Improving the Diagnosis of Ipsilateral Femoral Neck and Shaft Fractures: A New Imaging Protocol

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Purpose: Despite increased awareness of ipsilateral femoral neck and shaft fractures in patients with high- energy injuries, the misdiagnosis rate remains 6%-22%. The purpose of this study was to determine if the diagnosis of ipsilateral femoral neck fractures in patients with high-energy femoral shaft fractures can be improved with MRI compared to radiographic and CT imaging.

Methods: Beginning in September 2018, the imaging protocol for acute high-energy femoral shaft fractures was altered to include rapid-sequence MRI of the pelvis and the proximal femurs to assist in diagnosing acute ipsilateral femoral neck fractures. All patients with acute high-energy femoral shaft fractures received standard radiographic imaging as well as thin-cut pelvis CT imaging at the time of presentation. These patients were then placed in skeletal traction, and rapid-sequence MRI of the pelvis was obtained. The primary sequences for evaluation of proximal femur fractures were confined to a large field of view coronal T1 and coronal STIR (short-tau inversion recovery). These are limited short sequences, which take less than 10 minutes.

Results: During the 4-month study period, 37 consecutive patients presented with 39 acute, high-energy femoral shaft fractures. The average patient age was 29.1 years (range, 14-82), and 28 patients were male while 9 were female. 10 of 39 (25.6%) femoral shaft fractures were open. Two femoral shaft fractures (5.1%) had ipsilateral femoral neck fractures detected on radiographs. Of the remaining 37 femoral shaft fractures, none had a femoral neck fracture definitively identified on thin-cut CT imaging. 33 of 37 (89%) underwent large field of view pelvis and proximal femur MRI to evaluate the ipsilateral femoral neck. Four patients (12.1%) were diagnosed with a femoral neck fracture, not identified on CT or radiographic imaging. Two of these were complete and 2 were incomplete femoral neck fractures. In all 4 of these patients, the operative plan and rehabilitation protocol was changed based on these findings.

Conclusion: Based on a change in imaging protocol to include MRI for evaluation of ipsilateral femoral neck fractures in acute high-energy femoral shaft fractures, our early results suggest the number of femoral neck fractures may be underrepresented compared to radiographic and CT imaging alone. Importantly, due to the rapid sequences used for the MRI, we were able to obtain this imaging in a high percentage of polytrauma patients without altering their overall care. This new imaging algorithm will continue to improve our diagnosis of ipsilateral femoral neck and shaft fractures and optimize the care of patients with high-energy injuries.

See the meeting app for complete listing of authors' disclosure information.