Acetabulum Fragility Fractures: ORIF versus ORIF Plus Total Hip Replacement

Hans J Kreder MD, MPH, FRCS(C)
Professor, University of Toronto
Orthopaedic Surgery and Health Policy Evaluation & Management
Chief, Holland Musculoskeletal Program
Marvin Tile Chair & Chief, Orthopaedic Surgery
Sunnybrook Health Sciences Centre

Epidemiology and Fracture Pattern
The incidence of fragility fractures of the acetabulum is increasing, with a 2.4 fold increase in acetabular fractures noted over the last 25 years in patients over age 60(1). The most common fragility fracture patterns involve anterior column and quadrilateral plate displacement, medialization of the femoral head and possible superomedial dome impaction(1). However, geriatric fractures of the acetabulum can also involve the posterior wall in isolation with a posteriorly directed force mechanism(2,3).

Treatment Strategies for Elderly Patients with Acetabular Fractures

Goals of Treatment (4)
1. early mobilization and pain control
2. optimization of hip joint function
3. minimize treatment complications

Although elderly patients may have reasonable clinical function despite poor radiographic alignment after fractures of the proximal humerus and distal radius, poor anatomic restoration after acetabular fractures is generally associated with very poor functional and clinical outcome (1,2,4).

Treatment Options
Treatment strategies for elderly patients with acetabular fractures must be individualized taking into consideration the fracture pattern, associated injuries, the patient’s health status, functional requirements and support, and the expertise of the available surgical team. In general, management options are:
1. non-operative treatment with a plan for delayed total hip replacement if needed
2. definitive acetabular fracture fixation
3. immediate combined acetabular fracture fixation and total hip replacement.
Non-operative Treatment

Most acetabular fractures in the elderly are unstable and not amenable to definitive non-operative treatment because prolonged bed rest in traction would be required to avoid fracture site displacement, severe malunion or nonunion. Therefore, non-operative treatment is limited to patients with:

1. Stable or minimally displaced fractures
2. Fractures with a concentric hip joint
3. Those with severely compromised pre-injury function (e.g., non-ambulatory)
4. Those patients with severe medical comorbidity that would preclude operative treatment (i.e., moribund patient)

To avoid the complications associated with prolonged bed rest, patients should be mobilized immediately if non-operative treatment is chosen. Unless the fracture is very stable, this usually requires some degree of protected partial weight bearing to avoid displacement. If this is not possible, mobilization might be limited to “bed to chair” activity.

Definitive Fracture Fixation

When selecting a patient for definitive surgical reduction and fixation, one must consider:

1. the likelihood of failure to maintain a concentric reduction, and thus the need for a second operation (total hip replacement)
2. the ability of the patient to comply with protected weight bearing for 6 to 12 weeks after surgery

In general, functional outcome is dependent on the ability to achieve and maintain a concentric reduction, whether by percutaneous or open means. While success in this regard depends to some degree on the experience of the surgical team, a number of factors have been associated with early failure of open reduction and internal fixation:

1. older age
2. injury to the femoral head or neck
3. posterior wall comminution and associated hip dislocation
4. marginal impaction of the weight bearing area

True marginal impaction of the weight bearing dome can indeed be difficult to reduce and to maintain in osteoporotic bone. However, care must be taken in interpreting radiographs with a so-called “gull sign.” In many cases this double density may appear as an impacted dome, but it can simply represent a displaced, non-impacted anterior fragment superimposed on the intact dome and have no negative impact on long-term function if properly reduced.

Successful maintenance of a concentric hip reduction has been associated with a good functional outcome in geriatric fractures of the acetabulum that are similar to the outcomes for the specific fracture patterns overall. Failure of fixation and reduction is usually salvaged with total hip replacement. Total hip replacement procedures may be complicated by the presence of metal implants that need to be removed, acetabular non-unions or severe malunions as well as other complications such as infection. The rate of conversion
to total hip replacement after geriatric acetabular fracture fixation has generally been reported at between 20 to 30 percent (5,6,9) although as high as 46 percent in some series (22) and dependent on patient selection with respect to the factors noted above. Reported functional outcome after conversion to total hip replacement have been reported to be than results for primary total hip replacement for arthritis (16,23), although others have found more favorable results that are similar to primary hip replacements (20), albeit with longer surgical time and complication rates.

Immediate Combined Fracture Fixation and Total Hip Replacement
Immediate hip replacement for a geriatric acetabular fracture is an option when:

1. the patient is a surgical candidate
2. the likelihood of failure is high with fracture fixation alone due to the presence of negative prognostic factors
3. the patient cannot reasonably be expected to protect weight bearing after fracture fixation alone

One advantage of combined immediate fracture fixation and total hip replacement in a geriatric population is the ability to allow immediate weight bearing and mobility as tolerated. Because a significant proportion of the geriatric population with an acetabular fracture that is associated with poor prognostic indicators will require conversion to a total hip, consideration should be given to immediate total hip replacement in selected cases. An acute total hip replacement in the context of an acetabular fracture will generally require fracture fixation at the same time. This has been termed the combined hip procedure (24). Thus the expertise of both an acetabular fracture surgeon and an experienced arthroplasty surgeon is required for optimal management. Because the overall scale of the combined hip operation is greater than fracture fixation alone, the combined procedure should not be routinely performed if standard reduction and fixation has a reasonable chance of succeeding.

The method of fracture fixation during total hip replacement depends on the pattern. Columnar stability is required along with stabilization of the quadrilateral plate and of the posterior wall, if involved. Fixation and replacement can be performed through separate approaches(24) or using a single anterior approach (25,26) depending on the fracture pattern and surgeon preference and experience. The more common anterior fracture patterns associated with quadrilateral plate involvement can be managed with anterior column corridor screw fixation (27), quadrilateral plating or cable fixation (28,29). More recently the use of uncemented primary or revision cups has become more popular (30), although good results can be achieved with cages and cemented cups (31,32). If the posterior wall is involved, it can be stabilized with lag screws and a buttress plate at the time of total hip replacement.

The majority of patients can expect good functional outcomes following an acute combined hip procedure for geriatric acetabular fracture (7,33), but the medical and surgical complication rate is relatively high (17,22,24,33,34).
**Surgical Techniques**

Specific surgical techniques will be described during the session.