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## Evaluation of functional outcome of cemented bipolar hemiarthroplasty for treatment of osteoporotic proximal femoral fractures in elderly people

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### Abstract

**Background:** In India the estimated geriatric population is going to rise from 8% of total population in 2010 to 19% by 2050. Incidence of osteoporosis and associated fractures will rise in coming years with increasing elderly population. Management of fracture neck of femur and unstable intertrochanteric fractures in osteoporotic bone is challenging in elderly as they are more prone for fracture associated complications like pressure sore, deep vein thrombosis and pneumonia.

**Aim:** The purpose of this study is to evaluate the role of cemented bipolar hemiarthroplasty in management of osteoporotic proximal femoral fractures in elderly people.

**Patients and Methods:** In this prospective study twenty patients with osteoporosis having proximal femoral fractures (fracture neck of femur/unstable intertrochanteric fracture) were treated by cemented bipolar hemiarthroplasty. Patients were followed up at 3 weeks, 3, 6, and 12 months to evaluate the function outcome. Mean age of the patients in this study was 73.84 years.

**Results:** Average duration follow up in this study was 14.63 month. Mean Harris Hip Score in the post-operative period was  $42.73 \pm 8.78$  which improved to  $81.57 \pm 9.11$  at 6 months. Average post-operative mobilization duration was 3.84 day and average hospital stay was 11.31 day. At 1 year follow up 85% patients had excellent to fair outcome and 10% had poor outcome.

**Conclusion:** Treatment of osteoporotic proximal femoral fractures with cemented bipolar hemiarthroplasty gives better functional outcome.

**Keywords:** Proximal femoral fractures, elderly, osteoporosis, cemented bipolar hemiarthroplasty

### 1. Introduction

Elder age group is more prone for the fragility fractures of proximal femur mainly fracture of neck of the femur and unstable intertrochanteric fractures. According to United Nation, people more than 60 years of age are considered as elderly people [1]. Elderly people may have fragility fractures after minor trauma. Fracture caused by sideways fall from standing height are defined as fragility fractures [2]. These fractures have a slow initial velocity on the greater trochanter and mainly include trochanteric hip and fractures of femoral neck [3]. Osteoporosis plays a major role among many risk factors which cause fracture of the bone in this age group. Both male and female sexes are prone for osteoporosis in elderly age group but in comparison with females, males develop osteoporosis later in life and osteoporosis-related fractures risk is less [4].

Fractures of proximal femur in elderly patients are associated with impaired mobility, morbidity, mortality and bad effect on the daily living of the patient because of loss of independence [5]. Osteoporosis in these patients with fracture neck of femur or unstable intertrochanteric fractures makes internal fixation difficult with poor outcome due to implant and bone related complications such as head perforations, plate pullout, plate breakage, avascular necrosis of femoral head and non-union of femoral neck fracture [6, 7].

Displaced femoral neck fractures in elderly patients give better hip function and lesser reoperation rate if treated with cemented hip arthroplasty in comparison with internal fixation [8, 10]. Bipolar hemiarthroplasty has advantage of reduction of acetabular wear due to dual-bearing system [11].

Cemented bipolar arthroplasty is treatment of choice in freely mobile elderly patients with an intertrochanteric femoral fracture [12].

Most common treatment for displaced femoral neck fractures in elderly is hemiarthroplasty<sup>[13]</sup> which gives better functional outcome<sup>[14]</sup>. The aim of this study is to analyze the functional outcome of the proximal femoral fractures in elderly patients with osteoporosis which were treated by cemented bipolar hemiarthroplasty.

## 2. Materials and Methods

This prospective study was conducted at the Department of Orthopaedics, KBN Teaching and General Hospital attached to KBN Institute of Medical Sciences in Kalaburagi after getting clearance from ethical committee. Between October 2013 and June 2015, 20 elderly patients admitted with either unstable intertrochanteric fracture or fracture neck of the femur with associated osteoporosis were selected for this study. Inclusion criteria were elderly patient (>60 years) with walking ability, unilateral fracture neck of femur / unstable intertrochanteric fracture and Singh's Index < 3 on X-ray of both hips. Poly trauma patients, old contralateral hip fracture, osteoarthritis of hip involved, history of mental illness, pathological fracture and fractures older than 48 hours at admission were not included in the study.

All the 20 patients were admitted to casualty ward and immobilization of the fracture was done by skin traction. X-Ray of the pelvis with both hips and lateral view of the affected hip was taken. Classification of the fracture and assessment of severity of osteoporosis by Singh's index was done. Complete blood investigations were done to know the general health status of the patient. Treatment was started for osteoporosis and other associated medical problems.

Patients were posted for surgery within 48 hours of admission after optimization and pre anesthetic checkup. All the

operations were performed by experienced orthopaedic surgeon under spinal anesthesia. Posterior approach was used with the patient in lateral decubitus position. Diameter of extracted femoral head was measured and appropriate size bipolar prosthesis was fixed after reaming the femoral canal with 2<sup>nd</sup> generation cementing technique (Figure 1). Lesser and greater trochanter fragments in unstable intertrochanteric fractures were reduced to main fragment with SS wire, after which the bipolar prosthesis was fixed with second generation cementing technique (Figure 2). Care was taken to restore the neck length, femoral head offset and anteversion to get a stable hip joint after reduction. Soft tissue repair was done after confirming the stability of the joint and wound closed in layers over suction drain.

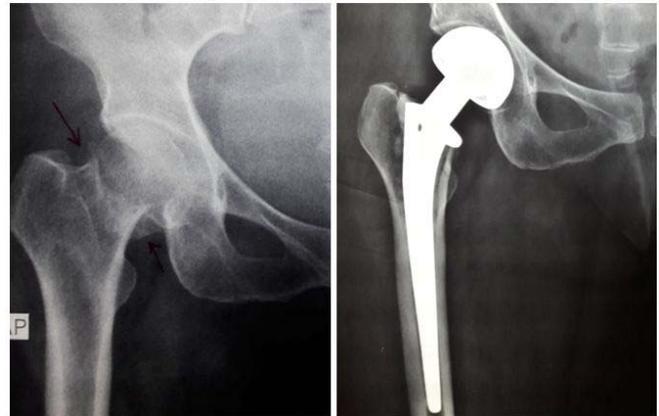


Fig 1: Implant fixation in fracture neck of the femur.

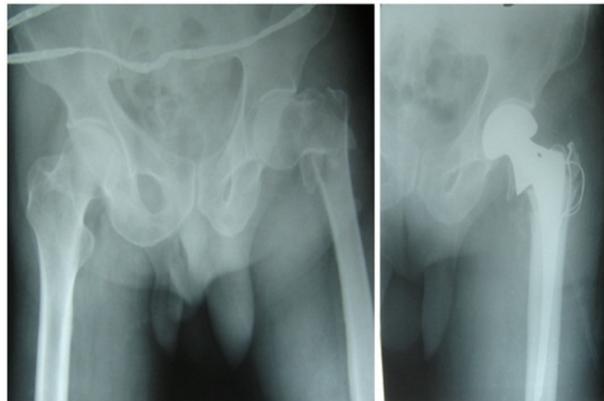


Fig 2: Reduction of trochanteric fragments with SS wire in unstable intertrochanteric fracture.

Post-operative intravenous antibiotics were given for 5 days. Patients were encouraged weight bearing from 2<sup>nd</sup> post-operative day after drain removal. Sutures were removed on 12<sup>th</sup> post-op day. Patients were advised to use some type of walking aid (cane/frame) up to 3 months or till they are comfortable to walk without support to avoid falling again. They were also advised to avoid squatting in future. After discharge patients were followed up at 3 weeks, at 3 months, at 6 months and at 12 months for functional evaluation of operated hip joint. Functional evaluation was done by Harris Hip Score and X-ray of the hip joint was taken to note the implant position.

Statistical analysis of the data was done and reported as mean, percentage and standard deviation.

## 3. Results

20 elderly patients were enrolled in this study having osteoporosis and unilateral proximal femoral fracture (unstable intertrochanteric fracture/ fracture neck of the femur). Average duration of follow up in this study was 14.63 month (12-22 months). One patient expired 1 month after surgery because of other medical condition and was not included in the final assessment. Average age of the study population was 73.84 year (63-96 years). 14 patients were walking without any support before the injury and five with the support of single cane. 18 patients had history of a simple fall at home or while walking on ground and one patient had RTA. Ten patients had fracture neck of femur and 9 had unstable trochanteric fracture. Other patient data is as depicted in table 1.

**Table 1: Patient Data**

| Patients  | Numbers/Mean      |
|---|-------------------|
| <b>Total patients</b>                                   | <b>19</b>         |
| Mean Age of patients                                    | 73.84 ± 8.75 year |
| Male : Female   | 6:13              |
| <b>Hip joint operated</b>                               |                   |
| Right side  | 9                 |
| Left side   | 10                |
| <b>Fracture neck of femur (Garden's Classification)</b> | 10                |
| Type-3  | 5                 |
| Type-4  | 5                 |
| <b>Unstable intertrochanteric fracture (AO/OTA#)</b>    | 9                 |
| 32A2.2  | 2                 |
| 32A2.3  | 4                 |
| 32A3.3  | 3                 |
| <b>Singh's Index (Osteoporosis)</b>                     |                   |
| Grade-3   | 6                 |
| Grade-2   | 13                |
| <b>Associated medical problems</b>                      |                   |
| Hypertension  | 5                 |
| Diabetes Mellitus (DM)                                  | 1                 |
| Hypertension with DM                                    | 2                 |
| Hypertension with IHD*                                  | 3                 |
| Anemia  | 2                 |
| No medical problems                                     | 6                 |
| #Orthopedic Trauma Association *Ischemic Heart Disease  |                   |

Average post-operative mobilization duration was 3.84 day (3-7 days) and average hospital stay was 11.31 day (7-21 days). Mean Harris Hip Score (HHS) in the post-operative period was 42.73 ± 8.78, which improved to 63.84 ± 8.37 at 3 weeks. There was gradual improvement in HHS at 3months, 6 months and up to 1 year after surgery (Table 2). The functional outcome is given in table 3.

**Table 2: Mean Harris Hip Score during follow-up.**

| Follow up at          | Mean Harris Hip Score |
|-----------------------|-----------------------|
| Post-operative period | 42.73 ± 8.78          |
| 3 weeks               | 63.84 ± 8.37          |
| 3 months              | 74.10 ± 7.78          |
| 6 months              | 81.57 ± 9.11          |

**Table 3: Functional outcome at 1 year**

| Harris Hip Score Grading | Number of patients | Percent | Cumulative Percent |
|--------------------------|--------------------|---------|--------------------|
| Excellent (90-100)       | 01                 | 5       | 5                  |
| Good (80-89)             | 15                 | 75      | 80                 |
| Fair (70-79)             | 01                 | 5       | 85                 |
| Poor (< 70)              | 02                 | 10      | 95                 |
| Not evaluated (Death)    | 01                 | 5       | 100                |
| Total                    | 20                 | 100     |                    |

Two patients in the study developed Grade-1 pressure sore which healed with local care and ambulation of the patient. One patient had deep vein thrombosis (DVT) which resolved with low molecular weight heparin therapy for 2 weeks. Two patients had urinary tract infection which responded to antibiotic therapy.

**4. Discussion**

Since, the elderly population in India is expected to rise from 8% of total population in 2010 to 19% by 2050 [15] an increase in cases of osteoporotic proximal femoral fractures is expected

in coming days. Proximal femoral fracture in elderly people with osteoporosis is a big challenge for treating orthopedic surgeon in view of intra & post-operative complications along with functional outcome. Review of the literature shows different opinions about the management of osteoporotic proximal femoral fractures in elderly patients. Early prosthetic replacement decreases morbidity and mortality in geriatric age group with fracture neck of femur, and primary hemiarthroplasty is the recommended treatment option for elderly patients with poor bone stock having unstable intertrochanteric fractures [16]. In our study we have included proximal femoral fractures (fracture neck of femur/unstable intertrochanteric fracture) in elderly patient who are having osteoporotic bone and were managed by cemented bipolar hemiarthroplasty.

A study on unstable osteoporotic intertrochanteric fractures in elderly found that 91% patients had excellent to fair functional results [6]. In our study 85% of patients had excellent to fair functional outcome with HHS which is comparable to above study. Another similar study on proximal femoral fractures in elderly with severe osteoporosis reported excellent to fair results in 92% of study population [17].

Mean HHS after hemiarthroplasty for displaced femoral neck fractures in elderly was 79.3 at 12 months follow-up [11]. Our study result is comparable to above mentioned study with HHS of 84.26 at 12 months follow-up. Another study on cemented bipolar hemiarthroplasty for fracture of femoral neck reported excellent to fair results in 86% of patients [7] with their grading system of patients ambulatory status which is comparable our study results. Different studies have mentioned about the complications associated with hemiarthroplasty in elderly like, wound infection, DVT, pressure sores, joint dislocation, implant loosening and acetabular erosion. Grade-1 pressure sores were reported in 4 patients [18] (n-25) and we had 2 patients (n-19) with grade-1 pressure sores which is less compared to above study because of early mobilization of patients on 3<sup>rd</sup> post-operative day. In the post-operative period DVT was reported in 9.6% study population [7] compared to our study where 1 patient (5.26%) developed DVT. Mortality rate reported in a study was 5.4% within 6 months of surgery [6] which is comparable with our study result of 5.

The limitation of this study is the short duration of follow up. Further studies are required on management of these fractures with large sample size and long duration of follow up to know the long term outcome of this treatment option.

**5. Conclusion**

The authors believe that cemented bipolar hemiarthroplasty is a better treatment option for the fractures of proximal femur in elderly people with osteoporotic bones as it helps in early mobilization thus, preventing complications associated with fractures around hip in this age group. Elderly patients treated with cemented bipolar hemiarthroplasty have better functional outcome in osteoporotic proximal femoral fractures.

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