Cardiac Surgery in Jehovah's Witness Patients: Experience of a Brazilian Tertiary Hospital

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Abstract

Introduction: The outcomes of Jehovah's Witness (JW) patients submitted to open heart surgery may vary across countries and communities. The aim of this study was to describe the morbidity and mortality of JW patients undergoing cardiac surgery in a tertiary hospital center in Southern Brazil.

Methods: A case-control study was conducted including all JW patients submitted to cardiac surgery from 2008 to 2016. Three consecutive surgical non-JW controls were matched to each selected JW patient. The preoperative risk of death was estimated through the mean EuroSCORE II.

Results: We studied 16 JW patients with a mean age of 60.6±12.1 years. The non-JW group included 48 patients with a mean age of 63.3±11.1 years (P=0.416). Isolated coronary artery bypass graft surgery was the most frequent surgery performed in both groups. Median EuroSCORE II was 1.29 (IQR: 0.66-3.08) and 1.43 (IQR: 0.72-2.63), respectively (P=0.988). The mortality tended to be higher in JW patients (18.8% vs. 4.2%, P=0.095), and there was a higher difference between the predicted and observed mortality in JW patients compared with controls (4.1 and 18.8% vs. 2.1 and 4.2%). More JW patients needed hemodialysis in the postoperative period (20.0 vs. 2.1%, P=0.039).

Conclusion: We showed a high rate of in-hospital mortality in JW patients submitted to cardiac surgery. The EuroSCORE II may underestimate the surgical risk in these patients.

Keywords: Jehovah's Witnesses. Cardiac Surgical Procedures. Mortality.
METHODS

The current case-control study was carried out at the Hospital de Clínicas de Porto Alegre (HCPA), a tertiary hospital in Southern Brazil (state of Rio Grande do Sul), during the period from 2008 to 2016. All JW patients submitted to cardiac surgery were selected. The patients' identification as JW occurred through surgical schedules, bioethics consultations and keyword search in the electronic medical records system. Three consecutive surgical non-JW controls were matched to each selected JW patient, including only surgeries with extracorporeal circulation.

Preoperative risk of death was estimated through the mean EuroSCORE II[13]. Death during hospitalization, regardless of its length, was defined as hospital mortality. The registry of at least one of the following complications was considered as hospital morbidity: creatinine > 2 mg/dL, mechanical ventilation > 48 hours, myocardial infarction, need for either hemodialysis or intra-aortic balloon pump, reintervention due to bleeding, reintubation, stroke and use of antibiotics. Definitions of active endocarditis, chronic pulmonary disease, critical preoperative state, surgery urgency, extracardiac arteriopathy and recent myocardial infarction (< 90 days) were the used in the EuroSCORE II study[13]. Creatinine clearance was estimated through Cockroft-Gault formula.

Data were collected directly from the patients' electronic charts, and analyzed in the Statistical Package for Social Sciences (SPSS) 21.0. Qualitative data were reported as absolute and relative frequency; mean (± standard deviation) or median (interquartile range) were used for quantitative variables. The comparison of the groups was performed by Student's t-test for quantitative variables with normal distribution, by Mann-Whitney U test, for the quantitative without normal distribution and chi-square test for categorical variables. In situations of low frequency, Fisher exact test was used. Normality of the distribution of each variable was evaluated using Shapiro-Wilk test. The significance level adopted in all tests was 5%. The present study was submitted and approved by the local Research Ethics Committee.

RESULTS

During the period under study, 16 JW patients were submitted to cardiac surgery at the institution. The demographic characteristics of the whole sample are described in Table 1. Patients were neither receiving iron supplementation therapy nor were in critical state in the preoperative period.

Isolated coronary artery bypass graft surgery was the most frequent surgery performed in both groups. Extracorporeal circulation and cross-clamp times were similar between JW and non-JW groups. Surgical characteristics data are described in Table 2.

Hospital outcomes are presented in Table 3. There was no statistically significant difference in the rate of mortality or morbidity, with a trend to a higher mortality in the JW group. Causes of death were septic (n=1), cardiogenic (n=1) and hypovolemic (n=1) shock in the JW group; ischemic stroke (n=1) and right ventricle failure/shock (n=1) were responsible for the deaths in the control group. The levels of both hematocrit and hemoglobin at discharge were leveled between the two groups. Lengths of stay, considering both intensive care unit and ward stay after surgery, were also similar between groups.

The comparison of the predicted and observed mortality is shown in Figure 1. As noted, unlike non-JW group, the observed mortality was higher than the rate predicted by mean EuroSCORE II in the JW group.

The need for hemodialysis in the postoperative period was significantly higher in JW patients, but the incidence of the other morbidities analyzed was similar between the patients' groups. Detailed hospital morbidity per outcome is shown in Table 4. The reasons for antibiotic use were septic shock due to central line infection (n=1) and ventilator-associated pneumonia (VAP; n=1) in JW patients; respiratory tract infection (n=4), urinary tract infection (n=2), surgical wound infection (n=2), VAP (n=1) and diverticulitis (n=1) accounted for the use of antibiotics in the non-JW group.

DISCUSSION

In this case-control study, we reported the hospital outcomes of a non-selected group of JW that were submitted to cardiac surgery in a Brazilian tertiary center between 2008 and 2016. Outcomes and demographic variables were compared with a matched control group as described above. The rates of hospital mortality and morbidity were leveled between JW and controls. However, there was a trend toward higher mortality rate in JW than in controls (18.8 vs. 4.2%, respectively; P=0.095). In addition, necessity of hemodialysis in the postoperative period was greater in JW than in controls (20.0 vs. 2.1%, respectively; P=0.039). Moreover, it was observed that, in JW, the mortality rates were higher than predicted by the EuroSCORE II. Hemoglobin levels remained similar between both groups, both preoperatively and at discharge.
Previous retrospective studies demonstrated that cardiac surgery might be performed in JW with acceptable outcomes[2-10]. Furthermore, retrospective studies that compared mortality and morbidity rates in JW and controls showed leveled results between both groups[7-10]. Bhaskar et al.[9] and Pattakos et al.[10] compared outcomes of JW with a control group of transfused patients. Marinakis et al.[7] and Stamou et al.[8] described outcomes of JW with a matched group regardless of blood transfusion. Table 5 shows a comparison of current study with previous retrospective comparative studies. In agreement with previous comparative studies, we observed similar levels of hemoglobin between groups, both preoperatively and at discharge. Our results also showed similar rate of reoperation due to excessive bleeding in JW and in controls. However, the in-hospital mortality rate in JW in our study was higher than in previous studies. In addition, our report is the first to demonstrate both higher necessity of hemodialysis in the postoperative period and a trend toward higher mortality rate in JW than in controls. Notwithstanding, our cohort is the first report that demonstrates higher mortality rates in JW than predicted by the EuroSCORE II in all risk strata.

Our study has several limitations. First, our sample of JW was small. However, this is a non-selected and consecutive cohort
Table 2. Surgical data.

| Variable                                      | JW (n=16) | Non-JW (n=48) | P   |
|-----------------------------------------------|-----------|---------------|-----|
| Non-elective surgery                          | 1 (6.3)   | 4 (8.3)       | 1.0 |
| Surgery                                       |           |               |     |
| Isolated CABG                                 | 7 (43.8)  | 28 (58.3)     | 0.469 |
| Isolated biological AVR                       | 3 (18.8)  | 6 (12.5)      |     |
| Isolated biological MVR                       | 2 (12.5)  | 1 (2.1)       |     |
| CABG + biological AVR                         | 1 (6.3)   | 1 (2.1)       |     |
| CABG + biological aortic valved graft         | 1 (6.3)   | __            |     |
| Isolated mechanical AVR                       | 1 (6.3)   | 3 (6.3)       |     |
| Mechanical AVR + MVR                          | 1 (6.3)   | __            |     |
| Isolated mechanical MVR                       | __        | 2 (4.2)       |     |
| Mechanical aortic valved graft + aneurysmectomy| __        | 1 (2.1)       |     |
| CABG + aorta pseudoaneurysm correction        | __        | 1 (2.1)       |     |
| Mechanical aortic valved graft                | __        | 1 (2.1)       |     |
| Biological aortic valved graft                | __        | 1 (2.1)       |     |
| Heart tumor removal                           | __        | 1 (2.1)       |     |
| Interventricular communication correction     | __        | 1 (2.1)       |     |
| Resection of subaortic membrane + septoplasty| __        | 1 (2.1)       |     |
| Extracorporeal circulation time (minutes)     | 58.5 (50.7-71.5) | 67.5 (55.2-90.0) | 0.139 |
| Cross-clamp time (minutes)                    | 38.5 (31.2-51.0) | 48.0 (40.0-65.0) | 0.054 |

AVR=aortic valve replacement; CABG=coronary artery bypass graft surgery; JW=Jehovah’s Witness; MVR=mitral valve replacement
Data presented as number (%) or median (interquartile range).

Table 3. Hospital outcomes.

| Outcome                                    | JW (n=16) | Non-JW (n=48) | P   |
|--------------------------------------------|-----------|---------------|-----|
| Mortality                                  | 3 (18.8)  | 2 (4.2)       | 0.095 |
| Morbidity                                  | 4 (25.0)  | 14 (29.2)     | 1.0  |
| Last hematocrit (%)                        | 28.6 (23.6-33.6) | 28.8 (26.5-32.9) | 0.625 |
| Last hemoglobin (g/dL)                     | 9.2 (7.5-11.6) | 9.4 (8.8-10.9) | 0.593 |
| Length of stay (days)                      | 6.5 (6.0-9.5) | 7.0 (7.0-9.7) | 0.143 |

JW=Jehovah’s Witness. Data presented as number (%) or median (interquartile range).

of JW and there is no record of denial of cardiac surgery to any JW at our hospital. Second, surgical data were heterogeneous between our groups: the rates of combined surgery and valve surgery were higher in JW than in controls. This can partly explain a trend toward higher mortality rate among JW in our cohort. Third, this is a cross-sectional retrospective study with all methodological limitations of such design. Therefore, our results need to be interpreted in a cautious and exploratory fashion.

CONCLUSION

In conclusion, our study demonstrated a high rate of in-hospital mortality in JW and a trend toward higher mortality in JW than in controls. In addition, we observed that in our cohort of JW the mortality risk predicted by EuroSCORE II was not accurate: in fact, EuroSCORE II underestimated surgical risk in JW in our study. To our knowledge, this is the first Brazilian study to compare outcomes of heart surgery in JW with controls.
Table 4. Hospital morbidity.

| Hospital morbidity                          | JW (n=16) | Non-JW (n=48) | P  |
|--------------------------------------------|-----------|---------------|----|
| Mechanical ventilation > 48h              | 4 (25.0)  | 4 (8.3)       | 0.099 |
| Need for hemodialysis*                     | 3 (20.0)  | 1 (2.1)       | 0.039 |
| Reintubation                               | 3 (18.8)  | 3 (6.3)       | 0.159 |
| Antibiotic use†                            | 2 (13.3)  | 10 (20.8)     | 0.714 |
| Creatinine > 2 mg/dL*                      | 1 (6.7)   | 4 (8.3)       | 1.0  |
| Perioperative MI                            | 1 (6.3)   | 2 (4.2)       | 1.0  |
| Need for IABP                              | 1 (6.3)   | __            | 0.250 |
| Reintervention for bleeding                | 1 (6.3)   | 3 (6.3)       | 1.0  |
| Stroke                                     | __        | 2 (4.2)       | 1.0  |

JW=Jehovah’s Witness; IABP=intra-aortic balloon pump; MI=myocardial infarction
* Excluding a chronic kidney disease on hemodialysis patient.
† Excluding an active endocarditis patient.
Data presented as number (%).

Table 5. Comparison of current study with previous retrospective comparative studies.

| Variable                     | Valle et al. (current study) | Marinakis et al.[7] | Stamou et al.[8] | Bhaskar et al.[9] | Pattakos et al.[10] |
|------------------------------|------------------------------|---------------------|------------------|-------------------|---------------------|
| n                            | 16                           | 31                  | 49               | 49                | 322                 |
| Age                          | 60.6±12.1                    | 62±15               | 62.7±9.5         | 65.3±10.1         | 62±13               |
| Isolated CABG                | 7 (43.8)                     | 15 (48.4)           | 38 (77.5)        | 25 (51.0)         | 209 (64.9)          |
| Hospital mortality           | 3 (18.8)                     | 1 (3.2)             | 3 (6.1)          | 1 (2.0)           | 10 (3.1)            |

CABG=coronary artery bypass graft surgery
Data presented as number (%) or mean ± standard deviation.

Authors’ roles & responsibilities

FHV  Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; drafting the work or revising it critically for important intellectual content; final approval of the version to be published

FPJ  Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; drafting the work or revising it critically for important intellectual content; final approval of the version to be published

BSG  Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; final approval of the version to be published

TMF  Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; final approval of the version to be published

VG   Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; final approval of the version to be published

MG   Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; drafting the work or revising it critically for important intellectual content; final approval of the version to be published

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