

Treatment and Outcomes of Patients with Ipsilateral Acetabular and Femur Fractures: A Multicenter Retrospective Analysis

Lisa K. Cannada, MD¹; Hassan R. Mir, MD²; Justin Hire, CPT, MD³; Preston Boyer, BS¹; Heidi Israel, PhD, RN¹; Jason Halvorson, MD⁴; Gregory J. Della Rocca, MD, PhD, FACS⁵; Bryan Ming, MD⁶; Brian Mullis, MD⁷; Chetan Deshpande, MD⁸

¹Saint Louis University, St. Louis, Missouri, USA;

²Florida Orthopaedic Institute, Temple Terrace, Florida, USA;

³Dwight D. Eisenhower Army Medical Center, Fort Gordon, Georgia, USA;

⁴Wake Forest University School of Medicine, Winston-Salem, North Carolina, USA;

⁵University of Missouri School of Medicine, Columbia, Missouri, USA;

⁶UNT Health Bone & Joint Institute, Fort Worth, Texas, USA;

⁷Eskenazi Health, Indianapolis, Indiana, USA;

⁸Mercer University, Macon, Georgia, USA

Purpose: The combination of ipsilateral acetabular and femur fractures are uncommon and associated with high-energy mechanisms. Orthopaedic complications from this combination may include heterotopic ossification (HO), osteonecrosis (ON) of the femoral head, and post-traumatic arthritis (PTA). There is a paucity of literature investigating the optimal treatment and outcomes. The goals of this study are to investigate the outcomes and complications of ipsilateral acetabular and femoral fractures.

Methods: A retrospective review of patients treated for ipsilateral acetabular and femoral fractures (excluding femoral head) was performed between 2007-2013 at 8 Level I trauma centers. Injury data and surgical details were collected. Surgical details included approach, positioning, and implant; order and timing of fixation (single/multiple procedures). The femoral fractures were classified according to the OTA classification system and according to Letournel for acetabular fractures. Nominal data were analyzed using χ^2 analysis or Fisher's exact test as appropriate. Categorical data were analyzed using Mann Whitney *U* test. Analysis of variance (ANOVA) was performed to model combinations of variables.

Results: 101 patients met inclusion criteria and had sufficient data for analysis. There were 64 males and 37 females with an average age of 37 (range, 17-78). The median follow-up was 11 months. 87 patients (86%) were injured in either a motor vehicle or motorcycle crash. 54 patients had elementary and 47 had associated/combined pattern acetabular fractures. Age of 45 or greater was significantly associated with marginal impaction of the acetabular fracture ($P = 0.001$). There were 52 proximal, 41 shaft, and 8 distal femur fractures. 26 patients underwent stabilization of both fractures during the same anesthetic. 16 patients underwent fixation of both fractures using the same incision. Seven patients (7%) had ON, 29 (29%) had HO, 18 (18%) had PTA, and 14 (14%) had DVT/PE (deep venous thrombosis/pulmonary embolism). There were 9 superficial and 8 deep infections, resulting in an aggregate infection rate of 17%. 15 patients required additional surgery on their acetabular fracture, 12 required additional surgery on their femur, and 6 required additional surgery at both sites. The rate of ON was significantly higher in the associated/combined acetabular fractures with proximal femur fractures ($P < 0.05$). The rate of DVT (20%) in femoral shaft fractures with acetabular fractures was significantly higher than other femur fracture

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locations ($P < 0.05$). In addition, the rates of DVT and PE were significantly associated with age and time to surgical fixation ($P < 0.05$).

Conclusion: This is the largest study to report the results of surgical treatment of ipsilateral acetabular and femoral fractures. In this cohort, approach and implants for fracture fixation had no impact upon the complication rate. Statistical analysis demonstrated the complications that occurred are multifactorial. The authors found that increased age was significantly associated with a higher risk of marginal impaction, DVT and PE ($P < 0.05$), and longer time between admission and fixation of either fracture was significantly associated with higher rates of DVT, PE, and superficial infection ($P < 0.05$). The complication rates for ON were found to be significantly higher when the associated acetabular fractures coexist in the same region (acetabular fracture and proximal femur). This study provides useful information regarding the prognosis and clinical outcome of patients with this predominantly high-energy injury complex.