



COXOFEMORAL BYPASS IN UNSTABLE TROCHANTERIC FRACTURES – A PROSPECTIVE STUDY

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ABSTRACT **Introduction:** Intertrochanteric fractures are the most common fractures around the hip in the elderly. Around half of them are unstable three or four part fractures. Stable fractures can be very well managed with intramedullary devices but unstable fractures especially in the elderly when treated with such devices have many drawbacks and complications. Coxofemoral bypass is a very good alternative in such group of patients which allows early mobilization of the patient. **Aims And Objectives:** This is a prospective study to analyze the functional outcome of primary hemiarthroplasty in unstable intertrochanteric fractures of the elderly osteoporotic population. **Materials And Methods:** It is a prospective study conducted in the Department of Orthopaedics, Andhra Medical College, Visakhapatnam from NOVEMBER 2019 to October 2021. The sample size is 25. **Results:** Of all the patients operated with hemiarthroplasty, the postoperative Harris hip score was very satisfactory and all the patients could be made to weight bear within one week postoperatively.

KEYWORDS : Hemiarthroplasty; Coxofemoral Bypass; Trochanteric Fractures

INTRODUCTION

Among all fractures around the hip in the elderly, Intertrochanteric fractures are the most common, accounting for around 50% of all hip fractures. Around half of them are unstable fractures (three or four part fractures). Stable fractures are managed with osteosynthesis and have shown particularly satisfactory results. However, it is not the same in the case of unstable intertrochanteric (AO 31-A2.2 and 2.3 type fractures) where obtaining an anatomical reduction is difficult.

Other challenges that we face in unstable intertrochanteric fractures, particularly in the old patients, is their poor bone quality and hence the surgeon is forced to prevent early weight bearing to prevent implant failure. But prolonged bed rest or limited ambulation in such patients can lead to risk of various complications like PE, DVT and pressure ulcers. These fractures are more common in females and a simple fall usually at their home is the cause.

The tendency to fall increases with a patient's age and is exacerbated by several factors, such as poor vision, labile blood pressure, decreased muscle power, decreased reflexes, vascular disease, and any coexisting musculoskeletal pathology.

Intramedullary devices have been introduced for unstable intertrochanteric fractures, which have reported lower rates of screw cut-outs. However, their role in osteoporotic and fractures with severe comminution, is still a debate.

Replacement with hemiprosthesis has an advantage of early ambulation of the patient and satisfactory long-term results. Owing to the inferior quality of bone, associated comorbidities and increased risk of complications due to delayed ambulation, the ideal implant for treating such fractures is still controversial. Recently some authors advocated the use of cemented bipolar arthroplasty or hemiarthroplasty which results in better functional outcome.

AIMS AND OBJECTIVES:

The major factor leading to unsatisfactory results in the management of unstable intertrochanteric fractures in elderly patients is Osteoporosis. Such patients would require a period of restricted mobilization, which may cause complications like atelectasis, bedsores, pneumonia, and deep vein thrombosis. There is evidence that use of hemiarthroplasty in such unstable intertrochanteric fractures in the elderly provides stable fixation and allows for early mobilization of the patient.

The Aims Of This Study Are:

- To analyze the functional outcome of primary hemiarthroplasty in unstable intertrochanteric fractures of the elderly osteoporotic population.

- To show that primary hemiarthroplasty has a lower chance of failure in such osteoporotic elderly patients and so the need for a second revision surgical procedure is low.
- To show that hemiarthroplasty is a good option in failed cases of unstable intertrochanteric fractures treated with other implants like DHS/PFN.

MATERIALS & METHODS:

Study Design: Hospital-Based Prospective Study.

Study Period: NOVEMBER 2019 to October 2021.

Study Setup: Study will be conducted in the Department of Orthopaedics, Andhra Medical College, Visakhapatnam.

Sample Size: 25

Inclusion Criteria:

- Patients of age 60 years and above.
- Patients of either sex
- Traumatic fractures
- Unstable intertrochanteric fractures (AO/OTA 31A2.2 and above)
- Subjects who have given informed consent.
- Failed Unstable IT fractures treated with other implants.

Exclusion Criteria:

- Age below 60 years.
- Unfit for anesthesia.
- Patients with compound fractures, pathological fractures, or with prior intertrochanteric femur fractures.
- Pre-existing deformities of the injured hip.
- Patients with multiple fractures/polytrauma.
- Patients with stable fractures with an intact lesser trochanter,
- Local or systemic infection
- Bone metastases
- Refusal for consent

METHODOLOGY:

- The Institute Ethics Committee approval was obtained.
- Consent was obtained from the patient.
- Upon arrival, patients were assessed clinically and stabilized hemodynamically
- They were subjected to radiographs of the pelvis with both hips anteroposterior view and full-length thigh anteroposterior and lateral views.
- Following radiographs, patients were admitted to orthopedic ward and were maintained on upper tibial pin traction over a Bohler-

Braun frame till surgery.

- Under regional anesthesia, cemented bipolar hemiarthroplasty was done through Moore's posterior approach to the hip.
- Patients were discharged on the 12th postoperative day following suture removal.
- Patients were made to mobilize on the 2nd postoperative day with the help of a walker frame.
- Patients were assessed clinically and radiologically on the 2nd post-operative day, at 6 weeks, 3 months, and then between 6 months to 1 year depending upon the fracture union.
- Data is statistically analyzed, recorded in specially designed proforma, and transferred to the expert sheet.
- These findings will be documented according to the protocol.
- Healing was judged by both clinical- (pain and motion at fracture site) and radiological – (bridging callus filling the fracture site or trabeculations across the fracture site) and the functional outcome will be reviewed according to the Harris Hip score (modified).

DETAILS OF THE STUDY:

- 25 cases of unstable intertrochanteric fractures were treated with hemiarthroplasty between November 2019 and October 2021 and were studied prospectively.
- There were 14 females and 11 male patients. All the patients were above 60 years of age (range 62-89 years).
- The AO classification of trochanteric fractures was used and all patients with AO/OTA type 31-A2.2 and 31-A2.3 fractures were selected for this study.
- Patients with associated fractures, patients that were not walking on their own before injury, and patients with psychiatric and neurological disorders were excluded from the study.
- All patients were walking prior to the trauma. Twenty were walking without support while the remaining walked with an aid. No patient had any significant preexisting hip pathology.

OPERATIVE PROCEDURE

- All cases were operated through a standard posterior approach (Southern Moore's) in lateral position under spinal anaesthesia by a senior surgeon at kGH.
- The fracture was assessed, a neck cut was made, and head was extracted out.
- After the head was removed, the fracture was then analysed.
- In some cases, the LT was attached to the neck fragment and was reattached to the shaft and GT by encirclage wires.
- In cases where there was severe comminution medially, bone cement was used to reconstruct the medial calcar and the fragments with soft tissue attachments were left behind.
- The greater trochanter fragment was attached to the shaft by either wires, ethibond sutures or k wires depending on the fragments size and fracture morphology.
- The femur was broached carefully with proper anteversion .
- Hip was reduced after placing a trial component in the canal. The limb was then pulled while the trial prosthesis was in-situ and the limb length was compared with that of the normal leg.
- This causes the femur to be pulled downwards causing a gap between the neck cut and the prosthesis. This gap was measured and the final prosthesis was also sunk to maintain this gap between the prosthesis and the neck cut. Thus leg length discrepancies could be avoided .
- Next, the remaining trochanter and calcar fragments were reattached to the main shaft wire cables.
- Wounds were closed in layers and a drain was kept when required.

POST OPERATIVE MANAGEMENT:

- Postoperatively, the patient's pulse, blood pressure, respiration, and temperature were monitored.
- Intravenous Antibiotics were continued for 5 days and oral antibiotics till suture removal (12th Day).
- Pain killers were given as required.
- The patients complete blood counts were checked postoperatively. Dressing was done on the 2nd postoperative day.
- Physiotherapy was initiated as early as possible. Patient was made to sit on the second day after surgery.
- The patients were made to do active hip ROM in bed. Extreme adduction and internal rotation were avoided.
- Quadriceps strengthening exercises were recommended.
- Weight bearing was allowed as early as tolerated. Patients were initially made to walk with a walker frame. Most of them were made to walk on the second postoperative day.
- On the 12 th postoperative day, pain medications were

discontinued, Sutures were removed and patient was sent home after educating him/her about the do's and don'ts after surgery like avoiding squatting and cross legged sitting.

FOLLOW UP:

- Patients were evaluated after 6 weeks. The next follow-up visit would be after 3 months. Thereafter the patient was advised follow-up after 6 months and 1 year.
- An x-ray was taken and functional scores of the patients were evaluated at each follow-up visit. The functional scores used in this study were the Harris hip score (HHS), Lower Extremity Functional Scale (LEFS) and Visual analogue scale (VAS) .
- X-rays were examined for features of any signs of nonunion, position and alignment of the prosthesis, any evidence of loosening or subsidence.
- Using the Harris hip score (HHS) - Fig 5.the patients were given scores as
 <70 - poor,
 70-79 - Fair,
 80-89 - Good and
 90-100 - Excellent.
- The results were analysed with the aim to study the functional outcome of intervention.

RESULTS:

This study included 25 cases (male 14, females 11; mean age 64.92 years). One case expired 6 months post op due to COVID related lung complication, hence was removed from the study. All the other 24 cases were followed up till the end of one year. No case was lost to follow-up. Of these 24 cases 12 patients had AO/OTA 31A2.2 type fracture and 11 patients had AO/OTA 31A2.3 type fracture. Two patients were operated after internal fixation failed in them. The mean age was calculated to be 69.41.The average hospital stay was 12.3 days, most patient were discharged on the 12 the postoperative day after suture removal. In the first week after the procedure, the mean HHS score was 31.75±5.85 which subsequently increased up to 78.33±7.88 by the end of one year [Table 3].

Similarly LEFS score was 6.45±1.66 in the first postoperative week and subsequently it gradually increased and reached up to 36.95±7.26 by the end of one year [Table 3]. In the first postoperative week (under adjunctive use of analgesics) the pain score on VAS Scale was 7.04±3.98 which decreased subsequently and by the year end it was 1.12±0.10 [Table 3].The mean time of surgery was 95.4 min (range 91-124 min), with an average blood loss of 325.8 ml (range 170-525 ml). All patients were made to walk with the help of a walker within 3.3 days of surgery. (Range 1-5 days).

[Table 1]: General Information

Total Number Of Cases	Gender		AO/OTA Type		Implant Failure		Mean Age
	Males	Females	31A2.2	31A2.3	POST DHS	POST PFN	
25	14	11	12	11	1	1	69.41

[Table 2]: Mean Hospital Stay, Operation Time And Blood Loss

Hospital Stay (days)	Operation Time (minutes)	Blood Loss (ml)	Time for weight bearing (days)
12.3	95.4	325.8	3.3

[Table 3]: Harris Hip Score, LEFS And VAS At Different Time Intervals

Time Interval	Harris Hip Score		LEFS Score		VAS Score	
	Mean± SD	p-value	Mean± SD	p-value	Mean± SD	p-value
Postoperative	31.75±5.85		6.45±1.66		7.04±3.98	
6 week Follow up	56.58±8.76	<0.001	20.54±3.66	<0.001	4.50±0.26	<0.001
3 month Follow up	74.30±8.28	<0.001	28.58± 4.95	<0.001	2.41±0.23	<0.001
6 month Follow up	76.62±7.31	<0.001	35.41±5.04	<0.001	1.58±0.23	<0.001
1 year Follow up	78.33±7.88	<0.001	36.95±7.26	<0.001	1.12±0.10	<0.001

[Table 4]: Comparison of Change in Harris Hip Score, LEFS And VAS

Time interval	Change in HHS		Change in LEFS		Change in VAS	
	Mean (SD)	p-value	Mean (SD)	p-value	Mean (SD)	p-value
Post op. – 6 week	24.83 (±2.91)	<0.001	14.09 ± 3.88	<0.001	2.54 ± 0.87	<0.001
Post op. –3 month	42.55 (±2.43)	<0.001	22.13 ± 5.48	<0.001	4.63 ± 0.87	<0.001

Post op. -6 month	44.87 (±1.46)	<0.001	28.96 ±5.78	<0.001	5.46 ±1.08	<0.001
Post op -1 year	46.58 (±2.03)	<0.001	30.50 ±5.71	<0.001	5.92 ±1.62	<0.001
6 week - 3 month	17.72 (±4.95)	<0.001	8.04 ±2.10	<0.001	2.09 ±0.58	<0.001
6 week - 6 month	20.04 (±3.27)	<0.001	14.87 ±2.73	<0.001	2.92 ±0.82	<0.001
6 week - 1 year	21.75 (±3.73)	<0.001	16.41 ±2.61	<0.001	3.38 ±0.29	<0.001
3 month - 6 month	2.32 (±4.00)	<0.001	6.83 ±1.55	<0.001	0.83 ±0.82	0.025
3 month - 1 year	4.03 (±4.52)	<0.001	8.37 ±1.46	<0.001	1.29 ±1.29	<0.001
6 month - 1 year	1.71 (±2.66)	0.317	1.54 ±0.40	0.317	0.46 ±1.00	0.002

COMPLICATIONS:

There were no surgical site infections or heterotopic ossification. There was death of one patient due to COVID related complications 6 months post discharge and is unrelated to the surgery performed. Hence there was loss of follow-up of one patient in this study. In this study, 25 cases were elderly severe osteoporotic patients. Of these patients: 1 case was found to have loosening of the prosthesis, no cases had acetabular wear, 2 cases had greater trochanter fracture nonunion, no case had peri-prosthetic fractures caused by postoperative trauma, one case was lost to follow up due to death from COVID related lung complications and 1 case had prosthetic dislocation due to post op trauma. Follow up was done for all these cases, no other case was lost to followup.

[Table 5:] Complications

COMPLICATION	NO. OF CASES
Dislocation	1
Greater trochanter nonunion	2
Aseptic loosening	1
Periprosthetic fracture	0
Acetabular wear	0
Surgical site infection	0
Heterotopic Ossification	0
Deaths	1

DISCUSSION:

Due to the availability of advanced health care facilities in recent times, there is an increase in life expectancy rate and at the same time the number of elderly patients with ITFs is also increasing year by year. Management of unstable IT fractures especially in severe osteoporotic patients remains controversial. Internal fixation has been accepted as an effective treatment modality for this injury²⁷. An ideal surgical technique for unstable intertrochanteric fractures in the elderly should have the least intra and postoperative morbidity²⁸. Proximal femoral nail antirotation (PFNA) has been used by most surgeons for elderly ITFs patients 29–31, but failures have also been reported due to extensive comminution, osteoporosis or long bedridden duration³¹. As a result, Bipolar hemiarthroplasty, which avoids the failures of osteosynthesis and permits early full-weight bearing, was used by some surgeons for ITFs treatment with satisfactory results³², and has been suggested as an alternative method for elderly ITFs patients 25,33. Unfortunately, BPH brings much more surgical injury than PFNA to patients due to the longer operation time and much more blood loss, and therefore it is recommended that BPH should be undertaken with caution in carefully selected patients. The immediate stability of bone cement enables early ambulation in patients, which makes functional recovery significantly well. Hence this procedure improves quality of life and enhances their cardio-pulmonary functions more rapidly.

The mortality associated with intertrochanteric fractures has been drastically reduced by internal fixation; however, early mobilization is still avoided in such cases due to osteoporosis and the severe comminution associated with such fractures in the elderly which may lead to poor screw fixation. But Primary hemiarthroplasty provides adequate fixation and early mobilization in such patients and helps to prevent postoperative complications like pressure sores, pneumonia, atelectasis, and pseudo arthrosis.

Haentjens *et al.* in their study showed extremely low occurrence of pressure sores and chest complications like pneumonia in the hemiarthroplasty group. The study by Kayali *et al.* showed comparable

results but the hemiarthroplasty group could load bear significantly earlier. Broos *et al.* and Stappaerts *et al.* in their studies also did not find any differences in functional outcome, but the need for blood transfusion was more for the arthroplasty group.

In our study also the average blood loss was 325.8 ml. Kesmezacare *et al.* in their study showed that the Postoperative mortality rate in the prosthetic group was 34.2%. In our study only 1 patient out of the 25 died within 6 months of surgery due to unrelated causes (COVID related complications). The prospective study by Kim *et al.*⁵⁸ also showed no notable difference in functional outcome scores, but the cut-out rate of the screw was 7% in their patients.

The main concern with bipolar hemiarthroplasty is the possibility of protrusion acetabuli and groin pain several years later from the gradual acetabular erosion. This erosion ultimately would lead to groin pain. The elderly patients already have compromised articular cartilage in their hips which puts them at a higher risk of erosion. These complications of hemiarthroplasty could not be evaluated in detail in our study due to the short duration of our study and also due to the small study group.

CONCLUSION:

When deciding on the treatment methods for intertrochanteric fractures several factors must be considered, which are - the type of fracture, the patient's age, health status, severity of osteoporosis. For the osteoporotic elderly with unstable intertrochanteric fractures, bipolar hemiarthroplasty is an effective method of treatment. It decreases complications, reduces mortality, improves the patient's quality of life, and reduces hospital burden on the family. Thus in conclusion, it is a good option in unstable trochanteric fractures especially in the elderly osteoporotic patients, with satisfactory results as seen in our study. The chances of implant failure are very low and load bearing on the injured limb is significantly earlier. The chances of needing a second surgical revision is also very low, which is very beneficial to such patients as they cannot tolerate and withstand multiple surgical procedures. Coxofemoral bypass is also a good option in failed PFN / DHS done for unstable intertrochanteric fractures. In this study, two patients with such failures were revised with arthroplasty and had significant improvement in their HHS. Revision surgery with intramedullary devices such as PFN would require the patient to be put to zero weight bearing until adequate union occurs at the fracture site and may predispose such elderly patients to various complications like bed sores, deep vein thrombosis, pulmonary edema etc. Arthroplasty in such cases has the benefit of providing immediate mobilisation of the patient and better functional outcomes. The mortality and revision rates after hemiarthroplasty for unstable trochanteric fracture are acceptable as a salvage procedure for this fragile sub-population. More clinical trials and prospective studies are required for the long-term outcomes after primary hemiarthroplasty for unstable trochanteric fractures.

REFERENCES:

- Kannus P, Parkkari J, Sievänen H, Heinonen A, Vuori I, Järvinen M. Epidemiology of hip fractures. *Bone*. 1996;18:57S–63S.
- Koval KJ, Zuckerman JD. Hip fractures are an increasingly important public health problem. *Clin Orthop Relat Res*. 1998;348:2.
- Rockwood PR, Horne JG, Cryer C. Hip fractures: A future epidemic? *J Orthop Trauma*. 1990;4:388–93.
- Frandsen PA, Kruse T. Hip fractures in the county of Funen, Denmark: Implications of demographic aging and changes in incidence rates. *Acta Orthop Scand*. 1983;54:681–6.
- Hedlund R, Lindgren U. Trauma type, age, and gender as determinants of hip fracture. *J Orthop Res*. 1987;5:242–6.
- Bergström U, Björnstig U, Stenlund H, Jonsson H, Svensson O. Fracture mechanisms and fracture pattern in people aged 50 years and older: A study of a 12-year population-based injury register. *Osteoporos Int*. 2008;19:1267–73.
- Evans EM. The treatment of trochanteric fractures of the femur. *J Bone Joint Surg Am*. 1949;31:190–203.
- Marsh JL, Slongco TF, Agel J, Broderick JS, Creevey W, DeCoster TA, et al. Fracture and dislocation classification compendium: Orthopaedic Trauma Association classification, database, and outcomes committee. *J Orthop Trauma*. 2007;21:S1–133.
- Bannister GC, Gibson AG, Ackroyd CE, Newman JH. The fixation and prognosis of trochanteric fractures: A randomized prospective controlled trial. *Clin Orthop Relat Res*. 1990;254:242–6.
- Chinoy MA, Parker MJ. Fixed nail plates versus sliding hip systems for the treatment of trochanteric femoral fractures: A meta-analysis of 14 studies. *Injury*. 1999;30:157–63.