Biomechanical Impact: Spinal Elongation and Shrinkage in Golf Putting

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INTRODUCTION:

Putting constitutes nearly half of a golfer's total strokes per round, demanding precision, accuracy, and control (1). Spinal overextension results in strains and sprains in supporting ligaments and muscles, while spinal compression, leading to issues like trapped nerves, occurs as the spine comes closer together (2; 3). The absence of studies using motion capture systems creates uncertainty about the optimal method for measuring spinal changes during golf putting. Therefore, this study applied kinematic techniques to investigate how slope and distance constraints impact spinal elongation and shrinkage of the Lumbar and Thoracic regions during golf putting at 3ft and 7ft distances.

METHODS:

Fifteen amateur golfers were selected to take part in testing within the biomechanics laboratory of the University of the West of Scotland. The fifteen participants performed three putts from three different slope constrains; Flat, Uphill and Downhill and two different distance constraints: 3ft and 7ft. Retroreflective markers were placed on the spinal processes from the cervical (C7) to lumbar (L5) spine. Four phases of the golf putting tasks were assessed (Address; Top of the Back Swing; Impact and Follow through). Vicon Motion Capture was used to collect data and process data on the movement of the thoracic and lumbar regions of the spine. Statistical analyses comprising of Shapiro-wilk tests, and a 3-Way ANOVA were applied to the distance constraint, slope constraint, spinal level datasets and their interactions. A one-way ANOVA was applied to the golf putting phases with respect to the changes in spinal movement at the spinal levels. Independent sample t-tests for distant constraints in relation to spinal phase were produced.

RESULTS:

In terms of elongation and shrinkage of the spine, correct placement of retroreflective markers on the spinal processes was key in enabling successful tracking and measurements of the spinal processes and distances between the markers. Significant differences were found when comparing 3ft and 7ft distance constraints, all slope constraints, and spinal levels ($P < 0.05$, $F > 0.066$). However, no significant differences in spinal elongation / shrinkage were observed between Address and Top of the Back Swing for all distance constraints and spinal levels ($P < 0.05$).

CONCLUSION:

The results offer valuable insights for golfers regarding spinal elongation and shrinkage. The study unveils a consistent trend of spinal compression in both lumbar and thoracic regions throughout various phases of the putting swing.

REFERENCES

1) Tanaka & Iwami, Percept Mot Skills, 2018
2) Boden & Javis, Phys Med Rehabil Clin N Am, 2009
3) Forsyth, J. Bone Surg, 1964