



A STUDY ON SURGICAL MANAGEMENT OF UNSTABLE INTERTROCHANTERIC FRACTURES TREATED WITH CEMENTED BIPOLAR HEMIARTHROPLASTY IN ELDERLY PATIENTS

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ABSTRACT

Aims: Most intertrochanteric fractures in elderly are osteoporotic and extensively comminuted, making them extremely unstable. Conservative treatment with traction and immobilisation causes several complications that add morbidity. Although managed with internal fixation, failure rates have been found to be significant. This study emphasizes effectiveness of cemented bipolar hemiarthroplasty in treating elderly individuals with unstable intertrochanteric fractures making early mobilisation possible with rapid rehabilitation. **Design:** A prospective observational study. **Methods And Material:** Thirty patients (16 males and 14 females- all were 65 years old or above) were considered, who underwent cemented bipolar hemiarthroplasty for unstable intertrochanteric fractures. Patients were followed up on 1, 3, 6 and 12 months postoperatively for functional and radiological assessment. **Results:** Mean age of patients was 75.5 years, 25 cases were of type 2 fractures, 4 were of type 3, 1 was of type 4 according to Boyd and Griffin classification. The average Harris hip score was 78. Excellent to fair results were obtained in 27 cases and poor in 3 cases. Average hospital stay was 12 days. None of the cases had any surgical site infection, implant loosening or sinking. **Conclusions:** Elderly patients with severe osteoporosis require a different management course for unstable intertrochanteric fractures. Instead of internal fixation, cemented bipolar hemiarthroplasty is a preferable option. It provides mobile, stable hips with early ambulation and shorter hospital stay to avoid complications of immobilisation.

KEYWORDS : Intertrochanteric fractures, hemiarthroplasty, elderly, unstable, cemented, osteoporosis

INTRODUCTION:

Elderly patients frequently have intertrochanteric fractures with considerable displacement and comminution due to poor bone quality, which leads to complications like implant failure, femoral head puncture, and non-union.^{1,2,3} Rapid mobilization with full weight bearing and a stable fixation are the main therapeutic objectives.^{4,5} While stable intertrochanteric fractures can be treated with osteosynthesis, in contrast, managing unstable intertrochanteric fractures is challenging due to osteoporosis and other underlying comorbidities.⁶ Complications associated with management of unstable intertrochanteric fractures with osteosynthesis includes excessive varus collapse, Z effect, reverse Z effect, broken implant, proximal femur fractures leading to loss of stable fixation ultimately contributing to implant failure.⁷ Even though some surgeons across the globe recommended prosthetic replacement for early post operative weight bearing and rapid rehabilitation while very sparse literature available on primary hemiarthroplasty for unstable intertrochanteric fractures.^{8,9}

MATERIALS AND METHODS:

Objectives of this study were to a)study functional outcome b)facilitate early weight bearing, mobilization and rapid rehabilitation after surgery c)avoid complications of internal fixation d)study the associated complications. This prospective study was conducted in Karnataka Institute of Medical Sciences, Hubballi over a period of 18 months from Jan 2021 to Jul 2022. A series of 30 patients were taken into study that underwent cemented bipolar hemiarthroplasty for unstable intertrochanteric fractures. Patients with age group >65 years of either sexes with unstable intertrochanteric fractures (posteromedial cortex; OTA 31A2 and 31A3), neglected intertrochanteric fractures and patients with failed internal fixation of intertrochanteric fractures were included in the study. Patients with <65 years of age and polytrauma cases were excluded. Boyd and Griffin classification system was used to classify the fractures. The study was approved by institutional ethics committee. Fully valid, informed, written consent was taken from patients.

radiographs were obtained. Mode of injury and type of fracture assessed and templates were prepared accordingly to determine implant of appropriate size. Posterior (Moore's) approach was used while patient in lateral decubitus position. Care was taken to cause less damage to greater trochanter while removing head and neck. Medullary canal prepared and trial reductions were performed to determine appropriate length of the implant which provides the desired tension and tissue balancing of the abductor muscles and an equal leg length. Calcar was reconstructed with bone graft from neck of femur. Bone cement was injected into the canal using cement gun after plugging at the distal level. At most care was taken while reduction to restore neck length, offset and version to maximize stability of the hip joint. Greater trochanter was reduced and stabilized using tension band wiring / encirclage techniques. Incision was closed in layers over a suction drain (figure 2).

Post operatively lower limbs kept in abduction using a pillow. Patients were assessed for any limb length discrepancy. IV antibiotics were continued for 5 days, drain removal was done after 48 hours. Made to sit up on the first day, stand up with support (walker) on second day and were allowed for tolerable weight bearing and walk with the help of a walker on third postoperative day. Sitting cross-legged and squatting were not allowed. Suture removal was done on 15th postoperative day. Patients were followed up at an interval of 6 weeks, 3 months, 6 months and 12 months. Clinical follow up was based on Harris Hip Score which was calculated from website https://www.orthopaedicscore.com/scorepages/harris_hip_score.html taken from the Journal of Bone and Joint Surgery.

RESULTS:

Out of 30 patients taken in this study, 16 were male and 14 were female. History of slip and fall was there in 28 patients whereas two patients had road traffic accidents. Eighteen of them had right sided intertrochanteric fractures while 12 had left sided. Boyd and Griffin type 2 fracture was seen in 25 patients, type 3 in four and type 4 in one patient (Table 1).

Preoperatively patients were evaluated for comorbidities and physician fitness was taken. Standard AP and lateral

Average duration of surgery was 98 minutes and blood loss of 150ml. Mean age was 75.5 years. Mean day of full weight

bearing was 4. Patients were discharged from the hospital on an average of 12.5 days. Interpretation of Harris Hip Score was tabulated as in (Table 2). Post operative limb length discrepancies were tabulated in (Table 3). No evidence of superficial or deep surgical site infection. One patient had superficial bed sore which responded well with water bed and daily dressing. Wound healed before the patient was discharged from the hospital. No evidence of loosening/sinking of implant noted at the end of one year follow up.

Cerclage wiring for Greater trochanter was done in 22 cases to hold the fragments together. Calcar reconstruction done in 10 cases.

Two patients (6.7%) had external rotation deformity of less than 20 degrees while others had mobile and stable hip with full range of flexion and abduction with adequate rotation movements. At the end of six weeks eight patients walked without any support, 10 patients walked with the help of a cane, 12 patients used walker (Table 4). Patients were followed up at 1,3,6 and 12th post operative months. Mean Harris Hip Score was 78 at the end of 12 months follow up. In our study, 12 patients had excellent results, eight patients had good results, eight patients had fair results, and two patients had poor result.

Figures

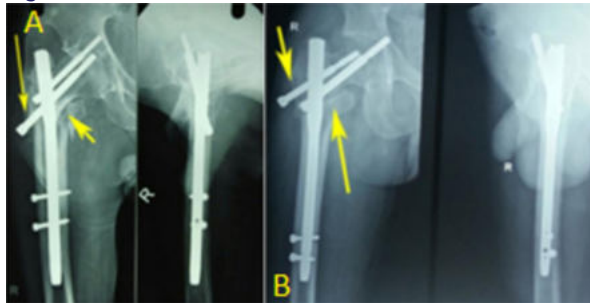


Fig 1: Modes of failure after internal fixation of intertrochanteric fractures. Post operative radiographs showing varus collapse with migration of screws as Z effect (figure A) and reverse Z effect (figure B)

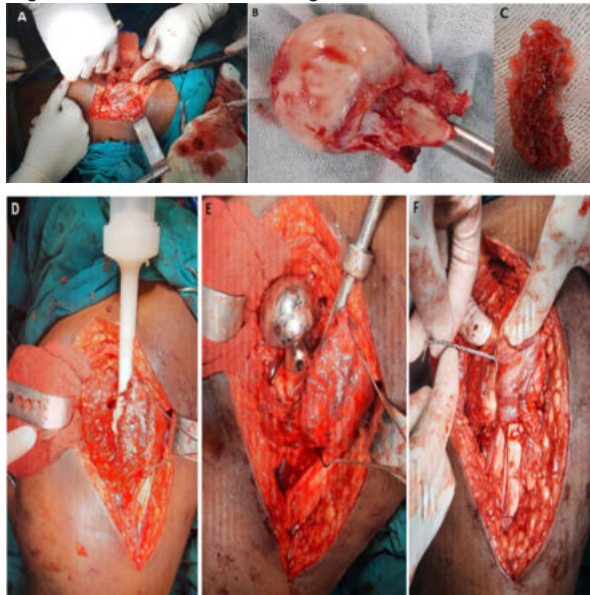


Fig 2: Steps of cemented bipolar hemiarthroplasty showing head extraction (A), reconstruction of calcar using bone graft from extracted neck (B and C), injecting bone cement using cement gun (D), introduction of implant into medullary canal (E), Encirclage of Greater trochanter (F)

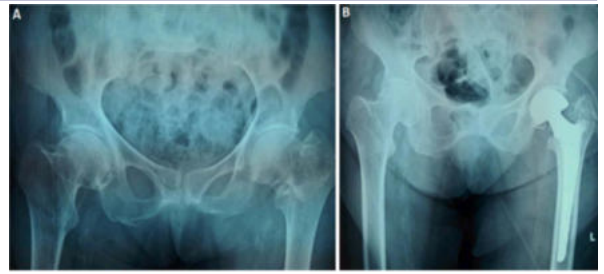


Fig 3: Pre operative (A) and immediate post operative (B) radiographs of a 76-year-old female and clinical assessment (C) images showing full range of movements at 6th month follow up visit



Fig 4: Pre operative (A), immediate post operative (B) and 3rd month post operative radiographs of a 72-year-old male and clinical assessment images (C)



Fig 5: Pre operative, immediate post operative and 3rd month post-operative radiographs and clinical assessment images

post operative radiographs of a 72-year-old male and clinical assessment images.

Table 1: Patient And Fracture Details

Sex	Male (16)	Female (14)
Side	Right (18)	Left (12)
Mode of injury	Slip and fall (28)	Road traffic accident (02)
Type of fracture#	Type 2 (25) Type 3 (04) Type 4 (01)	-

*Numerical numbers indicate quantity variable

#According to Boyd and Griffin classification

Table 2: Interpretation Of Harris Hip Score

Remarks	Score	Number of cases	Percentage
Excellent	90-100	12	40
Good	80-89	08	26.7
Fair	70-79	08	26.7
Poor	<70	02	6.7

Table 3: Post Operative Limb Length Discrepancy

Discrepancy	Number of cases	Percentage
Shortening (<2cm)	5	16.7
Shortening (>2cm)	1	3.3
Lengthening (<2cm)	3	10
Lengthening (2cm)	-	-

Table 4: Gait At Six Weeks Follow-up

Gait	No. of Cases	Percentage
Without Support	8	26.7
With a Cane	10	33.3
With a Walker	12	40
Total	30	100

DISCUSSION:

Stable intertrochanteric fractures when treated with proper reduction and stable internal fixation with ideal implants resulted good outcome with almost 100% union rates. Whereas unstable fractures having poor bone quality, severe comminution and displacements makes them challenging to manage with internal fixation as there are as high as 56% failure rates with added morbidity and mortality risk with complications arising from prolonged immobilization in elderly debilitating patients with poor general condition.^{10,11}

Complications of internal fixation of these unstable fractures in elderly osteoporotic bones are mainly attributed to poor bone quality which is responsible for poor bone purchase by the screws resulting in implant failure in various ways like varus collapse with migration of femoral head, screw cut-out leading to Z and reverse Z effect (figure 1). Ultimately leading to biomechanical failure of hip causing limb length discrepancies and weak abductor mechanism resulting in limp.¹² To avoid these complications, hemiarthroplasty started gaining light as it provides comparatively better results with mobile and stable hips. As unipolar implants ultimately leads to acetabular wear and tear, protrusion, loosening and dislocation bipolar hemiarthroplasty was introduced to avoid these long term complications as it shares the movements at two surfaces and reducing erosions at acetabular joint interface. Stems were also designed keeping in mind the total hip replacement types for better fit in the canal causing less loosening. Bone cement is advantageous as it helps in initial implant fit and stability.

Since we have started mobilising the patients on first post operative day, recumbency complications were not noticed such as pressure sores, urinary retention, chest symptoms, deep vein thrombosis etc. The use of long, straight-stemmed prostheses initially for intertrochanteric fractures was pioneered by Tronzo.¹³ After then, more researchers noted

positive outcomes while using the Leinbach prostheses.¹⁴ A study conducted by Liang et al., concluded that, hemiarthroplasty was a promising and safe procedure for treating unstable intertrochanteric fractures in elderly.¹⁵ Another study by Grimsrud et al., involving 39 patients with unstable intertrochanteric fractures treated with cemented bipolar hemiarthroplasty using a standard femoral stem and encircage of the trochanters concluded that its safe and allows early weight bearing with relatively less complications.¹⁶ Rodop et al., in their study on the use of bipolar hemiarthroplasty for intertrochanteric fractures, obtained 45% excellent and 37% good results after a follow up of 12 months, according to Harris hip scoring system. In our study 18 (90%) out of 20 patients had excellent to fair outcomes. In the context of variable results of osteosynthesis, results of our study involving this method of treatment looks promising and effective.¹⁷

It was shown in another study by Kim WY et al., that unstable intertrochanteric fractures treated with dynamic hip screw (DHS) leading to varus angulation, perforation of femoral head, extrusion of lag screw resulted in failure rates of >50%.¹⁸ Greater trochanter reconstruction was a crucial step in this study as it plays important role in maintaining stability. We have used both tension band wiring and encircage techniques to achieve the same. The straight line in managing these fractures is early surgery and mobilization with rehabilitation to prevent post operative complications as well as to reduce morbidity. Since there is very sparse information available regarding implants, there is always room to study on implant designs and their biomechanical properties to manage such fractures.

CONCLUSION:

We conclude that even though unstable intertrochanteric fractures could be treated with osteosynthesis using various implants, failure to achieve stable fixation with high rates of implant failure necessitates for improved techniques. Cemented bipolar hemiarthroplasty in such fracture in elderly patients with poor bone quality providing mobile, stable hips is a promising line of treatment as it allows early mobilization and rapid rehabilitation decreasing the morbidity with improved quality of life.

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Key Messages:

Cemented bipolar hemiarthroplasty provides mobile, stable hips with early ambulation in osteoporotic unstable intertrochanteric fractures.

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