

# Advances in cardiac rehabilitation: cardiac rehabilitation after transcatheter aortic valve implantation

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## Abstract

For more than a decade, transcatheter aortic valve implantation (TAVI) has become a promising treatment modality for patients with severe aortic stenosis and a high surgical risk. To improve exercise capacity and quality of life, cardiac rehabilitation (CR) including physical activity is a well-established treatment for patients after cardiac valve surgery. First studies have shown that CR could also be a helpful tool to maintain independency for activities of daily living and participation in socio-cultural life in patients after TAVI. Strength and balance training are important parts of physical activity in octogenarians and have been investigated in healthy older adults in several studies, but need to be widened and investigated for TAVI patients. Hence, for this older patient group, there are more prospective multicentre studies needed.

## Introduction

Due to the demographic change and an aging population, the prevalence of the most frequent valve disease, aortic stenosis (AS), is still rising [1,2].

For patients with severe AS and a prohibitive surgical risk, transcatheter aortic valve implantation (TAVI) has developed as a golden standard [3-5]. First performed in a human body in 2002 [6], the procedure is rapidly growing in utilization. A total of 48,353 TAVI procedures have been performed in Germany with a 20-fold increase since

2008 [7]. Several clinical trials and registries have shown the advantages and the procedural success concerning mid- to long-term outcomes with an improved survival rate compared to the standard therapy [3,8-10].

## Cardiac rehabilitation after TAVI

For the improvement of exercise capacity, quality of life and morbidity, cardiac rehabilitation (CR) including physical activity is a well-established treatment for patients after cardiac valve surgery [11-13]. As TAVI starts to get more common nowadays and numbers are steadily increasing, this relatively new patient group also becomes more present in CR. Little is known about the efficacy of CR in TAVI patients as there exist only few studies about CR in this high-risk patient group in the older age, often having several comorbidities. Russo *et al.* [14] investigated the efficacy regarding functional capacity and additionally the safety of CR in TAVI patients and patients after surgical aortic valve replacement (SAVR). Though having many comorbidities, no major complications occurred in TAVI patients. In the overall patient group, a significant increase the 6-minute walk test (6MWT) could be achieved. The authors showed that a supervised, short-term, exercise-based CR program is feasible, safe and effective in these octogenarians. Völler *et al.* [15] could also show a benefit in functional status in patients after TAVI undergoing CR. Measured by the 6MWT and a bicycle stress test, the patients reached a significant longer walking distance as well as a significant higher exercise capacity at discharge of the three-week inpatient structured rehabilitation program, that consisted of individualised physical training, patient education and psychological support [16]. As the valve academic research consortium-2 consensus document (VARC-2) [17] underlines the necessity of frailty as a multicomponent factor with the criteria slowness, weakness, exhaustion, wasting and malnutrition, poor endurance and inactivity as well as a loss of independence, evidence for these factors is needed. Zanettini *et al.* [18] could show that most TAVI patients obtained a significant improvement of an in-hospital CR program concerning functional status, quality of life and autonomy, which even remained constant during mid-term follow-up.

The first results of CR in TAVI patients show that CR can be a helpful tool to maintain independency for activities of daily living and participation in socio-cultural life, but still there are more prospective multicentre studies including geriatric assessments, such as frailty, needed to have enough evidence for the improvement and the prognosis of this high-risk and multimorbid patient group. Preliminary results of a prospective multicenter registry with a geriatric pre-interventional assessment according to Schoenenberger *et al.* [19], which was repeated at admission and discharge of inpatient CR, revealed that frailty could be a transient status in the majority of patients. Compared to the pre-interventional measurement, where 47.3% had a positive Frailty-Index,

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at discharge of inpatient CR only 33.3% of the TAVI patients were still considered as frail [20].

## Final remarks

Other factors, *e.g.* the importance of fall prevention or strength training, have been investigated in healthy older adults in several studies [21-23], but need to be widened and investigated for TAVI patients. Cardiac rehabilitation researchers need to investigate and implement programs and protocols that include physical training with a combination of balance training in dual- and multi-tasking situations and strength training, mainly focusing on the lower extremities.

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