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### Is osteoarthritis of the thumb a strictly orthopedic condition?

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**INTRODUCTION.** Osteoarthritis (OA) of the carpometacarpal (CMC) is an orthopedic condition that can lead to difficulties gripping objects and limited range of motion, both of which affect activities of daily living (ADLs) including writing, feeding, and dressing [1]. Parkinson's disease (PD) is a progressive degenerative neurological disorder, characterized by numerous motor features that also impact ADLs [2]. The purpose of this study was to compare deficits in dynamic dexterous manipulation between these conditions. **METHODS.** We measured performance in the Strength-Dexterity (SD) test—a validated instrument for quantifying dynamic dexterous manipulation with pinch forces < 300 grams force [3]—in 33 female patients diagnosed with CMC OA (65.81 ± 9.7 yrs., 42 hands) an average of 40 months post-treatment, 14 patients diagnosed with PD (10M, 4F; 67.6 ± 9.6 years, 27 hands), and a non-clinical control group of 29 healthy, age-matched volunteers (10M, 19F; 65.6 ± 9.7 years, 48 hands) with no history of hand injury or disease or neurological disorder. The SD test consists of compressing a slender spring prone to buckling between thumb and index, where the maximal compression (in gmF) is indicative of the maximal manipulation instabilities the subject can sustain. **RESULTS.** We report no significant differences in maximal mean compression force among groups. However, both the CMC OA ( $p < 0.000001$ ) and PD ( $p = 0.019$ ) groups displayed significant differences in the dynamic force variability while maintaining the maximal spring compression (1<sup>st</sup> and 2<sup>nd</sup> derivatives of forces and RMSE) compared to the control participants. This indicates significantly reduced stability of manipulation. Furthermore, linear regression shows that individuals with CMC OA ( $p = 0.013$ ) and PD ( $p = 0.026$ ) showed greater rates of decline of maximal spring compression vs. age than control subjects (-1.3 gmF/yr and -1.7 gmF/yr vs. -0.96 gmF/yr, respectively). **DISCUSSION.** Both CMC OA (an orthopedic condition) and PD (a neurological condition) are associated with significantly worse neuromuscular control of dynamic manipulation and accelerated losses with age when compared to non-clinical volunteers. These results challenge the notion that CMC OA is a strictly orthopedic condition given that it seems to also produce sensorimotor deficits. We underscore the need to investigate and understand these little known or studied effects of CMC OA on the neuromuscular control of dynamic manipulation at low force levels—which is so critical to ADLs.

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