INTRODUCTION

Early golf swing studies (cf. Carlsson, 1967) were ‘case studies’ in which a few professional golfers were used as subjects. In the present study, we attempted to clarify the general characteristics of the golf swing using both professional and amateur female golfers.

METHODS

The subjects were 37 female golfers, consisting of 18 professional tournament golfers (G-pro) and 19 amateur average golfers (G-ama). Drive shots were performed indoors into a safety net. The swing motion was filmed by two high-speed video cameras at 200 fps, and mechanical parameters for 25 points of the body and golf club were analyzed three dimensionally using a DLT method.

RESULTS AND DISCUSSION

Club-head velocity (CHV) during the early phase of the downswing was greater in G-ama than G-pro, however, that of G-pro exceeded that of G-ama at approximately 0.1 seconds before impact. Maximal CHV, which appeared at the time of impact in both groups, was significantly greater (p<0.001) in G-pro (39.1 m/s) than in G-ama (30.6 m/s in the average). The greater CHV in G-pro seemed to be associated with higher rotation velocities by the hips and shoulders. G-pro hit the ball with the hips rotated approximately 45° and the shoulders 26° relative to the direction of the strike, whereas G-ama hit the ball with relatively shallower angles to the striking direction (hip 17°, shoulder 7.4°). The ranges of rotation in the hips and shoulders were also significantly greater (p<0.001) in G-pro than in G-ama. These results suggested that a wide range along with high velocities in the hips and shoulders contributed to produce the higher CHV in G-pro. The so-called ‘cock angle’ at the wrist was significantly acute in G-pro, and it continued until down to the left grip at a much lower position than in G-ama. The angular velocities of the hips, shoulders and wrist (cocking) increased in that order in G-pro, suggesting that the drive was performed using a ‘whip-like action’ (Fig.1).

SUMMARY

To understand the characteristics of professional golfers, drive shots by 18 professional and 19 amateur female golfers were analyzed three dimensionally. We found that significantly higher club-head velocity by the professionals was associated with a greater range of torso rotation and higher velocities in the hip and shoulder rotations during the downswing. Further, the wrist cock angle was much more acute in the professionals. The angular velocities increased in the order of hip, shoulder, and wrist (cock) in the professionals, suggesting that the swing was performed using a ‘whip-like action’.

REFERENCES