Size and Location of Posterior Wall Fragment on CT Scan Predicts Hip Instability in a Cadaveric Model

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Purpose: Of all acetabular fractures, posterior wall fractures are the most common. While some studies have attempted to correlate fragment size and location with hip stability, controversy still remains. The purpose of our cadaveric study was to define posterior wall sizes and location that would help predict hip instability during an examination under anesthesia (EUA).

Methods: We conducted our study on 6 fresh human cadavers (12 hips), 4 M and 2 F with a mean age of 58 years (range, 49-72). Specimens underwent CT evaluation and were randomized to 3 groups based on the size of the osteotomy (fragment size [FS] 15%, 20%, and 25%). Osteotomies were performed based on CT scan measurements with FS determined in relation to the greatest depth of the posterior wall and fracture angle (FA) starting at 40° (Fig. 1). The hips underwent a standardized EUA (flexion adduction internal rotation axial loading [FADIR]) and if deemed stable, the FA was increased in 20° increments.

Results: In the group with FS of 15%, all hips were stable with a FA of 40° in all positions of EUA. Increasing the FA to 60° caused all hips to be unstable (25% dislocated, 75% subluxed). With an FA of 80°, 75% dislocated. In the group with FS of 20%, all 4 hips were unstable with an FA of 40° with 100% subluxation, and 100% dislocation rate when the FA was 60°. Finally, in the group with an FS of 25%, all hips subluxed when the FA was 40°. With an FA of 60° versus 80°, 50% and 100% of hips dislocated, respectively.

Conclusion: We identified that FS of 15% and FA of 40° were stable on EUA. Varying combinations of increasing FS size and increasing FA were all considered unstable. Our study provides data for a CT-based measurement predictive of hip instability based on FS and FA. More research is required to validate our data in a clinical setting.