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Transcatheter aortic valve implantation for patients with aortic stenosis and concomitant ischemic heart disease: A five-year follow-up

Version 2

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Abstract

Introduction: Transcatheter aortic valve implantation (TAVI) is an established procedure to treat severe aortic stenosis (AS). This study investigates the impact of ischemic heart disease (IHD) on survival in patients undergoing TAVI.

Aim: Five-year all-cause mortality stratified according to the presence or absence of IHD.

Methods: Retrospective register study including all patients that underwent a TAVI-procedure 2009 to 2018. Patients were stratified according to the presence or absence of IHD. Our primary end-point was five-year all-cause mortality. Survival was analyzed using Kaplan-Meier curve. Data were acquired through the SWENTRY registry and patient files.

Results: A total of 264 patients were included in the study, with 139 (52.7 %) patients in the IHD group vs 125 (47.3 %) patients in the non-IHD group. Mean follow-up time was 40 ± 30 months. At baseline, there was a higher proportion of males, patients with hypertension, peripheral arterial disease, left ventricular ejection fraction $<50\%$ and, a higher EuroSCORE I in the IHD-group. Transfemoral approach was most common in both groups. No differences were noted in respect to peri- and postoperative complications. Five-year all-cause mortality was 17/38 (44.7 %) vs 18/30 (60.0 %), $p = 0,232$, in the IHD and non-IHD group respectively. Non-adjusted cumulative five-year survival was not significantly different between the groups (Log-Rank, $p = 0,056$).

Conclusions: In patients with severe AS undergoing TAVI, the five-year all-cause mortality was not statistically different between patients with or without IHD.

Key words: Aortic stenosis, ischemic heart disease, mortality, transcatheter aortic valve implantation, transfemoral approach.

Introduction

Severe aortic stenosis (AS) is a common condition among the elderly with a prevalence of 3.4% in patients >75 years [1]. With medical treatment only, the condition carries a poor prognosis with a reported three-years all-cause mortality ranging between 43% - 57% [2,3]. Surgical aortic valve replacement (sAVR) was the only available treatment in the past and has been shown to be superior to medical therapy only [4]. High-risk patients were excluded from this treatment, and thus, carried the poor prognosis of severe AS.

Since it was first performed in humans by Alain Cribier in the year of 2002 [5], transcatheter aortic valve implantation (TAVI) has become an established treatment for severe AS [6–8]. It has been shown that TAVI is non-inferior to sAVR in intermediate to high-risk patients [6,7,9]. Results from two newly published studies comparing TAVI to sAVR in low-risk patients showed superiority [8] and non-inferiority [10] at one and two years respectively. Although TAVI is relatively new, it is reported that the five-year all-cause mortality ranges between 41.0% – 67.8% [6,11–17]. The 2017 guidelines from European Society of Cardiology and European Association of Cardiothoracic Surgery states a class IB recommendation for TAVI in intermediate to high-risk patients [18].

Ischemic heart disease (IHD) and aortic sclerosis or stenosis have similar associated clinical factors such as older age, male sex, elevated lipoprotein levels, hypertension and smoking [19,20]. The two conditions occur concomitantly in about 50% of cases [21,22]. Patients with a combination of severe AS and IHD undergoing sAVR have shown worse early and late survival in comparison to patients with isolated severe AS [23]. Ischemic heart disease is present in 30.8% – 78.2% of TAVI-patients, as reported in some studies [24,25]. The current literature discussing the clinical impact of IHD in patients undergoing TAVI is inconsistent. One meta-analysis shows higher one-year mortality in IHD-patients [25], whilst data from the FRANCE-2 registry shows similar death rates at three-year follow-up [26]. Prior intervention with coronary artery bypass grafting (CABG) has shown unfavorable two-year outcome [27], such correlation has not been found with prior intervention with percutaneous coronary intervention (PCI) in one meta-analysis [28].

Aim

The purpose of this retrospective study was to evaluate the five-year all-cause mortality for TAVI-patients with or without the presence of IHD.

Material and methods

Study design and population

This retrospective study included all patients with severe AS that underwent TAVI between 15th of September 2009 and 20th of November 2018 at Örebro University hospital. All included patients possessed intermediate to high surgical risk. Severe AS was defined as peak aortic jet velocity >4.0 m/s, peak gradient >64 mm Hg, median gradient >40 mm Hg and an aortic valve area <1.0 cm². A heart-team assessed the surgical risk using Logistic EuroSCORE I [29] and EuroSCORE II [30]. Patients were divided in two groups according to the presence or absence of IHD. Our definition of IHD was either prior intervention with PCI and/or CABG or as the presence of significant stenosis or occlusion in the coronary arteries. In patients with a history of angina, a low-grade stenosis was sufficient to be classified as IHD. Data was collected from patient files and the SWENTRY registry (Swedish Transcatheter Cardiac Intervention Registry) [31], a subdirectory of the SWEDEHEART registry (Swedish Web-System for Enhancement and Development of Evidence-Based Care in Heart Disease Evaluated According to Recommended Therapies) [32].

Surgical procedure

All patients underwent a preoperative radiological imaging with high-resolution ECG-gated computed tomography angiography (CTA) of the aorta, transthoracic echocardiography and, coronary angiography. Transesophageal echocardiography or stress-echocardiography with dobutamine were performed in selected cases. Significant proximal stenosis in the larger coronary arteries were treated with PCI before or during the procedure. General anesthesia, conscious sedation or local anesthesia was applied during the procedure. The heart team determined the access site (transfemoral (TF), transapical, or direct aortic). Balloon expandable bioprosthetic valves were used (Edwards SAPIEN, SAPIEN XT and SAPIEN 3) with sizes of 20, 23, 26 and 29 mm. The bioprosthetic valves were implanted during rapid pacing. Patients were prescribed life-long therapy with 75 mg of Acetyl Salicylic with or without 75 mg Clopidogrel for six months.

Patient follow-up

At baseline, medical history including co-morbidities and, prior cardiac interventions were taken. Procedure related characteristics, peri- and postoperative complications were noted at the time of discharge. All data were registered in the SWENTRY registry. Echocardiographic analysis was performed up to six months preoperatively and up to three months postoperatively. Patient files acted as a source of extraction for survival status as well as a method to proof check and add new parameters. The total follow-up time was defined as the date of the procedure to the 12th of February 2019, the time data was collected. Survival time was calculated from the time of the procedure to the date of death or to the time of data collection. Cause of death was obtained from death certificates. In cases where a death certificate could not be retrieved, a review of the patient's most recent files was conducted.

End-points

Our primary end-point was five-year all-cause mortality. Peri- and postoperative complications, echocardiographic findings and cause of death were our secondary end-points.

Statistical analysis

Continuous data was compared using independent t-test, whilst categorical data was analyzed via Chi-Square test, except for variables with small number where Fisher's exact test was used. Survival was analyzed using a Kaplan-Meier curve and was compared using a Log-Rank test. A p-value <0.05 was chosen as the statistical significance cut-off value in concordance with the medical research society. All data was processed using SPSS version 25 (SPSS Inc., Chicago, IL. US).

Ethical considerations

Consent was granted from the head of cardiothoracic and vascular surgery, Örebro University hospital, in order to review the patient files in accordance to quality-assurance. Patient anonymization was conducted by using a study number which was implemented through the SWENTRY registry. Due to the retrospective nature of the study, patients were not subjected to procedures for the sake of the study.

Results

Baseline characteristics

A total of 264 patients completed a TAVI-procedure at Örebro University hospital 15th of September 2009 to the 20th of November 2018. In total, 139/264 (52.7 %) patients were included in the IHD group. Prior coronary intervention with PCI and/or CABG occurred in 119/264 (45.1 %) of patients. However, there were 20 patients with IHD without prior coronary intervention. Baseline clinical characteristics are shown in Table 1. The mean age for the whole study population was 80.1 ±6.9. At baseline, the IHD group had a higher proportion of males, patients with hypertension, peripheral arterial disease and higher Logistic EuroSCORE I. The non-IHD group had a significantly higher proportion of patients with chronic pulmonary disease.

Table 1. Patient characteristics at baseline.

	IHD, n = 139 (52.7 %)	Non-IHD, n = 125 (47.3 %)	p-value
Male, n (%)	82 (59.0)	51 (40.8)	0.04
Age, years, mean ±SD	80.5 ±6.1)	79.7 ±7.6	0.320
BMI, $\frac{kg}{m^2}$, mean ±SD	26.8 ±4.8	27.4 ±5.7	0.321
Smoking, n (%)			0.333
Active smoker	12 (8.6)	8 (6.4)	
Ex-smoker	59 (42.4)	45 (36.0)	
Never smoker	53 (38.1)	58 (46.4)	
eGFR ¹ <50, n (%)	31 (22.3)	29 (23.2)	0.884
Myocardial infarction ≤3 månader n (%)	7 (5.0)	-	-
Hypertension, n (%)	123 (88.5)	96 (76.8)	0.014
Diabetes, n (%)	45 (32.4)	41 (32.8)	1.000
Insulin, n (%)	18 (39.1)	16 (39.0)	1.000
Prior CABG ² , n (%)	56 (40.3)	-	-
Prior PCI ³ , n (%)	82 (59.0)	-	-
Prior BAV ⁴ , n (%)	5 (3.6)	2 (1.6)	0.452
Non-intervened IHD, n (%)	20 (14.4)	-	-
Chronic pulmonary disease, n (%)	18 (12.9)	38 (30.4)	0.001
Stroke, n (%)	18 (12.9)	12 (9.6)	0.441
Critical preoperative state, n (%)	3 (2.2)	3 (2.4)	1.000
Acute surgery, n (%)	0 (0.0)	0 (0.0)	-
Peripheral arterial disease, n (%)	34 (24.5)	16 (12.8)	0.018
Atrial fibrillation, n (%)	47 (33.8)	54 (43.2)	0.129
Dialysis, n (%)	1 (0.7)	3 (2.4)	0.348
NYHA ⁵ function class III or IV, n (%)	126 (90.6)	114 (91.2)	1.000
Logistic EuroSCORE I ⁶ %, mean ±SD)	21.6 ±14.6	14.6 ±11.0	<0.0001

1 Estimated Glomerular Filtration Rate.

2 Coronary Artery Bypass Grafting.

3 Percutaneous Coronary Intervention.

4 Balloon Aortic Valvuloplasty.

5 New York Heart Association Functional Classification.

6 The European System for Cardiac Operative Risk Evaluation. Data was missing in 23 and 22 patients in the IHD and non-IHD group respectively.

Procedure related characteristics are provided in Table 2. A longer operation time was noted in the IHD group compared to the non-IHD group (84.8 ± 38.0 vs 72.5 ± 35.3 , $p = 0.014$). The transfemoral approach was less common in the IHD group (77.7% vs 87.2%), although not statistically significant ($p = 0.053$).

Table 2. Procedure related characteristics.

	IHD, n = 139 (52.7 %)	Non-IHD, n = 125 (47.3 %)	p-value
Operation time ¹ , min, mean \pm SD	84.8 \pm 38.0	72.5 \pm 35.3	0.014
Contrast amount, ml, mean \pm SD	61.7 \pm 33.5	61.3 \pm 31.1	0.925
Fluoroscopy, sec, mean \pm SD	1483 \pm 713	1404 \pm 779	0.390
Radiation dose, mSv ² , mean \pm SD	9110 \pm 16192	6635 \pm 6601	0.113
Transfemoral approach, n (%)	108 (77.7)	109 (87.2)	0.053
Valve-in-valve, n (%)	3 (2.2)	5 (4.0)	0.483
Valve type, n (%)			0.064
SAPIEN and SAPIEN XT	73 (52.5)	51 (40.8)	
SAPIEN III	66 (47.5)	74 (59.2)	
Valve size, n (%)			0.294
20 mm	2 (1.4)	7 (5.6)	
23 mm	54 (38.8)	50 (40.0)	
26 mm	70 (50.4)	58 (46.4)	
29 mm	13 (9.4)	10 (8.0)	
Predilatation, n (%)	43 (30.9)	34 (27.2)	0.500
Postdilatation, n (%)	12 (8.6)	8 (6.4)	0.642
General anesthesia, n (%)	40 (28.8)	24 (19.2)	0.084
Planned cardiopulmonary machine, n (%)	1 (0.7)	0 (0.0)	1.000
Successful procedure, n (%)	137 (98.6)	125 (100.0)	0.500

¹ Data was missing in 28 and 18 patients in the IHD and non-IHD group respectively.

² Millisievert.

Peri- and postoperative complications

Table 3 displays the peri- and postoperative complications. Bleeding requiring treatment was the most frequent complication with an overall occurrence of 16/264 (6.1%) and an incident of 11/125 (8.8%) in the non-IHD group. New permanent pacemaker implantation was the most common complication in the IHD group, 10/139 (7.2%). No events of valve embolization, acute valve surgery or coronary obstruction were reported in our study population. There were no

statistically significant differences regarding peri- and postoperative complications between the two groups.

Table 3. Peri- and postoperative complications.

	IHD, n = 139 (52.7 %)	Non-IHD, n = 125 (47.3 %)	p-value
Stroke, n (%)	4 (2.9)	2 (1.6)	0.686
TIA ¹ , n (%)	2 (1.4)	1 (0.8)	1.000
Pericardial tamponade, n (%)	0 (0.0)	2 (1.6)	0.225
New onset atrial fibrillation, n (%)	9 (6.5)	6 (4.8)	0.604
Myocardial infarction, n (%)	1 (0.7)	0 (0.0)	1.000
Vascular complications, n (%)			
Aorta	0 (0.0)	3 (2.4)	0.105
Punction site	6 (4.3)	9 (7.2)	0.426
Valve embolization, n (%)	0 (0.0)	0 (0.0)	-
Dialysis, n (%)	2 (1.4)	1 (0.8)	1.000
Infection requiring treatment, n (%)	8 (5.8)	5 (4.0)	0.578
Peroperative arrhythmia requiring treatment, n (%)	4 (2.9)	1 (0.8)	0.374
Bleeding requiring treatment, n (%)	5 (3.6)	11 (8.8)	0.119
New permanent pacemaker, n (%)	10 (7.2)	5 (4.0)	0.298
Acute valve surgery, n (%)	0 (0.0)	0 (0.0)	-
Coronary artery occlusion, n (%)	0 (0.0)	0 (0.0)	-
Unplanned cardiopulmonary machine, n (%)	3 (2.2)	1 (0.8)	0.624
Unplanned general anesthesia, n (%)	0 (0.0)	2 (1.6)	0.223
Need of further valve prosthesis	1 (0.7)	0 (0.0)	1.000
Other serious complication not listed above, n (%)	5 (3.6)	1 (0.8)	0.217
Nursing time, days, mean \pm SD	4.12 \pm 3.44	3.82 \pm 3.01	0.468

¹ Transient Ischemic Attack.

Five-year all-cause mortality and cause of death

The total follow-up time was between 2 months and 112 months, with a mean follow-up time of 40 \pm 30 months. Sixty-eight patients performed the TAVI-procedure between 15th of September 2009 to 12th of February 2014, allowing a follow-up time of five years or longer. The five-year all-cause mortality was 35/68 (51.5%). Table 4 shows the all-cause mortality and cause of death at 30 days, one year and five years respectively. A total of 17/38 (44.7%) vs 18/30 (60.0%), p = 0,232, of patients with IHD and non-IHD respectively, were deceased at five years. Figure 1 illustrates similar non-adjusted cumulative five-year survival between the IHD and non-IHD group. A Log-Rank test reveals a p-value of 0,056.

Table 4. All-cause mortality and cause of death at 30-days, one year and five years, respectively.

	IHD, n = 139 (52.7 %)	Non-IHD, n = 125 (47.3 %)	p-value
30-days all-cause mortality, n (%)	4 (2.9)	1 (0.8)	0.374
Cause of death at 30 days			1.000
Cardiac, n (%)	2 (50)	1 (100.0)	
Non-cardiac, n (%)	2 (50)	-	
One-year all-cause mortality, n (%)	12 (10.4)	8 (8.2)	0.643
Cause of death at one year¹			1.000
Cardiac, n (%)	9 (75.0)	5 (62.5)	
Non-cardiac, n (%)	3 (25.0)	2 (25.0)	
Five-year all-cause mortality, n (%)	17 (44.7)	18 (60.0)	0.232
Cause of death at five years²			0.156
Cardiac, n (%)	10 (58.8)	6 (33.3)	
Non-cardiac, n (%)	5 (29.4)	10 (55.6)	

1 Cause of death was missing in one patient in the non-IHD group. 2

Cause of death was missing in 2 patients in both groups.

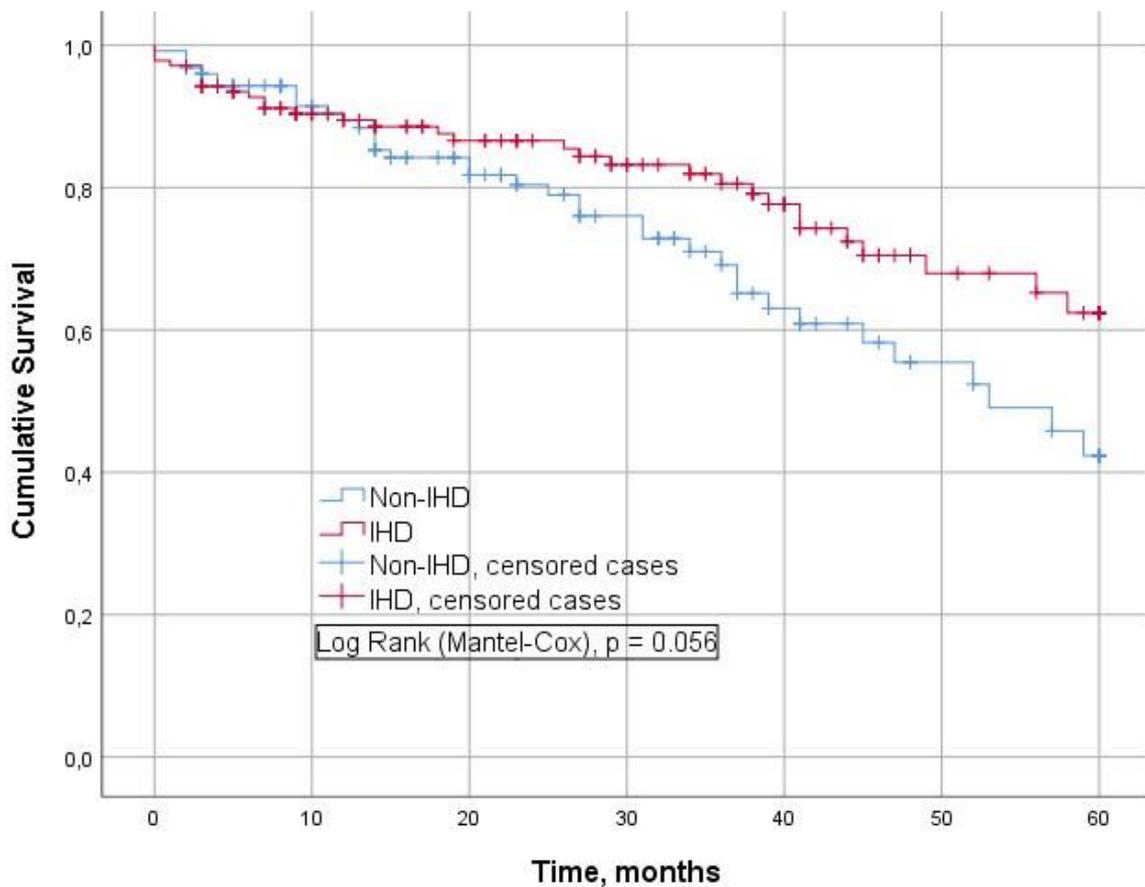


Figure 1. A Kaplan-Meier curve illustrating the non-adjusted five-year cumulative survival for TAVI patients.

Death due to cardiac disorders was most common at one year in both groups. At five years, cardiac death is still predominant in the IHD group but succumbs to death due to non-cardiac disorders in the non-IHD group. No significant differences in respect to cause of death were evident at 30 days, one year or five years between the groups.

Echocardiographic analysis

At baseline, the IHD group had significantly lower peak and mean gradients, lower peak aortic jet velocity and significantly more patients with left ventricular ejection fraction (LVEF) <50 %, see table 5. After TAVI, the IHD-group still displays a significantly lower peak aortic jet velocity and significantly more patients with LVEF <50% compared to the non-IHD group.

Table 5. Preoperative computed tomography angiography (CTA) and echocardiography in addition to postoperative echocardiography.

	IHD, n = 139 (52.7 %)	Non-IHD, n = 125 (47.3 %)	p-value
Preoperative echocardiography and CTA			
Annular diameter, mm, mean \pm SD	23.51 \pm 1.95	23.30 \pm 2.06	0.395
Valve area, cm ² , mean \pm SD	0.68 \pm 0.16	0.68 \pm 0.16	0.973
Peak gradient, mm Hg, mean \pm SD	77.8 \pm 17.8	85.0 \pm 24.4	0.006
Peak aortic jet velocity, m/s, mean \pm SD	4.37 \pm 0.54	4.57 \pm 0.63	0.005
Mean gradient, mm Hg, mean \pm SD	47.2 \pm 11.4	52.4 \pm 15.8	0.002
LVEF ¹ <50 %, n (%)	43 (30.9)	25 (20.0)	0.049
Pulmonary blood pressure ² , mm Hg, mean \pm SD	41.2 \pm 13.5	43.2 \pm 11.6	0.249
Aortic insufficiency grade II/III, n (%)	9 (6.5)	13 (10.4)	0.272
Mitral insufficiency grade II/III, n (%)	15 (10.8)	10 (8.0)	0.530
Postoperative echocardiography			
Peak gradient, mm Hg, mean \pm SD	22.3 \pm 7.8)	24.1 \pm 9.1	0.093
Peak aortic jet velocity, m/s, mean \pm SD	2.29 \pm 0.42	2.42 \pm 0.43	0.016
Mean gradient, mm Hg, mean \pm SD	12.2 \pm 4.4	13.1 \pm 5.0	0.157
LVEF <50 %, n (%)	32 (23.7)	14 (11.5)	0.014
Pulmonary blood pressure ³ , mm Hg, mean \pm SD	40.2 \pm 11.9	41.0 \pm 11.7	0.648
Aortic insufficiency grade II/III, n (%)	5 (3.6)	3 (2.4)	0.725
Mitral insufficiency grade II/III, n (%)	6 (4.4)	3 (2.4)	0.505

¹ Left Ventricular Ejection Fraction.

² Data was missing 30 and 25 patients in the IHD and non-IHD group respectively ³ Data was missing in 75 patients in both groups.

Discussion and conclusion

This retrospective study that investigated the clinical outcome after TAVI performed in patients with or without IHD at Örebro University hospital can be summarized in the following fashion. At five years, there was no significant difference in respect to all-cause mortality between the two groups. Secondly, there were no differences in respect to cause of death at 30 days, one year and five years between the groups. The peri- and postoperative complications had a similar incident compared to the two newly published studies comparing TAVI to sAVR in low-risk patients [8,10]. Bleeding requiring treatment was the most common complication, although no significant differences were found between the groups. Lower gradients were found in the IHD group along with more patients with reduced LVEF, pre- and postoperatively.

In our study, the five-year all-cause mortality was 51.5% which falls in range with earlier reported percentages between 41.0% and 67.8% [6,11–17]. Previous investigations have shown that the IHD prevalence in TAVI-patients is between 30.8% – 78.2% [24,25]. Our proportion of IHD patients of 52.7% is consistent with these studies. At baseline, our patients with IHD had significantly higher Logistic EuroSCORE I (21.6 vs 14.6, $p < 0.0001$) and in general a higher burden of cardiovascular risk factors, inclusive peripheral arterial disease. The latter has been associated with immediate and late mortality in TAVI-patients [33]. Despite this, the IHD group had a similar unadjusted five-year all-cause mortality. To the best of our knowledge, previous studies investigating the impact of IHD on TAVI outcome report follow-up times of no longer than three years. Furthermore, the study design, study population and definition of IHD of these studies have differed, along with a controversy in their results. One study found that TAVI-patients with previous CABG had a higher rate of two-year all-cause mortality and cardiovascular death [27]. However, IHD was present in the other group as well. Results from the FRANCE-2 registry showed that in general, IHD was not associated with increased mortality at 30 days or three years. Nevertheless, left anterior descending artery stenosis in specific was associated with higher three-year mortality [26]. One important factor to note is that patients with prior CABG were excluded from the study, which may explain why the IHD prevalence was in the lower range of 36%. Two meta-analysis also show a disagreement regarding one-year all-cause mortality. Sankaramangalam K et al. studied the impact of IHD in patients undergoing a TAVI-procedure and showed that the IHD group had a significantly lower survival at one year [25]. Their definition of IHD were similar to ours, prior CABG and/or PCI or a $>70\%$ stenosis with the exception of the left main, where a $>50\%$ were

sufficient. However, no considerations were put to symptoms which we did in our study. Kotronias RA et al. investigated the effect of previous PCI and one-year all-cause mortality [28] with no differences noted at one year between the groups.

In summary, the above-mentioned meta-analysis [25] that included all patients with IHD shows negative outcome regarding survival in patients with IHD undergoing TAVI. Why would our study demonstrate different results? One explanation could be that the majority (85.6%) of our IHD-patients had a prior intervention with either PCI and/or CABG and were therefore stable in their coronary heart disease. Furthermore, the non-IHD group had a significantly higher number of patients with chronic pulmonary disease. Kevin L. Greason et al. found that patients with severe chronic lung disease had a significantly higher death rates at one year, and these patients may not experience the mortality benefit that TAVI offers [34]. Unfortunately, we did not stratify our patients with chronic pulmonary disease depending on severity. Lastly, our population that had a follow-up time of five years or longer was limited (n = 68) and could therefore affect the results.

Previously conducted studies show a significant reduction of the mean gradients after TAVI [6,9,12,13,15,17,27,35,36]. In accordance with prior conducted studies [26,27], our IHD group also demonstrated a significant higher number of patients with reduced LVEF and significantly lower mean gradients, both pre- and postoperatively. A possible explanation why the non-IHD group have higher gradients is not due to the severity of the AS, but rather due to better left ventricular function. It comes as no surprise that the IHD-group has a worse left ventricular function, as IHD is the most common etiology for heart failure with reduced LVEF [37].

Our study comes with several limitations. Retrospective studies are always accompanied at risk for bias due to confounding factors. Furthermore, missing data is a frequently occurring problem in retrospective studies. However, we did report our missing data in the when encountered. Compared to other TAVI-studies, our study population is rather scarce due to the fact it is a single center study. Thus, the number of patients having a follow-up time of five-years or longer and number of patients experiencing peri- and postoperative complications were limited. One important aspect to note is that no adjustments were made in our survival analysis. One strength noteworthy to mention is the method of data acquisition from the SWENTRY registry served as our principal form of data collection. Additionally, we reviewed most of the data while adding new parameters using patient files.

In conclusion, there is no statistically significant difference regarding the unadjusted five-year all-cause mortality for patients with severe AS undergoing a TAVI-procedure stratified according to the presence or absence of IHD. Our study could help address the current implemented revascularization strategies usually attempted prior to TAVI, which are not risk-free. We suggest that further inquiries are in need in order to establish a consensus on the subject.

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Cover letter

The Editor
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Dear Doctor Feldman

Transcatheter aortic valve implantation for patients with aortic stenosis and concomitant ischemic heart disease: A five-year follow-up

It is our wish to submit our manuscript with the title mentioned above in your Journal of Interventional Cardiology.

Some previous conducted studies have tried to investigate the impact of ischemic heart disease on survival in patients with severe aortic stenosis undergoing transcatheter aortic valve implantation. However, the follow-up time of these studies were limited to maximum three years. Furthermore, some of these published investigations excluded patients with prior coronary artery bypass grafting, or only analyzed the effect of prior percutaneous coronary intervention. Our study has a follow-up time of five years and includes all patients with ischemic heart disease. Therefore, we get the impression that it might be of interest to your readers.

All the authors have read and approved the manuscript.

Our work has not been published elsewhere and is not under consideration for publication in other journals.

Yours sincerely

Akram Abawi (author)

Populärvetenskaplig sammanfattning

Förträngning av aortaklaffen, aortastenosis, är ett relativt vanligt tillstånd hos den äldre befolkningen. När förträngningen blir alltför tät kan symptom som andfåddhet, kärlkramp och svimning framträda, så kallad symptomatisk aortastenosis. Sedan 60-talet har kirurgiskt byte av aortaklaffen varit den etablerade behandlingen för aortastenosis. En stor nackdel var att en tredjedel av dessa patienter inte opereras på grund av för hög kirurgisk risk.

Sedan cirka tio år tillbaka finns en ny metod tillgänglig på alla universitetssjukhus i landet, TAVI, som går ut på att byta aortaklaffen via ett rörformat instrument som vanligen förs genom ljumskartären. Denna har i tidigare studier visat sig minst lika bra, eller till och med överlägsen kirurgiskt aortaklaffbyte hos patienter med låg till hög risk för kirurgi. Det är däremot oklart hur en underliggande kranskärslsjukdom påverkar utfallet avseende femårsöverlevnaden efter en TAVI-operation. Det var därmed vårt mål att studera detta.

Vi inkluderade alla patienter som har genomgått en TAVI-operation mellan 2009 till 2018 på universitetssjukhuset Örebro. Patienterna indelades i två grupper – med respektive utan underliggande kranskärslsjukdom. Data hämtades från patientjournaler och ett TAVI-register.

Resultaten visade att det inte finns någon statistiskt säkerställd skillnad mellan patienter med respektive utan kranskärslsjukdom avseende femårsöverlevnaden. Komplikationsfrekvensen under och efter operation skiljde sig inte heller mellan grupperna. Slutligen kunde vi se att patienter med kranskärslsjukdom hade sämre hjärtpumpförmåga både före och efter operationen jämfört med patienter utan kranskärslsjukdom.

Vår slutsats blir därmed att det inte finns en skillnad gällande femårsöverlevnaden mellan patienter med respektive utan kranskärslsjukdom som genomgår en TAVI-operation.

Etisk reflektion

TAVI är en relativ ny metod. Initialt tillämpades tekniken på extremt högriskpatienter, men successivt har denna operationsteknik brett ut sig och började inkludera patienter med lägre operationsrisk. Idag utförs TAVI även på medelriskpatienter. Nyligen lanserades resultat från två stora studier som undersökte överlevnad efter TAVI på lågriskpatienter. Dessa visade att TAVI var non-inferior, och på den andra studien till och med överlägsen kirurgiskt aortaklaffbyte på lågriskpatienter efter två respektive ett år. Nyheten spreds snabbt och var centrum på den amerikanska kardiologföreningens årliga möte 2019, som tog emot de med stående ovationer.

Bör en teknik som saknar långtidsuppföljning spridas lika snabbt som TAVI gör? När det gäller kirurgiskt aortaklaffbyte återfinns uppföljningar upp till 20 år avseende långtidsresultat inklusive klaffhållbarheten. Detta kan inte sägas om TAVI-klaffarna ännu. Skulle vi helt plötsligt börja operera lågriskpatienter, vilka har en relativ lång förväntad överlevnad, med TAVI finns möjligheten att dessa patienter dyker upp om 10 år på grund av stort paravalvulärt läckage eller restenos – vi vet helt enkelt inte.

Ett till problem är att patienterna numer ofta känner till om TAVI, av olika skäl. Det är inte helt ovanligt att TAVI önskas istället för kirurgiskt aortaklaffbyte av patienterna, inklusive en del lågriskpatienter. Hur kommer situationen se ut när dessa patienter har studier som stödjer TAVI även hos lågriskpatienter? Det som patienter kan missa är att studierna enbart har en uppföljningstid på två år, men kan detta överföras på ett adekvat sätt till patienterna?