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Cemented bipolar hemiarthroplasty in the management of comminuted intertrochanteric fracture of femur in elderly

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Abstract

The management of comminuted intertrochanteric fractures in elderly is challenging because of difficult anatomical reduction, poor bone quality, and sometimes a need to protect the fracture from stresses of weight bearing and the need for early mobilization. Internal fixation in these cases usually involves prolonged bed rest or limited ambulation, to prevent implant failure. This might result in higher chances of complications like pulmonary embolism, deep vein thrombosis, pneumonia, and decubitus ulcer. The purpose of this study is to analyze the role of primary cemented bipolar hemiarthroplasty in cases of comminuted intertrochanteric femur fractures. Fifty patients with comminuted intertrochanteric fractures were treated with primary cemented bipolar hemiarthroplasty. There were 31 females and 19 males with a mean age of 73.98 years (range, 65-89 years).

The average surgery time was 101.86 mins (rang, 80-120 min). The patients walked on an average 4 days after surgery (range, 1-21 days). One patient had superficial skin infection and one had bed sore with no other significant postoperative complications. One case had DVT which was managed by close monitoring and conservative management in ICU setup. One patient had pulmonary embolism as result of cementing which was managed by intensive care in ICU setup. Eventually all patients recovered well and progressed to full weight bearing. A total of 48 out of 50 patients (96%) had excellent to fair functional results and 2 had poor result with respect to the Harris hip score (67-93) at the end of 6 months. Cemented bipolar hemiarthroplasty for comminuted intertrochanteric fractures in elderly patients results in early ambulation and good functional results.

Keywords: Cemented bipolar hemiarthroplasty, comminuted intertrochanteric fractures, harris hip score

Introduction

Peritrochanteric fractures represent perhaps the most important public health problem facing the orthopedic surgeons today. Commonly affecting the elderly, these fractures have a tremendous impact on both the health care system and society in general. Peritrochanteric fractures comprise of fractures of trochanter, subtrochanteric region and basicervical fractures. Despite marked improvements in implant design, surgical technique and patient care, peritrochanteric fractures continue to consume a substantial proportion of our health care resources. These fractures are associated with substantial morbidity and mortality. Approximately 15% to 20% of patients die within 1 year of fracture^[1, 2].

Intertrochanteric fractures in younger individuals are usually the result of high energy injury, such as a motor vehicle accident and other traumatic injuries. But Ninety percent of intertrochanteric fracture in the elderly result from a trivial fall. Early and adequate fixation is very important in these patients so as to mobilize them at earliest and prevent complications of recumbency like bedsores, deep vein thrombosis and respiratory infections. Osteoporosis and difficult anatomical reduction are one of the most important factors leading to unsatisfactory results in these fractures^[3-5]. The goal of treatment is to achieve stable anatomical reduction, rigid fixation, early mobilization of patient and prevent deformity at hip. Studies have revealed that hemiarthroplasty in comminuted IT fractures have given good results^[6, 7].

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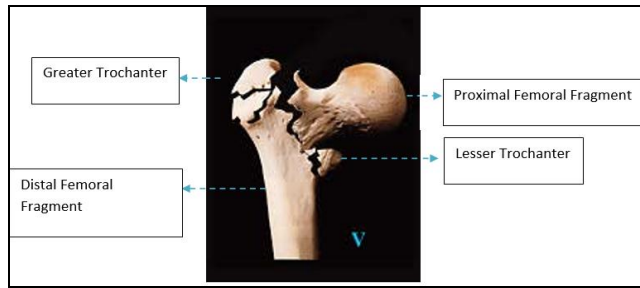


Fig 1: Main Fragments of Comminuted Intertrochanteric Fracture⁸

AO Classification of trochanteric fractures:

A1 – Fracture are uncomminuted simple two part fracture.

A2 – Fracture extends over two or more levels of Medial cortex.

A3 – Fracture extends through lateral cortex of femur.

All these groups further subdivided in to 1, 2, 3 according to extent of fracture fine extension and fracture comminution.

A1.1, A2.1 is commonly described as “Stable” fracture pattern while A2.2 to A3.3 usually is “unstable”.

Materials and Methods

Our study was a series of 50 cases of comminuted intertrochanteric fractures of femur in elderly treated with cemented bipolar hemiarthroplasty. This study was a prospective study conducted over a period of 2 years i.e., from December 2013 to December 2015. Patients of both sex belonging to the old age group (>65 years of age) presenting with comminuted intertrochanteric fractures of femur to the Orthopedic department of tertiary health care hospital.

Exclusion Criteria:

- Patients with associated injuries that might significantly affect the final functional outcome.
- Patients with compound intertrochanteric fractures, polytrauma patients and patients who were unfit for surgery
- Bleeding disorders, coagulation disorders

A careful brief history was elicited from the patients and /or attendants to know the mechanism of injury and the severity of trauma. The patients were then assessed clinically to evaluate their general condition and local injury. Local examination was carried out to detect the signs of fractures like limb shortening, limb attitude, swelling, deformity, tenderness, abnormal mobility and crepitus. On physical examination, the injured leg was typically shortened, externally rotated and painful with motion. Adequate anteroposterior (AP) radiographs of the hip and proximal femur were taken in full internal rotation to plan for the procedure and pre-operative templating was done. Templating included the use of plastic overlay templates supplied by the prosthesis manufacturer.

Hemiarthroplasty can be performed with either a unipolar or bipolar endoprosthesis. Several studies have shown good results for bipolar endoprosthesis, particularly when they are cemented in place [9-11]. All patients were operated by Direct Lateral approach by coxofemoral bypass. Standard non-modular fixed bipolar prosthesis was used. Longitudinal incision from 5cm above the greater trochanter which passes over the center of the tip of the greater trochanter and extends to approximately 8 cm down the line of the shaft of the femur. Incision of the fat and the deep fascia in line with the skin incision to pull the tensor fascia lata anteriorly and the gluteus maximus posteriorly. Fracture line of the greater trochanter is palpated and a plane is developed for the entry to be made through the fracture site. The superior aspect of the capsule is incised by a T shaped incision. Short external rotators and the posterior capsule do not need to

be incised. Femoral head along with the neck is extracted using a head extractor. Acetabulum is cleared of all soft tissues.

Use of a small tapered reamer to locate the medullary canal. Use of the smallest size broach first. Insertion of the broaches in 10-15 degrees of anteversion in relation to the axis of the flexed tibia. Use of progressively larger broaches to remove cancellous bone in the proximal shaft of femur. Largest size broach that can be easily inserted in the proximal femur used. Countersink the final broach slightly below the provisional femoral neck cut. Trial reduction with trial stems performed. Limb length is determined and range of motion and stability of the arthroplasty is checked using trial components. Depth of insertion of the component is determined at the level when limb lengths become equal and a bony landmark is marked as a guide during prosthesis insertion. Dislocation of the hip after final component sizes have been selected and limb length and stability have been assessed. Exposure of the proximal femur regained. One millimeter (18 gauge) stainless steel wire is passed through the drill hole created just below the lesser trochanter to fix the greater trochanter in figure of 8 fashion after inserting the prosthesis and reduction of the joint. Cement injecting gun was used for cement delivery. Desired amount of anteversion and mediolateral position of the stem is determined before insertion. Insertion of the femoral component when the cement has entered a medium dough phase (8-12 minutes).

Limb length and stability of the prosthesis confirmed. Soft tissue and skin closure achieved after keeping a suction drain. Limb is kept in abduction with pillow in between to prevent adduction and internal rotation. Supine static quadriceps exercises and ankle pumps are started on day of surgery and sitting quadriceps exercises started on 2nd day postoperatively. Full weight bearing started between Day 3- Day 8 postoperatively. Patients having delayed full weight bearing were started on toe touch weight bearing. Alternate and complete suture removal on 10th and 12th day postoperatively. Follow up was done post operatively at 6 weeks, 3 months, 6 months and 1 year. At each follow up visit patients were evaluated radiologically and clinically. Functional outcome was evaluated by Harris hip score¹² and were graded as-

Table 1

Harris Hip Score	Grading
<70	Poor
71-80	Fair
81-90	Good
91-100	Excellent

Radiographs were taken at each follow up and analysed to note any evidence of dislocation or prosthesis loosening. Rehabilitation was continued upto 1 year in the form of gait training and modification of lifestyle like avoiding squatting, sitting cross legged or climbing high steps.



Fig 2: Patient in lateral position

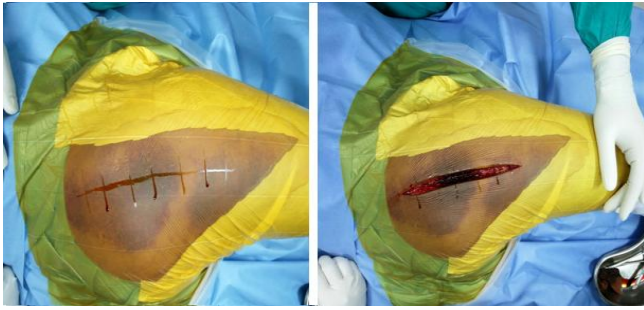


Fig 3 & 4: Incision centering over greater trochanter



Fig 5: Entry through fracture site



Fig 6: Head and neck removed by head extractor



Fig 7: Stem inserted and reduced



Fig 8: Greater trochanter fixed with S.S.wire



Fig 9: Patient mobilized on day 1



Fig 10: Full weight bearing on day 3



Fig 11: Pre operative radiograph



Fig 12: Post operative radiograph

Results

Our study had 50 cases (19 males and 31 females) of comminuted intertrochanteric fractures of femur. The study was conducted over a period from December 2013 to December 2015. All the patients were followed for a minimum of 6 months.

The following observations were made:

Table 2: Age Incidence

Age In Years	No. of Patients	Percentage
65-70	10	20%
71-75	15	30%
76-80	17	34%
81-85	5	10%
>85	3	6%
Total	50	100%

Our patients age range from 65 yrs to 89 years. This shows that most of the comminuted Intertrochanteric fractures patients are between the age 70-80 yrs with an average age of 73.98 years.

Table 3: Mode of Injury

Mode of Injury	Number of Patients	Percentage
Domestic Fall	44	88
RTA	6	12
Total	50	100

88% of the patients had domestic fall that caused the fracture. This data suggests that minimal trivial injury caused most of the Intertrochanteric fractures in our study age group. Again, pointing towards poor bone quality owing to osteoporosis.

Table 4: Associated medical conditions at the time of admission

Medical Condition	Number of cases	Percentage
Diabetes	7	14
Hypertension	10	20
Diabetes with hypertension	2	4
Pulmonary	3	6
No medical ailment	28	56
Total	50	100

This data suggests that many of these patients had associated medical ailments, suggesting that old age related medical ailments are a major problem to be considered while deciding treatment choice for comminuted IT fractures.

Time for Full Weight Bearing

All patients were encouraged for full weight bearing on second day of surgery. They were asked to walk using support of a walker for first few days and then gradually walker was replaced with an ipsilateral stick. Most patients walked without any support by fourth day of surgery.

Table 5: Time for full weight bearing

Post-operative day For full weight Bearing	No of patients	Percentage
1 to 2 days	10	20
3 to 4 days	20	40
5 to 6 days	10	20
7 to 8 days	7	14
More than 8 days	3	6
Total	50	100

Table 6: Complications

Complication	No of patients	Percentage
Deep vein thrombosis	01	2%
Superficial Infection	02	4%
Pressure sores	01	2%
Limb shortening	03	6%
Dislocation	01	2%
Pulmonary Embolism	01	2%

One case had DVT which was managed by close monitoring and conservative management in ICU setup. Two cases had superficial infection which were managed by targeted antibiotic therapy after culture and sensitivity testing. One case had pre-operative pressure sore which was managed by aggressive nursing care and since the patient had early post-operative mobilization, it helped in early healing of the wound. Three patients had limb shortening of 1 cm each which was managed by shoe raises. There was one case of post-operative postero-superior dislocation, which occurred on third post-operative day due to excessive hip flexion by the patient, which was managed by closed reduction under anaesthesia. The limb was kept in Thomas splint for three weeks post which delayed mobilization was started.



Fig 13: Postero-superior dislocation on day 3

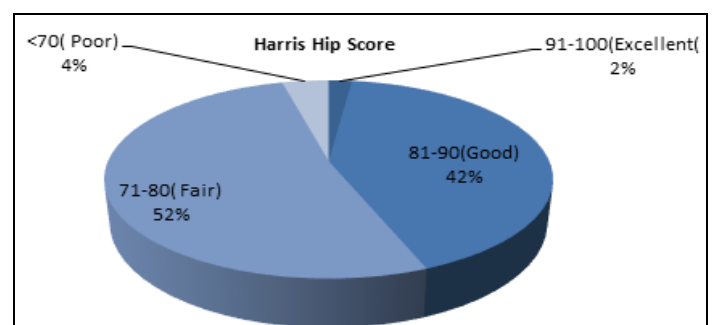
One patient had pulmonary embolism as result of cementing which was managed by intensive care in ICU setup. Eventually all patients recovered well and progressed to full weight bearing.

Functional Outcome

As per Harris hip score: 6 months after treatment

Table 7: Harris Hip Score

Scores	No of cases	Percentage
91 to 100(excellent)	1	2
81-90(good)	21	42
71-80(fair)	26	52
<70(poor)	2	4
Total	50	100



Discussion

Hip fractures are associated with notable morbidity and mortality in elderly patients. Complexity of comminuted intertrochanteric fractures in elderly patients poses challenging problems, with an added risk of increased morbidity and mortality. Early ambulation following surgeries is important for preventing complications that can be caused by long term bed rest in elderly patients with poor general conditions. The technique is familiar to orthopaedic surgeons, and it is relatively rapid. Internal fixation has drastically reduced the mortality associated with intertrochanteric fractures^[13]; however, early mobilization is still avoided in cases with comminution, osteoporosis, or poor screw fixation^[14-15].

Primary hemiarthroplasty offers a modality of treatment that provides adequate fixation and early mobilization in these patients thus preventing postoperative complications such as pressure sores, pneumonia, atelectasis, and pseudoarthrosis^[16, 17].

In our study we operated 50 cases of comminuted intertrochanteric fractures by cemented bipolar hemiarthroplasty. In all cases standard non modular fixed bipolar prosthesis was used. Our study group was rural based and not very affording. Most of our patients (64%) were of age group 70-80 yrs and 62% being females among them., 65 yrs was lowest aged patient and 89 yrs was oldest. The average age was 73.98 yrs thus suggesting that comminuted IT fractures are more common in elderly patients, owing to osteoporosis and poor bone quality. Domestic fall was the most common mode of injury, suggesting trivial trauma as a major cause of comminuted IT fractures (88%). This data suggests that minimal trivial injury caused most of the intertrochanteric fractures in our study age group. Again, pointing towards poor bone quality owing to osteoporosis.

Many of these patients had associated medical ailments, suggesting that old age related medical ailments are an major problem to be considered while treatment choice for comminuted IT fractures are chosen. Hypertension had the most frequent association (20%) though many had transient raised blood pressure due to anxiety. Majority patients had their hypertension controlled by antihypertensive regime. Diabetes mellitus was present in two patients, but blood sugar levels were within normal limits after anti-diabetic treatment.

It was of immense need to mobilize these patients at the earliest to avoid recumbency related complications to fulfill which, cemented bipolar hemiarthroplasty served as a good treatment modality. In our study, patients were ambulated from the next day of surgery depending on their pain and confidence to bear weight. They were encouraged to walk using support of a walker for first few days and then gradually walker was replaced with an ipsilateral stick. Most patients walked without any support by fourth day of surgery.

Conclusion

Cemented bipolar hemiarthroplasty offers a modality of treatment that provides adequate fixation and early mobilization in these patients thus preventing postoperative complications such as pressure sores, pneumonia and atelectasis. This will have a direct effect on the general condition and the post operative rehabilitation. Good clinical and functional outcomes assessed as per Harris hip score were obtained with 96% patients showing fair to excellent results. Thus, cemented bipolar hemiarthroplasty should be considered as one of the modalities for the primary treatment of comminuted intertrochanteric fractures of femur in elderly.

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