Establishing Radiographic Guidelines in Postoperative Care of Lower Extremity Fractures

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Introduction: Studies are beginning to question the usefulness of routine radiographs obtained early in the postoperative course following fracture fixation. The goal of this study was to investigate the cost-effectiveness and clinical utility of radiographs at all time points following internal fixation of lower extremity fractures.

Methods: A retrospective chart review was conducted at a level I trauma center. Four hundred eighty-five (485) patients with 586 operatively treated lower extremity fractures were included. These fractures represented all AO/OTA classification codes for the femur and tibia. Variables related to patient demographics, fracture characteristics, clinical management and outcomes were collected. Data was analyzed to investigate the impact of radiographs on changes in management at all follow-up clinic visits for each type of fracture.

Results: Each fracture received, on average, 4.8 radiographs following fixation for a total cost of $747,496. The management of 30.7% of fractures deviated from the expected postoperative course. The most common changes in management were return to the operating room (36%), workup or treatment for infection (21%), and prolonged weight bearing restriction (18%). These changes were most frequently made based on history and physical exam (H&P) findings alone (47%). Thirty-one percent (31%) of changes were due to radiographic findings alone and these changes occurred at very specific time intervals: 1) in the immediate post-operative period (0.5% of changes) and 2) in the period from consideration of advancement to full weight bearing up until confirmation of fracture union (30.2%). Radiographs obtained between the immediate postoperative period and the weight bearing as tolerated visit did not lead to any changes in management in the absence of positive findings on history and physical exam. Similarly, films obtained after confirmation of union did not lead to changes in management. If non-clinically indicated imaging was eliminated in our cohort, 38% of radiographs could have been eliminated without any changes in clinical outcome. This would have resulted in a cost savings of approximately $350,000. Using these findings, we developed a postoperative radiographic guideline for lower extremity fractures with emphasis on optimal timing for clinical decision-making and the importance of clinical indications. Application of this guideline to operatively treated lower extremity fractures from a single year ins the Healthcare Cost and Utilization Project's National Inpatient Sample database would have led to a potential national cost savings of over $350 million.

Conclusions: Radiographs obtained following operative treatment of lower extremity fractures contribute to changes in patient management in the absence of clinical indications 1) in the immediate postoperative period in select cases where intraoperative fluoroscopy may be inadequate, and 2) during the period when advancement to full weight bearing is considered up until confirmation of fracture union. Imaging in the absence of clinical indications may be eliminated 1) in the period prior to consideration of advancement to full weight bearing and 2) after confirmation of fracture union. This study presents evidence-based recommendations for improving the cost-effectiveness of postoperative radiographic utilization when treating lower extremity fractures.

See pages 47 - 108 for financial disclosure information.