Does Replication of Native Acetabular Anteversion Satisfy Recommended Hip-Spine Targets for Cup Orientation?

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INTRODUCTION:

This study aimed to assess whether replication of native acetabular anatomy would satisfy cup orientation recommended targets using three commonly described hip-spine algorithms. In doing so, we tested whether presence or absence of adverse spinopelvic characteristics influences ability to achieve cup orientation targets when replicating native anatomy and the agreement between algorithm recommendations. METHODS:

A prospective database was queried to identify patients with adverse (n=70) spinopelvic characteristics. These were ageand sex- matched with patients without adverse characteristics (n=70). Spinopelvic characteristics were obtained from radiographs and CT scans. CT scans were segmented to determine native acetabular anatomy, including anteversion as per transverse-acetabular-ligament (TAL). Three hip-spine planning algorithms were evaluated for each patient (Optimized Positioning System [OPS], Combined-Sagittal-Index (CSI), Hip-Spine Classification). Target inclination was set at 40°. Differences between target orientations and native anatomy for whole cohort and each group were determined. Agreement between algorithms were tested.

RESULTS:

No significant difference between OPS and native anteversions was seen $(18^{\circ}\pm6 \text{ vs } 18^{\circ}\pm6, p=0.1)$ for the adverse group. OPS planned anteversion was greater than native $(23^{\circ}\pm3 \text{ vs } 16^{\circ}\pm4, p<0.001)$ in the non-adverse group. Most native orientations met CSI targets (90% non-adverse, 59% adverse). Most native acetabular orientations (61% adverse and 58% non-adverse) failed to meet Hip-Spine classification targets. Overall, in 92% of cases replication of native acetabular version and 40° of inclination satisfied at least one suggested target. Agreement of all three algorithms was 15%; greater agreement was seen between CSI and OPS (50%).

DISCUSSION AND CONCLUSION: Native acetabular anteversion (as per TAL) and radiographic inclination of 40° are reliable targets and thus justifying such practice, when advanced hip-spine analysis not performed. The discrepancy between suggested orientations by the various published techniques emphasizes that, although achieving a target cup orientation is important, the nature of hip stability is multifactorial and merits a holistic approach.