

## Total Hip Arthroplasty and Immediate Weight Bearing for Osteoporotic Acetabular Fractures

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### ABSTRACT

**Background:** The treatment of osteoporotic acetabular fractures is complex since techniques of osteosynthesis have poor outcomes in this patient population. There is a trend towards treating patients acutely with a total Hip Arthroplasty (THA). We present a clinical series of osteoporotic acetabular fractures treated acutely with THA and weight bearing as tolerated.

**Methods:** From 2008-2012, 8 patients (3 women, 4 men, and 1 male-female transgender) with an average age of 70 (range 44-88) with displaced acetabular fractures following minimal trauma were treated acutely with THA by a single surgeon. All patients were allowed to weight bear immediately post-operatively. Modified Harris Hip Scores (HHS) was obtained for all available patients with an average follow up of 35 months (range 16-51 months).

**Results:** The average HHS for 7 available patients was 80.7 (range 67.5-97). Radiographic follow-up averaged 16.8 months (range 1-35) for 6 available patients. Postoperative complications included one hematoma not requiring drainage, one pleural effusion case requiring pleurocentesis and acute worsening of chronic renal failure requiring temporary dialysis. Two patients developed Brooker 1 Heterotopic Ossification (HO), and one patient developed Brooker 4 HO with ankylosis of the hip. Only one cup shifted and no cups medialized. One patient was lost to follow up.

**Conclusions:** Patients with compromised bone quality with acetabular fractures treated acutely with THA can be allowed to weight bear as tolerated immediately after surgery with fair to excellent functional results. Additional prospective studies are needed to evaluate the role of THA in acetabular fractures in these patient populations.

### INTRODUCTION

The incidence of acetabular fractures in the elderly has increased significantly in recent years with the increase in population longevity, with more than 50% of pelvic fractures occurring in patients over the age of 60 [1,2]. Treating acetabular fractures in the elderly is particularly challenging. While the primary goals of treatment are early mobilization and preservation of functional status, achieving this in the elderly is particularly difficult because of poor bone quality and a higher incidence marginal impaction and comminution which lead to poor outcomes after internal fixation [1-5]. Furthermore, internal fixation requires an extended period of limited weight bearing which is very difficult for older patients. Patient often undergo later reconstruction and secondary Total Hip Arthroplasty (THA) but this has been found to have poor implant

survival, higher rates of loosening and worse functional outcomes as compared to primary THA [6-8].

For these reasons, more recent studies have advocated for acute THA with limited internal fixation in the elderly [9- 11]. Studies have shown good to excellent functional results and implant survival, with some risk of cup subsidence and over medialization [9-11]. Nevertheless, most treatment protocols still limit weight bearing postoperatively. The aim of the present study was to present a series of osteoporotic patients with acetabular fractures treated with acute THA without weight bearing restrictions postoperatively.

We investigated the clinical and functional outcomes in osteoporotic patients with acetabular fractures (OTA 62A-C) treated with acute THA using anti-protrusion cages or multi-holed trabecular metal cup who was allowed to fully weight bear immediately after surgery.

## METHODS

This study is a retrospective review of patients treated by a single orthopaedic trauma surgeon between 2008 and 2012 at a Level I academic urban trauma center. Inclusion criteria were an acetabular fracture following minimal trauma and treatment with THA. Exclusion criteria were major trauma, multiple injuries precluding weight bearing postoperatively and previous surgery on the affected hip. Patients were followed postoperatively at 2 weeks, 6 weeks, 12 weeks and 6 months. Patients were encouraged to follow up yearly thereafter. Outcome measures included the modified harris hip scores [12], range of motion and radiographic images used to measure HO, hardware position and leg length.

### Preoperative assessment

All patients were admitted to an internal medical service for clearance and medical optimization preoperatively. The patient was taken to the operating room only once medically optimized. All patients were treated for acetabular fractures following minimal trauma (i.e. fall from ground level). Patients were chosen for THA by the treating surgeon due to either fracture pattern, known or suspected osteoporosis or overall poor medical condition.

### Operative procedure

All procedures were performed by a single surgeon using a Kocher Langenbach approach in the lateral decubitus position. Patients were given cefazolin 1-2g before incision. Posterior

wall, transverse and T type fractures were treated with a multi-hole cup and screws. Anterior fractures were initially treated similarly but due to a cup shift one patient, titanium porous backed cages (Biomet Timax acetabular cup) with cemented liners were used instead. The medial wall of the acetabulum was augmented in all patients with femoral head auto graft and additional allograft as needed to obtain a solid base for the acetabular component. Cemented versus uncemented femoral components were chosen based on femoral canal type by the Dorr classification as determined by the treating surgeon. Placement of all components were checked with intraoperative digital radiography in all cases, adjustments were made to component size and positioning as indicated after imaging was obtained.

### Postoperative management

All patients received antibiotic prophylaxis for 24 hours postoperatively. Weight bearing was allowed as tolerated on post-operative day 1. Patient were given standard posterior hip precautions. Physical therapy mobilized patients as tolerated daily beginning postoperative day 1. All patients were treated with 14 days of a low molecular weight heparin.

## RESULTS

8 patients (3 women, 4 men and 1 male to female transgender) aged 44-88 with an average age of 70 were included in the study. There were 2 anterior column fractures, 2 anterior column hemitransverse, 1 posterior wall fracture, 1 transverse and 1 T-type fracture in the series. One fracture was not classified. Average time from injury to treatment was 30 days (range 2-75). One patient required preoperative carotid end arterectomy due to stenosis and stroke on presentation and was operated on 75 days after injury. Two other patients were treated for failure of fixation at 39 and 64 days from original injury. All fractures were grossly mobile at the time of surgery. Estimated blood loss averaged 356 ml (200-500 ml). Operating room time averaged 104 minutes (40-178 min).

Postoperatively, no infections were recorded in our clinical series and no patients required revision surgery. There were no clinical deep vein thrombosis or pulmonary emboli. All patients except one required transfusions during their acute hospitalization. Two patients had medical complications during their early post-operative period, including one patient with

bilateral pleural effusions requiring multiple pleurocenteses, an acute worsening of chronic renal failure requiring temporary dialysis, and one patient who had a postoperative hematoma treated with prophylactic antibiotics and observation. Overall a 25% early medical complication rate was seen.

Modified Harris Hip scores were obtained for all patients in May 2012. At this point there was an average follow up of 35 months (range 16-51 months). Of 7 patients available for follow up the average modified Harris Hip score was 80.65 (range 67.9-97). No patient complained of limb length inequality, and hip and knee range of motion were clinically unrestricted in 7/8 patients at the hip. One patient had minimal range of motion due to Heterotopic Ossification (HO). Average radiographic follow up for 6 available patients was 17 months (1-31 months). HO was present in 3 patients. This graded as Brooker 1 in two patients and Brooker 4 with complete ankylosis in one patient. One patient had cup shift post operatively, without medialization of the cup. There were no reoperations for any reason. Average leg length discrepancy was 4.2mm as compared to the contralateral limb (range - 5.5mm to + 7.3mm).

## DISCUSSION

The treatment of acetabular fractures in elderly patients is complex. Much of the early literature surrounding acetabular fractures typically address a younger patient population that sustains the injury as a consequence of high energy trauma. Historically, elderly patients with poor bone stock have been treated non-operatively with protected weight bearing and traction however this treatment modality has led to unacceptable functional results in as many as 30% of patients over the age of 65 [3]. In addition to the high cost to both the patient and the hospital to place a patient in long term traction, studies in the non-operative management of hip fractures show a mortality rate of up to 73% in individuals who were unable to be mobilized effectively, and a 3.8 fold increase in mortality over controls even amongst those who could be mobilized [13]. The primary goal of treatment of lower extremity fractures in the elderly thus must be early mobilization for both the preservation of functional status as well as the reduction of short term mortality related to poor ambulatory status.

When surgical treatment is planned for these patients, primary ORIF is generally more difficult with poorer outcomes. Acetabular fractures in the elderly are more likely to have many poor prognostic indicators such as acetabular roof impaction (i.e. gull wing sign), femoral head injury, and subluxation and dislocation [3,14]. While a clinical series published by Matta [5] showed a 74% anatomic reduction of acetabular fractures by plain radiographs in patients younger than 60, this dropped to 44% in patients older than 60 years of age [15]. Other clinical series report similar rates of non-anatomic reduction in elderly patients [10]. The role of ORIF with secondary THA is of potentially of less utility in this patient population not only due to the deconditioning that occurs as a result of prolonged protected weight bearing, but also due to the increased complication rate and poor implant survivability. History of prior acetabular fracture presents a significant risk to the longevity of cemented acetabular cups placed secondarily [6]. Despite a trend seen towards improved survival in uncemented cups, no long term evidence on press fit cups currently exist [16]. Survival of the femoral component is also effected by the history of acetabular fracture. In a meta-analysis of 654 treated with acute or secondary THA patients, femoral stem survival was significantly higher in patients treated with acute THA (95% vs 85% at 10 years. Additionally there was also a trend for lower revision rate (8.6% vs 16.4%) and higher acetabular cup survival (81% vs 76%) at 10 years [8].

In the present study a series of patient is presented who underwent acute THA for acetabular fractures. Our results showed an average modified HHS of 80.7 (range 67.5-97). This compares favorably with recent functional outcome data obtained on healed fractures converted to total hip arthroplasty, with conversions scoring an average HHS of 70 (range 19-95), but still lag behind primary THA performed for arthritis in that same study, with a HHS of 90 (range 80-100) (7). Other authors have experienced similarly encouraging results with acute THA in the setting of acetabular fractures in elderly patients. Recent prospective data with regards to functional outcomes following APC and cemented THA showed excellent outcomes at 24 mo (HHS 90 .4) and good at 48 months (HHS 87.6) [17]. Other recent reviews of primary THA with limited fixation have also shown promising results in short

term follow up. Lin et al. found a 94% implant survival rate at an average follow-up of 6.4 years, with good to excellent results by oxford hip score in 25/27 patients available for follow-up [11].

Much has been published with regards to use of antiprotrusio cages in the use of acetabular deficiencies in revision THA, with good midterm and long term success with its use, with some series showing a survival rate as high as 92% at 21 years [18]. Other more recently published survival rates in APC's placed for acetabular deficiencies in revision total arthroplasty are 85% at 12 years, and 72.2 at 16 years [19,20], with 89.5% good or excellent results [19]. No longer term data with regards to their survival yet exists in the setting of acetabular fracture treatment.

Our case series adds to the growing body of evidence available on the outcomes of THA in the acute treatment of acetabular fractures. It is limited by its retrospective design, a small numbers of patients, and limited follow up. It is to our knowledge, however, the first clinical series to demonstrate the viability of immediate weight bearing in acetabular fractures treated with acute THA. It is our belief that if this treatment protocol is chosen, the use of additional fixation beyond a multihole cup (i.e. limited ORIF versus cage construct) in acetabular fractures involving the anterior column is indicated. Additionally it is our experience that if adequate fixation is obtained at the time of surgery it is reasonable to allow patients to immediately weight bear after THA with a low risk of component migration. It is our belief that this post-operative protocol allows for early mobilization of the patient with a low risk of need for reoperation, and represents a significant improvement over treatments requiring prolonged non weight bearing. Given the high rate of HO seen in our series we also recommend for the use of prophylaxis against HO in the postoperative period.

In our early clinical experience, acute THA for acetabular fractures can be performed in elderly patients with immediate postoperative weight bearing with acceptable functional results. Additional prospective studies are required to further delineate surgical indication and reconstructive options.

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