

Implementation of a Novel MRI Protocol for Diagnosing Femoral Neck Fractures in High-Energy Femur Fractures: 1-Year Outcomes

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Purpose: Preliminary results using a novel rapid-sequence MRI study to diagnose ipsilateral femoral neck fractures in patients who sustained high-energy femoral shaft fractures has been favorable compared to radiographic and CT imaging alone. To evaluate and optimize this new institutional imaging protocol further, we evaluated our results 1 year after implementation.

Methods: Rapid-sequence MRI was added to the imaging evaluation of patients with high-energy femoral shaft fractures without femoral neck fractures identified on radiographs or CT imaging. Data from the first year were retrospectively reviewed from a consecutive series of patients who met inclusion criteria.

Results: From September 2018 through September 2019, 114 patients sustained 121 high-energy femoral shaft fractures. The average patient age was 29.9 years, 73.7% (84/114) of patients were male, and 16.5% (20/121) were open fractures. Of patients indicated for an MRI, 86% (92/107) underwent MRI. Excluding patients with time to MRI >36 hours due to their medical condition, the average time from emergency department (ED) admission to MRI was 10.46 hours. 5% (6/121) of patients had an ipsilateral femoral neck fracture identified on radiographs alone. Three additional femoral neck fractures were identified with added CT imaging for an initial incidence of 7.4% (9/121). With the addition of MRI, 10 more femoral neck fractures were identified, for an incidence of 15.7% (19/121). Of the 10 fractures seen on MRI only, all were nondisplaced, 3 were complete, and 7 were incomplete.

Conclusion: The addition of a rapid-sequence MRI study of the pelvis in patients with high-energy femoral shaft fractures reliably increases the diagnosis of ipsilateral femoral neck fractures not identified with standard imaging. There were no cases of missed/delayed femoral neck fractures in patients with negative MRI. This new imaging protocol effectively and safely improves the diagnosis of this injury pattern.