

Physical fitness Improvements and Achievement of Recommended Physical Activity Levels One Year After Total Hip Arthroplasty: A Longitudinal Study of Physical Function and Activity Patterns

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Summary

This study evaluated physical fitness and activity patterns in hip osteoarthritis patients before and after total hip arthroplasty (THA). Seventy-eight patients underwent comprehensive physical fitness testing and accelerometry-based activity monitoring pre-operatively and at 4-month and 1-year follow-up. Results demonstrated significant improvements in multiple functional domains, with patients achieving recommended physical activity levels post-operatively, in contrast to pre-surgery. The established test battery reliability validates its utility for both research and clinical applications.

Introduction

While total hip arthroplasty (THA) effectively alleviates pain and improves quality of life in patients with severe hip osteoarthritis (OA), comprehensive longitudinal data regarding physical function and objectively measured physical activity patterns following THA is limited [1,2]. This study aimed to evaluate test-retest reliability of physical fitness measures in hip OA patients, compare physical fitness and activity patterns with healthy controls, and assess longitudinal changes in these parameters following THA.

Methods

Seventy-eight patients (mean age 74 ± 4.5 years, 81% women) scheduled for THA underwent comprehensive physical fitness testing and accelerometry-based physical activity monitoring. Assessments were conducted at two pre-operative time points and at 4-month and 1-year post-operative follow-up. The test battery included measures of muscle strength, motor fitness, and cardiorespiratory fitness. Physical activity was objectively measured using hip-worn triaxial accelerometers. Self-reported Hip disability and Osteoarthritis Outcome Score (HOOS) was collected pre- and post-operatively.

Results and Discussion

Good to excellent test-retest reliability was demonstrated across 23 of 24 fitness parameters. Pre-operatively, hip OA patients showed significant deficits compared to healthy controls in moderate-to-vigorous physical activity (18.7 vs 44.7 min/day) and several physical fitness. At 1-year post-op, significant improvements were observed in 23 of 45 measured parameters, including functional mobility (Timed Up and Go: -29%), walking distance (Six-Minute Walk Test: +16%), trunk endurance-strength (+71-82%), shoulder-press (+33%), various leg strength tests (+13-42%), 4m max walking-speed (+42%), moderate-to-vigorous physical activity (+63%) and

daily step count increased from 6004 to 7558 steps/day, (+26%). OA-limb vs non-OA-limb step height asymmetry decreased from 27% pre-operatively to 8% at 1-year. VO_2peak demonstrated modest but significant improvement from 22.7 to 23.6 mL/kg/min 1-year postoperatively, (+4%).

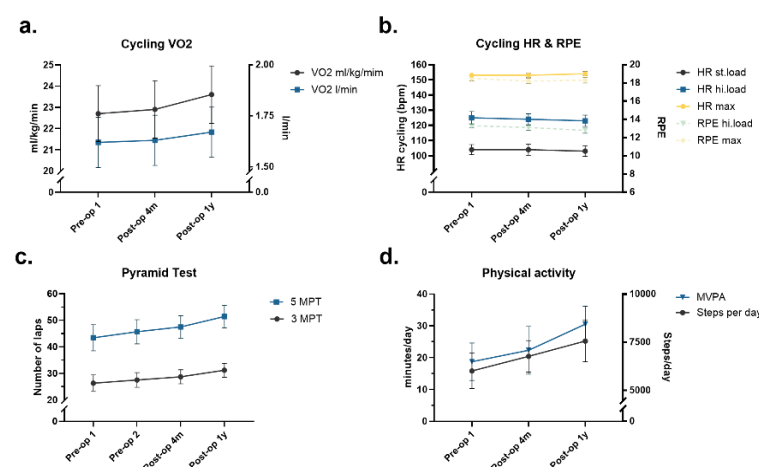


Figure 1. Mean values (with 95% CI) for the cardiorespiratory fitness tests a: VO_2max in maximal cycle test, b: submaximal cycle test, and c: pyramid step-test for 3min-3MPT & 5min-5MPT), and d: physical activity measures (accelerometer assessed minutes in MVPA, i.e. moderate to vigorous activity and steps per day).

Conclusions

This study revealed significant pre-operative functional deficits in patients with hip osteoarthritis, with substantial improvements observed across multiple performance domains 1-year post-surgery. Notably, patients failed to meet the recommended physical activity guidelines before surgery but achieved them post-operatively [3]. The demonstrated reliability of the test battery reinforces its value for both research and clinical applications.

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References

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