

An Economic Analysis on the Role of Radiographs and Office Visits in the Follow-up of a Healed Intertrochanteric Hip Fracture

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Purpose: The purpose of this study was to evaluate the role and the necessity of radiographs and office visits obtained during the follow-up of intertrochanteric hip injuries after the fracture had healed radiographically.

Methods: A retrospective review was performed at two academic Level I trauma centers to identify all patients >60 years of age with documented radiological and clinical union of the hip fracture with a minimum follow-up of 1 year treated between January 2009 and August 2014. Radiological union was defined as visible osseous bridging on at least 3 cortices on AP and lateral views. The reduction was considered good if there was normal or slight valgus on alignment on the AP radiograph, less than 20° of angulation on the lateral radiograph, and less than 4 mm of displacement of any fragment. The reduction was considered acceptable if there was a good reduction with respect to either alignment or displacement, but not both. The reduction was graded poor if neither criterion was met. The number of office visits and radiographs obtained after the fracture had healed was documented specifically. Clinical charts were reviewed at each follow-up visit and any specific complaints were noted. The radiographs obtained during each follow-up were evaluated for fracture alignment, implant position, healing characteristics, and any pathological changes including arthritis, osteonecrosis, and heterotopic ossification. The amount paid by the Centers for Medicare and Medicaid services (CMS) to the institution for radiographs and clinic visit (E3 visit) was noted. Overall costs that would have been saved by avoiding additional radiographs and clinic visit were computed.

Results: A total of 465 patients (females 293, males 172) with an average age of 77.2 years (range, 60-98) met the criteria. The mechanism of injury included 411 low-energy ground level falls (89%), 22 motor vehicle accidents/motorcycle accidents (5%), 4 auto versus pedestrian (1%), and 23 others (5%). The most common fracture types were 203 OTA 31-A1 (44%), 171 OTA 31-A2 (39%), and 91 OTA 31-A3 (17%). Of the 465 fractures, the quality of reduction based on immediate postoperative radiographs was graded as good in 188 fractures (40%), acceptable in 253 fractures (55%), and poor in 21 fractures (5%). The surgical fixation of 465 fractures included 155 short nails (33%), 232 long nail (50%), 69 sliding hip screw devices (15%), and 7 trochanteric blade plates (2%). The average fracture healing time was 12.8 weeks (range, 6-22 weeks). Of the 465 patients with an average follow-up of 81.2 weeks (range, 52-368), radiographs of 455 patients (96%) obtained after the fracture healed did not reveal any changes including fracture alignment, implant position, or any other pathological changes. Radiographic changes visualized included 3 heterotopic ossification (1%), 3 hip arthritis (1%), 3 osteonecrosis of the hip (1%), and a case of helical blade

migration (0.5%). 8 of these 10 patients were symptomatic and 2 patients with heterotopic ossification on radiographs were asymptomatic. The average number of elective office visits and radiographs obtained after the fracture had healed were 3.1 (range, 1-8) and 2.8 (range, 1-8) respectively. According to Medicare refunds to the institution, radiographs and office visits accounted for direct costs of \$360.81 and \$192 respectively per patient.

Conclusion: The current study strongly suggests that there is a negligible role for elective office visits and radiographs during a follow-up of well-healed hip fracture, if there is a documented evidence of radiographic healing along with acceptable fracture alignment and implant position. Implementation of this simple measure leads to minimizing the direct cost by approximately \$520 per patient as well as inconvenience to the elderly.