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# Indications for Distal Femoral Replacement Arthroplasty in Acute Geriatric Distal Femoral Fractures

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**Distal intraarticular femoral fractures in the elderly are associated with significant morbidity and mortality and represent a difficult clinical situation for the treating orthopaedic surgeon. Challenges are due to high levels of comminution secondary to osteoporotic bone which limits traditional fixation techniques. Furthermore, these injuries occur in the setting of patients with complex medical co-morbidities which benefit from rapid mobilization. Primary distal femoral replacement arthroplasty has emerged as a viable option for the management of distal femoral fractures in the native knee in the elderly population. In the appropriate patient population, surgeons should consider this technique in the acute setting.**
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**KEYWORDS** distal femur fracture, distal femoral replacement, arthroplasty

## Introduction

Distal femoral fractures account for 3%-6% of all fractures of the femur.[1-3] These fractures occur in a bimodal distribution with younger individuals experiencing fractures as the result of high energy trauma and geriatric patients as a result of low energy trauma secondary to poor bone quality. Fractures of the distal femur occur at an incidence of 4.5 per 100,000 adults,[2] with half occurring in patients older than 70 years of age.[4] Fractures occurring in the elderly largely occur in females due to osteoporotic nature of their bone, with a male-to-female ratio of 33:67[2] with many as a result of fall from standing[5]. This number will continue to increase as the aging population continues to expand.[1,2]

Operative management of distal femoral fractures in the elderly is challenging due to the potentially high degree of fracture comminution, poor bone quality limiting fixation, osteochondral damage, and pre-existing arthritis and deformity, all of which occur in the context of a medically complex patient population with the need to mobilize rapidly to avoid the known complications of prolonged recumbency.[6-8] Distal femoral fractures in the elderly have a 1-year mortality rate as high as 22% with a significant decrease in function and quality of life.[6] Additionally, reports of late above-knee amputation are as high as 9%[6] following open reduction and internal fixation (ORIF).

Multiple fracture fixation techniques and implants have been designed and utilized in the management of distal femoral fractures in the elderly[8-18] however, despite the rapid evolution of technology and techniques, these fractures remain associated with significant disability, morbidity, and mortality. Nonunion in these fractures is common with incidence of up to 20%, leading to high rates of reoperation and prolonged recovery times with associated complications thereof.[19-22] It is known that osteoporotic bone is less able to support internal fixation to resist axial and torsional loading or to buttress impacted articular segments.[23] Furthermore, many patients that go onto fail open reduction internal fixation will ultimately be converted to delayed total knee arthroplasty making primary arthroplasty more technically difficult secondary to the inherent complexity of the multiply operated knee.[24]

In recent years primary arthroplasty has been established as a viable option for the acute management of fractures around the hip, shoulder,[25] and distal humerus[26] in the elderly. Multiple randomized controlled trials have shown arthroplasty confers superior outcomes to open reduction and internal fixation in patients with displaced femoral neck

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fractures in the elderly and has now emerged as the standard of care.[27-31] In the aforementioned studies, arthroplasty has been associated with lower rates of reoperation, higher health-related outcome scores, and better mobility. Potential benefits of arthroplasty in the geriatric distal femur population include negating the need of bone healing, low reoperation rate, and immediate weight bearing and mobilization.

Literature surrounding the non-neoplastic use of distal femoral replacement (DFR) arthroplasty has largely been in the context of nonunion surgery[32-34] or periprosthetic fractures above total knee arthroplasties.[35-38] Literature regarding the use of DFR arthroplasty in the setting of acute native distal femoral fractures is less robust, however when used in the appropriate setting,[7,33,39-41] outcomes are promising. The goal of this review is to discuss the indications, surgical technique, and outcomes associated with the use of DFR arthroplasty in the setting of acute distal femoral fractures of the native knee in elderly patients.

## Indications

Strict indications for the use of distal femoral replacement for acute distal femoral fractures have not been formulated, however, this technique should be considered in elderly patients. In our practice this technique is usually limited to patients 75 years or older that are stable enough medically to endure anesthesia and surgery. DFR should be considered in patients with severely comminuted distal femoral or articular fractures (AO type: B2, B3, C2, and C3[42]) in cases where lack of adequate bone stock limits reliable fixation (Fig. 1). Further considerations should be given to the presence of poor osteoporotic bone quality, the potential need for rapid


**Figure 1** Injury films of a 71-year-old obese female with pre-existing osteoarthritis who presented to the emergency department after a ground level fall to her left knee. (A and B) Prereduction AP and lateral radiographs of a left distal intra-articular femur fracture. (C and D) Postreduction radiographs of an intraarticular comminuted distal femur fracture.