Center of Rehabilitation Research

Frailty as a predictor for all-cause mortality in patients 12 months after transcatheter aortic valve implantation (TAVI)

Sarah Eichler[1], Annett Salzwedel[1], Axel Harnath[2], Jörg Nothroff[3], Christian Butter[4], Martin Schikora[5], Mihai Chiorean[6], Heinz Völler[1,6]

Purpose

For more than a decade, transcatheter aortic valve implantation (TAVI) has become a promising treatment modality for patients with severe aortic stenosis. As the procedure enlarges from high-risk to lower-risk patients, the amount of patients in cardiac rehabilitation is rapidly growing. Up to now, there are no sufficient data about frailty and its possible predictive value of mortality. Therefore, we aimed to evaluate pre-interventional predictors for all-cause mortality in patients after TAVI with a 12-month follow up.

Methods

From 10/2013 to 07/2015, 344 patients with an elective TAVI were consecutively enrolled in the prospective multicentre cohort study, whereby 333 patients (80.9 ± 5.1 years, 44.1 % male) survived the procedure. Pre-interventionally, we documented sociodemographic, laboratory and echocardiographic parameters as well as comorbidities. Additionally, 6-minute walk test, Short Form-12, Hospital Anxiety and Depression Scale and a Frailty-Index (a score consisting of Activities of Daily Living, Instrumental Activities of Daily Living, Mini Mental State Exam, Mini Nutritional Assessment Short Form [MNA-SF], Timed Up and Go Test [TUG], and a subjective pre-clinical mobility disability) were performed. Predictors for all-cause mortality were identified using a multivariate regression model.

Table. Baseline data (n = 333)

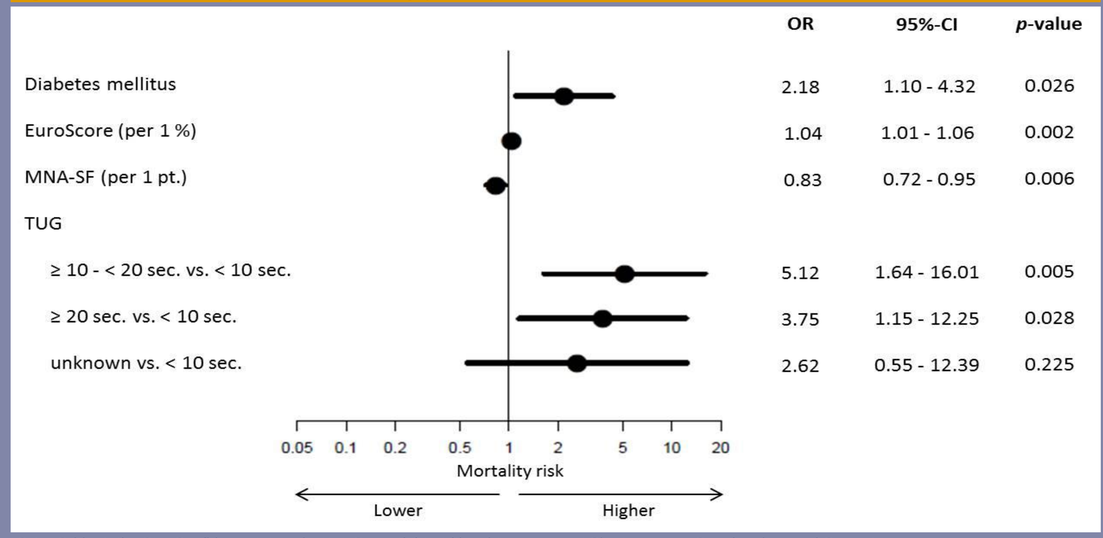
	Total (n = 333)	Survivors (n = 287)	Non-Survivors (n = 46)	*p*-value
Patient characteristics				
Age, years	80.9±5.1	80.6±5.1	82.3±5.0	0.035
Sex, male	147 (44.1)	125 (43.6)	22 (47.8)	0.350
Diabetes mellitus	156 (46.9)	128 (44.6)	28 (60.9)	0.040
Log. EuroScore, %	16.9±11.9	15.8±10.2	23.9±17.8	< 0.001
LVEF, %	54.1±11.1	54.6±10.6	51.0±13.6	0.048
Comorbidities, no.	2.2±1.3	2.1±1.3	2.6±1.4	0.026
COPD	62 (18.6)	50 (19.9)	15 (32.6)	0.161
PAD	72 (21.6)	57 (19.9)	15 (32.6)	0.051
CKD	159 (47.7)	129 (44.9)	30 (65.2)	0.011
Assessments				
6MWD, m	230.1±119.1	237.2±122.0	179.2±81.2	0.020
SF-12 PCS, points	33.2±9.9	33.6±9.8	30.5±9.7	0.050
SF-12 MCS, points	50.8±10.4	50.9±10.4	49.8±10.6	0.475
HADS Anxiety, points.	5.5±3.7	5.4±3.7	5.7±3.7	0.552
HADS Depression, points	5.5±3.7	5.3±3.6	5.9±4.4	0.007
Frailty-Index, points	2.6±1.7	2.4±1.6	3.4±1.7	< 0.001
MMSE, points	26.8±3.0	27.0±3.0	26.1±3.1	0.074
MNA-SF, points	11.7±2.3	11.9±2.3	10.7±2.5	0.001
ADL, points	93.2±12.7	93.5±12.5	91.6±13.5	0.355
IADL, points	6.9±1.7	7.0±1.7	6.5±1.5	0.105
TUG, sec.	14.2±7.0	13.8±7.2	16.4±5.1	0.026
Mobility disability	255 (76.8)	217 (75.9)	38 (82.6)	0.315

Categorical variables are presented in n (%), metric variables in mean ± SD. COPD = chronic obstructive pulmonary disease, PAD = peripheral artery disease, CKD = chronic kidney disease, LVEF = left ventricular ejection fraction, 6MWD = 6-minute walk distance, SF-12 = Short Form 12, PCS = physical component summary, MCS = mental component summary, MMSE = Mini Mental State Exam, MNA-SF = Mini Nutritional Assessment Short Form, ADL = Activities of Daily Living, IADL = Instrumental Activities of Daily Living, TUG = Timed Up and Go Test, HADS = Hospital Anxiety and Depression Scale.

Results

During a follow up of 381.0 ± 41.9 days, 46 patients (13.8%) died. The non-survivors were older (82.3 ± 5.0 vs. 80.6 ± 5.1 years; p = 0.035), had a higher number of comorbidities (2.6 ± 1.4 vs. 2.1 ± 1.3; p = 0.026) as well as a lower left ventricular ejection fraction (51.0 ± 13.6 vs. 54.6 ± 10.6 %; p = 0.048) and additionally, more suffered from diabetes mellitus (60.9 % vs. 44.6 %; p = 0.040) (Table). The Frailty-Index did not seem to be a predictor for all-cause mortality itself, but its single components such as MNA-SF (OR 0.83 per 1 pt., CI 0.72 - 0.94; p = 0.006) and TUG ≥ 10 - < 20 sec. (OR 5.12, CI 1.64 - 16.00; p = 0.005). Furthermore, clinical parameters such as diabetes mellitus (OR 2.18, CI 1.10 - 4.32; p = 0.026) and EuroScore (OR 1.04 per 1 %, CI 1.01 - 1.06; p = 0.002) were associated with a higher risk for all-cause mortality (Figure).

Figure. Predictors for one-year all-cause mortality (n = 333)



OR = Odds Ratio, CI = Confidence Interval. MNA-SF = Mini Nutritional Asssessment Short Form, TUG = Timed Up and Go Test.

Conclusions

The results of the underlying analysis provide information about pre-interventionally assessed parameters being predictive for one-year all-cause mortality in patients after TAVI. Frailty as a whole still seems to be difficult to capture.

Thus, beside clinical parameters, single dimensions of frailty, such as mobility and nutrition, should be considered in the decision of possible therapies and aftercare programs in high-risk patients with severe aortic stenosis.

1 Center of Rehabilitation Research, University of Potsdam, Germany
2 Sana-Herzzentrum Cottbus, Germany
3 MediClin Reha-Zentrum Spreewald, Germany
4 Immanuel Klinikum Bernau, Herzzentrum Brandenburg, Germany
5 Brandenburg Klinik Bernau, Germany
6 Klinik am See, Rüdersdorf, Germany

Disclosures (all authors): none

Contact: sarah.eichler@uni-potsdam.de