Hip Joint Torques during a Golf Swing After A Total Hip Replacement: A Pilot Study

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Introduction

Total Hip Replacements (THR) are a common procedure for older people who suffer from some form of degenerative joint disease. Golf is a very popular leisure sport played by many older Americans. Little is known concerning the hip torques encountered in a golf swing after THR. The purpose of this study was to collect hip joint torques generated during a golf swing of those with and without THR.

Participants

Inclusion criteria:
- Male golfers who were at least 1 year post THR
- Between the ages of 55-75
- Right handed golfers

Exclusion criteria:
- Any other total joint replacements in the lower extremities
- Current low back pain
- Medical history of neuromuscular disease affecting balance

All participants completed the Hip Harris Score. Each participant read and signed a waiver before completing a motion capture analysis. Participants then changed into shorts and tagged with markers on key bony anatomical landmarks and allowed to warm up prior to data recording golf swings. Ten real time data swings were captured, using a standardized grip... Data points were then synchronized on Cortex and key markers were identified through each phase of the golf swing. Data was then imported into Visual 3.0 to determine inverse dynamics to generate hip torque estimates.

Results: Sagittal Plane

Red line represents R THR and black line represents L THR's. Gray line represents the senior group. Sagittal Plane: In a previous investigation conducted on typical senior golfers (insert citation) revealed the largest peak torque to be the trail leg Hip extension torque. We saw that same trend with our THR golfers. In addition, RO1 golfer had the slowest club head speed and torque production was the lowest.

Results: Frontal Plane

Frontal Plane: All THR had a lower torque compared to senior group, but R1 had greater torque of trail leg compared to seniors with slowest club head speed.

Results: Transverse Plane

We found higher internal rotation torque in all THR than in the senior group.

Methods

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Conclusion

We acknowledge that this pilot has many significant limitations which limits our discussion. It is our recommendation due to the small sample size and the lack of statistical analysis, this study be continued to examine and trends seen in the transverse plane with external rotation. With a variety of anatomical variability, it is difficult to characterize what one would expect in an older population of golfers.

Clinical Significance

We hypothesize that subjects with a THR may be prone to abnormal forces that may lead to inefficient movement or injury especially during the downswing and acceleration of the golf swing. Any asymmetry of movement and rotation is of significance since the trail leg does more work for longer periods of time (12). We recommend that future studies investigate the amount of torque in the transverse plane and use EMG or MMT to identifying any residual weakness in kinematic pairs on the trail leg with a THR. This could identify a potential problem, since perfection of movement is achieved by the ability of muscles to generate forces during transition from eccentric to concentric work. (15) This information is vital in generating post-surgical protocols that state when it is best or deemed the safest for someone wanting to return to playing golf.

References

6. Chatterji U, Ashworth M, Lewis P, Dobson P. Effect of total hip arthroplasty on recreational and sporting Modify the color scheme and layout by going to VIEW and then SLIDE MASTER. The columns in the provided layouts are fixed and different column layouts. We found higher internal rotation torque in all THR than in the senior group.

Table 1 - Demographics

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<td>HHS</td>
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<td>Peak Club Velocity (MPH)</td>
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<td>84.23</td>
<td>74.52</td>
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</tbody>
</table>

Table 1 - Demographics

% Swing

+ Int / - Ext (Trail)

Figure 1: Participant hitting with markers

Figure 2: Standardized Driver

Figure 3: Hip Torque (%BW*HT)

Figure 4: Hip Extension torque

Figure 5: Hip Adduction torque

Figure 6: Hip External Rotation torque

Figure 7: Hip Adduction torque