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ORIGINAL ARTICLE

Management of Nonagenarian Patients With Severe Aortic Stenosis: The Role of Comorbidity

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Background The number of nonagenarian patients with aortic stenosis will likely increase due to the ageing population. We assessed the clinical characteristics, management, and outcomes of nonagenarian patients with severe aortic stenosis.

Methods A total of 177 (117 females and 60 males) consecutive nonagenarian patients from two large contemporary registries were included in this study. Clinical characteristics, comorbidity as assessed by the Charlson Index, clinical management, and outcomes were recorded. The main outcome measure was one-year mortality.

Results The mean patient age was 91.1 years, and 56 patients (31.6%) had a Charlson Index <3. A strong association between comorbidity and one-year overall mortality was observed, with higher one-year mortality in patients with Charlson Index ≥3 (66.4% vs. 32.1%, $p < 0.001$). A total of 150 patients (84.7%) were managed conservatively, and 27 (15.3%) underwent transcatheter aortic valve implantation (TAVI). Predictors of a conservative management were treatment out of TAVI centres, lower mean aortic gradient and better functional class. Clinical management was not significantly different with different degrees of comorbidity. A trend toward higher mortality in patients undergoing conservative management was observed (58% vs. 40.7%, $p = 0.097$). Independent predictors of mortality were higher Charlson Index, lower creatinine clearance, lower mean aortic gradient, poorer left ventricular ejection fraction, significant mitral regurgitation and conservative management.

Conclusions About one third of nonagenarians with severe aortic stenosis have few comorbidities. The clinical management was similar irrespective of the Charlson Index. Both higher Charlson Index values and a conservative management were independently associated with a higher mortality.

Keywords Nonagenarian • Aortic stenosis • Management • Comorbidity • Prognosis • TAVI

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Introduction

The prevalence of aortic stenosis (AS) increases with age and is especially high in the elderly [1]. The impact of this disease will probably increase during the upcoming years due to the continuous ageing of the population [2,3]. Prognosis clearly worsens in severe AS when symptoms appear, with impaired quality of life and high mortality in untreated patients. Both surgical and, more recently, percutaneous aortic valve replacement (TAVI) improve survival in this clinical setting [4–6]. Despite current recommendations [7], recent data show that symptomatic severe AS patients, especially very elderly patients, are commonly managed conservatively in routine clinical practice [8]. Nonagenarian patients are poorly represented in registries of elderly patients with AS. While most series show a conservative management in non-selected nonagenarian patients from routine clinical practice, some reports have shown excellent short-term results in highly selected nonagenarian patients undergoing TAVI. Therefore, assessing the role of comorbidity on management and prognosis in these very elderly patients is challenging.

The aim of this study was to assess the clinical profiles, management, and prognosis of a series of consecutive nonagenarian patients with severe AS from two large contemporary Spanish registries.

Methods

Setting, Population, and Design

The designs of the Influencia del Diagnóstico de Estenosis Aórtica Severa (Impact of diagnosis of Severe Aortic Stenosis, IDEAS) [9] and Pronóstico de la Estenosis Grave Aórtica Sintomática del Octogenario (Prognosis of Symptomatic Severe Aortic Stenosis in Octogenarians, PEGASO) [8] registries were previously described in detail. Briefly, the PEGASO [8] registry was a prospective, observational, multicentre registry including 37 centres in Spain between July 2008 and June 2010; it was designed to describe the baseline characteristics of octogenarians with symptomatic severe AS, analyse the factors that determine treatment choice, and evaluate variables that affect the long-term clinical outcome. The inclusion criteria were: age $\geq$80 years; severe AS with a mean aortic valve gradient >40 mmHg or an aortic valve area (AVA) <1 cm^2; dyspnoea, angina, or syncope associated with AS (in the investigator's opinion); and the ability and willingness to give informed consent (by the patient or his/her family in the case of non-competent subjects). Exclusion criteria were previous aortic valve intervention, failure to provide at least two phone numbers for follow-up, and non-cardiac disease with a life expectancy of <6 months.

The IDEAS registry [9] retrospectively included consecutive patients with severe AS (mean aortic gradient $\geq$40 mmHg or AVA <1 cm^2 by continuity evaluation [7] without previous valve intervention) diagnosed by echocardiography in 48 Spanish centres in January 2014 (n = 726). In both registries, clinical characteristics, echocardiographic data, and the Charlson Comorbidity Index [10] were registered.

For the purpose of this study, all patients >89 years of age (PEGASO, n = 115 and IDEAS, n = 62) were included, assessing their baseline clinical characteristics and clinical management. The degree of comorbidity was assessed in all patients by the Charlson Comorbidity Index [10].

One-year Follow-up

Clinical follow-up was performed in all patients at 12 months by reviewing their medical records or via phone contact; vital status and valve interventions (surgical or percutaneous) were recorded. The performance of valvuloplasty was considered intervention for the purpose of this study. Mortality was the main outcome of the present study. Subjects were considered as alive after 12 months of follow-up or censored when they died, whichever occurred first. Death was deemed of cardiac origin when it was due to heart failure, myocardial infarction, or sudden death. The assignment of causes of death was performed by the registry investigators after review of medical records.

For the analysis, the only patient who underwent surgery was excluded. Therefore, the analysis included patients managed conservatively (n = 150) and those undergoing TAVI (n = 27).

Statistical Analysis

Quantitative variables are expressed as mean and standard deviation (SD). Categorical variables are expressed as n (%). Categorical variables were compared using Chi-squared or the Fisher test where indicated. Quantitative variables were compared by Student's t-test. Survival curves were created using the Kaplan-Meier method and significance assessed by the log rank test.

Assessment of the Predictors of a Conservative Management

This assessment was performed by binary logistic regression analysis, using variables with an association with a conservative management ($p < 0.2$) in univariate analysis. The selection of variables was performed using backward and forward stepwise binary logistic regression.

Assessment of Predictors of One-year Mortality

This assessment was performed by a multivariate Cox regression analysis, using variables with an association with mortality ($p < 0.2$) in univariate analysis. The selection of variables was performed using backward and forward stepwise Cox regression method.

These analyses were performed in the Statistical Package for Social Sciences (SPSS) program (version 21.0, SPSS Inc. Chicago. IL, USA). Tests were two-sided and p-values <0.05 were regarded as significant.

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