

A STUDY ON THE GRIP FORCE DURING PUTTING STROKE

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INTRODUCTION: There are lots of variables to affect the control of ball movement during golf putting. Among several variables, it is believed that grip force during putting stroke is one of the important variables. However, there is not much quantitative evidence from published literature (Delay 1997, Gwyn 1993). Therefore, the purpose of this study was to quantify the grip force by comparing putts performed by elite and novice golfers and to identify the relationship between kinematic parameters and the grip force at 16 different parts of subjects' right and left hand at each putting phase.

METHOD: The participants consisted of two groups based on their playing ability: 5 elite golfers (handicap ≤ 2) and 5 novice golfers (handicap ≥ 25). All of them were male subjects. An 1 m \times 10 m artificial putting surface was set up for the experiment. The system for grip force measurement was developed for this study. The system consists of 16 FSR (Interlink Electronic, USA) sensors, 3-axis accelerometer, ATMEGA128 processor, and software developed by using LabVIEW 7.1 (National Instrument Inc., USA). During actual putting experiment, the grip force measurement system and 3D motion analysis system (Motion Analysis Corp., USA) with 4 high-speed Falcon digital cameras were used at the same time. 3D data (120Hz) and grip force data (1000Hz) were collected for each subject performing 5 trials of putts from each of these distances: 1 m, 3 m and 5 m. The putting stroke was divided into back swing, through swing, and follow through phase. Dependent variables will include timing variables, angular kinematic variables, and grip force variables.

RESULTS AND DISCUSSION: Our previous study (Tack 2005) investigated several linear kinematic parameters including timing variables, displacements and jerks. This study will focus on the variability of angular motion, grip force and the comparison between these parameters. Significant differences in selected angular kinematic parameters are expected between elite and novice golfers. Other angular kinematic parameters such as angular velocity and angular jerk will be identified to differentiate these two groups. Specifically, since the elite group is more proficient in putting, the angular jerk value will be minimal to show the smoothness of the movement when compared to novice group. From the grip force point of view, it is expected that there is a difference between two groups at each putting phase.

CONCLUSION: The results provide insights into the stroke mechanics of putting used by elite golfer and such information will be useful resources for the instruction of putting stroke.

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