Research Article ISSN 2689-1093

Surgical Research

Primary Arthroplasty for Unstable Peritrochanteric Fractures in the Very Old: A Two-Patient Illustrative Series and Evidence-Informed Rationale

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Received: 10 Nov 2025; **Accepted:** 27 Dec 2025; **Published:** 08 Jan 2026

Citation: Chi-Ming Chiang. Primary Arthroplasty for Unstable Peritrochanteric Fractures in the Very Old: A Two-Patient Illustrative Series and Evidence-Informed Rationale. Surg Res. 2026; 8(1): 1-3.

ABSTRACT

Background: *In very old patients with osteoporotic, unstable peritrochanteric fractures, the optimal index surgery remains debated. While cephalomedullary nailing is guideline-recommended for many unstable patterns, early full-weight bearing after primary arthroplasty may shorten recumbency in the frailest patients. We report two illustrative patients (ages 78 and 95 years) treated with primary arthroplasty and synthesize contemporary evidence.*

Methods: *Both patients presented with AO/OTA 31-A2/A3 morphology and severe osteopenia on radiographs. One underwent total hip arthroplasty (THA) and one bipolar hemiarthroplasty through a posterolateral approach. Early mobilization protocols targeted chair-standing on day 1 and supervised ambulation by day 2. Radiographic endpoints were restoration of offset, leg length, and stable implant position; clinical endpoints were pain control and safe transfer/ambulation.*

Results: *Immediate postoperative films demonstrated stable component positioning and restoration of hip center in both cases (Figures 2–4). Both patients mobilized with protected weight bearing within 48 hours, without early mechanical failure. Conclusions: In selected very old patients with poor bone quality and unstable peritrochanteric patterns, primary arthroplasty can be a pragmatic, time-efficient pathway to early mobilization. Contemporary trials and meta-analyses suggest that while cephalomedullary nails remain standard care, hemiarthroplasty yields comparable hip scores with fewer cut-out events at the expense of higher superficial infection risk. Evidence for cement augmentation of nails is mixed. These cases illustrate an evidence-informed rationale for individualized arthroplasty when fixation would not plausibly allow immediate full weight bearing.*

Keywords

Peritrochanteric fracture, Intertrochanteric, Hemiarthroplasty, Total hip arthroplasty, Frailty, Cement augmentation, Cephalomedullary nail.

Introduction

Unstable peritrochanteric fractures (AO/OTA 31-A2/A3) in very old patients carry high short-term morbidity and mortality. The American Academy of Orthopaedic Surgeons (AAOS) recommends cephalomedullary nailing for unstable patterns, with surgery within 24–48 hours as feasible [1]. Nevertheless, fixation in profoundly osteoporotic bone can delay full weight bearing and is vulnerable to varus collapse or cut-out. Cement augmentation of intramedullary devices improves screw purchase biomechanically, yet randomized data show limited functional advantage [2]. By contrast, primary arthroplasty can provide immediate stability and allow early unrestricted transfers and gait; comparative trials and network meta-analyses suggest similar functional outcomes to nails, with trade-offs in operative time and wound complications [3,4].

Case Descriptions

Case 1 (age 78, female). Preoperative anteroposterior (AP) pelvis and cross-table lateral radiographs show an unstable right peritrochanteric fracture with comminution at the lesser and greater trochanters and medial calcar incompetence (Figure 1A–

B). Primary THA was performed. Immediate postoperative AP and lateral films confirm anatomic hip center restoration, neutral stem alignment, and a well-seated acetabular component with appropriate inclination and anteversion (Figure 2A–B). A standing long-leg radiograph demonstrates coronal alignment and limb length symmetry without subsidence (Figure 2C).

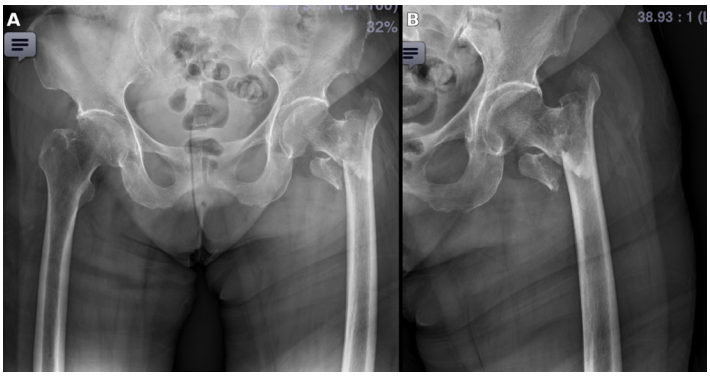

Figure 1: Case 1 (78-year-old female), preoperative radiographs. (A) AP pelvis shows an unstable right peritrochanteric fracture with calcar disruption and trochanteric comminution. (B) Cross-table lateral confirms posterior sag and loss of posterior support.

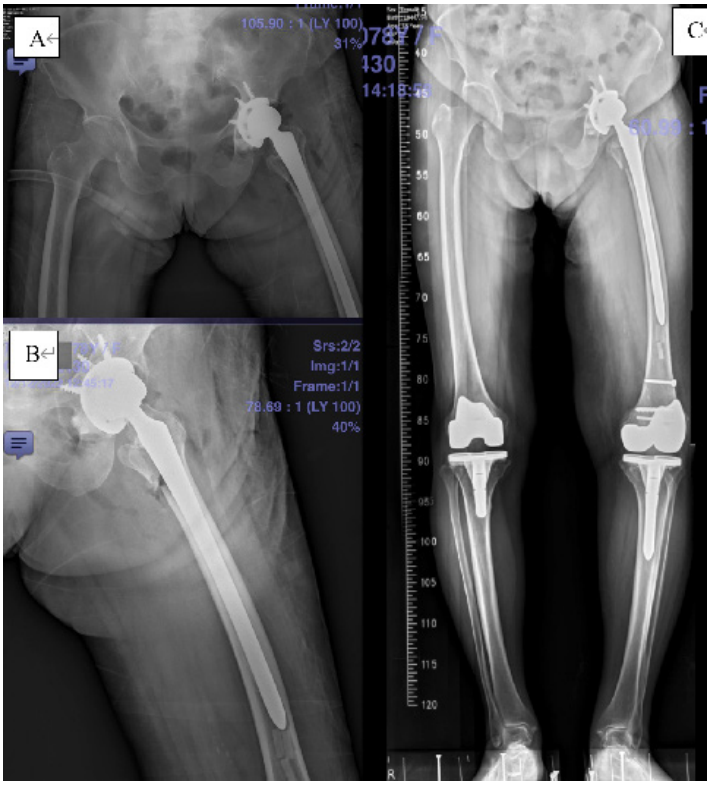

Figure 2: AP pelvis (A) shows restoration of hip center, offset, and leg length with a neutrally aligned femoral stem. Lateral view (B) demonstrates appropriate acetabular inclination/version and a stable femoral component without periprosthetic fracture or dislocation following a posterolateral approach and posterior repair. (c) Full-length hip-to-ankle AP image demonstrates neutral coronal alignment with symmetric limb lengths and no radiographic evidence of femoral stem subsidence or malposition; overall mechanical axis is maintained to permit unrestricted gait training..

Case 2 (age 95, female). AP pelvis and lateral images demonstrate an unstable left peritrochanteric fracture with severe osteopenia (Figure 3A–B). Given age, bone quality, and preinjury limited reserve, cemented bipolar hemiarthroplasty was selected to permit immediate full weight bearing. Postoperative AP and lateral images show a stable press-fit stem with cement mantle at the calcar and restored offset and leg length; there is no periprosthetic fracture or dislocation (Figure 3C–D).

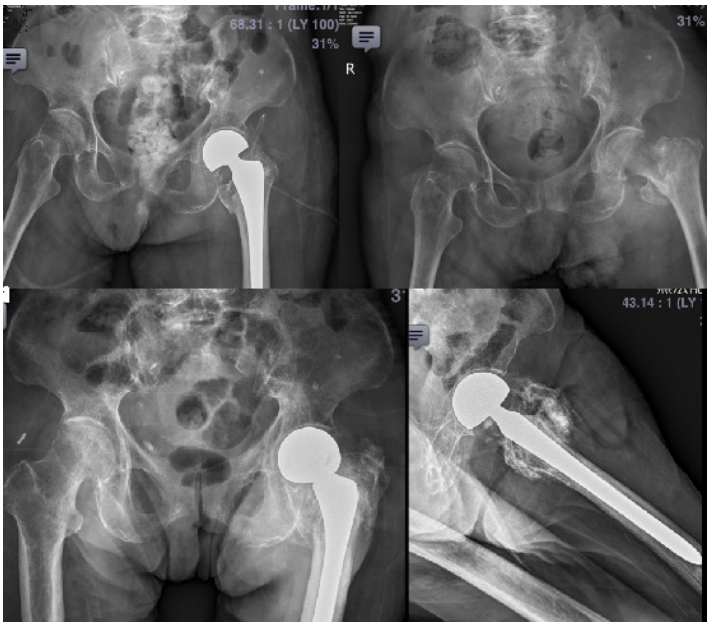

Figure 3: Upper panel, preoperative shows an unstable left peritrochanteric fracture (AO/OTA 31-A2/A3) with calcar deficiency and trochanteric comminution in markedly osteoporotic bone (injured hip on the image's right side). Postoperative demonstrates a bipolar hemiarthroplasty with restoration of hip center, offset, and limb length; the femoral stem is neutrally aligned. lower panel, Postoperative AP and lateral following cemented bipolar hemiarthroplasty demonstrate concentric reduction, restoration of offset/length, and a stable construct without early periprosthetic complication, enabling immediate full weight bearing.

Surgical rationale and perioperative pathway

Selection of primary arthroplasty followed a simple decision rule: (i) fracture instability with calcar deficiency; (ii) very old age with frailty and sarcopenia; (iii) radiographic osteoporosis that makes immediate full weight bearing after fixation implausible; and (iv) caregiver/environment favoring rapid transfer training. Operations were performed through a posterolateral approach with careful restoration of offset/leg length and routine posterior repair. Weight bearing as tolerated began on postoperative day 1 with a walker.

Discussion

For unstable peritrochanteric fractures, strong-quality guidelines support cephalomedullary nails as default fixation [1]. Cement augmentation of PFNA can reduce tip–apex migration and mechanical failure in osteoporotic bone, but a multicentre

randomized trial did not detect superiority in early mobility compared with non-augmented nails [2]. Recent network meta-analysis of randomized trials suggests that hemiarthroplasty and PFN achieve comparable Harris Hip Scores; PFN has lower superficial infection risk, whereas arthroplasty avoids cut-out events [4]. Observational data further indicate that joint replacement may enable earlier ambulation and reduce bed-related complications in selected very old, osteoporotic patients [3]. Our two cases illustrate radiographic stability and rapid mobilization—core goals for this population—while acknowledging trade-offs: greater blood loss and implant cost compared with short nails. Cost-effectiveness analyses suggest cement augmentation of nails may be economically attractive when it prevents reoperation, but payer perspectives and local implant prices vary [5]. We therefore propose a **logic-based algorithm** for this specific cohort: when the input variables—calcar incompetence, severe osteoporosis, and limited physiological reserve—predict a high probability of fixation failure, the surgical objective must shift to **deterministic stability**. In this context, primary arthroplasty minimizes the **'time-to-mobilization'** variable, serving as a strategic solution rather than just an alternative.

Limitations

This is an illustrative two-patient series without standardized functional scores. Our intent is to transparently report radiographic endpoints and the decision logic guiding index arthroplasty. Prospective registries are needed to stratify by instability pattern, bone quality, and frailty.

Conclusion

Primary arthroplasty provided **deterministic stability** allowing immediate mobilization. Given the probabilistic risks of screw cut-out in osteopenic bone, individualized selection should be modeled on a 'zero-tolerance for immobility' principle. When the biological cost of fixation failure exceeds the surgical risk, arthroplasty becomes the **mathematically sound solution**.

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