The Extended-Short Nail System: A Novel Concept in the Management of Proximal Femur Fractures

Study Summary

OBJECTIVE

Medical device and surgical technique advancements have prompted the shift in management of proximal femur fractures from extramedullary devices to intramedullary (IM). The numerous benefits of the IM technique include reduced blood loss, less soft-tissue dissection, shorter surgical time, and quicker return to weight-bearing. The Extended-Short (ES) Nail System offers the mechanical characteristics of long IM nails and facilitates proximal screw placement through a specialized targeting system. The purpose of this retrospective clinical study was to report minimum 2-year outcomes of the first 150 patients who received the ES nail for intertrochanteric (IT) fracture.

STUDY DESIGN AND METHODS

Patients presenting with IT fractures at a single community hospital emergency department between May 2006 and April 2008 were consented prior to surgery. Patients with pathologic fractures and those not medically cleared for surgery were excluded from participation. The data reported in this study includes patients who were exclusively treated with the ES nail.

The following variables were assessed for this patient cohort: age, sex, comorbidities, pre-fracture living conditions, fracture classification, intraoperative and postoperative complications, blood transfusion, discharge location, and date of fracture union. Fracture pattern was assessed with preoperative radiographs and graded as type A1, A2, or A3 according to the AO classification system.

IM nailing was performed as standard of care, and patients were followed up at intervals of 2 to 4 weeks until the fracture was deemed healed, based on physical examination, ambulatory status, pain with weight-bearing, and radiographic union (defined as bridging callus formation across 3 or more cortices). Radiographs were obtained at 1 and 2 years postoperatively to assess fracture healing and implant position. Additionally, patients and families were interviewed retrospectively at the 1- and 2-year follow-up visits to assess pre-fracture activity level with the UCLA Activity Scale.

RESULTS

Baseline Data

Of the 150 subjects assessed for this study, 36 were male and 114 were female.

Preoperative radiograph assessment reveals 67 (44.7%) fractures were classified A1, 60 (40%) were A2, and 23 (15.3%) were A3. Additionally, 67 (44.7%) fractures were stable (Table 1).

Operative Data

The mean (range) time from hospital admission to surgery was 1.6 (0-21) days. Mean operative time from skin incision to end of wound closure was 27.4 (18-41) minutes.

Mean operative blood loss was 196 (SD 43) mL per patient. The need for blood transfusion was assessed based on hemoglobin and hematocrit levels, along with clinical evaluation. Five patients required a blood transfusion before surgery, and 92 patients (61.3%) received a blood transfusion after surgery.

The IM fixation with the ES hole was used in all cases and provided sufficient fracture stabilization. Locking at the distal hole was not used in this cohort.

Surgical complications include 2 superficial wound infections and 3 hematomas. All complications were resolved with conservative management.

Seventy-one patients (47.3%) were admitted to the acute rehabilitation ward, 62 (41.3%) were transferred to a skilled nursing facility, 16 (10.7%) were discharged home, and 1 (0.7%) died in hospital as a result of comorbidities.

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Clinical Outcomes

Nineteen patients (12.7%) were lost to follow-up within the first year after hospital discharge, and 26 patients (17.3%) died within the first year of the index procedure. The cumulative 1-year mortality rate was 18%. Therefore, 104 patients (84.6%) constitute 1-year follow-up data. No evidence of nonunion, implant failure, cutout, or fixation failure was observed. Two of the 104 patients (1.9%) fell after surgery (at 5 weeks and 11 weeks) and sustained femoral shaft fractures distal to the ES hold and proximal to the tip of the nail. These cases were managed with closed reduction under fluoroscopic assistance and stabilized with 2 distal locking screws.

Time to union in the 104 patients who were available at 1-year follow-up was 11.3 (SD 2.2) weeks. The mean (SD) UCLA Activity Scale score was 3.0 (1.2) before fracture and 3.5 (1.4) at 1-year follow-up. Sixty-five patients (62.5%) returned to pre-fracture activity level.

At the 2-year interval, 112 patients were alive, and 93 (83%) were available for follow-up. The mean (SD) UCLA Activity Scale score for the 93 patients was 3.9 (1.2) before fracture, 3.6 (1.4) at 1-year, and 3.5 (1.4) at 2-year follow-up. Fifty-four patients (58.1%) returned to pre-fracture activity level.

Prior to fracture, 38 of the 150 patients lived in a skilled nursing facility, and 112 lived independently. The mean (SD) pre-fracture UCLA activity score was 3.9 (1.2).

Documented comorbidities included cardiovascular disorder (n=75), endocrine/metabolic disorder (n=54), neurologic disorder (n=49), gastrointestinal disorder (n=18), respiratory disorder (n=14), and genitourinary disorder (n=4). Previously documented osteoporosis was noted in 41 patients.

CONCLUSION

This retrospective analysis of the first 150 patients treated with the ES Nail System for IT fractures demonstrates the system as an effective option for the management of IT hip fractures, as evidenced by stable fixation, a high union rate, a favorable rate of return to pre-fracture activity level, and a low complication rate.

Table 1. Clinical Data Summary

Demographics and AO Classification (N = 150 patients)	
Sex	36 M/114 F
AO classification	A1: 67, A2: 60, A3: 23
Operative Data	
Hospital admission	1.6 days (range: 0-21)
Operative time	27.4 minutes (range: 18-41)
Blood loss	196 (SD 43) mL
Postoperative discharge	Acute rehabilitation: 71 Skilled nursing facility: 62 Patient home: 16
Hospital deaths	1
2-Year Follow-Up	
Death	11
Available for follow-up	n=93
UCLA Activity Scale score, mean (SD)	Before fracture: 3.9 (1.2) 1-year: 3.6 (1.4) 2-year: 3.5 (1.4)

Reference

1. Wright RC, Yacoubian SV, Salzman GA, Raven RB 3rd, Falkinstein Y, Yacoubian SV. The extended-short nail system, a novel concept in the management of proximal femur fractures. *Am J Orthop (Belle Mead NJ).* 2011;40(12):630-635.