

Evolution of muscle strength and physical activity 1 year after heart transplantation: a prospective observational study

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Background: Heart transplantation (HTX) is a therapeutic option in a selected group of patients with end-stage heart failure. Although cardiac function normalizes after surgery, maximal exercise capacity of HTX-patients after 1 year is only half that of age- and gender matched healthy subjects. Data on the evolution of muscle strength and physical activity after HTX are scant. Having this knowledge might help to optimize rehabilitation programs.

Purpose: To describe changes in muscle strength and physical activity following HTX.

Methods: 58 HTX-patients were addressed, of whom 52 (90%) patients participated in the study. Study visits were planned every 3 months from hospital discharge until 1 year of follow-up. 43 HTX-patients (67% male; age: 48 ± 14 years; BMI: 24 ± 4 kg/m²) fulfilled the study protocol. Outcome measures included functional exercise capacity (6MWD), peripheral strength (QF), respiratory muscle strength (MIP) and objectively measured physical activity (PAwalk, walking intensity (WI), PAsteps). All patients received physiotherapy at home during the first 6 weeks, as standard of care after thoracic surgery. After that, cardiac rehabilitation in a specialized center was started. Data were analyzed using repeated measures ANOVA, with Bonferroni test as post-hoc test.

Results: 6MWD ($+178 \pm 17$ meter), QF ($+26 \pm 4$ Nm) and MIP (-32 ± 3 cmH₂O) significantly improved over time ($p < 0.0001$). Despite improvements in QF, peripheral muscle weakness was still present in 32% of patients 1 year post-HTX. A significant time effect in PA (PAwalk ($+33 \pm 7$ minutes/day), WI ($+0.036 \pm 0.007$ g) and PAsteps ($+3711 \pm 640$ steps/day)) could be noticed ($p < 0.0001$). Sedentary time did not significantly change during follow-up ($p = 0.14$). (Figure 1)

Conclusion: Functional exercise capacity and muscle strength gradually improve during 1 year after HTX. A considerable number of patients still present with peripheral muscle weakness. Despite improvements in PA, results remain below recommended health levels. Enrollment in a cardiac rehabilitation program, offering a combined exercise and PA intervention seems warranted to further enhance health outcomes in this patient population.

Abstract Figure 1

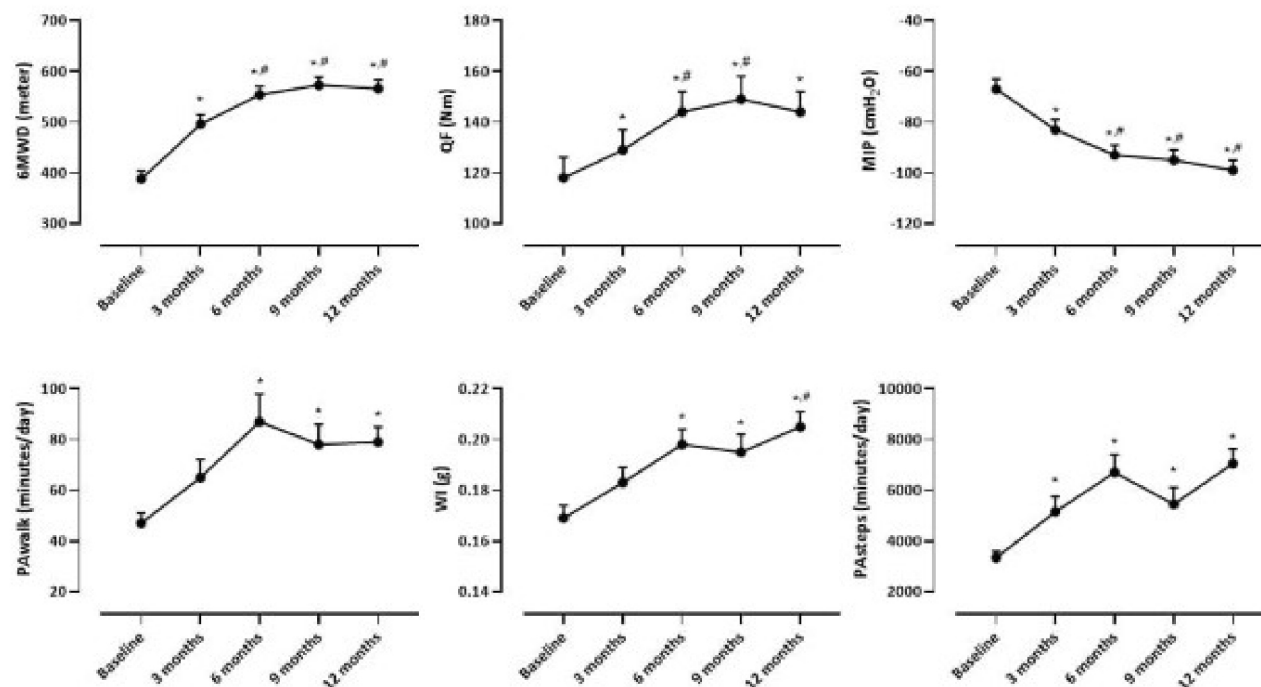


Figure 1: Evolution of functional exercise capacity, muscle strength and physical activity during 1 year of follow-up. Data are presented as mean \pm SEM. 6MWD: functional exercise capacity; QF: peripheral muscle strength; MIP: respiratory muscle strength; PAwalk: daily walking time; WI: movement intensity during walking; PAsteps: daily amount of steps. *: Significant result from baseline; #: Significant result from 3 months, $p < 0.05$.