seen in Table 1.

Thus, preoperatively, 70 (65%) of the patients presented normal spirogram; 23 (21%), obstructive respiratory disorder; 14 (13%), nonspecific ventilatory disorder, and one (1%), restrictive ventilatory disorder. On the 6th postoperative day, 56 (52%) with restrictive ventilatory disorder, 29 (27%) with nonspecific disorder; 20 (18%) with obstructive respiratory disorder, and three (3%), with normal spirogram. The pre- and postoperative ventilatory disorder can be seen in Figure 1.

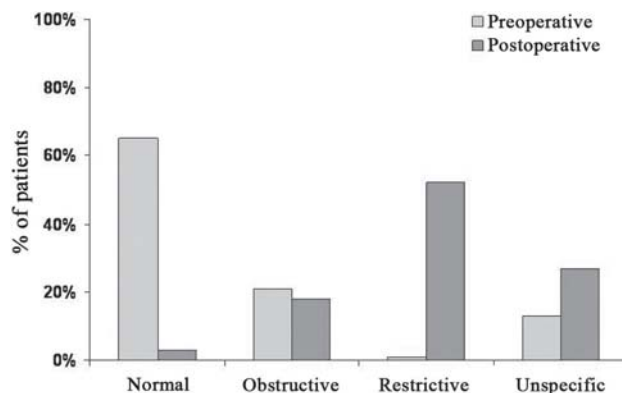


Fig. 1 - Comparison of the ventilatory disorder from the preoperative to the sixth postoperative day

As the severity of the disorder, preoperatively, 36 (33%) presented mild, one (1%), moderate, and one (1%), severe. On the 6th postoperative day, as the severity of the ventilatory disorder, 46 (42%) patients showed mild severity, eight (7%), moderate severity, and 51 (47%), severe severity. The pre- and postoperative severity can be seen in Figure 2.

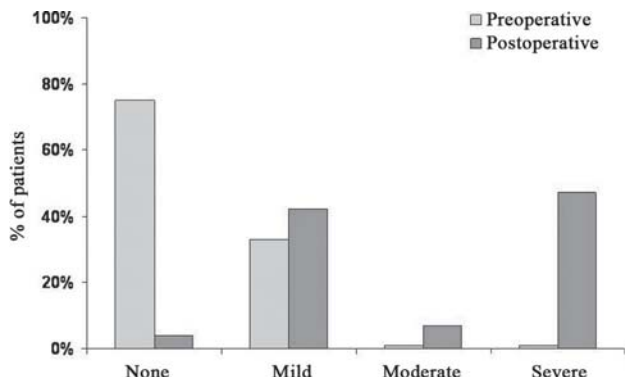


Fig. 2 – Severity comparison of the ventilatory disorder from the preoperative to the sixth postoperative day

### Manovacuometry

In Figure 3, it is possible to note the values of MIP and MEP, in the pre- and postoperative periods. The mean MIP preoperatively was  $65.8 \pm 28.6$  cmH<sub>2</sub>O, with significant drop to  $42.4 \pm 19.9$  cmH<sub>2</sub>O, on the 6th postoperative day ( $P < 0.001$ ). The same occurred with the MEP, with mean in the preoperative period of  $89.3 \pm 34.4$  cmH<sub>2</sub>O, with significant drop to  $59.2 \pm 26.6$  cmH<sub>2</sub>O, on the 6th postoperative day ( $P < 0.001$ ).

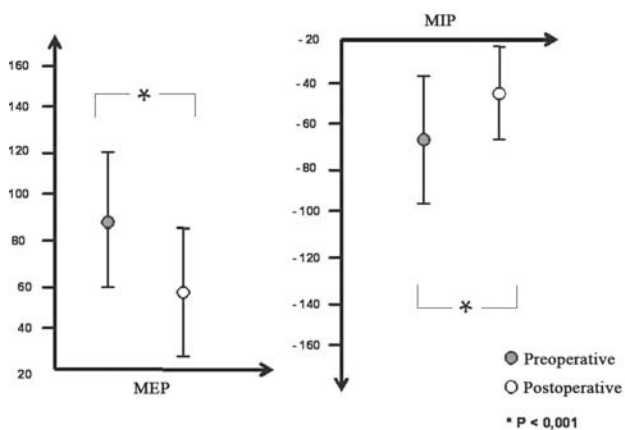


Fig. 3 – Comparison between the maximal expiratory (MEP) and inspiratory (MIP) values

### Radiological findings

Preoperatively, 86% of the radiographs presented normal, while on the sixth postoperative day, only 22% of radiographs were normal. The incidence of pulmonary complications of patients on the preoperative period can be noted on the 1<sup>st</sup> postoperative day and on the 6th postoperative day. A greater number of radiographs changed on the 6<sup>th</sup> postoperative day was found (78%) compared to the 1st postoperative day (40%), occurring on

the 6th postoperative day the most prevalent pleural effusion of the sample (41 %).

The length in postoperative unit (POU) was  $72 \pm 52$  hours, with a median of 63 hours. The length of hospital stay did not differ from patients with respiratory disorder preoperatively, compared to those who presented normal spirogram, with mean  $13.49 \pm 6.2$  days for those with ventilatory disorder and  $13.08 \pm 8.8$  days for those with normal spirogram.

In this study, there were eight (6.5%) deaths from the original sample, one (0.8%) by severe ventilatory disorder, one (0.8%) by pulmonary embolism, one (0.8%) by septic shock, and five (4%) by cardiogenic shock.

### DISCUSSION

In this study, we noted a significant loss in lung function in the postoperative CABG, evidenced by the significant reduction ( $P < 0.001$ ) of FEV<sub>1</sub>, FVC, inspiratory and expiratory ventilatory muscle strength. These changes in lung function are a frequent finding in the literature after heart surgery [4,5,13,15] and it is a well-known complication, but its causes are still being explored.

CPB is considered the main responsible for lung damage, whereas all patients undergoing CPB suffer some disorder of respiratory function due to various factors such as interstitial edema, pulmonary congestion, damage to the pulmonary vascular endothelium and microatelectasis [8,9,11,16,17].

The heart surgery predisposes to changes in respiratory mechanics, lung volumes and gas exchange, and can trigger postoperative respiratory changes. These changes are related to various causes such as heart and lung function preoperatively, duration of CPB and the degree of sedation [7], intensity of surgical manipulation and the number of pleural drains, and the intraoperative factors were the main responsible for change on respiratory mechanics in the immediate postoperative period [2,6].

The diaphragmatic dysfunction may occur as a result of surgery, by manipulation, or by the use of cardioplegic solution, due to the thermal damage. The paresis or diaphragmatic paralysis caused by inhibition of the phrenic nerve contributes to greater drop in lung volume and capacity [18]. It is crucial a better understanding and more research about the resources currently available to reverse the presentation of pulmonary dysfunction associated with heart surgery and its possible effects [17]. Physiotherapy in this context has been increasingly required [19], as it uses techniques able to improve respiratory mechanics, pulmonary reexpansion and bronchial hygiene [15].

Several researchers have shown benefits of off-pump CABG, especially in relation to the reduction of the postoperative morbidity rate, shorter time to tracheal

intubation, decrease of respiratory complications and thus resulting in reduced length of hospital stay associated with the reduction in hospital costs [5,8,10,20,21].

Guizilini et al. [5] affirmed the CPB as one of the causes for the loss of lung function due to increased airway resistance and possible increase in diaphragmatic dysfunction, comparing the pulmonary function of patients who used CPB or not. The authors concluded that there is injury after heart surgery, however, in procedures involving CPB, the damage is greater. Szeles et al. [8] noted that the *odds ratio* to hypoxia was 2.3 for CPB, up to 120 minutes, and 3.1 for CPB exceeding 120 minutes, compared to off-pump surgeries. It is important to emphasize that patients selected to perform off-pump surgery presented better clinical conditions than those who usually underwent on-pump surgery, which could characterize a selection bias.

Silva et al. [16] analyzed the in-hospital evolution of patients aged 70 years or more, undergoing CABG without CPB, using intracoronary shunt. Patients who underwent urgent, emergency and elective surgery presented appropriate postoperative evolution and low rates of complications and mortality. Although some studies suggest that the morbidity related to CABG surgery have been attributed to CPB and others show that the procedure without CPB reduces the inflammatory response with consequent improvement in lung function, the role of CPB, as potentiator of pulmonary dysfunction in the postoperative period, is still controversial.

Saad and Zambom [22] found decreased lung capacity and FEV<sub>1</sub> in the immediate postoperative period, but full recovery of those values occurred on the fifth postoperative day in major thoraco-abdominal surgery. It does not happen in heart surgery, because, as demonstrated in this study, there is still a significant decrease in lung volume and capacity on the sixth postoperative day. Giacomazzi et al. [4] also observed significant loss of lung function, without full recovery up to the fifth postoperative day. This damage found in lung function is related to factors unique to CABG, such as CPB and surgical incision.

The chest drain also changes significantly the FEV<sub>1</sub> and FVC. Guizilini et al. [1] reported the intercostal drain as the worst when compared to the subxiphoid drain, caused by friction during the respiratory movement. Postoperative pain and presence of drains are directly involved in the maintenance of low lung volumes [4]. The patients in this sample presented no intercostal drainage, whereas the 97 (100%) of patients with mammary graft used pleural drain located in the subxiphoid region.

In this study, most of patients (52%) showed restrictive ventilatory disorder on the 6<sup>th</sup> postoperative day, and, preoperatively, only one (1%) presented restrictive pattern. Studies of Shapira et al. [23] assessed pulmonary function preoperatively, after extubation, at discharge and three

months after surgery in patients undergoing CABG surgery. They found, after surgery, a restrictive pulmonary pattern affecting all lung volumes. At discharge, volumes remained low at 19% to 33% compared to preoperative values. After three months, only minimal changes were present.

The use of internal thoracic artery (ITA) may represent an additional surgical trauma and decrease of the blood supply to the intercostal muscles, reducing the ventilatory muscle strength [24]. Guizilini et al. [5] showed in their study that there is loss of lung function in postoperative of coronary artery bypass grafting using left internal thoracic artery and pleurotomy, regardless of use or not of CPB.

Regarding ventilatory muscle strength, a study performed by Mendes and Borghi-Silva [11] reported a decrease in respiratory muscle strength with the worsening of pulmonary function and, consequently, with higher incidence of pulmonary complications. The study of Bellinetti and Thomson [25] found the ventilatory muscle strength in elective thoracotomies and laparotomies, and the results indicated that the preoperative ventilatory muscle function below the predicted value was associated with a higher relative risk of postoperative pulmonary complications. In this study, the ventilatory muscle strength was assessed and there was a statistically significant difference between MIP and MEP between the preoperative assessment and on the sixth postoperative period.

The low significant values of spirometry and ventilatory muscle strength may also reflect the fear or the indifference of the patient to collaborate with pulmonary function tests, since these depend on the cooperation of the patient. Since there are no means of confirming that the patient has spent all the effort possible, this is a limitation of voluntary testing [4].

The radiological changes most commonly seen in postoperative heart surgery with CPB are atelectasis [9,15], mainly in the left lower lobe. The atelectases are associated with the loss in gas exchange in lung compliance, in reduction of lung volume and capacity. Atelectases are considered clinically relevant when progressing by extension or if they are persistent, associated with hypoxia and increased respiratory effort [17]. The incidence of pulmonary complications is difficult to be determined by the literature because of the separation performed by the authors, such as complications of clinical and also radiological significance of the disease [13]. It is worth emphasizing that the radiological findings of this study were without clinical relevance, and the higher incidence of pulmonary radiological complications was found on the 6<sup>th</sup> postoperative day.

As for the duration of mechanical ventilation, Arkdur et al. [10] have shown that patients undergoing coronary artery bypass grafting, requiring prolonged mechanical ventilation (more than 24 hours), showed a significant decrease in lung function when compared to the group of

time less than 24 hours. They concluded that patients who required mechanical ventilation more than 24 hours were those who stayed in longer time of CPB and aortic clamping, and also that postoperative complications and risk of complications was 3.5 times higher in this group. In the study of Guizilini et al. [5], the time of orotracheal intubation of patients undergoing surgery without CPB was significantly lower when compared to the group with CPB. In this sample, most of the patients remained on mechanical ventilation less than 24 hours.

The severe hypoxemia is a frequent complication in the postoperative period of coronary artery bypass grafting, by promoting increase of the duration of mechanical ventilation, incidence of lung infections, stay in the intensive care unit and hospital costs and mortality [8]. Szeles et al. [8] studied 481 adult patients undergoing elective surgery for coronary artery bypass, considering severe hypoxemia a relationship  $\text{PaO}_2/\text{FiO}_2$  lower than 150 on admission to the intensive care unit. The time of extubation of patients with severe hypoxemia was higher than in other patients. In multivariate analysis, the variables age, weight, need for prolonged CPB and left ventricular dysfunction were identified as independent predictors for severe hypoxemia.

Lopes et al. [21] showed in their study improvement in oxygenation of the patients in the immediate postoperative period of heart surgery, using noninvasive ventilation for 30 minutes after extubation when compared to the control group with nasal oxygen catheter.

## CONCLUSION

It is concluded that patients undergoing coronary artery bypass grafting presented significant worsening of pulmonary function in the postoperative period. The fact that there are so pronounced reduction in pulmonary function and ventilatory muscle strength, on the sixth postoperative day, emphasizes the importance of unique characteristics to this surgery in the genesis of ventilatory dysfunction. The damage found in pulmonary function and in ventilatory muscle strength in the postoperative period is associated with transoperative factors, such as sternotomy, cardiopulmonary bypass, general anesthesia, rather than the preoperative pulmonary function.

This study approached the ventilatory, clinical and radiological profile of patients undergoing coronary artery bypass grafting during hospital stay. It is suggested the fulfillment of studies with long-term outcomes, with assessments of the patients after three and six months postoperatively, or also by associating the better physiotherapeutic intervention with the patient's profile, since it is known that the loss of lung function is important during the postoperative hospitalization.

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