The effectiveness of primary bipolar arthroplasty in treatment of unstable intertrochanteric fractures in elderly patients

Khaldoun Sinno, MD.1, Mazen Sakr, MD.2, Julien Girard, MD., MSc.2, Hassan Khatib, MD.1

1Division of Orthopedic Surgery and Traumatology, Makassed General Hospital, Beirut, Lebanon.
2Centre Hospitalier Régional Universitaire de Lille Hôpital Roger Salengro, Service d'Orthopédie C, Lille, France.

Doi: 10.4297/najms.2010.2561
Availability: www.najms.org
ISSN: 1947 – 2714

Abstract
Background: The treatment of unstable intertrochanteric fracture in the elderly patient is still controversial. Traditionally, internal fixation using a dynamic hip screw was of choice. Recently, some authors advocated the use of cemented bipolar arthroplasty or hemiarthroplasty which results in better functional outcome. Aim: The aim of this study is to find out which of these treatment options can lead to the best clinical and functional outcomes. Patients and Methods: One hundred and two patients admitted to Makassed General Hospital between 2002 and 2007 with a diagnosis of unstable intertrochanteric fracture of femur were selected. Preoperative and operative data was retrieved from inpatient hospital files. Postoperative radio clinical data at follow up visits was collected from outpatient department files. Functional outcomes were assessed with use of Harris hip score. The main clinical measures were early postoperative full weight bearing, postoperative complications and functional outcome. Results: The time to full weight bearing, the rate of postoperative complications, and the functional outcomes was significantly better in the cemented bipolar arthroplasty group. Conclusion: According to our results, we believe that cemented bipolar hemiarthroplasty is of choice in freely mobile elderly patients above seventy years of age with an intertrochanteric femoral fracture.

Keywords: Unstable intertrochanteric fracture of femur, Cemented bipolar arthroplasty for treatment of unstable intertrochanteric fractures, Internal fixation in unstable intertrochanteric fractures.

Correspondence to: SINNO Khaldoun, MD, Makassed General Hospital, Division of Orthopedics and Traumatology, Beirut, Lebanon, 009613283869, Email: sinnokh@hotmail.com

Introduction
Intertrochanteric fracture in the elderly patient is a frequent problem and is becoming more common as the proportion of elderly people in the population increases [1]. Unstable intertrochanteric fracture in the elderly patient is associated with high rate of mortality as much as 20 per cent during the first postoperative year [2-6]. The treatment of such unstable intertrochanteric fracture is still controversial, despite of the publication of reports of randomized trials and comparative studies [7-9].

Excessive collapse, loss of fixation, and cut-out of the lag screw resulting in poor function remain problems associated with internal fixation of unstable intertrochanteric fracture in the elderly patient with osteoporotic bone. To allow earlier postoperative weight-bearing and to avoid excessive collapse at the fracture site, some surgeons have recommended prosthetic replacement for the treatment of unstable intertrochanteric fractures [10-13].

The purpose of this retrospective study is to evaluate the functional and clinical outcomes of cemented bipolar arthroplasty as a primary treatment for unstable intertrochanteric fracture in the elderly patient compared to internal fixation using a sliding or dynamic hip screw.
Patients and Methods

This study is approved by the Institutional Review Board at Makassed General University Hospital in Beirut. Between 2002 and 2007, 102 patients admitted with the diagnosis unstable intertrochanteric femur fracture according to AO-ATO classification of intertrochanteric fractures (Association for Osteosynthesis/Orthopaedic Trauma Association) [14] were selected (Fig. 1). These patients were all above seventy years of age and were independently mobile before sustaining the fracture. Exclusion criteria included patients unable to walk before the fracture, patients less than seventy years old, patients with pathological fractures, patients with a previous contra lateral hip fracture, and patients with stable fractures and intact lesser trochanters. Data was collected from in-patient hospital files and out-patient department upon follow up. Pre-operative data included: Age, sex, fracture type, and preoperative co-morbid medical problems. Peri-operative data included type of anesthesia, operative time, amount of blood loss, number of units of blood transfused, and duration of hospital stay. Postoperative data included time to full weight bearing, postoperative complications such as pulmonary problems, urinary tract infection, deep vein thrombosis, cardiac problems, infection (superficial and deep), pressure sores, fixation failure, prosthetic dislocation, and mortality.

Fig. 1 AO Classification of intertrochanteric fractures of femur
A1. Simple (2-fragment) pertrochanteric area fractures: A1.1 Fractures along the intertrochanteric line; A1.2 Fractures through the greater trochanter; A1.3 Fractures below the lesser trochanter;
A2. Multifragmentary pertrochanteric fractures; A2.1 With one intermediate fragment (lesser trochanter detachment); A2.2 With 2 intermediate fragments; A2.3 With more than 2 intermediate fragments; A3. Intertrochanteric fractures; A3.1 Simple, oblique; A3.2 Simple, transverse; A3.3 With a medial fragment.

All surgical procedures were performed by the same surgical team as soon as the condition of the patient was stabilized, usually within forty-eight hours after admission.

In the bipolar arthroplasty group, Charnley components (DePuy International, Leeds, United Kingdom) were used with an Elite Plus 28 mm head and femoral cup (self-centering; Depuy). Preoperative templating of radiographs of the fractured side and contra lateral side was performed to determine the approximate size and position of the stem and the approximate femoral neck offset. The operations were performed using the transgluteal lateral approach in a lateral decubitus position. The femoral head and neck were osteotomized at a level determined by preoperative templating of the uninjured side and by the use of trial femoral components to help find the appropriate level. Meticulous care was taken to preserve the integrity of the greater trochanter, abductor muscles, and all the vascularized bone fragments. The femoral medullary canal was then reamed to appropriate stem size and diameter. Trial reductions were performed to determine the exact length that will provide the desired tension and tissue
balancing of the abductor muscles and equal leg length. Careful restoration of neck length, offset and version to maximize stability of the hip joint was also performed during trial. The definitive femoral stem was cemented into the femoral canal use of so-called second-generation techniques (medullary lavage, use of an intramedullary cement plug, hand-mixing of cement, use of a cement gun to deliver the cement in a doughy state in a retrograde fashion and to insert antibiotic-impregnated cement in all patients). Small calcar bone fragments were reduced over the medial aspect of the femoral stem below the stem collar during insertion. As for large calcar bone fragments, they were reduced by cerclage wires. Other cases needed medial calcar bone reconstruction in the form of U-shaped autograft fashioned from the removed head and neck to fit around the medial portion of the femoral stem. Any protrusion of cement between reduced bone fragments was cleaned out. The greater trochanter was reduced and stabilized using tension band wiring technique after hip reduction or just sutured near the prosthesis. The gluteus medius muscle and vastus lateralis muscle were sutured to their anatomical locations using anchor sutures if necessary. Fascia Lata was tightly closed over a suction drain (Fig. 2).

In the internal fixation group, the operations were performed on an orthopedic fracture table, with the patients lying supine. Biplane fluoroscopy was routinely used. The aim of the closed reduction was to obtain an optimum position, with a correct angle between the femoral neck and shaft or a slight valgus position. Distraction of the fragments, varus position, or lateral displacement of the shaft must be avoided. The proximal part of the femur is exposed through a lateral approach with splitting of the vastus lateralis muscle, and dynamic hip screw was inserted. Injectable bone graft substitute (Allomatrix®, Wright Medical Technology) was used in all cases. The wound was closed in layers over a suction drain.

The use of prophylactic antibiotics was the same in the two groups. Second generation cephalosporin (1.5 gram Zinacef) and metronidazole (500 mg Flagyl) were given at the induction of anesthesia and continued for 3 doses postoperatively. Prophylaxis against deep venous thrombosis using Low-molecular-weight heparin (Lovenox 40 mg) was started 12 hours prior to the operation and continued for 35 days postoperatively. Pain killers were given as needed.

Patients in the bipolar arthroplasty group were ambulated full weight bearing on the first postoperative day with the aid of a physiotherapist. Patients in the internal fixation group were ambulated non-weight bearing on the first postoperative day and gradually progressed to partial then full weight bearing depending on the quality of bone fixation assessed intraoperatively and bone healing on follow up radiographs.

After discharge from hospital, patients in both groups were followed at six weeks; at three, six, and twelve months; and yearly thereafter for radiological control and functional evaluation using the Harris Hip score at each visit.

The Harris hip score is a validated fifteen-item patient questionnaire on which scores range from 0 to 100 (<70 poor; 70–79 fair; 80–89 good; 90–100 excellent).

Antero-posterior and lateral radiographs of the affected hip were made postoperatively and at each follow up visit. The reduction of the fracture was considered anatomical (<5° of varus or valgus and/or anteversion or retroversion), acceptable (5° to 10°), or poor (>10°) [15]. Any erosion of the acetabular cartilage with horizontal or vertical migration of the bipolar cup of >2 mm was documented [16]. A stem was considered to be unstable when there was progressive subsidence exceeding 3 mm, any change in position, or a continuous radiolucent line wider than 2 mm at the bone-cement interface.

Statistical analysis
Data were reported as mean, standard deviation (SD), median (range) or number (percentage). T-test was used to assess significant difference among all numerical parameters of the study within the two surgical groups. Whereas, Chi square test was used for statistical analysis among all studied categorical variables such as gender, pre-morbid conditions and postoperative complications. P-values < 0.05 were considered statistically significant.

Results
One hundred and two patients were enrolled in this study. All had unilateral intertrochanteric fracture of the hip after falling from standing position to ground level. The study group consisted of 48 patients treated with a primary bipolar arthroplasty. The average age at operation was 78.6 years (range, 70 to 96 years). There were 14 men and 34 women. 22 patients had the A1 fracture type, 14 patients had A2 fracture type, 7 patients had A3 fracture type, 3 patients had A4 fracture type, and 2 patients had A5 fracture type. The control group consisted of 54 patients treated by internal fixation using a dynamic hip screw. The average age at operation was 78.7 years (range, 70 to 92 years). There were 21 men and 33 women. 22 patients had the A1 fracture type, 15 patients had A2 fracture type, 8 patients had A3 fracture type, 5 patients had A4 fracture type, and 4 patients had A5 fracture type, according to AO/OTA classification (Table 1).

The mean operative time (minutes) was greater in the internal fixation group (142± 31) than in the bipolar arthroplasty group (112± 29) (P<0.001). The mean blood loss intraoperatively (ml) was higher in the internal fixation group (253± 122) than in the bipolar arthroplasty group (192± 85) (P=0.005). The mean blood transfusions (number of units) required during hospital stay was greater in the internal fixation group (1.92± 1.22) than in the bipolar arthroplasty group (1.37± 0.89) (P=0.012). The
average length of hospital stay (days) was less in the bipolar arthroplasty group (6.3± 1.8) than in the internal fixation group (7.8± 2.3) (P<0.001) (Table 2).

Table 1 Demographic and preoperative data

<table>
<thead>
<tr>
<th></th>
<th>Hemiarthroplasty Group</th>
<th>Internal Fixation Group</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>48</td>
<td>54</td>
<td></td>
</tr>
<tr>
<td>Age (years)</td>
<td>78 (6.46)</td>
<td>79 (5.94)</td>
<td>0.983</td>
</tr>
<tr>
<td>Sex (Female: Male)</td>
<td>34:14</td>
<td>33:21</td>
<td>0.304</td>
</tr>
<tr>
<td>AO/OTA† fracture type (No. of patients)</td>
<td>22 22 14 15 7 5 2</td>
<td>22 15 8 5 4</td>
<td>0.375</td>
</tr>
<tr>
<td>Medical illness (No. of patients)</td>
<td>Cardiovascular disease 24 38</td>
<td>0.36</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Diabetes</td>
<td>19 23</td>
<td>0.759</td>
</tr>
<tr>
<td></td>
<td>Neurological disease</td>
<td>13 12</td>
<td>0.571</td>
</tr>
<tr>
<td></td>
<td>Hypertension</td>
<td>37 40</td>
<td>0.76</td>
</tr>
<tr>
<td></td>
<td>Pulmonary disease</td>
<td>5 5</td>
<td>0.845</td>
</tr>
<tr>
<td></td>
<td>Chronic renal failure</td>
<td>2 5</td>
<td>0.312</td>
</tr>
</tbody>
</table>

* Values are expressed as mean and (standard deviation) unless otherwise stated. † AO/OTA denotes Association for Osteosynthesis/Orthopaedic Trauma Association. P-value < 0.05 was considered significant.

Table 2 Intra operative data

<table>
<thead>
<tr>
<th></th>
<th>Hemiarthroplasty Group</th>
<th>Internal Fixation Group</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>48</td>
<td>54</td>
<td></td>
</tr>
<tr>
<td>Type of anesthesia.</td>
<td>Block</td>
<td>General</td>
<td>0.239</td>
</tr>
<tr>
<td></td>
<td>33</td>
<td>31</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>23</td>
<td></td>
</tr>
<tr>
<td>Operative time (min)</td>
<td>112 (29.35)</td>
<td>142 (30.79)</td>
<td>0.0001</td>
</tr>
<tr>
<td>Amount of blood loss (ml)</td>
<td>192 (85.35)</td>
<td>253 (122.22)</td>
<td>0.005</td>
</tr>
<tr>
<td>Blood transfusions (units)</td>
<td>1.37 (0.89)</td>
<td>1.92 (1.22)</td>
<td>0.012</td>
</tr>
<tr>
<td>Duration of hospital stay (days)</td>
<td>6.3 (1.8)</td>
<td>7.8 (2.3)</td>
<td>0.0001</td>
</tr>
</tbody>
</table>

* Values are expressed as mean and (standard deviation) unless otherwise stated. P-value < 0.05 was considered significant.

Table 3 Postoperative complications

<table>
<thead>
<tr>
<th></th>
<th>Hemiarthroplasty Group</th>
<th>Internal Fixation Group</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality rate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>During hospital stay</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>&lt; 6 weeks</td>
<td>2</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>6 – 24 months</td>
<td>3</td>
<td>4</td>
<td>1.000</td>
</tr>
<tr>
<td>Pulmonary Complications</td>
<td>6 (12.5%)</td>
<td>16 (29.6%)</td>
<td>0.037</td>
</tr>
<tr>
<td>Urinary Tract Infection</td>
<td>6 (12.5%)</td>
<td>6 (11.1%)</td>
<td>0.829</td>
</tr>
<tr>
<td>Deep Vein Thrombosis</td>
<td>2 (4.2%)</td>
<td>2 (3.7%)</td>
<td>0.905</td>
</tr>
<tr>
<td>Cardiovascular Complications</td>
<td>2 (4.2%)</td>
<td>7 (13%)</td>
<td>0.120</td>
</tr>
<tr>
<td>Prosthetic/Fixation Failure</td>
<td>0 (0%)</td>
<td>2 (3.7%)</td>
<td>0.180</td>
</tr>
<tr>
<td>Wound Infection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Superficial</td>
<td>0 (0%)</td>
<td>4 (7.4%)</td>
<td></td>
</tr>
<tr>
<td>Deep</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td></td>
</tr>
<tr>
<td>Pressure Sores</td>
<td>3 (6.3%)</td>
<td>11 (20.4%)</td>
<td>0.047</td>
</tr>
</tbody>
</table>

* Values are expressed as mean and (standard deviation) unless otherwise stated. P-value < 0.05 was considered significant.

Table 4 Functional outcome

<table>
<thead>
<tr>
<th></th>
<th>Hemiarthroplasty Group</th>
<th>Internal Fixation Group</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Follow-up Period (months)</td>
<td>22 (4.6)</td>
<td>21 (5.5)</td>
<td>0.474</td>
</tr>
<tr>
<td>Time to full weight bearing (weeks)</td>
<td>1.26 (0.68)</td>
<td>9.6 (2.28)</td>
<td>0.0001</td>
</tr>
<tr>
<td>Harris Hip Score (100)</td>
<td>76.15 (6.11)</td>
<td>64.89 (5.66)</td>
<td>0.0001</td>
</tr>
<tr>
<td>3 months postoperative HHS</td>
<td>80.35 (4.98)</td>
<td>68.17 (5.22)</td>
<td>0.0001</td>
</tr>
<tr>
<td>12 months postoperative HHS</td>
<td>82.76 (4.78)</td>
<td>70.91 (5.25)</td>
<td>0.002</td>
</tr>
<tr>
<td>24 months postoperative Harris HHS</td>
<td>43.71 (1.04)</td>
<td>40.95 (5.34)</td>
<td>0.0001</td>
</tr>
<tr>
<td>Harris Pain Score at 24 months (44)</td>
<td>34.15 (4.61)</td>
<td>54.00 (8.78)</td>
<td>0.276</td>
</tr>
<tr>
<td>Return to Normal daily activities (days)</td>
<td>19.15 (2.79)</td>
<td>19.78 (2.73)</td>
<td></td>
</tr>
</tbody>
</table>

* Values are expressed as mean and (standard deviation) unless otherwise stated. P-value < 0.05 was considered significant.
The mean follow-up (months), for the bipolar arthroplasty group and the internal fixation group, was 22.46± 4.59 and 21.73± 5.54 respectively.

Patients who underwent internal fixation had more postoperative complications than those having bipolar arthroplasty; pressure sores (6.3% in group I and 20.4% in group II), pulmonary complications (12.5% in group I and 29.6% in group II), cardiac complications (4.2% in group I and 13.0% in group II), superficial wound infection (0% in group I and 7.4% in group II). No significant difference was noted between the 2 groups as regards the occurrence of urinary tract infection and deep vein thrombosis (Table 3).

In the bipolar arthroplasty group, six of the 48 patients (12%) died within the first two years of follow-up. In the internal fixation group, nine of the 54 patients (16%) died within the first two years of follow-up. There was no significant difference between the 2 groups in terms of mortality rate (Table 3).

The radio-clinical analysis in surviving patients showed that in the internal fixation group 13 patients had unsatisfactory results: four patients had shortening of the limb with marked limitation in range of motion (bony collapse along fracture line in 2 cases, migration of the femoral head into varus and retroversion in 2 cases), two patients had the lag screw cutting out from the femoral head and underwent salvage hip arthroplasty, three patients were unable to walk due to generalized weakness, two patients had marked limping, and two patients had marked pain.

In the hemiarthroplasty group the radio-clinical results of 5 patients were considered unsatisfactory: two patients had restriction in the range of movement of the affected limb, one patient had leg length discrepancy (more than 13mm), one patient was unable to ambulate due to generalized weakness, one patient had moderate pain and limping associated with non union of the greater trochanter.

There was no dislocation, no signs of femoral stem instability, or acetabular erosion with cup migration.

The Harris Hip Score at 3 months postoperatively was significantly higher in patients who underwent bipolar arthroplasty (76.15± 6.11) (range 66 – 86) compared to those in the internal fixation group (64.89± 5.66) (range 55 - 75) (p<0.0001). The Harris Hip Score at 12 months postoperatively was significantly higher in patients who underwent bipolar arthroplasty (80.35± 4.98) (range 72 – 89) compared to the internal fixation group (68.17± 5.22) (range 59 - 78) (p<0.0001). At 24months, Harris Hip Score was significantly higher in patients who underwent bipolar arthroplasty (82.76± 4.78) (range 76 – 90) compared to the internal fixation group (70.91± 5.25) (range 62 - 79) (p<0.0001) (Table 4).

The time (weeks) to independent full weight bearing and return to the pre-fracture level of daily activity was significantly earlier in patients who underwent bipolar arthroplasty (1.26± 0.68) compared to those in the internal fixation group (9.6± 2.28) (p<0.0001) (Table 4).

Discussion

Most intertrochanteric hip fractures can be treated successfully with internal fixation [17, 18]. Dynamic devices, also known as a sliding screw/side plate, sliding nail, telescoping nail, dynamic hip screw, and sliding hip screw, (Fig. 3), are currently in wide use as reliable methods of internal fixation although the operative technique is not always easy and postoperative regimens cannot be standardized [2, 8, 9, 17, 19-21]. Although union rates as high as 100% have been reported in association with well-reduced, stable fractures that were treated with ideal implant placement, failure rates of as high as 56% have been noted in association with unstable fractures, comminution, suboptimal fracture fixation, or poor bone quality in elderly patients [18, 22].

Fig. 3 Example of a dynamic hip screw.

The poor mechanical properties of the weak and porotic bone in these elderly patients do not usually provide a firm purchase for the screws leading to early biomechanical failure [19, 23]. This will lead to collapse with migration of the femoral head into varus and retroversion resulting in limping due to shortening and decreased abductor muscle lever arm [24, 25]. Another complication of internal fixation in porotic weak bone is cutting-out of the implant from the femoral head leading to profound functional disability and pain [26].
Thus, it has become clear that, although the use of internal fixation has decreased the mortality rate somewhat [2, 3] the rate of complications still ranges from 4 to 50 percent [27, 28] and walking with full weight-bearing before the fracture has healed is often impossible [7, 17, 19, 23, 29-32].

In our study 13 hips (26%) in the internal fixation group had unsatisfactory results due to biomechanical failure. This is comparable to the incidence of internal fixation failure in other studies ranging from 10% to 30% [33, 34]. On the other hand, our study confirmed unsatisfactory functional outcome in 5 hips only (10%) among patients treated with hemiarthroplasty, (p≤0.001).

Therefore treatment with primary bipolar arthroplasty rather than internal fixation could return these patients to their pre injury level of activity more quickly, thus obviating the postoperative complications caused by immobilization or failure of the implant [7,35, 36].

Harwin et al. [37] reported on fifty-eight elderly patients with osteoporosis in whom a comminuted intertrochanteric femoral fracture had been treated with a bipolar Bateman-Leinbach prosthesis and who were followed for an average of twenty-eight months. The average patient age was seventy-eight years, and 91% walked prior to discharge. Two patients had a nonunion of the greater trochanter. There were no deep infections, dislocations, acetabular erosions, or cases of stem loosening.

Broos et al. [38] reported on ninety-four elderly patients treated with a bipolar Vandeputte prosthesis. They found that the average operating time was shorter, the mortality rate was lower, and the functional results were better in the group treated with the bipolar hemiarthroplasty than in groups treated with Ender nailing, an angled blade-plate, or a dynamic hip screw.

Recently, Rodop et al. [39] reported on fifty-four elderly patients who had been treated with a bipolar Leinbach hemiprosthesis (Protek; Sulzer Orthopedics, Baar, Switzerland). A good to excellent result, as assessed with the Harris hip-scoring system, was reported in 80% of the patients. There were no dislocations or cases of stem loosening.

In our study, the results of the hemiarthroplasty group were significantly better than those of the internal fixation group regarding operative time, blood loss, perioperative blood transfusion, and hospital stay. Early postoperative full weight bearing in the hemiarthroplasty group compared with early partial or non-weight-bearing in the internal fixation group was the main reason for significant reduction in postoperative complications such as pressure sores and pulmonary complications [36,40, 41]. There was no significant difference in postoperative deep vein thrombosis between the two groups.

The most serious complication in patients who have had a prostatic operation on the hip is deep infection; the rate of infection after such an operation has been reported to range from 0 to 3 percent. The large wound surfaces and the extensive dissection that is needed are factors that facilitate bacterial contamination [42, 43]. Nevertheless, the rate of deep infection in both groups in our study was zero.

The rate of dislocation, as reported in the literature, has varied widely aggravated by many factors [44]. In the study of Woo and Morrey [45], there was an increased rate of dislocation of the hip due to adductor weakness and/or trochanteric non-union. The dislocation rate in our hemiarthroplasty group was zero. The large diameter of the head and self-centering cup that was used in the bipolar arthroplasty might explain the decreased tendency to dislocate [46]. Also the surgical technique might decrease the risk of dislocation if proper soft tissue balancing around the hip joint, proper restoration of equal leg length, and proper selection of the neck length, offset and version were performed.

The presence of unattached lesser trochanter may preclude accurate adjustment of the proper limb length. This added to the technical difficulty of the operation. To establish a proper limb length, the center of the prosthetic head was adjusted to be in line with the tip of the anatomically repositioned greater trochanter [47]. In our current study one case of non-union along the greater trochanter attachment was encountered in the hemiarthroplasty group. However, the patient could walk in spite of mild to moderate hip pain and lurching gait. This was possibly because of the low functional demand. Similar results were reported by Green et al [48] who had two painful hips in their series due to trochanteric non-union and also by Chan and Gill [49] who had one case of greater trochanteric non union. None of these patients required reoperation. Stern and Angerman [36] reported that all the hips were stable after hemiarthroplasty regardless of whether the greater trochanter was anatomically reduced or just sutured near the prosthesis.

Our present study also showed that the cemented mantle used to fix the prosthesis in the femoral shaft was possibly able to transmit the stresses of weight bearing directly to the femoral diaphysis bypassing the postero-medial area of the proximal femur. In addition, calcar reconstruction had the potential advantage of improved trochanteric healing, restoration of bone stock, re-establishment of proper limb length and reduced implant cost. This mechanism was properly efficient for elderly patients with low functional demands [48].

The mortality rate was similar in both groups after two years follow up. Although we were not able to decrease the mortality rate in these elderly patients, early walking with full weight-bearing and early return to pre-fracture level of activity significantly reduced the incidence of pressure sores, pulmonary infection, and atelectasis. The Harris Hip score was significantly better in the
hemiarthroplasty group than in the internal fixation group at all follow up visits. At two years follow up the hemiarthroplasty group results were regarded as “good” and in the internal fixation group as “fair” using the Harris Hip score.

One retrospective study by Kesmazar et al [25] demonstrated a higher rate of morbidity & mortality among the hemiarthroplasty group. This may be explained by the longer operative time and hospital stay along with a delay in the mobilization of the patient.

**Conclusion**

According to our results, we believe that cemented bipolar arthroplasty is of choice in freely mobile elderly patients above seventy years of age with an intertrochanteric femoral fracture. Postoperative full weight bearing after hemiarthroplasty spares the postoperative complications of non weight bearing after internal fixation. This also reflects on the functional outcome if the patient survives after the first year postoperatively. Yet hemiarthroplasty in these cases is a surgically demanding technique. Bad surgical technique may lead to prolonged operative time, high incidence of deep infection, dislocation, and a poor radiological and functional outcome.

**References**

24. Liang YT, Tang PF, Gao YZ, Tao S, Zhang Q, Liang XD, Han G, Cui G, Yang MY. Clinical research of hemiprosthesis arthroplasty for the treatment of


