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Physical Fitness Improvements and Achievement of Recommended Physical Activity Levels One Year After Total Hip Arthroplasty

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Purpose: To evaluate test-retest reliability of physical fitness measures in hip osteoarthritis (OA) patients and assess longitudinal changes in these parameters following total hip arthroplasty (THA). This study incorporates previously unexamined parameters like $\dot{V}O_2$peak and trunk endurance, alongside physical activity monitoring through accelerometry and self-reported outcomes in 1-year follow-up.

Methods: Seventy-eight patients (mean age 74 ± 4.5 years, 81% women) scheduled for THA performed physical fitness tests and accelerometry-measured physical activity. The test battery included muscle strength, motor fitness, and cardiorespiratory fitness. Assessments were conducted at two pre-operative timepoints and at 4-month and 1-year post-operative follow-up. Physical activity was objectively measured using hip-worn triaxial accelerometers. Results were compared with healthy older adults. Statistical analyses included test-retest reliability assessment, between-group comparisons, and longitudinal change analysis using repeated measures ANOVA.

Results: Good to excellent test-retest reliability was demonstrated for most 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 multiple physical fitness parameters. 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%), and 4 m max walking-speed (+42%). Moderate-to-vigorous physical activity increased by 63% and daily step count improved from 6,004 to 7,558 steps/day (+26%). Notably, ipsilateral-to-contralateral step height asymmetry decreased from 27% pre-operatively to 8% at 1-year. $\dot{V}O_2$peak demonstrated modest but significant improvement from 22.7 to 23.6 mL/kg/min 1-year postoperatively (+4%).

Conclusion: This study highlights 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 prior to surgery but achieved them post-operatively. The demonstrated reliability of the test battery reinforces its value for both research and clinical applications.