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EDITORIAL COMMENT

Closing the gap, or the beauty of alleviating our patients' symptoms

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This article refers to 'Durability of benefit after transcatheter tricuspid valve intervention: insights from actigraphy' by T.J. Stocker *et al.*, published in this issue on pages 1293–1301.

Following the tremendous success using transcatheter techniques to treat aortic and mitral valve pathologies over the last decades the interventionalists' mind- and handcraft have shifted toward the tricuspid valve. Severe tricuspid regurgitation (TR) is common, more frequently secondary to heart failure (HF) and accompanied by high morbidity and mortality with expected increasing prevalence.[1] The reasons hard outcome data proving the potential effects of transcatheter repair are lacking are numerous. The anatomy of the tricuspid valve proves more complex as well as the geometry of the right ventricle, therefore not allowing to define a population that would benefit from a transcatheter procedure so far.

In our daily practice, improving our patients' lives is more about extending life than increasing health-related quality of life (QoL) at the same time. A qualitative longitudinal interview study conducted in southern parts of Germany with old and very old patients (≥70 years) with severe HF (New York Heart Association [NYHA] class III–IV) was able to demonstrate that the increasing loss of QoL is the negative game changer toward 'decisive existential experiences that may increase a person's wish to die'.[2] The feeling that 'time can no longer be used in a fulfilling way because the necessary energy, mobility and means are lacking'.[2] In such cases, 'the patients longed for rather than rejected death and viewed life as having been lived'.[2]

For treating physicians this highlights a gap of knowledge in modern interventional cardiology where 30-day, 1- and 5-year survival rates are not the only currency that should count. As a matter of fact, QoL in which self-determination through preservation of physical activity plays a pivotal role, should not be given less attention. As an approach closing the gap in 2016 the Food and Drug Administration (FDA) for regulatory submissions for HF medical devices highlighted the role of the Minnesota Living with Heart Failure Questionnaire (MLHFQ)[3] and 2 years later in 2020 additionally approved the Kansas City Cardiomyopathy Questionnaire clinical summary score and its component scores[4] as patient-reported outcomes and the use as a potential endpoint in clinical trials.

At the same time the idea was put forward using intermediate endpoints like natriuretic peptides, 6-min walk test, and QoL questionnaires that, when improving in a congruent fashion, are reasonably likely to predict clinical benefit and can be used as clinically meaningful endpoints in HF trials.[5] This translated into trial protocols using QoL as a primary[6] or secondary[7] endpoint.

Two steps ahead are our colleagues in the field of oncology who drafted an entire guideline focusing on the best supportive care of terminally ill patients.[8] Frankly, our cardiology wards are filled with patients suffering from HF, which are equally as ill with not rarely an even poorer prognosis[9] but communication with physicians predominantly focuses on curative treatment.[2] Talking about best supportive and palliative care and therefore addressing the treatment strategy to alleviate our patients' symptoms should not be degraded a pity prize but an incremental part of our profession.

In this issue of the Journal, Stocker *et al.*[10] evaluate the potential effect of transcatheter tricuspid valve intervention (TTVI) on activity levels and physical capacity in HF patients with severe TR using activity tracking devices. In this single-centre trial, 128 patients undergoing TTVI, predominantly tricuspid transcatheter edge-to-edge-repair, were prospectively enrolled, equipped and trained with the usage of wrist activity tracking devices for 1 week before TTVI, and again at 1–6 months and 1 year after TTVI.

To keep methodology as simple as possible aiming for a high device adherence in this old population (median age 79 years; interquartile range [IQR] 75–82 years), re-charging, connection to a cell-phone or another device, and cellular data transmission were not performed. This lead to a median tracking phase of actigraphy assessments of 7 (IQR 6–9) days, and at least 5 days were recorded in 90% of actigraphy analyses.

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The primary outcome of the trial was the mean number of steps per day at each tracking period referred to as continuous physical activity (CPA). Secondary analyses included the steps per day at the day with the highest activity (high-performance day) and the day with the lowest activity (low-performance day) in each tracking period as well as the resting heart rate defined as the mean resting heart rate of all days within a tracking period.

Transcatheter tricuspid valve intervention led to a significant reduction of TR in 94% of patients, as assessed by echocardiography at the day of discharge (TR ≤2+). At discharge from the hospital, residual TR was ≤1+ in 72 patients, 2+ in 48 patients and 3+ in 8 patients. Survival at 1 year after TTVI was 88% (113 of 128 patients).

During short-term follow-up CPA significantly improved from 3108 (IQR 1350–4959) steps per day to 3958 (IQR 1823–5657) steps per day ($p < 0.001$). This proved consistent and at the 1-year follow-up CPA further increased to 4080 (IQR 2293–6514) steps/day ($p < 0.001$ compared with baseline CPA). The primary outcome measure of median CPA increased in 74 patients and decreased in 17 patients 1 year after TTVI and patient characteristics were similar between groups. The authors defined an improvement of CPA by 500 steps per day clinically relevant and this was observed in 59% of all patients 1 year after TTVI.

Extra attention deserves the finding of Stocker *et al.*[10] described after stratifying the patients according to their baseline CPA into a low activity group (<1350 steps per day), a moderate activity group (IQR 1350–4959 steps per day) and a high activity group (>4959 steps per day). Patients classified as low activity group had a higher NYHA class (37% in NYHA class IV vs. 3% in high activity, $p < 0.001$), showed increased N-terminal pro-B-type natriuretic peptide levels (5193 [2117–8028] vs. 1174 [1134–3185], $p < 0.01$), had – using the MLHFQ – a higher (higher scores indicating more significant impairment in health-related QoL) QoL score (41 [33–52] vs. 31 [22–42], $p < 0.05$) and were at higher operative risk using the EuroSCORE II (5.7 [4.4–8.3] vs. 3.6 [2.2–5.5], $p < 0.01$).

In comparison with baseline CPA, patients in the low activity group showed the greatest relative improvement after TTVI (change in short-term CPA: +87.1%, change in 1-year CPA: +121.3%, both $p < 0.001$) and 76% (19 of 25) of patients had a clinically significant improvement of 500 steps per day. Patients in the moderate activity group also benefited from TTVI and CPA improved significantly (change in short-term CPA: +32.1%, change in 1-year CPA: +27.5%, both $p < 0.001$). Clinically significant improvement of CPA 1 year after TTVI was identified in 60% (26 of 43). For patients in the high activity group, CPA did not favourably change after TTVI (change in short-term CPA: −3.5%, change in 1-year CPA: +2.6%; $p = 0.63$ and $p = 0.52$, respectively), and clinically significant improvement of CPA 1 year after TTVI was determined only in 39% (9 of 23) of patients.

Heart failure affects approximately 2–5% of adults aged 65–75 and >10% of adults aged 80 and older and moderate or severe TR is observed in 0.55% of the general population and its prevalence increases with age, affecting about 4% of the patients aged 75 years or more.[11]

Transcatheter tricuspid valve intervention are under clinical development and early registry and study data demonstrated the feasibility to reduce TR using various systems aiming at symptomatic and haemodynamic improvement.[12,13] In a propensity score-matched study comparing medical treatment with TTVI, all-cause mortality and rehospitalizations at 1 year were lower among the patients who received the interventional treatment.[14] Further randomized controlled trials will continue to investigate the efficacy of TTVI against medical treatment.[15]

The findings of Stocker *et al.* greatly reflect on the data presented in the introduction about the patients' wish to stay mobile and physically active as a definition of a life worth living. The limitations of the trial such as single-centre experience, the lack of a control group and the small sample size were openly communicated by the authors and therefore are hypothesis-generating and need further follow-up.

We congratulate the authors to a well-drafted protocol and the collected data adding important knowledge in the treatment of terminally ill patients with TTVI for severe TR secondary to HF introducing actigraphy as an additional tool to measure physical activity and therefore QoL.

Conflict of interest: none declared.

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