Can Total Shoulder Arthroplasty Save More Than Just Your Shoulder?

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INTRODUCTION:

Patients with Glenohumeral arthritis (GA) often attempt to compensate to regain their lost motion and function with variable success. Therefore, the purpose of this study was to quantify trunk and pelvic compensation during common ADLs. We hypothesize that there are statistically significant deviations in cervical spine, lumbar spine, and pelvic motion in patients with end-stage glenohumeral arthritis when compared to healthy controls. METHODS:

Seventeen patients with GA, who were candidates for total shoulder arthroplasty, and 8 healthy controls (C) were enrolled for this study. Patients were asked to perform multiple overhead reach and hairbrush tasks with both surgical (S) and non surgical sides (NS). Shoulder, neck, trunk, and pelvis kinematics were measured using human motion capture (Vicon) system. Data was processed and analyzed using MTALAB. One-way ANOVA analyses was run using SPSS.

RESULTS: Patients with GA presented with limited shoulder angle (Overhead reach: S:87.6° vs. NS: 106.1°, p=0.01, C: 121.8°, p=0.01; Hairbrush: S:59.2° vs. NS: 70.0°, p=0.14, C: 77.5°, p=0.03) and longer time to complete the tasks (Overhead reach: S:3.3s vs. NS: 2.2s, p=0.04, C: 1.6s, p=0.05; Hairbrush: S:1.7s vs. NS: 1.5s, p=0.33, C: 1.0s, p=0.01). These patients presented with compensation from their lumbar spine (S: -10.9° vs. NS: -5.3°, p=0.03, C: -2.5°, p=0.06) during overhead reach and cervical spine during hair brush (S:10.7° vs. NS: -4.1°, p=0.01, C: -3.8°, p=0.02) in comparison to H (Figure 1).

DISCUSSION AND CONCLUSION: Our findings demonstrate that there is statistically significant cervical and lumbar compensation during routine ADLs in patients with severe GA. We posit that these increased compensatory mechanisms may lead to further low back and neck pain if their GA is left untreated. Further research is needed to understand the specific risk and the degree of relief provided by arthroplasty.



Figure 1. Lumbar and cervical compensation of a representative patient with glenohumeral arthritis during overhead and hairbrush task.