INCIDENCE OF ATRIAL FIBRILLATION IN POSTOPERATIVE CARDIAC SURGERY PATIENTS AT A UNIVERSITY HOSPITAL

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ABSTRACT

Atrial fibrillation (AF) is the most prevalent arrhythmia in medical practice, as well as the most frequent complication after cardiac surgery: incidence of 40%. AF has been implicated in a prolonged hospitalization, hemodynamic instability and increasing death. Considering that, in the State of Rio Grande do Norte, there's no data collection involving post-operative AF (POAF) occurrence in cardiac surgery, an accurate investigation can contribute to prevent its occurrence and reduce its prevalence. The goal of this study is to determine the incidence of POAF after cardiac surgery in patients previously in sinus rhythm. Moreover, it's intended to identify the clinical and laboratory profile of POAF patients, including their evolution within the hospital. A cross-sectional observational retrospective study, involving 223 patients undergoing cardiac surgery at Onofre Lopes Universitary Hospital (HUOL) from the year 2006 to 2010. The average age of the 223 patients was 58.9±14.6 years, predominantly male (61.4%). The POAF incidence was 13.9% (N=31). Coronary Artery Bypass Graft was the most commonly surgery performed (69.95%), followed by aortic valve replacement (8.52%) and mitral valve replacement (6.27%). POAF patients spent longer in intensive care unit (ICU), median of 4 days. On the other hand, non-POAF patients spent the median of 3 days (p=0.034). Mortality in POAF patients was higher (16.13%) comparing with non-POAF group (9.38%) (p=0,001). The incidence of POAF in cardiac surgery of HUOL was lower than that reported in the literature. However, it was associated with increased length of stay in ICU and death in the hospital course.

KEYWORDS: Atrial fibrillation, thoracic surgery, adult, pre-operative care, mortality.

1. INTRODUCTION

Atrial fibrillation (AF) is an arrhythmia characterized by electrical disorganization of the atria leading to their loss of function. It is the most common arrhythmia in clinical practice and results in the largest number of hospitalizations. Although it can occur originate in normal hearts, atrial fibrillation frequently happens as a consequence of cardiopathies, such as acute myocardial infarction, or as a result of systemic organic disorders, such as hyperthyroidism and pheochromocytoma.

The global incidence of AF is 2%, according to studies by Framingham, but in individuals submitted to cardiac surgery, it increases by up to 40% [2,3,4,5,6]. Prevalence is higher in men and the elderly, increasing twofold after the age of fifty years and affecting 10% of octogenarians[7]. Patients with AF are more prone to developing thromboembolic complications, especially stroke and heart failure.

With respect to cardiovascular surgeries, atrial fibrillation is one of the most frequent postoperative complications; however, its determining factors and prophylaxis are still not well defined. It occurs in around 15-50% of patients, and is more common after valve surgery and less frequent after orthotopic cardiac transplantation – 11-24%[4,7,8,9].Atrial fibrillation usually emerges between the second and third day postoperative, is self-limited and well tolerated in most patients. However, its occurrence is associated with prolonged hospitalization, hemodynamic instability, increased risk of stroke and a rise in mortality [5,6,12].

In this context, in Rio Grande do Norte (RN) state there are no data on the occurrence of AF in postoperative cardiac surgery patients, it is important to conduct a study that collects this information, as well as the profile of patients and their prior history. An accurate investigation of AF in postoperative cardiac surgery patients in

RN may contribute to preventing its occurrence and reducing its prevalence. The long-term results of studies on this issue may decrease hospitalization time, reduce expenses and increase available hospital beds, making the system more functional and posing fewer risks to patients who undergo cardiovascular surgery.

The present study aimed at determining the incidence of AF in postoperative cardiac surgery patients who were in sinus rhythm, identifying the demographic and clinical-laboratory profile of individuals that develop AF and identifying the intrahospital evolution of these patients.

2. MATERIAL AND METHODS

This is a cross-sectional, observational, retrospective study, based on a thorough analysis of the medical records of individuals submitted to cardiac surgery at Onofre Lopes University Hospital (HUOL) between January 2006 and December 2010. Chart data from admission to discharge were recorded in order to standardize information for later analysis. Patients were selected according to the following inclusion criteria: individuals of both sexes; age greater than or equal to 18 years; submitted to heart valve surgery, interatrial/interventricular correction, left ventricular aneurysmectomy, Bentall and De Bono and/or myocardial revascularization with or without extracorporeal circulation; and preoperative sinus rhythm.

A retrospective analysis was conducted of the charts of 223 individuals submitted to cardiac surgery between June 2006 and December 2010, at HUOL, representing 100% of the target population. Exclusion criteria were the absence of chart data confirming cardiac rhythm before heart surgery; presence of atrial fibrillation in the preoperative phase; cardiac surgery to correct aortic pathology; and patients who died during the transoperative phase.

Data analysis was carried out using SSPS 20.0 software. In addition to descriptive analysis, inferential analysis was also performed by the Student's t-test to compare the means of continuous parametric variables between the two groups: the Postoperative Atrial Fibrillation group (POAF) and the Postoperative Sinus Rhythm group (POSR) or the Mann-Whitney for analysis of nonparametric variables.

The study was conducted based on the ethical guidelines contained in resolution 196/96, which governs research involving human beings in Brazil. The project was submitted and approved by the Human Research Ethics Committee of Onofre Lopes University Hospital - (CEP/HUOL), under Protocol no. 570/11 and Certificate of Presentation for Ethical Consideration (CAAE) 0017.1.294.000-11.

The study was entirely financed by the researchers themselves.

3. RESULTS

A total of 276 medical charts of patients submitted to cardiac surgery were analyzed, representing 100% of the target population. Twenty-nine of these were excluded for not meeting the inclusion criteria: 27 with chronic atrial fibrillation, 1 for being younger than 18 years, 1 for intraoperative death and 24 whose charts were not located in the files of the institution, leaving 223 patients in the study sample (Figure 1).

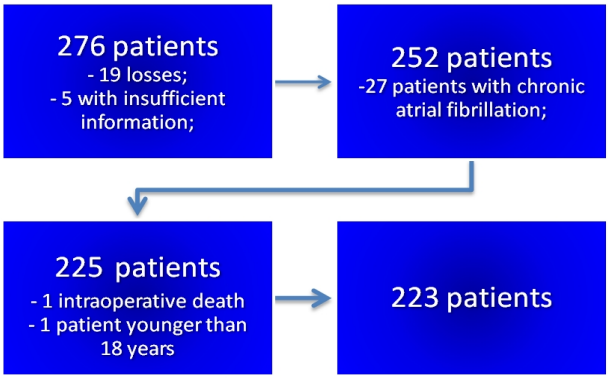

Figure 1. The target population of the study.

3.1 Clinical and demographic characteristics of the population

The 223 The 223 patients analyzed had a mean age of 58.9±14.6, 137 men (61.4%) and 86 women (38.6%). Demographically, the vast majority of this population comes from the interior of Rio Grande do Norte (RN) state (147 individuals = 65.92%), whereas 76 (34.08%) are from the capital (Natal). The schooling level of the sample was low, illiterate individuals and those with incomplete elementary education accounting for 74.2% of the population (N=121) (Table 1).

The prevalent etiology that motivated surgical intervention was coronary artery disease (CAD), which accounted for 76.2% of preoperative diagnoses in this population, followed by valvulopathies (25.6%) and congenital cardiopathies (2.2%).

With respect to comorbidities, 97.3% of the population exhibited some comorbidity, systemic hypertension (SHT) being the most prevalent at 159 (74%), followed by diabetes mellitus (DM), 91 (42.3%), dyslipidemia, 80 (35.8%), and previous acute myocardial infection, 50 (22.32%). It is important to highlight that nearly half of the individuals, 80 (40.5%), exhibited SHT and DM, both a considerable cardiovascular risk factor. Two hundred and nineteen patients were analyzed for prior cardiac surgery, 199 (90.9%) of whom had never been submitted to surgery and 20 (9.1%) who had.

Table 1. Clinical and demographic characteristics of the population studied.

Variable	Results
Ages* (N=223)	58.9 ± 14.6 anos
Gender† (N=223)	
Male	137 (61.4%)
Female	86 (38.6%)
Education † (N=163)	
Illiterate	44 (27%)
Incomplete primary education	77 (47.2%)
Complete primary education	14 (8.6%)
Incomplete secondary education	5 (3.0%)
Complete secondary education	19 (11.7%)
Incomplete university	0 (0%)
Complete university	4 (2.5%)
Origin† (n=223)	
Capital city	76 (34.08%)
Country town (n=219)	147 (65.92%)
House	193 (88.13%)
Another hospital	26 (11.87%)
Height * (m) (N=140)	1.63 ± 0.103
Weight * (Kg) (N=179)	67.97 ± 12.05
BMI * (kg/m²) (N=139)	29 ± 4.24

* Results expressed as mean ± standard deviation; † Results expressed in number (percentage)

3.2 Atrial fibrillation in the postoperative period (POAF)

The most common surgery performed was myocardial revascularization (MR), accounting for 156 (69.95%) of the surgical procedures, followed by aortic valve replacement, with 19 procedures (8.52%), and mitral valve replacement with 14 (6.27%).

Atrial fibrillation during the postoperative period occurred in 31 of the 223 individuals studied (13.9%), 18 (58.06%) after myocardial revascularization (MRV), 5 following aortic valve replacement (16.12% of POAF patients), 3 (9.68%) after mitral valve replacement, and 2 (6.45%) following MRV associated with left ventricular aneurysmectomy.

Information regarding reversal of arrhythmia was available for 25 patients, 24 of whom reversed their arrhythmia (96%), while only 1 (4%) did not. Reversal of AF was obtained chemically in 23 patients (95.8%), with the use of amiodarone. Only a single patient (4.2%) was electrically cardioverted. Recurrence of arrhythmia after reversion was observed in 11 patients (45.8%) during hospitalization (Table 2).

Table 2. Data of the Postoperative Atrial Fibrillation (POAF)

Variable	Results
Time until emergence of POAF* (h)	62.38
Hospitalization time * (days)	30.2
Use of Extracorporeal circulation in patients with POAF †	21 (67.7%)
Serum K^+ level * (mEq/L)	3.5
Reversal of POAF † (n=25)	
Nonreverted	1 (4%)
Reversed	24 (96%)
Type of reversal † (n=24)	
Drug:	23 (95.8%).
Electric:	1 (4.2%).
Recurrence † (n=24)	
Nonrecurrence:	13 (54.2%).
Recurrence:	11 (45.8%).
Incidence of POAF with previous cardiac surgery documented in the chart † (n=31)	3 (9.7%)
POAF incidence in patients with previous AF †(n=6)	4 (66.67%)

* Results expressed as mean ± standard deviation; † Results expressed in number (percentage)

3.3 Hospitalar patient outcomes

Time in the ICU was greater in the POAF group than in the POSR group, with a median of four and three days, respectively (p=0.034).

Table 3. Length of stay and hospital outcomes of patients undergoing surgery.

Variable	POAF (N=31):	POSR (N=192)	P
Hospital mortality rate † Without POAF (N=192) With POAF (N=31)	5 (16.13%)	18 (9.38%)	0.001§
Length of hospital stay* (days) (N=223)	30.2 ± 23,51 (Median 19)	23.93 ± 17.72 (Median 19)	0.08ǂ
Length of postoperative stay in the ICU (days) (N=223)	4	3	0.04ǂ

** Results were expressed in Median; † Results expressed as number (percentage); ǂ Mann Whitney Test; § Chi-square Test, ‖ T Test.*

The POAF group also exhibited longer mean hospital stay, albeit with no statistical difference considering the median of 19 days in both groups. In relation to outcome, 201 (90.13%) patients were discharged, 21 (9.42%) died and 1 (0.49%) was transferred to another hospital.

Hospital mortality in those with POAF compared to the other group was 16.13% and 9.38% (p=0.001), respectively (Table 4).

4. DISCUSSION

Regarding to the demographic investigation of the study group, the profile obtained reinforces the representativity of the Onofre Lopes University Hospital (HUOL) for Rio Grande do Norte state, given that 65.92% of individuals were from the interior of the state and the remainder from the capital. Furthermore, this result underscores the need for complex care services in inland areas, showing the urgency of developing strategies to track and prevent cardiovascular disease throughout the state, primary care being of utmost importance in this process. The patients submitted to heart surgery exhibited a low schooling level. A total of 163 patients were analyzed and the sum of illiterates and those with incomplete elementary education was 74.2%. This finding is worrisome since it involved patients who underwent complex surgeries, with late postoperative success highly dependent on treatment adherence, such as the need for anticoagulation in cases of AF[2].

The incidence of POAF in the present study was 13.9%, less than that described in the literature, estimated at 15-40%. This lower index may be due to MRV, the most widely performed surgery at HUOL, in detriment to those normally associated with POAF, such as valve replacement[4].

The mean age of 64.97 years in those with POAF is within the risk range for this cardiovascular event, with onset at 55 years[4] and increasing over subsequent decades, and one of the greatest predictors of POAF[2,6,11,12,13]. The development of atrial fibrillation and structural cardiac changes attributed to advanced age are responsible for the process[6].

The length of time until the onset of AF after cardiac surgery is well documented in the literature, showing that 70% of the events occurred in the first four days postoperative[12]. This condition was also observed in our study, since the mean time until AF occurrence was 62.38 hours (2.59 days).

With respect to patient evolution, the length of ICU stay in the POAF group was longer than the POSR group, corroborating recent literature data[4,5]. Furthermore, hospital mortality was 9.42% for cardiac surgery, 16.13% in the POAF group and 9.38% in the POSR group, corroborating recent studies[4,5,6], which demonstrate higher mortality in the POAF group, compared to its non-POAF counterpart (1.7-7.4% and 1.2-4.3% respectively). However, higher mortality was observed in both groups of the present study, which can be attributed to several factors, especially the precarious situation of the Brazilian public health system, as compared to countries in which the other studies were conducted. The high comorbidity index also characterizes the status of the study population as being more severe and is therefore one of the factors that may have contributed to the higher death rate.

5. CONCLUSION

Atrial fibrillation (AF) is frequent in the postoperative phase of cardiac surgery at Onofre Lopes University Hospital, although the incidence is lower than that reported in the literature. Individuals with POAF are predominantly men, with low schooling level and comorbidities. Moreover this population evolves unfavorably, with longer hospital stays and increased in-hospital mortality.

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