

ORIGINAL RESEARCH

A study on bipolar hemiarthroplasty for trochanteric fracture femur in geriatric age group and its functional outcome

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ABSTRACT

Introduction: The incidence of intertrochanteric femur fractures has increased due to longer life expectancy and osteoporosis. These types of fractures are highly unstable and challenging to manage when they occur in osteoporotic bones that are grossly comminuted. Aim of the present study was to study the functional outcome of bipolar hemiarthroplasty for trochanteric fractures in geriatric age group and to facilitate early weight bearing, mobilization and rapid rehabilitation of the patient after surgery. **Materials and Methods:** This prospective study was conducted at Bhaskar General Hospital from January 2018 to June 2019, and it involved the management of 30 cases of Bipolar Hemi Arthroplasty trochanteric fracture femur in the geriatric age group. Patients were followed up for a period of one and a half years and evaluated clinically using the MODIFIED HARRIS HIP SCORE to assess their functional outcome. The results of this study will be based on the outcome of the evaluations. **Results:** The majority of 15 study participants were aged between 65 years and 75 years, followed by 75 to 85 and above 85 years age group was 16.6 and 6.6%, respectively. In the study participants, 10 were males, and the remaining 20 participants were females. Majority of fractures in our study are associated with elderly female patients. Other 26 patients were followed up at 6 weeks, 3 month, 6 months and 12 months post operatively. The most common associated comorbid medical problem was hypertension in 9 patients followed by type II diabetes mellitus in 8 patients. The mean day of full weight bearing was on the 6th post-operative day. Average day to full weight bear in our study is 5.5 days. **Conclusion:** In conclusion, this study involved 30 elderly patients aged 65 years and above who underwent primary hemiarthroplasty for Intertrochanteric fractures. The versatility of the bipolar prosthesis was evident in the varied indications in which it was used, highlighting its potential for a wide range of orthopedic procedures.

Key words: Bipolar hemiarthroplasty, Trochanteric fracture femur, Geriatric age, Functional outcome

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INTRODUCTION

Hip fractures are the most frequently seen injuries by orthopedic surgeons and are particularly prevailing in the geriatric community ¹. Femoral neck and intertrochanteric fractures account for over 90% of hip fractures, occurring in approximately equal proportions. Among intertrochanteric fractures 35% to 40% of intertrochanteric fractures of hip are unstable ones which are the major cause of disability and death in the elderly ². The management of comminuted intertrochanteric fractures of femur in elderly patients is tricky as there is challenge of difficult anatomical reduction in osteoporotic bones, need for prolonged

immobilization after surgery and more chances of screw cut out in poor quality bone.

Proximal femoral nailing has shown better results in most cases of comminuted intertrochanteric fractures. However, the role of this nail in comminuted osteoporotic intertrochanteric fractures is still to be defined. For the treatment of these fractures, there are various options available which include hemiarthroplasty, total hip arthroplasty and internal fixation ³.

As per surveys conducted in the past,

hemiarthroplasty is considered to be the most accepted treatment option by surgeons. Cemented fixation has an advantage as it enhances the initial fixation strength among geriatric with poor bone quality ⁴, on the other hand, cementless fixation encourages biological fixation and can reduce cardiovascular toxicity. It can be said that for unstable intertrochanteric fractures in the older population bipolar hemiarthroplasty is an enduring and adaptable solution ⁵.

The study by Matar *et al.*, analyzed the functional outcomes of bipolar hemiarthroplasty in elderly patients with unstable trochanteric femur fractures. The authors found that bipolar hemiarthroplasty led to significant improvements in patients' functional status and quality of life ⁶.

Pajarinen *et al.*, evaluated the efficacy of bipolar hemiarthroplasty in treating unstable trochanteric fractures in elderly patients. The authors concluded that bipolar hemiarthroplasty was a reliable treatment option that led to good functional outcomes and a low rate of complications ⁷.

The study by Pal *et al.*, assessed the functional outcomes of bipolar hemiarthroplasty in elderly patients with trochanteric fractures. The authors found that the majority of patients experienced significant improvements in their functional status and reported high levels of satisfaction with the treatment ⁸.

Recently endoprosthetic replacements have shown to achieve early mobilization of the patient and good long term results. Aim of the present study was to study the functional outcome of bipolar hemiarthroplasty for trochanteric fractures in geriatric age group and to facilitate early weight bearing, mobilization and rapid rehabilitation of the patient after surgery.

MATERIAL AND METHODS

The present prospective study was done at Bhaskar General Hospital during the study period of January 2018 to June 2019 with 30 cases taken to study on management of Bipolar Hemi Arthroplasty trochanteric fracture femur in geriatric age group and its functional outcome. Patient will be followed up for one and half year period and evaluated clinically with MODIFIED HARRIS HIP SCORE and the outcome will be used for study.

INCLUSION CRITERIA

- Patient above 65 years of age.
- Independently ambulatory before sustaining the fracture.
- Comminuted intertrochanteric femur fracture (type II/III Boyd & Griffin).

EXCLUSION CRITERIA

- Patient less than 65 years.
- Non ambulatory patients before the surgery.
- Patients with pathological fractures.

- Open/stable fractures were excluded from the study.

Patient's average age was 65 yrs and above. Both male and female patients were included in the study. 10 patients were male, 20 patients were female. Male to female ratio was 1:2 all the patients had sustained fracture following a trivial trauma. 12 patients had left sided fracture 18 patients had right sided fracture.

Fractures were classified under Boyd and Griffin classification. 27 patients had sustained Boyd & Griffin Type II intertrochanteric fracture, 3 patients had sustained Boyd & Griffin Type III intertrochanteric fracture. The mean number of days from sustaining fracture to surgery was 15 days. Most of the patients were treated with cemented bipolar prosthesis through posterior (Moore's) approach.

PREOPERATIVE EVALUATION

After patient's admission detailed history regarding mode of injury, associated co-morbid condition was taken. Clinical assessment of the patients was done in detail. All patients were treated preoperatively with buck's traction, with the aim of relieving pain preventing shortening and to reduce unnecessary movement of injured limb. Oral or parental NSAIDs were given to relieve the pain.

The following investigations were done routinely on all these patients preoperatively. Blood investigations includes complete blood picture, Random blood sugars, fasting, postprandial blood sugars in diabetics, blood urea, serum creatinine, blood grouping, Rh typing, HIV, HbsAg, clotting time and bleeding time. ECG, 2D-Echo and cardiology fitness, doppler if required.

- Pelvis with both hips-AP view.
- Injured Hip with femur-AP (Traction and internal rotation view).
- Chest X ray PA view.
- CT if required.

The operation was conducted by using Moore's posterior approach. Straight lateral position with the patient lying on the unaffected side. Knee of the unaffected side is flexed to 45 degree which is used as intraoperative reference for measuring limb length. A 10 cm incision made from posterior superior iliac spine to greater trochanter. Gluteus Maximus split to expose greater trochanter. Gemilli, obturator internus and tendon of piriformis divided. Joint capsule exposed and incised. Hip dislocated and osteotomy performed. Femoral head levered out and acetabulum prepared. Prosthesis inserted and trial reductions performed. Cementing done and prosthesis reduced. Wound closed in layers.

POST-OPERATIVE PROTOCOL

Post operatively Patients were made to sit up on the first day, stand up with support (walker) on the second

day and were allowed to full weight bear and walk with the help of a walker on the third postoperative day, depending on his/her pain tolerance and were encouraged to walk thereafter. Sitting cross-legged and squatting were not allowed. Suture removal was done on the tenth postoperative day. Patients were

followed up at an interval of 6 weeks, 3 months, 6 months and 12 months. Patient was analysed clinically and radiologically at each follow up. Radiologically the patient was assessed for position of stem, stem loosening, periprosthetic fracture.

RESULTS

Table 1: Summary of baseline characteristics

Parameter	No. of patients	Percentage
Age group, years		
65-75	23	76.6
75-85	5	16.6
>85	2	6.6
Gender		
Male	10	33.3
Female	20	66.6
Side Determination		
Right	20	66.6
Left	10	33.3
Fracture Classification		
Type-I	0	0
Type-II	27	90
Type-III	03	10
Type-IV	0	0

The majority of 15 (76.6%) study participants were aged between 65 years and 75 years, followed by 75 to 85 and above 85 years age group was 16.6 and 6.6%, respectively. In the study participants, 10 (33.3%) were males, and the remaining 20 (66.6%) participants were females. Majority of fractures in our study are associated with elderly female patients. Among the side determination, 20 (66.6%) participants had the fractured on right, and 10 (33.3%) participants had left fracture. Among the study population, 27 (90%) participants belong to Boyd &

Griffin type 2 fractures (Table 1). Out of 30 patients, 4 patients died within 6 months of surgery. Other 26 patients were followed up at 6 weeks, 3 month, 6 months and 12 months post operatively. The most common associated comorbid medical problem was hypertension in 9 patients followed by type II diabetes mellitus in 8 patients. The mean day of full weight bearing was on the 6th post-operative day. Average day to full weight bear in our study is 5.5 days (Figure 1).

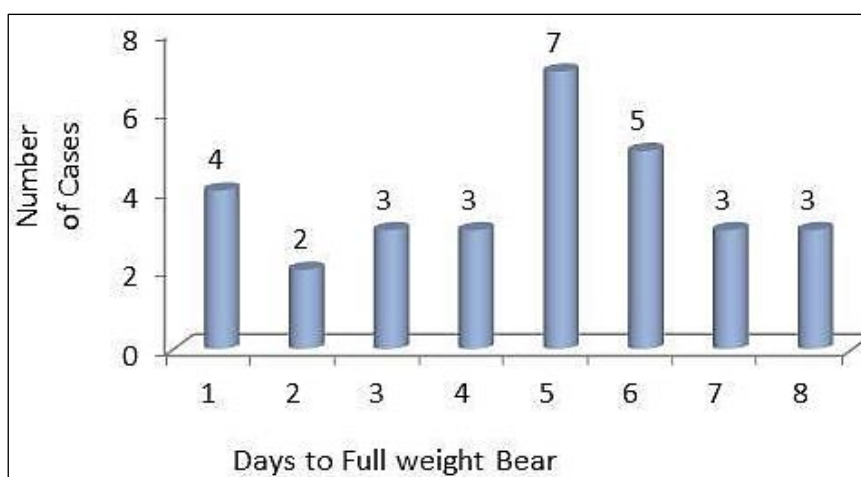


Figure 1: Days to Full Weight

The mean time from injury to surgery was 15 days. All the cases were treated with bipolar prosthesis most of the cases with bone cement. Tension band wiring of greater trochanter was done in 8 cases and circlage wiring done 4 patients to hold the fragments together.

Calcar reconstruction using cement was done in 23 cases. Intra operatively average volume of blood loss was 330.66 ml, mean operative time was 81mins 46secs. There was no hypotension following

application of bone cement into femoral canal. Pre-operatively 8 patients (26.6%) had blood transfusion and post Operatively 20 patients (66%) had blood transfusion, which were uneventful.

A total of 15 patients had shortening of the operated limb, of which 12 had less than 2 cms, so they were

given a heel raise. They walked with the help of a cane, 3 patients had shortening more than 2 cm, had a slight limp, in our study 50% of patients had shortening of limb (Figure 2).

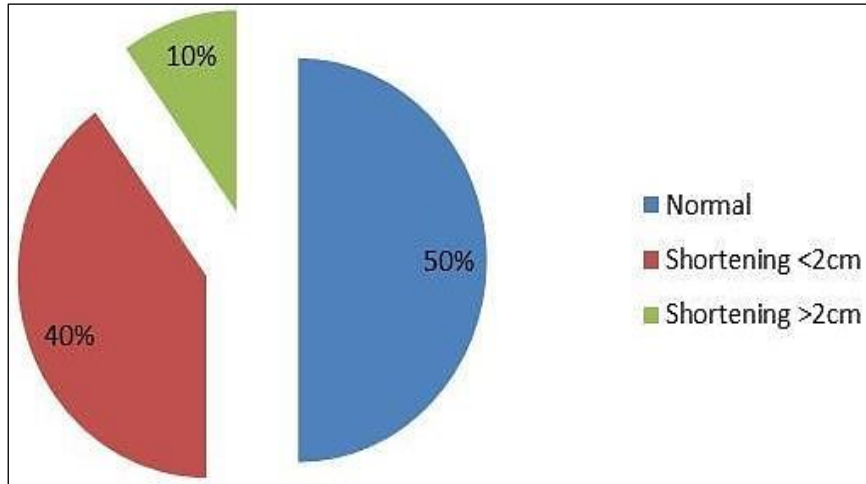


Figure 2: Limb Length Discrepancy

The mean number of days spent by the patient in the hospital in the postoperative period was 12days. At the end of 18 months 6 patients walked without any support, 21 patients walked with the help of a cane, 4 patients complained of occasional anterior thigh pain on long distance walking, which was relieved on taking rest and analgesics. 3 patients were bedridden

(Figure 3) 4 patients died due to unrelated causes. In our study 65% of patients used support (cane) for walking. There was no incidence of deep vein thrombosis, pneumonia, Pressure sores or cardiovascular complication in the early postoperative period.

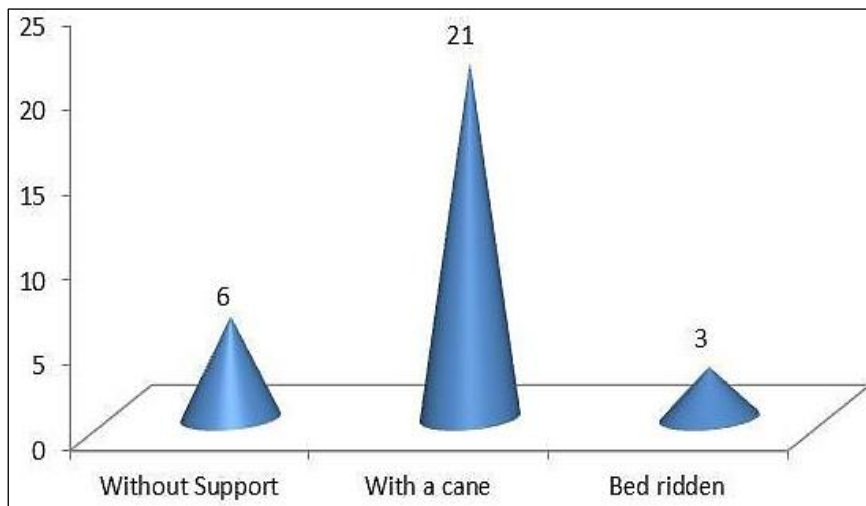


Figure 3: Gait Analysis

The functional results were graded according to Harris Hip Scoring System. In our study, 6 patients had excellent results, 9 patients had good results, 8 patients had fair results, 3 cases had poor result. In our

study, 23 cases (76%) had excellent to fair result as assessed by modified Harris hip score. In our study 76% of patients achieved excellent to fair result as assessed by modified Harris hip score. (Figure 4).

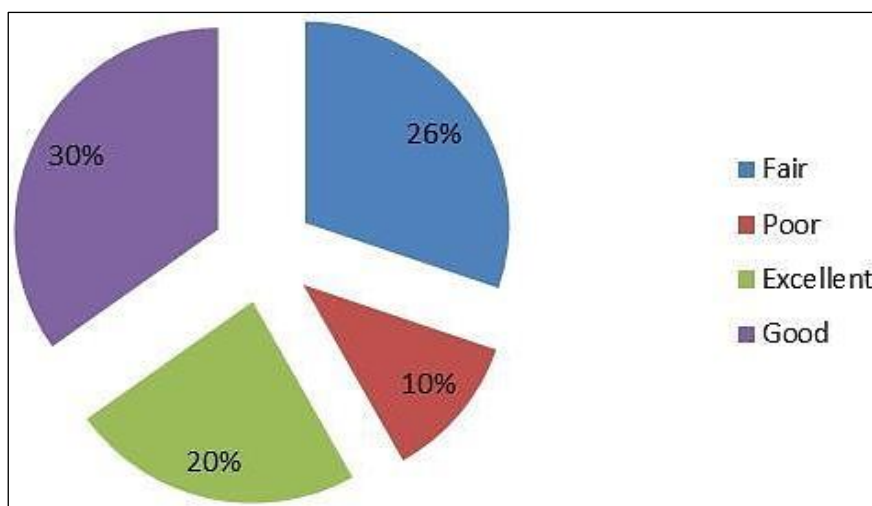


Figure 4: Functional results according to Harris hip score

DISCUSSION

Internal fixation with dynamic hip screw is the treatment of choice for stable intertrochanteric fracture. However the scenario is different when comes to the management of unstable fracture. Failure rate of as high as 56% have been noted with internal fixation of unstable fractures⁹. Early weight bearing following internal fixation of comminuted trochanteric fractures by various means in physiologically elderly and osteoporotic patients leads to fixation failure and poor results¹⁰.

Hemiarthroplasty is a frequently employed alternative as it gives stability and allows early full weight bearing. Most of the complications associated with internal fixation are avoided with the use of prosthetic replacement¹¹. Initially hemiarthroplasty is used only in the treatment of failed fixation of intertrochanteric fractures.

Tronzo¹² was the first surgeon to use long-stem Matchett Brown endoprosthesis for the primary treatment of intertrochanteric fractures. Following this many other surgeons also reported good results with the use of various prosthesis. Green *et al.*,¹³ reported good results with bipolar prosthesis. In this study we used bipolar prosthesis in all 30 cases.

The average age of patients in our study was 72.6 years. Our study results are in accordance with several studies¹⁴. In our series average blood loss was 330.66 ml with only 16 patients required blood transfusion and the operative time was 81 mins 46 secs. Our results are comparable with other authors. Geiger *et al.*,¹⁵ reported a significant increase in blood loss (1050 ml) and operating time (115 min) compared to the internal fixation group.

Stern and Goldstein¹⁶ used Leinbach prosthesis for treatment of 22 intertrochanteric fractures and found early ambulation and early return to preinjury status as a definite advantage. Grimsurd *et al.*,¹⁷ in a study of 39 patients of unstable intertrochanteric fractures treated with cemented bipolar hip arthroplasty, reported a relatively low rate of complication.

In this study there was no complications like pressure sores, pneumonia, Deep vein thrombosis, since most of our patients were ambulatory immediately after surgery. Siwach *et al.*,¹⁸ reported shortening of < 5mm in 64% of cases, 28% of cases had limb lengthening between 5mm and 10 mm. He noticed shortening was due to excessive sinking of prosthesis following weight bearing. Kiran Kumar *et al.*,¹⁹ reported 20% cases had shortening of less than 2cm, 10% of case had shortening of more than 2 cm.

In our series there was 12 cases had shortening less than 2 cm and 3 cases had shortening > 2 cm. Sanchetti *et al.*,²⁰ reported 6 patients with abductor weakness, in a study of 37 trochanteric fractures treated with bipolar hemiarthroplasty. In our study 7 patients out of 30 cases had abductor weakness. His study also reported 71 % of good to excellent results according to Harris hip score, in their series of 35 patients treated with hemiarthroplasty. In our study fair to excellent results was achieved in 76% of cases. Thus the results of hemiarthroplasty in the management of intertrochanteric fractures are definitely promising.

Post-operative mortality reports were conflicting as cited in the literature, varying from 5.4% to 48.8%. Most of the comparative studies have shown a slight increase in mortality rate in prosthetic group than the internal fixation group. Kesmezacare *et al.*,²¹ reported post-op mortality rate of 48.8 % after a mean of 6 months in patients treated with endoprosthesis. Sanchetti *et al.*,²⁰ reported post op mortality only in 2 patients out of 37 patients (5.4%) within 6 months of surgery. They have predicted delay in treatment is the most common cause for post op mortality and morbidity. In our series 4 out of 30 patients died within 6 months of surgery due to unrelated causes.

To conclude, in this study primary hemiarthroplasty was performed for Intertrochanteric fractures in 30 elderly patients of more than 65 years. This procedure offered excellent pain free mobile hip, with early mobilization, easy rehabilitation and early return to functional level, when standard techniques were used.

The potential of the bipolar prosthesis in varied indications shows its versatility.

Bipolar hemiarthroplasty reduced the complications of prolonged immobilization, prolonged rehabilitation, marked residual deformities and need for revision surgeries. The procedure offered, faster mobilization, rapid return to pre injury level, improved the quality of life and gave a long term solution in elderly patients with intertrochanteric fractures of the femur.

REFERENCES

1. Kannus P, Parkkari J, Sievanen H, Heinonen A, Vuori I, Jarvinen, M. Epidemiology of hip fractures. *Bone* 1996; 18:57S-63S.
2. Koval KJ, Zuckerman JD. Hip fractures are an increasingly public health problem. *Clin Orthop Relat Res* 1998; 348:2.
3. Jensen, J. Steen, Tondevold, E. & Sonne-Holm.: Unstable trochanteric fractures. A comparative analysis of four methods of internal fixation. *Acta orthop. scand.* 1980;5,949-962.
4. Laros, G. S. and Moore, J. F.: Complications of fixation in intertrochanteric fractures, *Clin. Orthop.* 1994; 101:110.
5. Chan KC, Gill GS. Cemented hemiarthroplasties for elderly patients with intertrochanteric fractures. *Clin Orthop Relat Res* 2000;371:206-215.
6. Matar HE, Selvaratnam V, Shah N, Wynn Jones H. Custom triflange revision acetabular components for significant bone defects and pelvic discontinuity: early UK experience. *J Orthop* 2020;21:25-30.
7. Pajarinen J, Lindahl J, Michelsson O, Savolainen V, Hirvensalo E. Peritrochanteric femoral fractures treated with a dynamic hip screw or a proximal femoral nail: a randomised study comparing post-operative rehabilitation. *The Journal of bone and joint surgery. British volume.* 2005 Jan;87(1):76-81.
8. Pal CP, Mittal V, Sharma B, Sadana A, Singh M, Hussain A. Functional outcome of hemiarthroplasty in unstable intertrochanteric femur fracture in elderly patients. *Journal of Bone and Joint Diseases* Jan. 2016;31.
9. Kyle RF, Cabanela ME, Russell TA, Swiontkowski MF, Winquist RA, Zuckerman JD, *et al.*, Fractures of the proximal part of the femur. *Instr Course Lect.* 1995;44:227-253.
10. Gruen TA, McNeice GM, Amstutz HC. "Modes of failure" of cemented stem-type femoral components: a radiographic analysis of loosening. *Clin Orthop* 1979;141:17-27.
11. Dimon JH III, Hughston JC (1967) Major components of unstable trochanteric fractures. *Bone Joint Surg* 49A:440-444.
12. Tronzo RG. The use of an endoprosthesis for severely comminuted intertrochanteric fractures. *Orthop Clin North Am* 1974;5:679-681
13. Green S, Moore T, Prano F. Bipolar prosthetic replacement for the management of unstable Inter trochanteric hip fractures in the elderly, *Clin Orthop* 1987, Nov:224:169-177.
14. Sancheti *et al.*, Primary hemiarthroplasty in elderly unstable osteoporotic intertrochanteric fracture. *Indian J orthop.* 2010;44(4):428-434.
15. Florian Geiger, Monique Zimmermann-Stenzel Christian Heisel, Burkhard Lehner, Wolfgang Daecke: Trochanteric fractures in the elderly: the influence of primary hip arthroplasty on 1-year mortality. *Arch Orthop Trauma Surg.* 2007 December; 127(10): 959-966.
16. Stern MB, Anger man A: Comminuted Inter trochanteric fractures treated with a Leinbach prosthesis. *Clin orthop.* 1987 May (218): 755-780.
17. Chris Grimsrud, Raul J. Monzon, Jonathan Richman and Michael D. Ries: Cemented Hip Arthroplasty with a Novel Cerclage Cable Technique for Unstable Intertrochanteric Hip Fractures. *J Arthroplasty* 2005 Apr;337-343.
18. Ramchander Swatch, Hemant Jain, Roop Singh, Kapil Sangwan. Role of hemiarthroplasty in intertrochanteric fractures in elderly osteoporotic patients: a case series. *Eur J Orthop Surg Traumatol* (2012) 22:467-472.
19. Kiran Kumar GN, Sanjay Meena, Vijaya Kumar, Manjunath S, Vinaya Raj MK. Bipolar Hemiarthroplasty in Unstable Intertrochanteric Fractures in Elderly: A Prospective Study. *Journal of Clinical and Diagnostic Research* 2013;7(8):1669-71.
20. Sancheti *et al.*, Primary hemiarthroplasty in elderly unstable osteoporotic intertrochanteric fracture. *Indian J orthop.* 2010;44(4):428-434.
21. Kesmezarcar H, Ogut T, Bilgili MG, Gokay S, Tenekecioglu Y.: Treatment of intertrochanteric fractures in the elderly patients. Internal fixation (or) hemiarthroplasty. *Acta Orthop Traumatol Tur* 2005;39:287-294.