

## RESEARCH ARTICLE

# How to Treat the Complex Unstable Intertrochanteric Fractures in Elderly Patients? DHS or Arthroplasty

Ebrahim Ghayem Hassankhani, MD; Farzad Omid-Kashani, MD; Hossein Hajitaghi, MD; Golnaz Ghayem Hassankhani, MD

Research performed at Orthopedic Research Center, Imam Reza Hospital, Mashhad University of Medical Sciences, Mashhad, Iran

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## Abstract

**Background:** Due to difficulty in obtaining anatomical reduction, management of the unstable intertrochanteric fractures in elderly osteoporotic patients is challenging. The purpose of this study is to compare the results of hip arthroplasty (total, hemi, or bipolar) with DHS in the elderly patients with unstable intertrochanteric fractures.

**Methods:** We prospectively studied and followed-up 80 old patients with complex unstable intertrochanteric fracture from January 2007 to December 2010. Depending on the time of the patients' admission, we alternatively treated them by DHS and arthroplasty, and placed them in Groups A and B, respectively. We followed them up radiologically and also clinically by Harris Hip Score for more than 24 months. Statistical analysis was performed using SPSS version 11.5 for Windows.

**Results:** The mean length of follow-up and age were  $34.3 \pm 4.1$  months (ranged; 24-59) and the  $75.2 \pm 5.2$  years (ranged; 58-96), respectively. Comparing Group A with B, demographic data, mean blood loss, duration of operation, time to walking and duration of hospital stay had no significant difference but overall device related complications were significantly higher in Group A. Functional scores were also higher in Group B, but this difference was not significant statistically. In both groups, the patients with Type A3 compared with Type A2, had more duration of surgery and blood loss.

**Conclusions:** Arthroplasty is an alternative treatment in elderly patients with unstable intertrochanteric fractures and can provide good and satisfactory clinical outcomes associated with low complication and mortality rates.

**Key words:** Arthroplasty, Dynamic hip screw, Intertrochanteric fracture, Unstable fracture

## Introduction

45% of all hip fractures are intertrochanteric fractures and 35–40% of these fractures are unstable three or four part fractures and associated with high rates of morbidity and mortality (1, 2). Due to difficulty in obtaining anatomical reduction, management of the unstable intertrochanteric fractures in elderly patients is challenging and controversial (3, 4). Osteoporosis and instability are the most important factors preventing early weight bearing and leading to unsatisfactory results in these cases (3, 5, 6).

Complications such as excessive sliding (leading to shortening), varus displacement, nail pull-out, and/or screw breakage are some of the problems commonly seen in these osteoporotic patients who had been treated by

Dynamic Hip Screw (DHS) (7, 8). Although this implant is the standard treatment for unstable intertrochanteric fractures, it is associated with high rate of complications and morbidity, and therefore primary hip arthroplasty was also suggested as an alternative treatment by some authors (6, 9, 10). In addition, DHS is not usually recommended in unstable reverse oblique fractures (8, 11, 12). The purpose of this study is to compare the results of hip arthroplasty (total, hemi, or bipolar) with DHS in the elderly patients with unstable intertrochanteric fractures.

## Materials and Methods

After obtaining local institutional review board approval (code number 900186), we prospectively studied and followed-up 80 old patients (50 females

**Corresponding Author:** Farzad Omid-Kashani, Orthopedic Research Center, Imam Reza Hospital, Mashhad University of Medical Sciences, Mashhad, Iran.  
Email: [omidif@mums.ac.ir](mailto:omidif@mums.ac.ir)



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**Table 1. Demographic and operative data of our treated patients**

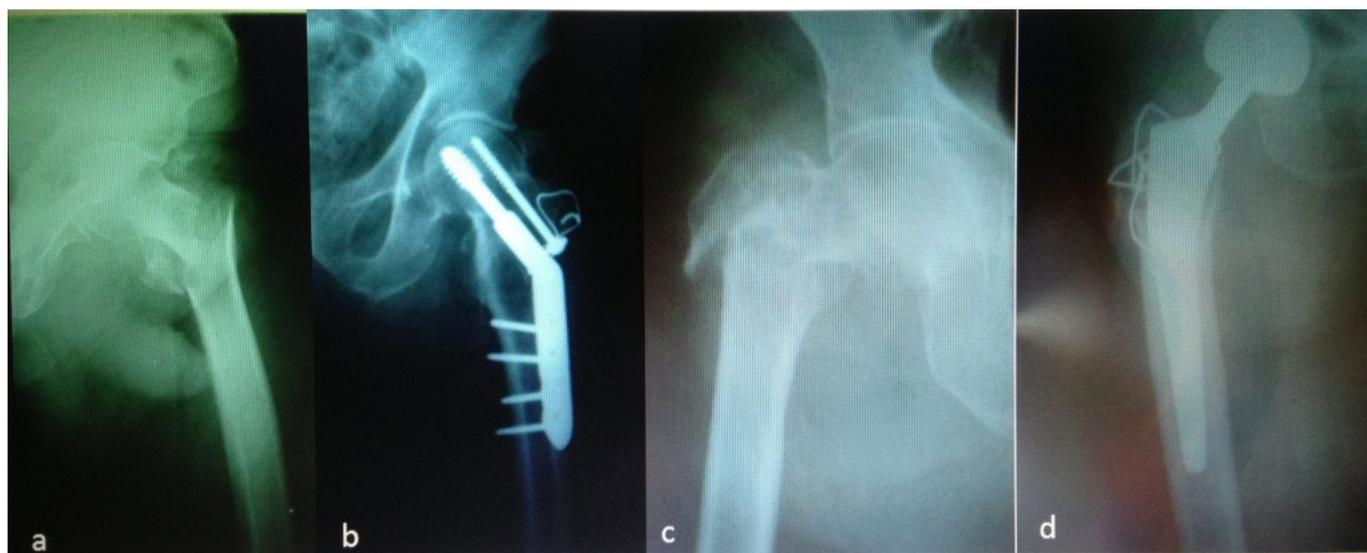
	Group A	Group B	P value
<b>Demographic data:</b>			
-Male/Female	13/27	17/23	0.341
-Mean Age (year)	71.3±4.12	78.9±7.82	0.601
-Mean Follow-up (month)	32.8±5.91	36.1±3.24	0.821
<b>Surgical Characteristics</b>			
-Blood Loss (cc)	690.3±45.6	610.2±60.1	0.487
-Mean Duration of surgery (minute)	113.5± 35.5	121.8±25.3	0.561
-Mean Length of Hospital Stay (day)	8.1±2.1	7.3±3.2	0.981
-Mean Time to Walking (day)	3.1±2.6	2.6±4.5	0.141

and 30 males) with complex unstable intertrochanteric fracture of the femur (types A2 and A3) from January 2007 to December 2010. After the patients signed the informed consents, depending on the time of the patients' admission, we alternatively treated them by DHS and arthroplasty, and placed them in Groups A and B, respectively (each group contained 40 patients). We excluded those patients with an age less than 40 or a follow-up period of less than 24 months.

The fracture type was classified according to AO/OTA system (AO: Arbeitsgemeinschaft für Osteosynthesefragen; German for "Association for the Study of Internal Fixation", and OTA: Orthopaedic Trauma Association) (2). In Group A, fracture reduction was obtained closely while the patient had been placed on the fracture table. We used only 135° DHS implants with four or five holes side plates. In some cases, tension band wiring of the greater trochanter, anti-rotation screw, and cement augmentation were also used. In Group B due to underlying osteoporosis or associated morbidity, we usually treated the patients with cemented type of

prostheses to mobilize them more quickly (Figure 1). Indeed, we used cementless arthroplasty in only four patients.

Treatment with antibiotics was initiated with surgery (first dose given 20-30 minutes before skin incision) and continued for three days after surgery. Active assisted exercises were started during the first postoperative day and depending upon the patient condition, ambulation started on the second or third day. All patients underwent a routine postoperative physiotherapy protocol that included early gait training with the help of a walker starting as tolerated. Patients were examined postoperatively at 3 and 6 weeks, 3 months, 6 months, 1 year, and thereafter annually. At each visit, clinical and radiological examinations were completely performed and the patient was evaluated using the Harris Hip Score (HHS; <70 poor, 70-79 Fair, 80-89 Good and 90-100 Excellent) (13, 14). Anteroposterior and lateral radiographs of the hip were analyzed at each follow-up visit to discover any evidence of implant failure, loss of reduction, prosthesis loosening, etc.



**Figure 1.** Parts "A" and "B" show pre- and postoperative radiographs of a 83 years old male with intertrochanteric fracture Type A2 treated with DHS, tension band wiring and an anti-rotation screw (Group A). Parts "C" and "D" illustrate pre- and postoperative radiographs pertaining to a 75 years old obese female with intertrochanteric fracture Type A3 treated by bipolar hemiarthroplasty and tension wiring (Group B).

**Table 2. Various complications observed in our patients**

	Group A	Group B	P value
<b>General</b>			
-Pulmonary thromboembolism	6	4	0.629
-Myocardial infarction	2	2	>1
-Pneumonia	2	1	0.795
-Early Mortality (during hospitalization)	0	0	>1
-Late Mortality	4	2	0.017
<b>Device related</b>			
-Nail cut-out	4	-	-
-Varus deformity >15°	10	2	<0.001
-Shortening >2 cm	7	-	<0.001
- Non-union of greater trochanter	4	3	0.743
- Revision	6	0	<0.001

### Statistical analysis

Statistical analysis was performed using SPSS 11.5 for Windows (SPSS Inc., Chicago, IL, USA). The continuous variables were declared as mean  $\pm$  standard deviation (SD). Categorical variables were compared by Fisher's exact test. Depending on the distribution, mean values were compared using Mann-Whitney U test or Student's t-test. Statistical significance was determined as  $P < 0.05$ .

### Results

Seventy (87.5%) patients were operated within 1-3 day after admission. In other patients, operation was delayed to improve the preoperative associated medical conditions. Demographic data and operative characteristics of the patients are depicted in Table 1. The prevalence of type A2 and A3 in group A was 32 and 8, while in group B was 30 and 10. Altogether, the mean length of follow-up and age were  $34.3 \pm 4.1$  months (ranged; 24-59) and the  $75.2 \pm 5.2$  years (ranged; 58-96), respectively.

Type of the fracture had a great influence on the duration of surgery and blood loss. In Group A, the mean duration of surgery was  $101.3 \pm 24.5$  minutes in Type A2 and  $121.2 \pm 39.7$  minutes in Type A3 ( $P = 0.012$ ), and also in Group B, it was  $105.9 \pm 34.8$  minutes in Type A2 and  $129.1 \pm 32.3$  minutes in Type A3 ( $P = 0.012$ ). In Group A, the mean blood loss was  $510.2 \pm 80.4$  cc in Type A2 and  $800.6 \pm 65.9$  cc in Type A3 ( $P = 0.019$ ), and similarly in Group B, it was  $452.7 \pm 60.4$  cc in Type A2 and  $754.3 \pm 80.8$  cc in Type A3 ( $P = 0.019$ ).

The various complications observed in this study are shown in Table 2. There was no significant difference between two groups regarding to mortality rate during

hospitalization (no patient died during this time), but there was a significant difference between the two later. Six patients (7.5%) died within 24 months after surgery (four cases from Group A and two from Group B). Fracture classification, age and gender also had no significant influence on mortality. Fracture type and age had no significant influence on general complications, but 81.25% of these complications had been occurred in female patients. Overall device related complications were significantly higher in Group A ( $P < 0.001$ ).

Functional outcome of patients was shown in Table 3. The score was higher in Group B, but this difference was not significant statistically ( $P = 0.682$ ). Fracture type, sex and age had no noteworthy influence on functional outcome.

### Discussion

Although the standard and ideal treatment for intertrochanteric fractures still is the internal fixation devices such as dynamic hip screw (DHS) and intramedullary nailing, common problems such as cutting out of the hip screw in unstable and osteoporotic fractures (which reported to be as high as 4-20%) have questioned the use of these devices (8, 11, 12, 15). In our series, nail cut out occurred in 4(10%) patients for whom a secondary hemiarthroplasty was undertaken. Early mobilization and full weight bearing regardless of bone quality is a crucial important aim in unstable intertrochanteric fractures of the elderly patients, because early walking with full weight bearing reduces the incidence of mortality rate, pressure sores, pulmonary infection and pulmonary atelectasis (16-

**Table 3. Functional outcome in our treated patients**

	Functional outcome				
	Excellent	Good	Fair	Poor	Total
<b>Group A</b>	12(30%)	18(45%)	10(25%)	0	40(100%)
<b>Group B</b>	13(32.5%)	21(52.5%)	6(15%)	0	40(100%)
<b>Total</b>	25(31.25%)	39(48.75%)	16(20%)	0	80(100%)

18). Early mobilization also reduces the mean length of hospital stay (16). Based on previous studies, mortality was significantly influenced by patient related factors such as gender and age but not the fracture type (19, 20). In the study we conducted, neither gender nor age nor the fracture type have significant effect on mortality.

Although internal fixation devices (DHS or Intramedullary nail) relative to the conservative treatment reduce the mortality and complications, early mobilization is still a challenge in these osteoporotic old cases and mortality rate is still high (21). Therefore, in accordance with other authors we think that in unstable intertrochanteric fractures with poor bone quality, arthroplasty is an alternative option of treatment (22). Primary arthroplasty (hemi- or total) provides adequate fixation and early mobilization and thus decrease postoperative complications (3). Arthroplasty has been used for unstable intertrochanteric fractures since 1971 and then there are several studies indicating the effectiveness of arthroplasty as the primary treatment for unstable intertrochanteric fractures in elderly patients. These studies denoted that early ambulation and return to the pre-fracture status are the definite advantages (23). Arthroplasty can decrease the complications, reduce the mortality, allow safe and early weight bearing on the injured hip, and improve the functional outcome (2). In our study, although most of the patients in arthroplasty group were out of bed on the second postoperative day, time to walking and length of hospital stay were comparable with Group A.

Some authors have suggested that operative time, blood loss and transfusion rate were slightly higher in arthroplasty patients (24). Considering these items, our study failed to show any significant differences between the two groups. Rodop et al in 2002 reported the results of primary hemiarthroplasty (bipolar cemented) in 54 cases with unstable intertrochanteric fractures (25). In their study, seven cases died within postoperative four months. Their reported complications included deep infection (one case and after one year), acetabular erosion (one case), non-union of the greater trochanter (four cases), and leg length discrepancy (five cases). Based on Harris hip scoring system after 12 months they obtained excellent and good outcome in 66% of the patients. This index was higher in our study and this may be somewhat due to the difference in mortality rate.

Higher rate of complications occasionally seen in the patients treated with osteosynthesis compared to arthroplasty, has led to more application of the later in the treatment of unstable intertrochanteric fractures (26). Some of these complications mentioned in the literature are superficial or deep infection, periprosthetic

fracture, dislocation, implant failure and a reoperation (27). The main aims are to achieve independency in the performance and return to home more quickly after these fractures happened. The patients must gain the ability to perform basic activities of daily living (self-feeding, bathing, dressing, and using the toilet) and instrumental activities of daily living (food shopping, preparing meals, managing finances, doing laundry and housework, and using public transport). Pre-fracture state of activity is an important factor crucial in making a decision for surgery. The preferred operation is the operation that causes the patient to be launched faster, while avoiding the associated perioperative risks.

Although some preoperative good prognostic factors like younger age, absence of co-morbidities, and presence of patient's cooperation are important, surgical planning has also an essential role in functional outcome and rehabilitation (28, 29). In this respect, arthroplasty compared with osteosynthesis seems to be a better choice for these patients with severe osteoporosis. In the study we carried out, arthroplasty compared to osteosynthesis could gain better functional outcome but this difference was not significant statistically. The reported rate of postoperative dislocation after total hip arthroplasty in the patients with intertrochanteric fractures is as high as 40%, but this incidence in hemiarthroplasty is much lower (30). In our study we did not encounter any postoperative dislocation during this follow-up period.

In conclusion, arthroplasty is an alternative treatment in elderly patients with unstable intertrochanteric fractures and can provide good and satisfactory clinical outcomes associated with low complication and mortality rates.

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Ebrahim Ghayem Hassankhani MD  
Farzad Omid-Kashani MD  
Orthopedic Research Center, Imam Reza Hospital,  
Mashhad University of Medical Sciences, Mashhad, Iran

Hossein Hajitaghi MD  
Golnaz Ghayem Hassankhani MD  
Imam Reza Hospital, Mashhad University of Medical  
Sciences, Mashhad, Iran

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