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Research paper

Geriatric assessment to objectify the multidisciplinary heart team decision for treatment of elderly patients with severe, symptomatic aortic valve stenosis

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ABSTRACT

Objectives: The aim of this study was to evaluate which components of the multidimensional geriatric assessment mostly match to the subjective multidisciplinary heart team decision in order to objectify the treatment selection of elderly patients with symptomatic severe aortic valve stenosis (AVS).
Methods: One hundred and thirteen elderly patients with severe, symptomatic AVS underwent standardized multidimensional geriatric assessment, independent of the clinical multidisciplinary heart team evaluation, for final treatment strategy selection: (1) surgery, if not: (2) transcatheter aortic valve implantation (TAVI) or conservative treatment.
Results: Based on multivariate analyses, parameters of the standardized geriatric assessment mostly paralleling the multidisciplinary heart team's decision to surgery were age [odds ratio (OR): 0.867, $P = 0.007$), logistic EuroSCORE (OR: 0.854, $P = 0.001$) and Katz independence (OR: 6.747, $P = 0.001$)]. Parameters mostly paralleling the multidisciplinary heart team's decision to TAVI were Katz bathing (OR: 3.947, $P = 0.056$), mobility (OR: 3.737, $P = 0.023$) and calf muscle circumference (OR: 1.231, $P = 0.010$). STS score (OR: 1.411, $P = 0.006$), Katz independence (OR: 0.190, $P = 0.026$) and Mini-Nutritional Assessment-short-form (OR: 0.631, $P = 0.015$) mostly paralleled the multidisciplinary heart team's decision to conservative treatment.
Conclusion: In this single center prospective study, selected objective geriatric characteristics can be used as an alternative to the more subjective process of the multidisciplinary heart team treatment decision in elderly patients with severe, symptomatic AVS, by this potentially making treatment decision less heart team dependent.

1. Introduction

According to current guidelines, patient selection for transcatheter aortic valve implantation (TAVI) resides on the multidisciplinary heart team evaluation, where technical aspects related to the procedure are evaluated, together with the procedural risk estimation of the individual patient [1,2].

Individualized treatment selection by the local multidisciplinary heart team remains a challenging task. Although surgical risk scores [logistic EuroSCORE, EuroSCORE II and the Society of Thoracic Surgeons (STS score)] could estimate procedural risk in cardiac surgery, their applicability for TAVI is limited [3,4]. Moreover, TAVI is not considered applicable in all patients refused for SAVR. In selected patients, medical treatment might still be preferred.

One of the most frequent co-morbidities in the evaluation of the choice of treatment of patients with severe, symptomatic AVS (SAVR, TAVI or conservative treatment) is frailty [5]. Frailty is defined as a clinical state that is characterized by increased vulnerability for developing increased dependency and/or mortality when exposed to stressors [6]. Previous studies mentioned

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frailty as a predictor of poor outcome after TAVI [7–11]. However, in these studies, the treatment was already decided by the heart team. Because different objective frailty scoring criteria are available in literature [12–16] and the diagnosis of frailty is often based on clinical evaluation, this evaluation could potentially be subjective and therefore heart team dependent [17]. This could make final treatment selection of the heart team potentially variable.

Therefore, the aim of this study was to evaluate which components of the multidimensional geriatric assessment mostly match to the subjective multidisciplinary heart team decision in order to objectify the treatment selection of elderly patients with symptomatic severe aortic valve stenosis (AVS).

2. Materials and methods

This study is a prospective, explorative single centre study evaluating geriatric characteristics of elderly patients with severe, symptomatic AVS based on multidimensional geriatric assessment. Patients referred to the Antwerp University Hospital for evaluation and treatment selection (SAVR, TAVI or conservative treatment) by the local multidisciplinary heart team, were prospectively recruited between January 2013 and March 2014. All patients underwent multidimensional geriatric assessment (based on visual analogous scales and multiple choice questions).

2.1. Multidimensional geriatric assessment

2.1.1. Quality of life

Quality of life was reported based on the on the EuroQol-5D 5L and is reported as percentages of the patients without problems in the different domains [18]. The Short-Form 12-Item Health Survey (SF12) consists of the Physical Health State (PHS) and the Mental Health State (MHS) and is reported as a score (percentage) [19].

2.1.2. Dependency or self supporting in daily life activities

The Katz index assesses the (in)dependency for daily activities [20]. Katz index is reported as percentages of the patients independent for all activities. The Barthel index [21] additively evaluates bowel and bladder function, grooming, mobility and the ability to use the stairs. This Barthel index is reported as a score (maximum 100, totally independent).

2.1.3. Mental state

The cognition of the patient is evaluated by the Mini-Mental State Exam (MMSE) [22]. A score of $< 27/30$ was considered as indicative for impaired cognition. The geriatric depression score evaluated the state of mind of the patient [23]. A minimum score of 5/15 indicates the risk of developing a depression.

2.1.4. Nutrition

The risk of malnutrition was evaluated by the Mini-Nutritional Assessment (MNA), based on the screening score or MNA short-form (MNA-sf) and the total score [24]. A score of respectively $\geq 12/14$ and $\geq 24/30$ indicates a normal nutritional state.

2.1.5. Function

The functional state of the patient is evaluated by the gait speed (seconds/5 m), the Six-Minute Walking Test [25] and the grip strength (Dynex® Hand dynamometer).

2.1.6. Frailty

Frailty was assessed based on the slightly adapted criteria proposed by Fried and the FRAIL Scale as described in Table 1 [12,13], in order to shorten the composed questionnaire and increase its usability. Patients who met three or more criteria were defined as being frail. The deficit index was also calculated based on 32 deficits, including daily activities and co-morbidities [14].

Table 1
Description of frailty according to Fried [9] and the FRAIL scale [10].

Fried index	
Exhaustion	
Self-report of moderate or most of the time for either of two questions	
I felt that everything I did was an effort in the last week	
I could not get going in the last week	
Weakness	
Low grip strength if	
Men	Women
≤ 29 kg for BMI ≤ 24	≤ 17 kg for BMI ≤ 23
≤ 30 kg for BMI 24.1–26	≤ 17.3 kg for BMI 23.1–26
≤ 30 kg for BMI 26.1–28	≤ 18 kg for BMI 26.1–29
≤ 32 kg for BMI > 28	≤ 21 kg for BMI > 29
Slowness	
Slow gait speed to walk 5 m if	
Men	Women
≥ 7 s for height ≤ 173 cm	≥ 7 s for height ≤ 159 cm
≥ 6 s for height > 173 cm	≥ 6 s for height > 159 cm
Low activity level	
≤ 270 kcal (women) or ≤ 383 kcal (men) of physical expenditure on activity scale per week	
Loss of weight	
> 3 kg weight loss during the last three months	
FRAIL scale	
Fatigue	
How much time during the past 4 weeks you felt tired? Most of the time or all of the time	
Resistance	
Any difficulty walking up 10 steps alone without help	
Ambulation	
Any problems with walking [≤ 5/10 on a scale of 0 (bedridden) to 10 (no problems)]	
Illness	
Presence of 5 to 11 of the following illnesses: hypertension, diabetes, cancer, chronic lung disease, heart attack, congestive heart failure, angina, asthma, arthritis, stroke and kidney disease	
Loss of weight	
> 3 kg weight loss during the last three months	

The FRIED criteria and the FRAIL scale were slightly, but not clinically relevantly modified and patients positive for three or more criteria were defined as frail.

2.2. Heart team evaluation

The multidisciplinary heart team, consisting of an interventional cardiologist, cardiac surgeon and patient specific specialists, evaluated all patients and advised treatment strategy (SAVR, TAVI or conservative treatment), independently and blinded of the multidimensional geriatric assessment. Patients were divided into 3 treatment groups, based on step by step decision: (1) SAVR or not (multidisciplinary heart team step 1), if not, (2) TAVI or conservative treatment (multidisciplinary heart team step 2). The decision of the multidisciplinary heart team was defined as the 'intentional treatment'.

The study was approved by the ethics committee of the Antwerp University Hospital and all patients gave written informed consent.

2.3. Statistics

Data are presented as mean ± standard deviation (SD) or as median (Q1–Q3), depending on the distribution of the data. Normality was evaluated by histograms, QQ-plots and Kolmogorov–Smirnov test. Continuous variables were tested with Student *t*-test or Mann–Whitney *U*-tests, depending on the distribution. Categorical variables are presented as *n* (%) and were compared with Chi^2 or Fisher's exact test. A *P*-value < 0.05 was considered to be significant. Multivariable analysis of binary logistic regression to the choice of treatment was performed based on the results of the