

Original Article
Orthopaedics

COMPLICATIONS OF INTERTROCHANTERIC FRACTURE MANAGED WITH HEMIARTHROPLASTY OR INTERNAL FIXATION USING DYNAMIC HIP SCREW

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Abstract:

Intertrochanteric fractures are common problem in the elderly population and are associated with high rate of morbidity and mortality. Increased rate of these fractures is due to increased life expectancy of the people and due to increased incidence of osteoporosis in the old age. Before the advent of the term osteoporosis Sir Astley Cooper wrote "that regular decay of nature which are easily detected in the dead body and one of the principal of these is found in the bones, for they become thin in their shell and spongy in their texture. Hence the present study was conducted at our tertiary care hospital to compare results and complications of intertrochanteric fracture managed with hemiarthroplasty or internal fixation using dynamic hip screw.

Material And Methods: 45 patients aged 60 years and above with Type 3, Type 4 Evans intertrochanteric fracture femur operated between February 2015 to Jan 2017 were studied. Case selection was done on the criteria of history, clinical examination and radiological (X-ray) examination. Soon after admission, clinical data was recorded as per the proforma.

Inclusion Criteria:

- Age of patient is at least 60 years and older.
- Femoral intertrochanteric fracture confirmed on antero-posterior and lateral hip radiographs.
- Unstable fracture (Evans type 3, 4, 5). Reverse oblique type.

- Patient ambulatory prior to fracture, though they may have used an aid like cane or a walker.
- No other major trauma in patient.

Exclusion Criteria:

- Age less than 60 years
- Associated major injuries of lower extremity.
- Any infection around the affected hip (soft tissue or bone).
- Stable fracture (Evans type 1, 2).

Results: The average trauma admission time was 3.85 days and inpatient duration was 15.18 days. All fractures were fixed using DHS and bone wires, k wires and screws were used to provide additional stability in some fractures. Complete weight bearing was started after average period of 10.6 weeks. 3 patients had bed sore treated with air bed and wound dressing while 1 patient had lacunar infarct in lentiform nucleus and right frontal area postoperatively, and was treated accordingly. 1 patient was admitted for

physiotherapy in 6th month for gait training and muscle strengthening. 1 patient who had palpable implant and pain in hip had implant removal after 1 year and fracture was united after collapse. No patient had deep infection. After 6 months of follow up, 2 patients had poor results, 3 had fair results, 16 had good results and 4 had excellent result. At the end of 1 year, all patients who were available for follow up had good to excellent results. No implant cut out was seen and no revision surgery was required.

Conclusion: Most of the fractures occurred above 50 years were due to trivial trauma. As age advances there is weakening of bones due to osteoporosis and decreased mineralization and deterioration of general condition due to which cancellous bones are prone to

fracture with trivial trauma. Although the clinical outcomes were comparable at the end of one year in both groups, arthroplasty patient had lower post-operative complications like bed sores, pulmonary infection and atelectasis. Major difference was in the duration after which full weight bearing was started, which was significantly early in arthroplasty group. We conclude that hemiarthroplasty is a better option in patients with unstable intertrochanteric fractures.

Key words: External Fixator, K wire, Locking compression plate, distal end radius fractures

Introduction:

Intertrochanteric fractures are common problem in the elderly population and are associated with high rate of morbidity and mortality^{1,2}. Increased rate of these fractures is due to increased life expectancy of the people and due to increased incidence of osteoporosis in the old age. Before the advent of the term osteoporosis Sir Astley Cooper wrote "that regular decay of nature which are easily detected in the dead body and one of the principal of these is found in the bones, for they become thin in their shell and spongy in their texture." In the early days these fractures were treated with conservative treatment in traction or non - rotating boot for 6-8 weeks. It is now accepted that internal fixation is the best method because it allows early mobilization and prevention of complications due to prolonged immobilization²⁻⁵. Treatment with primary bipolar hemiarthroplasty rather than internal fixation could perhaps return these patients to the pre-injury level of activity more quickly thus obviating the postoperative complications caused by immobilization or failure of the implants⁶. This study was conducted at our tertiary care hospital to compare results and complications of intertrochanteric fracture managed

with hemiarthroplasty or internal fixation using dynamic hip screw.

Material And Methods

Study site: Tertiary centre

Study Population: 45 patients aged 60 years and above with Type 3, Type 4 Evans intertrochanteric fracture femur operated between February 2015 to Jan 2017 were studied.

Case selection was done on the criteria of history, clinical examination and radiological (X-ray) examination. Soon after admission, clinical data was recorded as per the proforma.

Inclusion Criteria

- Age of patient is at least 60 years and older.
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- Unstable fracture (Evans type 3, 4, 5). Reverse oblique type.
- Patient ambulatory prior to fracture, though they may have used an aid like cane or a walker.
- No other major trauma in patient.

Exclusion Criteria

- Age less than 60 years
- Associated major injuries of lower extremity.

- Any infection around the affected hip (soft tissue or bone).
- Stable fracture (Evans type 1, 2).

The diagnosis was mainly based on clinical examination and was supported by radiological (X-ray) examination.

The outcome measures were to compare results and complications of intertrochanteric fracture managed with hemiarthroplasty or internal fixation using dynamic hip screw.

Results

Hemiarthroplasty (Group1) consisted of 20 patients that had undergone hemiarthroplasty while Internal fixation(Group 2) had 25 patients that had undergone internal fixation using dynamic hip screw. There were no significant differences between the 2 groups in terms of demographic data (age, sex), fracture type, hospital stay, operating time, metabolic diseases and associated diseases. Full weight bearing started significantly earlier in patients of Hemiarthroplasty (Group1). Patients who underwent internal fixation had more early complication than those with hemiarthroplasty.

In Hemiarthroplasty (Group1), the mean age of patients was 78.4 years, female to male ratio was 10:8 and

mean follow up period was 1.2 yrs. Of the total 20 patients, 10 patients were Type 3 fractures, 8 were Type 4 fractures, 1 of Type 5 and Type reverse oblique each. Mechanism of injury in this group was mainly trivial trauma in the form of slip and fall and only one patient had road traffic accident. All patients were ambulatory pre-fall either community or household. The average trauma admission time was 2.5 days with average stay of 16.14 days in hospital. All were operated with cemented prosthesis bipolar prosthesis. Complete weight bearing was started after average period of 8.12 days. 1 patient had superficial wound infection which was treated with meticulous wound care and antibiotics. No patient had deep infection or pulmonary infection. 1 patient had bed sore which was treated with air bed and wound dressing. 1 patient had post-operative constipation and abdominal distention (known operated case of carcinoma stomach). GI scopy was done and treated accordingly, which increased stay in hospital. After 6 months of follow up fair result in 2 patients, good result in 5 patients and excellent result in 13 patients was observed. Eventually all patients had good to excellent result after 1 year. There was no dislocation, acetabular protrusion or aseptic loosening of the stem in any patients.

In Internal fixation (Group 2) the mean age of patients was 71.3 years, female to male ratio was 7:16 and mean follow up period was 1.3 years. Of the total 25 patients, 12 patients are of Type 3, 9 are of Type 4 and 4 are of Type 5. The mechanism of injury in this group was also trivial trauma in the form of slip and fall, 3 patients had road traffic accident and had fall from height. All patients were ambulatory pre fall except 1 patient who had

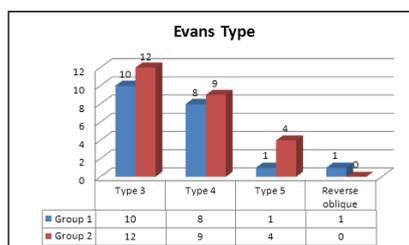
hemiplegia on same side. The average trauma admission time was 3.85 days and inpatient duration was 15.18 days. All fractures were fixed using DHS and bone wires, k wires and screws were used to provide additional stability in some fractures. Complete weight bearing was started after average period of 10.6 weeks. 3 patients had bed sore treated with air bed and wound dressing while 1 patient had lacunar infarct in lentiform nucleus and right frontal area postoperatively, and was treated accordingly. 1 patient was admitted for physiotherapy in 6th month for gait training and muscle

strengthening. 1 patient who had palpable implant and pain in hip had implant removal after 1 year and fracture was united after collapse. No patient had deep infection. After 6 months of follow up, 2 patients had poor results, 3 had fair results, 16 had good results and 4 had excellent result. At the end of 1 year, all patients who were available for follow up had good to excellent results. No implant cut out was seen and no revision surgery was required.

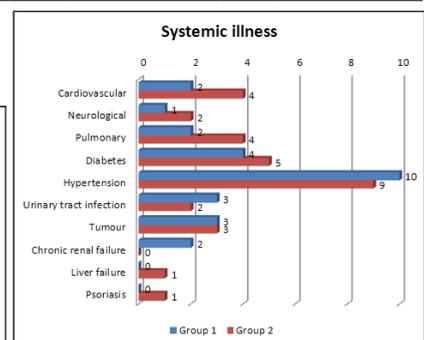
The comparison of patient characteristics between the two groups is given in Table 1:

Table 1

Patient characteristics	Group 1	Group 2
Mean Age	78.4 years	71.3 years
Female: Male ratio	10:8	7:16
Evans type		
Type 3	10	12
Type 4	8	9
Type 5	1	4
Reverse oblique	1	0
Systemic illness		
Cardiovascular	2	4
Neurological	1	2
Pulmonary	2	4
Diabetes	4	5
Hypertension	10	9
Urinary tract infection	3	2
Tumour	3	3
Chronic renal failure	2	0
Liver failure	0	1
Psoriasis	0	1
Trauma-admission interval	2.5 days	3.85 days
No. of days inpatient	16.14	15.18
Mean follow up period	1.2 years	1.3 years



Graph 1: Evans Type

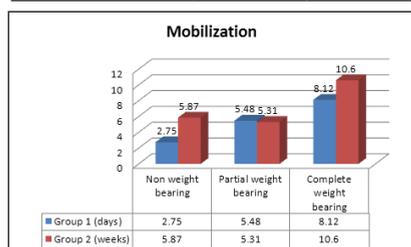


Graph 2: Systemic illness

The comparison of weight bearing parameters between the two groups is characterized in Table 2:

Table 2

Patient characteristics	Group 1	Group 2
Mobilization		
Non weight bearing	2.75 days	5.87 weeks
Partial weight bearing	5.48 days	5.31 weeks
Complete weight bearing	8.12 days	10.6 weeks



Graph 3: Mobilization

Discussion

Surgical outcome in elderly patient is unsatisfactory with associated comorbid conditions like medical illness, osteoporosis and fracture instability. Elderly patients, even if they are in good general health cannot be mobilized without some weight being borne on the involved limb. Early mobilization may decrease the risk of morbidity. In patients with osteoporotic fractures, and major comminution, maintenance of reduction can be a major problem, so many surgeons recommend hip to be protected throughout the healing period. To reduce the healing time, dynamic devices are replaced with the static ones. Dynamic implants have more weight bearing capacity than static implants^{6,7}. Partial weight bearing creates a micro movement in dynamic system which increases union rate. The weak and porotic bone tolerates screws poorly so cut out is the major problem in internal fixation. Central position of the screw in the femoral neck is the recommendable

position. Use of internal fixation has decreased the morbidity rate but rate of complications are high bearing, many surgeons prefer arthroplasty for the treatment of unstable intertrochanteric fractures. The patient's rapid return to the prefracture level of activity has essentially prevented post-operative complications such as bed sores, pulmonary infections and atelectasis.

In the current study, 84.4% patient had excellent to good results after follow up period of 1 yrs. In the study of Kadam R et al²¹ out of 22 patients, 21 had excellent to fair outcomes with primary cemented bipolar hemiarthroplasty. The study of Pal CP et al²² observed that 91% of bipolar hemiarthroplasty group (Group 1) and 100% of total hip arthroplasty (Group 2) has an excellent to fair outcome. Haentjens P et al⁸ compared results of bipolar arthroplasty and internal fixation and reported 75% satisfactory results with less post-operative complications in arthroplasty group. Rosenfeld RT et al⁹ reported 86% of satisfactory results in early period using arthroplasty.

In patients with internal fixation, it is advised to put minimal weight on the affected limb. Despite the advice patient bear more weight and it is difficult to teach them to bear weight only on normal limb. The placement of the screw near the subchondral bone can improve the fixation and associated weight bearing aids can help in the healing of the fracture¹⁰⁻¹⁶.

In the current study rate of deep infection is 0% in arthroplasty. It should be remembered that even in the conventional total hip replacement, the rate of deep infection is higher in patients who have a previous operation on the hip. Ehlinger M et al¹⁷ reported that about 6% of patients with intertrochanteric fractures treated

with the DHS device suffered from infections; however, no implant loosening was observed.

In the current study, rate of postoperative complications are higher in internal fixation as compared to arthroplasty, full weight bearing was delayed in internal fixation. No dislocation was seen in this study. Sengodan MM²³ observed in his study that 3 patients had immediate complications (2 cases of limb length discrepancy, 1 case of superficial infection) and 1 patient had delayed complication (dislocation at 1.5 years follow up following an attempt to sit on the floor). The rate of dislocation is aggravated by improper prosthesis length, larger the femoral component greater the tendency to dislocate. Sinno K et al¹⁸ conducted a retrospective study on 102 patients with intertrochanteric fracture and compared the results of bipolar and DHS usage. The authors observed that the function, complication rate and FWB in the bipolar group were significantly better.

Shah K et al¹⁹ compared open reduction and internal fixation (ORIF) and bipolar outcomes in 124 patients with intertrochanteric fractures. In a two-year follow-up of patients, who were treated with ORIF, there were better results of pain reduction, ability to walk and HHS compared with the bipolar hemiarthroplasty groups. Bhattacharyya T et al²⁰ compared results of bipolar with total hip arthroplasty (THA) in intertrochanteric fractures. In the THA group, duration of surgery, blood loss and need for blood transfusion, patient costs and dislocation rate was significantly higher than the bipolar group. However, the duration of hospital stay, complications, pain and function were not difference between the two groups.

They concluded that in patients with intertrochanteric fractures, bipolar is the better treatment in comparison with THA

Conclusion

Patients treated with internal fixation started full weight bearing (avg. 10.6 weeks) late as compared to hemiarthroplasty (avg. 8.12 days), hence the functional recovery was delayed with internal fixation group. Early post-operative Harris Hip score were good in patients treated with hemiarthroplasty as compared to internal fixation group but at the end of 1 year score was comparable. Post-operative complications were more internal fixation group than hemiarthroplasty group and were comparable with other studies.

Most of the fractures occurred above 50 years were due to trivial trauma. As age advances there is weakening of bones due to osteoporosis and decreased mineralization and deterioration of general condition due to which cancellous bones are prone to fracture with trivial trauma. Although the clinical outcomes were comparable at the end of one year in both groups, arthroplasty patient had lower post-operative complications like bed sores, pulmonary infection and atelectasis. Major difference was in the duration after which full weight bearing was started, which was significantly early in arthroplasty group. We conclude that hemiarthroplasty is a better option in patients with unstable intertrochanteric fractures.

References

1. Sexson S B and Lahner J T :Fractures affecting hip fracture mortality.jorthop trauma 1987;1298-305;
2. White B L , Fisher W D and Laurin C A : Rate of mortality for elderly patients after fracture of hip in the 1980s J B J S-A Dec 1987;69 :1335-1340.
3. Laros G S and Moore J F :Complications of fixation in intertrochanteric fracture.clinorthop 1974;101:110-119.
4. CharnleyJOHN :Petrochanteric fracture of neck of femur in the closed treatment of common fractures Ed.3,Edinburgh E and S,livingstone 1961 pp.160-165.
5. Evans E M : Treatment of trochanteric fracture of femur.J B JS 1949;31-B2:190-203.
6. Chang W S,Zuckerman J D,Kummer F J,Frinkel V H:Biomechanical evaluation of anatomical reduction vs medial displacement osteotomy in unstable intertrochanteric fractures.clinicalorthoprelat res 1987;225:141-146.
7. Desjardins A L,RoyA,Paieiment G,NewmanN,PedlowF,Desloges D et al:Unstable intertrochanteric fracture of the femur.A prospective randomized study comparing anatomical reduction and medial displacement osteotomy.J B J S-B 1993;75;445-447.
8. Haentjens P, Casteleyn P P ,Deboeck H , Handelberg F and Opdecam P : Treatment of unstable intertrochanteric and subtrochanteric fractures in elderly patients. Primary bipolar arthroplasty compared with intemalfixation . J B J S Am 1989 ;1214-1225.
9. Rosenfeld R T, Schwartz D R and Alter A H : Prosthetic replacement for trochanteric fractures of the femur. J B J S Am 1973 ; 55;420
10. Kyle RF, Gustilo B, Premer RF. Analysis of six hundred and twenty-two intertrochanteric hip fractures. J Bone Joint Surg Am. 1979;61(2):216–21.
11. Yong C, Tan C, Penafort R. Dynamic hip screw compared to condylar blade plate in the treatment of unstable fragility intertrochanteric fractures. Malaysian orthopaedic j. 2009. pp. 13–18.
12. Wolfgang GL, Bryant MH, O'Neill JP. Treatment of intertrochanteric fracture of the femur using sliding screw plate fixation. ClinOrthop. 1982;163:148–158.
13. Li P, Yang H, Zheng L, Shan HH. Postoperative complications of Dynamic hip screw and its prevention in the treatment of intertrochanteric fracture. J Dalian Med Univ. 2009;3:17.
14. Nordin S, Zulkifli O, Fisham WI. Mechanical failure of Dynamic Hip Screw (DHS) fixation in intertrochanteric fracture of the femur. Med J Malaysia. 2001. pp. 12–7.
15. Laskin RS, Gruber MA, Zimmerman AJ. Intertrochanteric fractures of the hip in the elderly: a retrospective analysis of 236 cases. ClinOrthopRelat Res. 1979. pp. 188–95.
16. Moroni A, Faldini C, Pegreff F, Hoang-Kim A, Vannini F, Giannini S. Dynamic hip screw compared with external fixation for treatment of osteoporotic pertrochanteric fractures. A prospective, randomized study. J Bone Joint Surg Am. 2005;87(4):753–9.
17. Ehlinger M, Adam PH, Delpin D, Moser T, Bonnomet F. Osteosynthesis of periprosthetic femoral fractures with Locking Plate fixation using an LCP: A consecutive series of 36 fractures with mean 26 months follow- up. J Bone Joint Surg Br. 2011;93:531.
18. Sinno K, Sakr M, Girard J, Khatib H. The effectiveness of primary

- bipolar arthroplasty in treatment of unstable intertrochanteric fractures in elderly patients. *N Am J Med Sci.* 2010;2(12):561–8.
19. Shah K, Eissler J, Radomisli T. Algorithms for the treatment of femoral neck fractures. *ClinOrthopRelat Res.* 2002. pp. 28–34
 20. Bhattacharyya T, Iorio R, Healy WL. Rate of and risk factors for acute inpatient mortality after orthopaedic surgery. *J Bone Joint Surg Am.* 2002;84:562–572
 21. Kadam R, Sawant R, Chhallani A. Functional outcome of intertrochanteric fractures treated with bipolar hemiarthroplasty. *Int J Res Orthop.* 2017;3(1):1-3
 22. Pal CP, Dinkar KS, Mittal V, Goyal A, Singh M, Hussain A. Role of bipolar hemiarthroplasty and total hip arthroplasty in unstable intertrochanteric fracture femur. *J Orthop Allied Sci* 2016;4:69-74.
 23. Sengodan MM. Transtrochanteric Approach for Cemented Bipolar Hemiarthroplasty in Unstable Inter Trochanteric Fractures in Elderly Osteoporotic Patients –A Case Series. 2015;4(10):1241-1243