

Reduction Quality After ORIF of Acetabulum Fractures: Surprisingly Low Interobserver and Intraobserver Reliability

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Purpose: Matta previously described a method for rating the quality of reduction of acetabular fractures on radiographs. While this system has been widely adopted and is prevalent throughout the literature, there is a paucity of evidence on its reproducibility. Given the importance of an anatomic reduction on functional and radiographic outcomes, an accurate and reliable system for assessing intraoperative quality of reduction is essential. The purpose of this study was to examine the interobserver and intraobserver reliability of this system when utilized with intraoperative fluoroscopy in order to validate this assessment technique.

Methods: This is an IRB-approved evaluation of a prospectively collected acetabular fracture database from a single orthopaedic trauma surgeon at a Level I trauma center. The quality of reduction of all acetabular fractures treated with open reduction and internal fixation (ORIF) between May 2013 and December 2015 was assessed using 3 standard intraoperative fluoroscopic views (AP and two 45° oblique Judets). Displacement of ≤ 1 mm was considered an anatomic reduction, 2-3 mm imperfect, and >3 mm poor. A total of 132 acetabular fractures were treated with ORIF during that time period. 21 patients were excluded for incomplete intraoperative fluoroscopic imaging and 4 patients were excluded for acetabular or femoral hardware that obscured the acetabulum on imaging, leaving a total of 107 (81%) patients available for analysis. Acetabular fracture reductions were reviewed by the operative surgeon at time of surgery and subsequently reviewed by 2 fellowship-trained pelvic/acetabular surgeons. All reduction assessments were performed in a blinded fashion. The primary outcome measure was interobserver reliability for assessing reduction quality. This was evaluated using a weighted kappa (κ_w) statistic between each reviewer and the operative surgeon and a generalized kappa (κ_g) for all 3 surgeons. After a 6-week "washout interval," the surgeons reviewed the images again and intraobserver agreement was calculated using a κ_w statistic.

Results: Interobserver reliability based on the initial assessment was low ($\kappa_g = 0.09$); however, it did slightly improve at the time of the second assessment to fair ($\kappa_g = 0.24$). Individual interobserver reliability between the operative surgeon and each other surgeon was also slight ($\kappa_w = 0.08$ and 0.11). Intraobserver reliability ranged from slight ($\kappa_w = 0.20$) to moderate ($\kappa_w = 0.53$) among the surgeons.

Conclusion: The widely used system described by Matta for assessing reduction quality of acetabular fractures demonstrated low interobserver and intraobserver reliability when used intraoperatively by fellowship-trained pelvic/acetabular surgeons. Further studies are necessary to validate this finding, but these results suggest that a more reliable system may be necessary for the evaluation of the quality of reduction of acetabular fractures following ORIF to aid in achieving an anatomic reduction.