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Invited Editorial

Exercise intervention after transcatheter aortic valve implantation: current evidence and issues to be resolved

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Be ready for more TAVI patients

Aortic stenosis (AS) is a chronic, progressive valve disease in which, if not treated, the estimated 5-year survival of severe AS is only 15-50% (1). The only effective treatment of severe AS is thus surgical replacement of the aortic valve (1). Indeed, transcatheter aortic valve implantation (TAVI) leads to significant reductions in morbidity and mortality, especially in patients with high perioperative mortality risk (2,3). Due the ageing population (in which AS is more prevalent) in the Western countries, together with a progressive worsening in cardiovascular risk profile on population scale, it is anticipated that more patients are in need of TAVI in the near future (4).

More focus on functional outcomes after TAVI

When examining the impact of TAVI, most studies have focused on hard endpoints (adverse cardiovascular events and mortality) (2), although functional outcome parameters should be considered more often during follow-up (5). This makes earlier and tailored intervention possible in case of anomalous recovery, even before onset of symptoms or (long before) adverse events. Indeed, suboptimal post-operative improvements in functional capacity is often observed in a significant amount of TAVI patients (6). This is highly relevant as failure to improve the 6-minute walking distance by at least 20% after TAVI is independently associated with an elevated risk for all-cause and cardiovascular death or rehospitalisation (6). These patients are thus clearly in need of post-operative interventions to optimise the functional/exercise capacity (3).

A case for rehabilitation?

Exercise-based cardiac rehabilitation indeed leads to significant improvements in exercise tolerance, walking capacity, muscle strength and quality of life, and reduces frailty, at least in the short term (7-11) and may, hypothetically, be effective to improve the patients' prognosis. As a result, official position statements promote the implementation of exercise-based cardiac rehabilitation after TAVI,

in which exercise modalities similar to those used after coronary artery bypass graft surgery are recommended (12,13).

In this issue of the European Journal of Preventive Cardiology, Pressler and colleagues however reveal findings that are of key importance to the cardiovascular rehabilitation community when dealing with TAVI patients (14). In a previous randomized controlled study from this laboratory, it was found that eight weeks of endurance and resistance exercise training led to significant improvements in peak oxygen uptake (VO_{2peak}), muscle strength and components of quality of life in TAVI patients (10). In the current issue, these colleagues now examined, for the first time, whether these improvements were maintained after a follow-up of 24±8 months. Their exercise intervention led to a preserved anaerobic threshold on the long term, but the effects on VO_{2peak}, muscle strength and quality of life were lost during follow-up. On the one hand, it is positive to notice that the anaerobic threshold remained elevated in those patients who followed an exercise-based rehabilitation intervention, because this parameter is of prognostic relevance and this would translate into a greater ability to execute daily life physical tasks with greater comfort. However, other prognostic indicators (VO_{2peak} and muscle strength) were no longer maintained, meaning that some of the prognostic impact of this intervention is lost in the long term in TAVI patients. It must however be mentioned that the mortality rate was lower in the intervention group, although not (yet) statistically significant due to the low sample size.

The waning effect of exercise-based rehabilitation on peak physical fitness and muscle strength on the long term should not be viewed as weakness of exercise-based rehabilitation, but on the contrary: if we strive for optimal patients' outcomes after TAVI, exercise-based rehabilitation intervention should be implemented and prolonged for as long as possible (and an elevated physical activity must be permanently achieved).

Rehabilitation after TAVI: how to improve the long-term effects?

What are then the opportunities for the cardiovascular rehabilitation community to overcome this limitation? Probably one of the most important things these patients need is an exercise training/physical activity follow-up system/platform specifically tailored to their needs. Such system should allow patients to exercise whenever and wherever they want, be cost-effective, and provide clear guidance in exercise programming (selection of the correct exercise modalities) and medical safety (by interaction and feedback). In this respect, cardiac telerehabilitation would seem an ideal intervention (especially for patients living in remote areas). Evidence is accumulating that such intervention is well-accepted by patients, is clinically and cost-effective, at least in coronary artery disease patients (15). Moreover, many TAVI patients have different co-morbidities and/or cardiovascular risk factors. When applying telerehabilitation interventions, clinicians can now use digital decision support systems to assist them in the formulation of an integrated exercise prescription

(taking into account all these different disease and risk factors), such as the EAPC EXPERT tool (18). As a result, there is now solid evidence and an attractive hypothesis to examine the impact of such long-term telerehabilitation intervention in TAVI patients, which would seem a next logical step when aiming to optimise long-term treatment after TAVI.

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Confict of interest

None to be declared