

Aortic Valve Replacement in Octogenarian Patients: Evaluation, Operative Risk and Mid-Term Outcomes

FERNANDO PICCININI^{MTSAC, 1}, JUAN M. VRANCIC^{MTSAC, 1}, GUILLERMO VACCARINO^{MTSAC, 1}, HERNÁN RAICH¹, GUSTAVO SILES¹, MARIANO BENZADÓN^{†, 2}, JORGE THIERER^{MTSAC, 3}, DANIEL NAVIA^{MTSAC}

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Address for reprints:

Dr. Fernando Piccinini
Instituto Cardiovascular de
Buenos Aires
Blanco Encalada 1543
(1428) Ciudad Autónoma de
Buenos Aires
Tel. (011) 4787-7502
Fax (011) 4787-7500 Ext. 3162
e-mail: donadpic@yahoo.com.ar

SUMMARY

Background

Aortic valve replacement benefits and indications have been clearly established, even for elder populations, with high comorbidity. Even so, the manipulation of aortic atheromas, the use of extracorporeal circulation and aortic clamp, cardiac arrest and the decalcification related to this technique and its possible consequences generate doubts about its indication in this group of patients.

Objective

To communicate morbidity and mortality of the procedure in octogenarian patients and validate the usefulness of the risk prediction scores most frequently used.

Material and Methods

A total of 87 octogenarian patients undergoing isolated aortic valve replacement were studied; preoperative, intraoperative and postoperative variables were analyzed and EuroSCORE was applied; to make easier the sub-analysis of logistic EuroSCORE the population was divided into three groups: low, moderate and high risk. Conventional surgical technique was used. For the follow-up, the patient's medical history was analyzed and/or telephone survey was made.

Results

Mean age was of 83 ± 2.5 years, with a range of 80 to 90 years. About 60% of the population studied was female. Surgical indication was: stenosis 92%, endocarditis 4.6% and valve disease 3.4%. Medical history: hypertension 71%, smoking (nicotinism) 31%, dyslipidemia 39%, diabetes 11.5%, COPD 10%, CKD-dialysis 2.3%, CVA 11.5%, previous AMI 8%, atrial fibrillation 16%, reoperation 15%. Clinical manifestation: asymptomatic 3.45%, chronic stable angina 10.3%, unstable angina 11%, CHF 13.8%, FC III-IV dyspnoea 60%. Moderate to severe left ventricular dysfunction 18.3%. Risk through logistic EuroSCORE $12.4 \pm 5\%$. Mean operative time was of 200 ± 61.7 min, extracorporeal circulation 86 ± 32.5 min and aortic clamp 65 ± 18.2 min. Complications: medical bleeding 17.2%, reoperation due to bleeding 5.7%, low cardiac output 13.8%, inotropic agents > 48 hours 32.1%, balloon pump 1.2%, atrial fibrillation 32.2%, temporary peacemaker 20.7%, permanent peacemaker 5.7%, pulmonary complication 3.4%, CVA with sequelaes, oliguric ARF 27.6%, dialysis 5.7%, sternal infection 1.2%, ICU 3 ± 5.2 days of stay 8 ± 9.6 , total mortality 10.34%, priority elective mortality 9.5%, non-elective mortality 12.5%. Stay in ICU 3 ± 5.2 days and a total of 8 ± 9.6 days. Divided into groups, the reported mortality was of 7.14%, 15.38% and 5% for low, medium and high risk respectively. The low postoperative cardiac output at 30 days was identified as a mortality predictor (OR 7, $p = 0.0011$). A number of 71 patients were followed (91%), median 1.203 days (51 to 3.927). Regardless of the preoperative score, survival at the first year was of 98.6%, at three years 87.65%, at 5 years 77.3%, and at 7 years 48.6%. 72% observed an improvement in the quality of life, 21% did not see changes and 7% of them noted worsening. No predictors in the follow-up were found.

Conclusions

Valve replacement surgery is a safe and durable procedure, with proven functional benefit and with survival in the long-term comparable with the general population. The use of preoperative risk scores should be revised, due to the demonstrated overestimation of operative risk.

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Key words

> Aortic valve stenosis- Elderly- Thoracic surgery -Aortic valve- Heart valve prosthesis.

Abbreviations

> CVA	Cerebrovascular accident	AMI	Acute myocardial infarct
TIA	Transient ischemic attack	CHF	Congestive heart failure
FC	Functional Class	CKD	Chronic kidney disease
COPD	Chronic obstructive pulmonary disease	STS	Society of Thoracic Surgeons
Log Euroscore	Logistic EuroSCORE		

BACKGROUND

The aging of the global population and the sustained reduction in the rate of mortality in patients over 65 years made octogenarian patients regular visitors to centers dealing with cardiovascular health. (1, 2) In this population, aortic stenosis of variable degree is the most frequent structural disease, with an incidence of 15% and 20%, which in octogenarian patients reaches to 50%. (3) The indications for valve replacement surgery due to severe stenosis (about 4%) have been clearly established (4) and its benefit over medical treatment is widely proved, even for elderly populations. (5) Even so, the manipulation of aortic atheromas, the use of extracorporeal circulation and aortic clamp, cardiac arrest and the decalcification related to this technique and its possible consequences generate doubts about its indication in patients with increased comorbidity. This situation can be seen in the high number of patients with aortic valve disease with no evaluation for surgery. (6-8) The industry promoted the percutaneous technology as an option for those “inoperable” patients and, with this, the use of risk prediction scores as EuroSCORE or STS-score, widely accepted for the general population. (9-12) The objective of this study is to communicate mortality associated with the procedure in octogenarian patients, establish predictors for such events, and validate the usefulness of the prediction scores most frequently used.

MATERIAL AND METHODS

Between January 1997 and December 2008, a total of 87 consecutive octogenarian patients underwent isolated aortic valve replacement surgery in our health center. Preoperative variables, as well as the rest of the informed data, were included prospectively in the database of the Cardiac Surgery Department and were evaluated retrospectively. Patients with significant coronary heart disease liable for revascularization, procedures on the ascendant aorta and mitral and/or tricuspid valvular heart disease coexisting with surgical indication were excluded. They were evaluated in the center by echocardiography with the purpose of obtaining standardized measurements, as valve area, annular diameter, pulmonary systolic pressure and left ventricular function. A preoperative coronary angiography study was made as routine in patients with multiple risk factors, cardiological history and/or abnormal functional tests. Patients of low risk for coronary heart disease, previous cerebrovascular accident (CVA), renal dysfunction or known aortic pathology were evaluated in 2007-2008 period, by multislice computed tomography. For the purpose of using traditional risk scores, preoperative variables (chronic obstructive pulmonary disease, extracardiac arteriopathy, neurological dysfunction, active endocarditis, preoperative critical state, unstable angina, acute myocardial infarct (AMI), pulmonary hypertension, emergency priority, etc.) are informed following the EuroSCORE and STS database

definitions. In both cases, online calculators offered by both organizations were used. Global population was analyzed and, to make easier the sub-analysis of logistic EuroSCORE, was divided into three groups, low risk those with logistic score under 10, moderate risk those patients with values between 10 and 20 and high risk those with a score over 20. Preoperative quality of life is communicated based on Duke score (DASI Duke Activity Status Index). (13) In 92% of the cases the indication for valve replacement was stenosis, mostly degenerative. There were 4 cases of active endocarditis (4.6%), in 3 of them prosthetic, and in 3 cases valve disease (3.4%), one of them associated with prosthetic dysfunction.

The surgical procedure was performed by standardized technique. Median sternotomy was used in 75 patients (86%), upper mini-sternotomy in 11 patients (12.6%) and right lateral mini-thoracotomy in only 2 patients (2.4%). In all, cannulation was aortic (distal and/or arc ascending) and unique cava, and mild hypothermia (34°C) was used, and intermittent antegrade- retrograde cold blood cardioplegia. Bioprostheses with stent were used in 80 patients (91.9%) and double disc mechanical valves in 6 patients (6.9%). In only one case (1.2%) aortic homograft due to endocarditis was used.

Postoperative complications and mortality at 30 days were informed. The information obtained for the follow-up comes from the medical history, consultations (surgery, clinical cardiology, interventional cardiology, haematology, nutrition, cardiovascular rehabilitation), GP (family doctor) records and/or telephone survey.

Statistical analysis

Qualitative variables are presented as percentages and are compared to the chi-square test (also χ^2 test). Quantitative variables are presented as mean and standard deviation and were compared through the analysis of variance (ANOVA) with Bonferroni's test in case post hoc comparison was necessary.

Predictors of events in a univariate and multivariate way were analyzed. Association of variables with evolution is expressed as odds ratio with its corresponding confidence interval (CI 95%). A value of $p < 0.05$ was considered statistically significant.

RESULTS

For the whole series, mean age was of 83 ± 2.5 years, range 80 to 89 years. The average height and weight were 60 kg and 1.60 m, surface of 1.75 ± 0.2 m², female 60%. Basal characteristics are summarized in Table 1.

For the group in general, FC III-IV dyspnoea was predominant. A high rate of CVA, transient ischemic attack (TIA) and previous AMI, as well as the antecedent of previous cardiac surgery was observed. Naturally, the high logistic EuroSCORE group is represented by sicker patients, with systemic vascular

pathology seen in the rate of non-cardiac arteriopathy, previous AMI and dialysis.

There was a considerable number of endocarditis, especially active prosthetic infection responsible for the high rate of reoperations for this subgroup (40%).

The predicted risk by logistic EuroSCORE for the whole series was of $9\% \pm 2.5\%$. Divided into groups, the expected mortality for low risk ($n=20$; 23%) was of $33\% \pm 17.9\%$.

In relation to the surgical procedure, the average operative time was of 200 ± 61.7 min, extracorporeal circulation was 86 ± 32.5 min and aortic clamp 65 ± 18.2 min. Evidences found by echocardiography and/or objectified during the process are considered aortic calcifications which, according to the operator opinion would change the operative strategy (cannulation place, PC, etc). There were no statistical differences in the analyzed variables among groups, as it is shown in Table 2.

Postoperative events, as well as global and priority mortality, are shown in Table 3. Median stay in Intensive Care Unit was of 3 ± 5.2 days and the total stay 8 ± 9.6 days, which was extended in the moderate and high risk groups. Nine patients died at 30 days (10.34%); according to risk groups (low, moderate and high), percentages were 7.14%, 15.38% and 5% with no statistical differences among them. In relation to mortality by EuroSCORE, for the low risk group the observed mortality (7.14% 28 observations, CI 95% 0.8% to 23.5%) versus the predicted one (8.2%) did not present a significant statistic difference. Likewise, a similar result was observed for mortality in the moderate risk group (15.4%, 39 observations, CI 95%, 5.8% to 30.5%) versus predicted mortality (13%). Mortality in the high risk group (5%, 20 observations, CI 95% 0.1% to 24.8%) versus predicted mortality (33%) had statistical significance. If we take the relation obtained value/predicted value as an index, the finding for high risk was 0.15.

Although the univariate analysis identify multiple factors as predictors of hospital mortality with statistical tendency, through the multivariate the only thing that acquires significance is the postoperative low cardiac output (OR 7, CI 95% 0.7-31.5; $p=0.011$).

The follow-up was completed in 71 patients (91%) with a median of 1.203 days (range 51 to 3927).

Independently of the postoperative score, survival was of 98.6% at the first year, 87.65% at 3 years, 77.3% at 5 years and 48.6% at 7 years (Figure 1). In relation to quality of life, 72% of the patients referred postoperative improvement, 21% expressed no changes and 7% impoverishment. About 12% of the patients were referred to tertiary care centers and/or they require special care. For this series, no risk predictors in the follow-up were found.

DISCUSSION

For years, global population and argentine in particular, have suffered important modifications due to the reduction of birth and mortality rates and, therefore,

a sustained aging. For our country, the proportion for those over 65 years increased from 3.9% in 1947 to 9.9% in the national survey of 2001. In this subgroup, those over 75 years represented 34.2% in 1980, 39.4% in 2001 and a projected 42.8% in 2010, with greater changes in urban centers (for example; Capital Federal, 36.6% to 49.1%, respectively). Although mortality rate for the subgroup was reduced from 108% to 88% in that period, cardiovascular disease is still the main cause of death. (1) As aortic stenosis in its different degrees is considered a prevailing pathology for this population, and considering the development of diagnostic techniques, it is natural to suppose that octogenarian patients would be regular visitors to cardiovascular surgery centers, despite their comorbidities.

Comorbidities

Female dominates our series, 59.7% global and 92% in the subgroup of low risk. This condition has been communicated in works as Chiappini et al. (59.1% octogenarian women), Avery et al. (32% women aged 65 to 75 years, 50% over 80 years) and Thourani et al. (40.8%, 52% and 53.4% for 60-69 years, 70-79 years and octogenarian respectively). (14-16) Female predominance can be associated to the exclusion, for this revision, of patients with significant coronary disease; for the same period, octogenarian patients undergoing combined aortic-coronary surgery were mostly male ($n=69$; 72.4%). Female is considered a risk factor due to its association with a small body surface and its additional difficulty in valve implantation. In series like Ghosh et al., which included 212 octogenarians divided by age, being mostly diabetics, small and with valve implantation N^o21 or lower, hospital mortality was similar. (17) In our series, female only demonstrated tendency as predictor by univariate analysis. The incidence of preoperative renal failure, active smoking, dyslipidemia and diabetes is lower than the one communicated in series with young patients, even for the group of biological replacements previously published by our center; (18) this comes from the natural selection implied by an octogenarian and certain bias in the type of patient to whom the cardiologist would refer to surgery evaluation. The numbers of previous CVA and chronic obstructive pulmonary disease are, on the contrary, higher than the published series. There is a considerable difference among the numbers of previous atrial fibrillation and systemic anticoagulation, but not with the chronic antipatelet therapy. Anticoagulation in octogenarians was widely discussed and several publications conclude that low ranges and monitoring at short intervals are compatible with a low rate of associated events. (19, 20)

Although previous atrial fibrillation (16% of the series) helps the choice of a mechanical prosthesis, the indication of a biological graft exceeded 90% in our series, according to the rules of the American Heart Association and the American College of Cardiology

Table 1. Preoperative variables

Variable	Total n = 87 (100%)	LogEuroSCORE 0-9 n = 28 (32.2%)	LogEuroSCORE 10-19 n = 39 (44.8%)	LogEuroSCORE ≥ 20 n = 20 (23%)	p
Age, years	83 ± 2.5	82 ± 1.99	84 ± 2.31	83 ± 2.9	ns
Female, % (n)	59.8 (52)	60.7 (17)	61.5 (24)	55 (11)	ns
Body surface, m ²	1.75 ± 0.2	1.75 ± 0,19	1.76 ± 0.20	1,73 ± 0,22	ns
HTN, % (n)	71.3 (62)	64.3 (18)	74.3 (29)	75 (15)	ns
COPD, % (n)	10.3 (9)	0 (0)	12.8 (5)	20 (4)	0,029
SMOKING, % (n)	31 (27)	21.4 (6)	35.9 (14)	35 (7)	ns
DYSLIPIDEMIA, % (n)	39.1 (34)	32.1 (9)	41 (16)	45 (9)	ns
DM, % (n)	11.5 (10)	3.6 (1)	20.5 (8)	5 (1)	ns
Extracardiac arteriopathy, % (n)	6.9 (6)	0 (0)	5.1 (2)	20 (4)	0,024
Previous/diálisis CKD, % (n)	2.3 (2)	3.6 (1)	0 (0)	5 (1)	ns
Previous CVA-TIA, % (n)	11.5 (10)	7.14 (2)	15.4 (6)	10 (2)	ns
Previous AMI, % (n)	8 (7)	3.6 (1)	5.1 (2)	20 (4)	ns
Previous TCA, % (n)	3.5 (3)	7.1 (2)	0 (0)	5 (1)	ns
Atrial fibrillation/flutter % (n)	16.1 (14)	7.1 (2)	23.1 (9)	15 (3)	ns
Preoperative Anticoagulation, % (n)	9.2 (8)	7.14 (2)	15.4 (6)	0 (0)	ns
Previous cardiac surgery, % (n)	14.9 (13)	3.6 (1)	7.7 (3)	45 (9)	0,000
Clinical manifestations					
Asymptomatic, % (n)	3.45 (3)	7.14 (2)	2.6 (1)	0 (0)	ns
Chronic stable angina, % (n)	10.3 (9)	10.7 (3)	15.4 (6)	0 (0)	ns
Unstable angina, % (n)	11.5 (10)	0 (0)	10.3 (4)	30 (6)	0,005
Heart failure, % (n)	13.8 (12)	3.6 (1)	10.3 (4)	35 (7)	0,007
FC III-IV dyspnoea, % (n)	60 (52)	64.3 (18)	56.4 (22)	60 (12)	ns
Syncope, % (n)	19.5 (17)	14.3 (4)	28.2 (11)	10 (2)	ns
Infected endocarditis, % (n)	5.7 (5)	3.6 (1)	0 (0)	20 (4)	0,007
Moderate-severe LV dysfunction, % (n)	18.4 (16)	0	12.8 (5)	55 (11)	0,001
Abnormal AV conduction, % (n)	17.2 (15)	10.7 (3)	15.4 (6)	30 (6)	ns
Coronary disease, % (n)	11.5 (10)	7.1 (2)	7.7 (3)	25 (5)	ns
Preoperative creatinine μmol/L	110 ± 34.2	104 ± 29.6	115 ± 27.9	102 ± 49	ns
Preoperative haematocrit, (%)	37 ± 4.9	38 ± 4.3	37 ± 3.49	35.5 ± 7	ns
Elective priority, % (n)	72.4 (63)	92.8 (26)	74.4 (29)	40 (8)	0,000
EuroSt med-d.std mortality risk	12.4 ± 15	8.2 ± 0.4	9 ± 0.7	13 ± 2.3	
LogEuroSCORE med-d.std mortality risk	9 ± 2.5	8.2 ± 1.14	13 ± 2.8	33 ± 17.9	

HTN: Hypertension. DM: Diabetes Mellitus. COPD: Chronic Obstructive Pulmonary Disease. CVA: Cerebrovascular Accident. TIA: Transient Ischemic Attack. CKD: Chronic Kidney Disease. AMI: Acute Myocardial Infarct. TCA: Transluminal Coronary Angiography. FC: Functional Class. LV: Left Ventricle. AV: Atrioventricular. LogEuroSCORE: Logistic EuroSCORE. Ns: Not significant. EuroSt: EuroSCORE Standard.

Table 2. Intraoperative data

	Total n = 87 (100%)	LogEuroSCORE 0-9 n = 28 (32.2%)	LogEuroSCORE 10-19 n = 39 (44.8%)	LogEuroSCORE ≥ 20 n = 20 (23%)	p
Aortic calcifications*, % (n)	34.48 (30)	21.4 (6)	41 (16)	40 (8)	ns
Clamp time, min	65 ± 18.2	63.5 ± 16,4	63 ± 23.5	69.5 ± 19.2	ns
ECC time, min	86 ± 32.5	86.5 ± 26.8	85 ± 35.7	91.5 ± 37.8	ns
Operative time, min	200 ± 61.7	200 ± 47.9	200 ± 57.6	210 ± 62.3	ns
Biological prosthesis, % (n)	91.9 (80)	85.7 (24)	94.9 (34)	95 (19)	ns

*Degree II X-ray or higher seen by preoperative echo.

LogEuroSCORE: Logistic EuroSCORE. ECC: Extracorporeal Circulation (by risk groups). Ns: Not Significant.

	Total n = 87 (100%)	LogEuroSCORE 0-9 n = 28 (32.2%)	LogEuroSCORE 10-19 n = 39 (44.8%)	LogEuroSCORE ≥ 20 n = 20 (23%)	p
Medical bleeding, % (n)	17.2 (15)	21.4 (6)	12.8 (5)	20 (4)	0.624
Average drainage, cm ³	500 ± 827	525 ± 788	500 ± 277	650 ± 513	0.18
Reoperation due to bleeding, % (n)	5.7 (5)	3.6 (1)	10.3 (4)	0 (0)	0.248
Low cardiac output, % (n)	13.8 (12)	14.3 (4)	17.9 (7)	5 (1)	0.446
Inotropics > 48 hs, % (n)	32.1 (28)	28.6 (8)	30.8 (12)	40 (8)	0.699
Balloon counterpulsation, % (n)	1.1 (1)	3.57 (1)	0 (0)	0 (0)	0.552
Atrial fibrillation, % (n)	32.2 (28)	28.6 (8)	25.6 (10)	50 (10)	0.163
Temporary pacemaker, % (n)	20.7 (18)	14,3 (4)	17,9 (7)	35 (7)	0,184
Permanent pacemaker, % (n)	5,7 (5)	14.3 (4)	2.6 (1)	0 (0)*	0.089
Pulmonary complication, % (n)	3.4 (3)	3.6 (1)	0 (0)	10 (2)	0.092
CVA with sequelae, % (n)	3,4 (3)	3,6 (1)	5,13 (2)	0 (0)	0,794
Oligoanuric ARF, % (n)	27.6 (24)	21.4 (6)	30.8 (12)	30 (6)	0.713
Dialysis, % (n)	5.7 (5)	0 (0)	10.3 (4)	5 (1)	0.190
Sternal infection, % (n)	1.2 (1)	0 (0)	2.6 (1)	0 (0)	ns
ICU days	3 ± 5.2	2.5 ± 8.2	3 ± 2.86	3 ± 2.83	ns
Stay days, (n)	8 ± 9.6	6 ± 8.1	9 ± 8.3	10 ± 12	0.0137
Global mortality, % (n)	10.34 (9)	7.14 (2)	15.4 (6)	5 (1)	0.475
Elective priority mortality, % (n)	9.5 (6)	7,69 (2)	13.8 (4)	0 (0)	
Non elective mortality, % (n)	12.5 (3)	0 (0)	20 (2)	8.33 (1)	

Table 3. Postoperative complications and mortality by groups of risk.

*Three patients (15%) were carriers of previous endocavitary pacemaker.
 CVA: Cerebrovascular Accident. ARF: Acute Renal Failure. ICU: Intensive Care Unit. Pulmonary Complication. Prolonged Mechanical Ventilation and/or pneumonia.

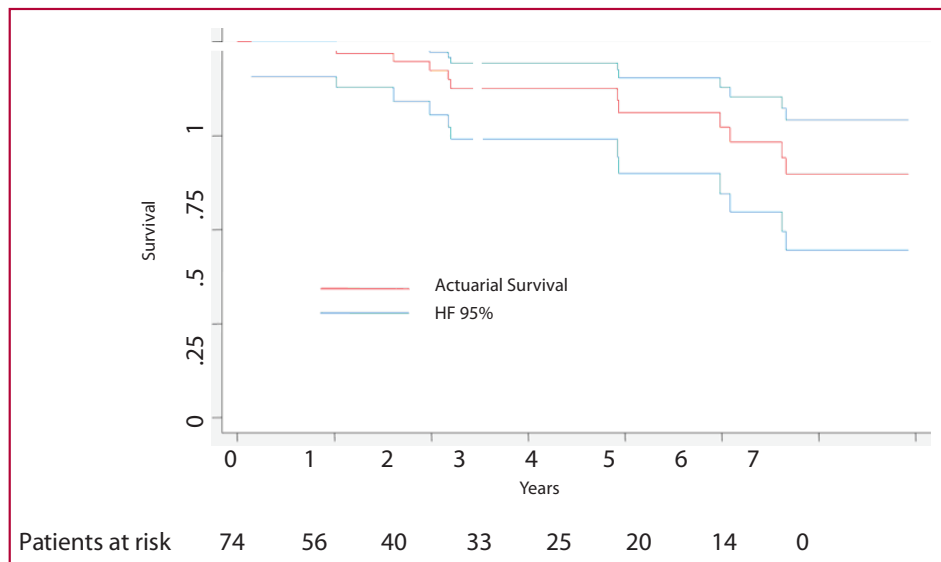


Fig 1. Monitoring survival

and its modifications; those patients with small annular diameter and notable prosthetic mismatch, or reoperation due to prosthetic dysfunction, as it is suggested in the bibliography are an exception. (18, 21, 22) In a work published by De Vicentiis et al. the choice of mechanical implantations in patients with small rings, shows remote results even higher than biological for this age bracket. (23) Taylor et al. revised a British series of 1.100 patients and communicated remote results independent from the used model.

824) A similar situation was published by Vicchio et al. about a series of 160 octogenarians selected based on life expectancy lower or higher than 10 years. (25)

The presence of dyspnoea in FC III IV is the main cause of consultation and is responsible for the poor preoperative quality of life. Surgical indication in asymptomatic patients is infrequent, especially in those with increased risk, (EuroSCORE 20 or higher).

If primary surgical indication in an octogenarian patient is a complex decision, reoperation is even

more complex. In the evaluation by risk scores, previous surgery has a great impact on mortality. Eitz et al. condition this statement through a series of 142 patients with primary surgery and reoperation, with comparable preoperative characteristics, and disparate results in terms of morbidity and mortality. In this publication, the numbers of mortality at 30 days were 7% and 17% for primary surgery and reoperation, respectively, and the predictors, postoperative low cardiac output and gastrointestinal complications; conclude that reoperation condition is not a contraindication, but complications in this subgroup of patients are often fatal. (26) In our series, the incidence of reoperation is similar to the ones of the published series, near to 10%. (27) The association between reintervention and postoperative low cardiac output, and the latter with higher hospital mortality is clear, but in the multivariate analysis of our series the condition reoperation, did not result an independent predictor. Moderate to severe ventricular dysfunction, associated to low output and death, did not result a predictor in this revision.

Preoperative evaluation

The existence of coronary disease in patients with aortic stenosis implies the need of preoperative evaluation and, in this sense; the chosen method is the conventional invasive coronary angiography. However, occasionally, its indication is a non-minor complication. The development of multislice tomography opened greater diagnostic possibilities, even though with some limitations; in 2006 Gilard et al. published a prospective series of 55 patients with aortic stenosis to whom multislice tomography of 16 slices was performed and conventional angiography, with a sensitivity of 100% and a specificity of 80% for the tomography; its positive predictive value was of 55%, especially for patients with high score of calcification. (28) Later publications, as the one written by Meijboom et al., with 64-slice tomography, refer a sensitivity of 100%, a specificity of 92% and a predictive negative and positive value of 82% and 100% respectively. (29) Bettencourt et al. published an extensive prospective series of 237 valvular patients undergoing 64-slice tomography and conventional angiography as preoperative evaluation, in which an analysis per patient, per vessel and per segment has been made with sensitivity and specificity higher than 90%. (30) Taking into account these numbers, multislice tomography, especially in elderly patients, with atheromatous pathology of abdominal and thoracic aorta, may become a preoperative routine study. For those patients with high score of calcification, arrhythmia, and low positive predictive value (20% of the series), the study to consider would be the conventional angiography.

Risk prediction scores

The natural evolution of aortic disease with conservative treatment has been clearly demonstrated (31, 32)

and supports operative indication. Surgical results in octogenarian population are good and the benefits in a medium and/or long term, in terms of survival and quality of life, have been widely communicated. (5, 14-17, 23-27, 33-36) If we consider the numbers of the national census (more than a million of octogenarians in 2010 projection) (1) and we apply the occurrence rate of aortic stenosis published by Otto et al. (3) for this population, we would find a considerable number of patients with surgical indication. However, national reality is another: following the records of suppliers, the number of bioprostheses implanted does not exceed 3.500 annual cases (not necessarily elderly with aortic stenosis), that is to say, less than 10% of the potential candidates are finally operated. While this work is beyond the analysis of the complex medical-social-economic situation of the elderly population (limited access to high complexity health systems, sub-diagnosis, underestimation of the natural evolution of the disease, etc.), is useful to revise some concepts which led to a limited operative indications. For years, the cardiovascular surgeon has protected his results supporting his practice in predictors of morbidity and mortality scores. Among them, EuroSCORE (European System for Cardiac Operative Risk Evaluation), originally designed in Belgium for patients who will undergo a myocardial revascularization. Its additive variant is known as inadequate for patients of high risk due to the possibility of underestimating its value, reason why a logistic variant was implemented, of complicated calculus but improved sensitivity. When it was applied to our population, operative mortality was significantly lower than the predicted by the logistic EuroSCORE, theoretically applicable to patients of high risk. The division by groups of risk (low, moderate, high) does not show advantages, as no higher operative mortality was informed among the ones enlisted in the group of maximum score. This situation was previously announced by Grossi et al. in a series of octogenarians and nonagenarians with a predicted mortality of 17.2% and an obtained one of 7.8%, observed/expected index of 0.45%, without dividing into groups. (38) Dewey et al. published their own series of 64 patients above 90 percentile risk by logistic EuroSCORE undergoing valve replacement, with a predicted mortality of 50.87% (33.47% to 93.32%) and an observed one of 15.63% with an index of 0.31. (39) More recently, Leontyev et al. evaluated a similar population and coincide in the EuroSCORE inaccuracy in the evaluation of octogenarian patients. (40) Considering that an octogenarian patient has a risk which makes him inoperable has its implications: first, not considering a therapeutic opportunity, even knowing what medical treatment means; second, the over-indication of percutaneous valve implantation based on the 85 to 12% of perioperative mortality in patients with "high" operative mortality estimated by this method. (41, 42) This new therapeutic option, even with undeniable conditions to be the future treatment of aortic stenosis, has a series of

uncertainties in relation to communicated morbidity and mortality, quality of life, durability and the need of reintervention.

Morbidity

Higher medical bleeding percentages, inotropics rate, postoperative atrial fibrillation, need of sequential peacemaker and renal failure with dialysis in relation to young patients' series are observed, but comparable with octogenarian patients' series. (18, 36) The association low cardiac output-hospital mortality is already known, so identifying predictors for this complication would be very useful. Based on the finding, the incidence of low postoperative output, was analyzed, which could not be statistically associated with sex ($p = 0.755$), body mass index, moderate to severe postoperative ventricular dysfunction ($p = 0.452$) or priority (0.299). The use of valves lower than N° 21 as predictor of low output ($p = 0.001$) was identified, but its impact on mortality is over the limits of statistical significance ($p = 0.06$).

Remote survival

Late survival was of 98.6%, 87.6%, 77.3% and 64.7% at 1, 3, 5 and 7 years and no predictors of remote mortality were identified. Survival at one year was elevated in relation to published series, but the numbers at 5 years are comparable. (34-36, 43, 44) These values show the octogenarian patient's life expectancy undergoing this type of procedure. Not only an extension in time is demonstrated but a marked improvement in their quality of life, as it is demonstrated in our series. Remote postoperative disability is limited and the need of intensive care, either in tertiary care centers or home care (12%), are similar to the ones of Sundt's, Thourani's, Huber's and Sedrakyan's series already mentioned.

CONCLUSIONS

Valve replacement surgery is a therapeutic important tool for octogenarian patients with aortic valve disease. It is a safe and durable procedure, with proven functional benefit and with a long-term survival comparable with the general population. The use of preoperative risk scores should be revised due to the demonstrated overestimation of operative risk; each case should be analyzed individually and operative mortality should be taken into account for the age bracket. The reassessment of the conventional surgical procedure may be the solution for patients that nowadays do not have a definitive treatment.

RESUMEN

Cirugía de reemplazo valvular aórtico aislado en pacientes octogenarios: evaluación, riesgo operatorio y resultados a mediano plazo

Introducción

Las indicaciones y los beneficios del reemplazo valvular aórtico han sido claramente establecidos, aun para

poblaciones aórticas, de aumentada comorbilidad. Aun así, la manipulación de aterosomas aórticos, el uso de circulación extracorpórea y de clampeo aórtico, el paro cardíaco y la descalcificación ligadas a esta técnica y sus eventuales consecuencias generan dudas acerca de su indicación en este grupo de pacientes.

Objetivo

Comunicar la morbimortalidad del procedimiento en octogenarios y validar la utilidad de los puntajes de predicción de riesgo utilizados más frecuentemente.

Material y métodos

Se estudiaron 87 pacientes octogenarios sometidos a reemplazo aórtico aislado; se analizaron variables preoperatorias, intraoperatorias y posoperatorias y se aplicó el Euroscore; para facilitar el subanálisis del Euroscore logístico, la población se dividió en tres grupos: riesgo bajo, moderado y alto. Se utilizó técnica quirúrgica convencional. Para el seguimiento, se analizó la historia clínica y/o se realizó encuesta telefónica.

Resultados

La mediana de edad fue de $83 \pm 2,5$ años, con un rango de 80 a 89 años. El 60% de la población en estudio era de sexo femenino. La indicación quirúrgica fue estenosis 92%, endocarditis activa 4,6% y enfermedad valvular 3,4%. Antecedentes: hipertensión 71%, tabaquismo 31%, dislipidemia 39%, diabetes 11,5%, EPOC 10%, IRC-dialisis 2,3%, ACV 11,5%, IAM previo 8%, fibrilación auricular 16%, reoperación 15%. Cuadro clínico: asintomático 3,45%, angina crónica estable 10,3%, angina inestable 11%, ICC 13,8%, disnea CF III-IV 60%. Disfunción ventricular izquierda moderada-grave 18,3%. Riesgo por Euroscore logístico $12,4\% \pm 15\%$. El tiempo operatorio promedio fue de $200 \pm 61,7$ min, el de CEC de $86 \pm 32,5$ min y el de clampeo aórtico de $65 \pm 18,2$ min. Complicaciones: sangrado médico 17,2%, reoperación sangrado 5,7%, bajo gasto cardíaco 13,8%, inotrópicos > 48 horas 32,1%, balón de contrapulsación 1,2%, fibrilación auricular 32,2%, marcapasos transitorio 20,7%, marcapasos definitivo 5,7%, complicación pulmonar 3,4%, ACV con secuela 3,4%, IRA oligoanúrica 27,6%, diálisis 5,7%, infección esternal 1,2%, días UTI $3 \pm 5,2$, días estadía $8 \pm 9,6$, mortalidad global 10,34%, mortalidad prioridad electiva 9,5%, mortalidad no electiva 12,5%. Estadía en UCI $3 \pm 5,2$ días y total $8 \pm 9,6$ días. Divididos por grupos, la mortalidad comunicada fue del 7,14%, 15,38% y 5% para riesgo bajo, mediano y alto, respectivamente. Se identificó como predictor de mortalidad a los 30 días el bajo gasto cardíaco posoperatorio (OR 7, $p = 0,011$). Se siguieron 71 pacientes (91%), mediana 1.203 días (51 a 3.927). Independientemente del puntaje preoperatorio, la sobrevida fue del 98,6% al primer año, del 87,65% a los 3 años, del 77,3% a los 5 años y del 48,6% a los 7 años. El 72% refirió mejoría de la calidad de vida, el 21% sin cambios y el 7%, empeoramiento. No se hallaron predictores al seguimiento.

Conclusiones

La cirugía de reemplazo valvular resulta un procedimiento seguro y duradero, de comprobado beneficio funcional y con sobrevida a largo plazo homologable a la población general. La utilización de puntajes de riesgo preoperatorio debe ser revisada, por la sobrestimación del riesgo operatorio demostrada.

Palabras clave > Estenosis de la válvula aórtica - Anciano - Cirugía torácica - Válvula aórtica - Prótesis valvular cardíaca

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