

## Optimal Hip Fracture Management In High-Risk Frail Older Adults

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### CASE #1 NON-OPERATIVE CASE

Mr. G, age 84, fell on the ice and suffered a right hip fracture. His medical history included heart disease, diabetes, emphysema, and asbestosis. Before the fall, he was oxygen-dependent but living independently. His surgery was delayed while his pulmonary status was assessed. Unfortunately, he developed complications; and it was decided not to operate. After discharge to a rehabilitation facility, he suffered from pain, anorexia, constipation, delirium, aspiration pneumonia, pressure ulcers, weight loss, and cognitive and functional decline. After multiple hospitalizations, the family and patient elected hospice care. The patient died 3 months after the fracture.

### CASE #2 OPERATIVE CASE

Mrs. J, age 88, suffered a fall and sustained a displaced right femoral neck fracture. She lived independently with her husband, walked with a cane, and had a history significant for interstitial lung disease and coronary artery disease. She was admitted to the hospital and underwent uncomplicated right hip hemiarthroplasty. Although it was difficult to wean her off the ventilator, she was extubated and sent to the floor. She remained in the hospital due to persistent wound drainage, and also needed oxygen. Early on the morning of post-operative day #7, she developed respiratory distress and was transferred again to the intensive care unit and intubated, and treated for sepsis presumed secondary to pneumonia. Two days later, after a family meeting, the patient was made "comfort measures only" and died that day.

These cases demonstrate the complexities of managing high-risk patients. This paper presents some of the important orthopedic and medical concerns in managing these patients.

### OVERVIEW OF HIP FRACTURES IN OLDER PERSONS

In 2006, the National Center for Health Statistics reported 330,000 hospital admissions for hip fracture: 293,000 (89%) occurred in patients over the age of 65; 238,000 (72%) affected women.<sup>1</sup> Hip fractures have a significant impact on mortality and functional status. Various studies have looked at one-year mortality following hip fracture; results range

from 14 to 36%.<sup>2</sup> A large prospective study of operative hip fractures found that 41% of patients regained their preoperative ambulatory status, 40% required assistive devices, 12% became limited ambulators, and 8% became nonambulatory.<sup>3</sup> While hip fractures in the young, healthy population are rare high-energy injuries, those in the geriatric population are low-energy fractures often associated with osteoporosis.

The term hip fracture can refer to fractures of the femoral neck, or intertrochanteric or subtrochanteric regions. These anatomical distinctions are important, because different degrees of vascular disruption and mechanical stability will affect both treatment and prognosis.

*Femoral neck fracture* - displacement of the fragments indicate that the blood supply to the femoral head has been disrupted, with the subsequent likelihood of avascular necrosis of the femoral head even if the fragments are anatomically reduced. While a nondisplaced fracture may be fixed with screws alone, a displaced fracture necessitates prosthetic replacement of the femoral head.

*Intertrochanteric fracture* - the blood supply to the femoral head is usually preserved, and the fracture may or may not

**Table 1: Risk Factors for Poor Outcomes in Hip Fracture Patients**

Pre-existing Factors	Preoperative Factors	Postoperative Factors
Age	Type of fracture	Overall prognosis
Baseline functional status	Open or closed fracture	Risk for non-healing surgical repair
Baseline Mobility	Additional injuries	Risk of severe agitation or delirium
Baseline cognitive status	Rhabdomyolysis	Risk of post-operative fall and injury
Dementia	Time since fracture	Risk of worsening nutritional status
Nutritional status	Delay in surgery	Risk of inability to extubate
ASA score	Delirium	
Severity of Osteoporosis	Degree of pain	
Lung disease		
Cardiac disease		
Renal disease		
Anticoagulation		
Terminal Illness		

**Table 2: Outcomes for hip fracture patients treated operatively and non-operatively**

	<b>Operative (n=46) n (%)</b>	<b>Non-Operative (n=38) n (%)</b>
<b>Complications</b>		
Urinary Tract Infection	7 (15)	10 (26)
Pneumonia	6 (13)	5 (13)
CVA	2 (4)	2 (5)
Pressure Sores	0 (0)	4 (11)
<b>Causes of Death</b>		
Pneumonia	7 (15)	9 (24)
Acute MI	5 (11)	5 (13)
Congestive Heart Failure	0 (0)	3 (8)
Urinary Tract Infection	4 (9)	4 (11)
Mortality (1 year) %	30%	45%
Mortality (2 year) %	41%	58%
Dependent Ambulation %	62%	90%

Ref: 9

be mechanically stable, depending on the particular fracture pattern. Treatment is with either a side plate and interlocking screw into the femoral head (eg., Dynamic or Compression Hip Screw) or with an intramedullary nail and interlocking femoral head screw (eg., Gamma Nail). Patients with intertrochanteric fractures have higher one-year mortality rates than those with femoral neck fractures, as well as worse short term functional outcomes.<sup>4</sup>

*Subtrochanteric fracture* –a spectrum of fractures primarily involving the 5 cms below the lesser trochanter. These fractures are by definition unstable and require a long intramedullary device in the same manner as a femoral shaft fracture.

### RISK FACTORS FOR POOR OUTCOMES

Risk factors for poor outcomes in hip fracture patients can be divided into 3 categories: preexisting conditions, pre-operative fracture conditions, and potential postoperative considerations.<sup>5-9</sup> (Table 1) Preexisting factors are pre-fracture risk factors that increase the risk of morbidity and mortality, including baseline functional and cognitive status, comorbid conditions such as lung disease (especially if patient has a baseline oxygen requirement), cardiac (recent myocardial infarction, unstable angina, or congestive heart failure), and renal diseases (especially chronic renal insufficiency or failure). The number and severity of comorbid conditions are also extremely important. The type of fracture and the circumstances around the trauma that resulted in the fracture are also important considerations. Other more urgent injuries may take priority over the hip fracture. For example, acute renal failure from rhabdomyolysis may occur in patients who fell and were unable to get medical attention for a long period of time, thus delaying surgery. Postoperative concerns include the likelihood of negative outcomes, such as inability to extubate, severe delirium, agitation, fall, and injury or dislocation of the prosthesis. Patients with severe osteoporosis and poor nutrition are at greater risk for non-healing of the surgical site, increasing their likelihood of requiring additional operations.

Hip fracture patients often have several co-morbidities that may or may not have been previously addressed, and questions are often raised about the need for pre-operative medical intervention. The impact of the time to operative intervention after a hip fracture has been addressed in several large studies. Delays beyond 24 or 48 hours are associated with increased mortality, prolonged hospital stay, development of pressure ulcers, and worse functional outcome.<sup>5,6,10,11</sup>

As noted in a recent meta-analysis, there are few randomized studies from which to draw evidence on the outcome of non-operative treatment compared to operative treatment of hip fractures.<sup>12</sup> Most prospective studies reveal increased mortality and morbidity with worse functional status among non-operative cohorts.<sup>9</sup> (Table 2) Only 10% of patients with non-operative management resume walking.

### STRATEGIES FOR IMPROVING OUTCOMES

Various programs to manage complicated older patients with hip fractures have been described. The primary goal for some of them is to prevent delirium; for others, the goal is to prevent postoperative falls. Both outcomes are associated with higher costs, morbidity and mortality. However, two common themes seem to permeate these programs.<sup>13,14</sup>

One theme is the collaborative relationship between a medical team (often led by geriatricians) and the orthopedic team. Hip fracture patients are often medically complicated and may have exacerbations of chronic medical conditions. Thus, a collaborative relationship with the medical team optimizes the medical and surgical management.

The second theme is the multifactorial nature of the interventions. No single action will improve outcomes. The problem is multifaceted, and interventions must be individualized to the patient. Most programs include education of front-line staff (especially nurses and aides) on dementia, delirium and falls. The multidisciplinary approach includes nurses, aides, rehabilitation professionals, nutritionists, pharmacy, and the medical and orthopedic teams. Standardized order sets have also been shown to work well, especially when developed by a multidisciplinary team.<sup>15</sup> Several protocols have targeted early and aggressive ambulation and early removal of bladder catheters.

### SUMMARY

Management of high-risk hip fracture patients is complicated. The optimal surgical decision must be individualized and made promptly, with the assistance of all important team members, including primary care doctors, patient, family, and the orthopedic team. The risks of delaying surgery are significant and should be avoided if possible. Strategies for improving outcomes in these patients include collaborations with medicine and delirium prevention protocols, especially with early ambulation.

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## Disclosure of Financial Interests

The authors have no financial interests to disclose.

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