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Functional and Cognitive Decline in Patients after Transcatheter Aortic Valve Implantation

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To the editor; Transcatheter Aortic Valve Implantation (TAVI) is an alternative to Surgical Aortic Valve Replacement (SAVR) in high risk patients with symptomatic aortic valve stenosis. Severe symptomatic aortic stenosis occurs in 3.4% of patients aged > 75 years [1]. TAVI is superior to medical treatment, while survival rates are similar or higher compared to SAVR [2]. Nevertheless, in high risk patients, morbidity and mortality after TAVI is substantial with one-year mortality 14.2-19% and two-year mortality 33.9-43.3% [2]. Frail patients have increased mortality risk after TAVI [3]. Frailty is defined as a syndrome of impaired physiological reserve and decreased resistance to stressors. Delirium frequently occurs after TAVI; incidence is highly variable, 12-53% [4]. Frailty is associated with postoperative delirium and postoperative functional decline [5,6]. Nowadays geriatric assessment is advised for risk stratification and treatment selection in patients referred for TAVI [6]. The aim of this study was to compare functional and cognitive status in patients before and after TAVI.

Methods

128 high risk patients were referred to the pre-TAVI outpatient clinic, where patients were assessed by a multidisciplinary team including a geriatrician. Based on consensus within this team, 91 patients were assigned to TAVI, 18 to SAVR and 19 to medical treatment [7]. In the first 50 patients who underwent TAVI, geriatric assessment was also performed by a geriatrician at outpatient follow-up scheduled nine months after the procedure. Procedural success was defined according to the VARC-2 criteria [8].

Geriatric assessment consisted of patient history, history by proxy, medication review and the following specific instruments for frailty assessment: Mini Mental State Examination (MMSE; range 0-30, with higher scores indicating better cognitive status), Basic Activities of Daily Living (BADL; range 0-20, with higher scores indicating better functional performance), Instrumental Activities of Daily Living (IADL; range 0-8, with higher scores indicating better functional performance), Mobility: gait speed over 4-meter distance (with higher scores indicating better mobility) and Timed Up and Go test (TUG; with lower scores indicating better mobility), and Mini Nutritional Assessment (MNA; range 0-14, with scores below 12 indicating risk of malnutrition). Frailty Index (range 0-5, with higher scores indicating more frailty) was calculated as a summary score from these baseline components: 1 point each for MMSE ≤ 27; BADL ≥ 1 limited activity; IADL ≥ 1 limited activity; MNA < 12; and impaired mobility (defined as 4-meter gait speed < 0, 75 m/s or TUG > 12, 5 sec). Quality of Life was measured with the EQ - 5D (range 0-100, with higher scores indicating better quality of life).

Results

This was a prospective, observational study over a 1.5 year period. In total 89 patients underwent TAVI, of whom the first 50 patients mean age 80 ± 6 year and 54% female were assessed after a median follow-up period of 9.3 months. In 47 of these 50 patients (94%) the procedure was successful (no procedural death, single valve placed, no more than mild paravalvular regurgitation); in two patients placement of a second valve was required due to supra-annular migration of the first valve, moderate paravalvular regurgitation was observed in one patient. Postoperative delirium occurred in 15 patients (30%), mean hospital stay was 7.6 ± 5.0 days. A significant decline was present in IADL: 6.9 ±1.5 pre-TAVI versus 6.0 ± 1.8 post-TAVI ($p < 0.001$) and MMSE: 27.2 ± 2.6 pre-TAVI versus 26.1 ± 3.5 post-TAVI ($p = 0.002$) (Table 1). BADL scores were stable over time in 29 patients, nine patients improved in functional activities and 12 patients (24%) experienced a functional decline of at least 1 BADL point (median 2.0; range of decline 1-16). Quality of life and mobility did not improve after TAVI (Table 1). The frailty index increased from 2.0 pre-TAVI to 2.5 post - TAVI ($p = 0.01$). Decline in IADL and MMSE was similar in those with and without delirium.

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Table 1: Before and after TAVI in 50 patients undergoing TAVI.

Variable	pre-TAVI	post-TAVI	P-value
BADL	18.9 (1.3)	18.3 (3.2)	0.14
IADL	6.9 (1.5)	6.0 (1.8)	<0.001
Gait speed, m/s	0.88 (0.28)	0.85 (0.29)	0.41
TUG, seconds	11.9 (8.5)	11.3 (5.8)	0.43
MMSE	27.2 (2.6)	26.1 (3.5)	0.002
MNA	11.9 (2.3)	12.2 (2.1)	0.47
Frailty Index	2.0 (1.4)	2.5 (1.5)	0.01
EQ-5D	66 (17)	70 (15)	0.35

Scores with standard deviation in parentheses. BADL= Basic Activities of Daily Living, IADL= Instrumental Activities of Daily Living, TUG= Timed Up and Go test, MMSE= Mini Mental State Examination, MNA= Mini Nutritional Assessment, EQ-5D= Quality of Life.

Discussion

Although survival rates are similar or even higher compared to SAVR, the effect of TAVI on quality of life and functional performance had not yet been thoroughly studied [9]. This study observed functional and cognitive decline in a substantial part of patients after TAVI. This study is limited by lack of a control group; nevertheless the declines established are considerable and more than expected with normal aging. Importantly, the frail patients at pre-operative screening were assigned for medical treatment and therefore not included in this study [7].

Although TAVI is less invasive than SAVR, functional and cognitive decline occurs frequently, even after a successful procedure. Clinical decision making and future research should therefore not only focus on mortality and technical complications, but also on outcomes relevant to the aging population, such as autonomy, well-being, functional performance and quality of life.

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