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Functional outcome of comminuted inter trochanteric fractures of femur treated using cemented bipolar hemiarthroplasty in elderly patients: A prospective study

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Abstract
Introduction: The management of comminuted inter trochanteric fractures of femur in elderly patients is tricky as there is challenge of difficult anatomical reduction in osteoporotic bones, need for prolonged immobilization after surgery and more chances of screw cut out in poor quality bone. Prolonged immobilization will leads into complications like bed sores, chest infections, deep vein thrombosis, dependency and psycho social side effects, increasing the both morbidity and mortality. The aim of our study was to evaluate the functional outcome of cemented bipolar hemiarthroplasty in comminuted inter trochanteric fractures of femur in elderly patients using Harris Hip Score.
Materials and Methods: This prospective study was conducted at Basaveshwara Teaching And General Hospital attached to M R Medical college, Kalaburagi. Twenty elderly patients with age above sixty years having comminuted inter trochanteric fractures of femur treated by using cemented bipolar hemi arthroplasty from june 2016 to may 2018 were evaluated for functional outcome using Harris Hip Score.
Results: There were 12 female and 8 male patients with mean age of 71.29(60 -84) years treated by cemented bipolar hemiarthroplaty. The average surgery time was 96.34 min (64- 125min), the average intraoperative blood loss was 355ml and average stay in hospital was for 14.5 days. Patients were followed up at 6 weeks, 3months, 6 month and 1 year. At one year follow up with help of Harris Hip Score 8 patients (40%) were graded as excellent, 10 patients (50%) as good and 2 patients (10%) as fair.
Conclusion: The procedure offered rapid mobilization, early return to pre injury level and gave a lasting solution to elderly patients with comminuted inter trochanteric fractures of femur.

Keywords: Comminuted intertrochanteric fracture, cemented hemiarthroplasty, Harris hip score

Introduction
Intertrochanteric fractures make upto 45% of all hip fractures [1] and are the major cause of death and disability in elderly [2]. 35-40% of these fractures are comminuted and unstable three and four part configurations with displacement of posteromedial cortex. The failure rates of these comminuted fractures fixed with sliding hip screws averages approximately 6-32% [1, 3, 4] In an effort to mobilize these patients more rapidly, permit early weight bearing and to avoid complications of recumbency, hemiarthroplasty has been used to treat comminuted intertrochanteric fractures. [4, 5] Among intertrochanteric fractures 35% to 40% of intertrochanteric fractures of hip are unstable ones which are the major cause of disability and death in the elderly [6]. Displaced, unstable, severely comminuted intertrochanteric fractures are not easy to treat in elderly people with osteoporosis and complex intertrochanteric fracture. DHS does not allow for unrestricted weight bearing and failure rates between 5% to 12% have been reported [9]. Proximal femoral nailing has shown better results in most cases of comminuted intertrochanteric fractures. However, the role of this nail in comminuted osteoporotic intertrochanteric fractures is still to be defined. To allow early post-operative weight bearing and to recumbency, many surgeons have recommended and are doing primary prosthetic replacement for the treatment of these intertrochanteric fractures [13]. The main goals for the treatment of these fractures in elderly patients are, to restore the pre-fracture activity status, to allow early full weight bearing and to avoid possible re-operation [11].

Intertrochanteric fractures in elderly people are usually comminuted and unstable because of osteoporosis and indirect forces which include pull of iliopsoas muscle on the lesser trochanter and pull of the abductor muscle on the greater trochanter [12]. The weak and osteoporotic bone tolerates screws poorly so cut out is the major problem with internal fixation. Many a times patient spends a long time in bed, following standard internal fixation, which complicates the recovery [14].

Materials and Methods

Twenty patients with comminuted inter trochanteric fractures of femur who were aged 60 years and above, admitted and treated at basaveshwara teaching and general hospital between June 2016 to May 2018 were included prospectively in our study. Fractures were classified as per AO/OTA classification (Figure 1). Informed consent was taken from the patients. Outcome was reviewed in terms of functional outcome using Harris hip score and radiological outcome.

The inclusion criteria were as follows

- Patients with age group of > 60 years of either sex.
- AO/OTA classification type 31 A2 and A3 fractures
- The exclusion criteria were as follows
- pathological fractures
- Patients with neuromuscular disorders
- Arthritic changes in acetabulum
- Non ambulatory patients prior to surgery
- Any other fracture in the ipsilateral limb

There were 12 female and 8 male patients with mean age of 71.29(60 -84) years treated by cemented bipolar hemiarthroplaty. The average surgery time was 96.34 min (64- 125min), the average intraoperative blood loss was 355ml and average stay in hospital was for 14.5 days. patients were followed up at 6 weeks, 3months, 6 month and 1 year. At one year follow up with help of Harris Hip Score 8 patients (40%) were graded as excellent, 10 patients (50%) as good and 2 patients (10%) as fair. Among these 20 patients 14 patients were treated by cemented modular prosthesis and 6 were treated by fixed bipolar prosthesis.

Pre-operative templating of x rays of both fractured and normal hip was done to find out the approximate size and position of the femoral stem and the femoral neck offset. The operation was conducted by using Moore's posterior approach with patient in lateral decubitus position. The joint capsule was opened using a T shaped capsulotomy, femoral head extracted and head size measured. Femoral canal preparation was done using entry reamer and rasp, care was taken not to disturb the integrity of greater trochanter and abductor mechanism while rasping. In 10 cases definitive greater trochanter fixation was done by tension band wires inserted in holes drilled in the proximal and distal fragments. (figure 2)After fragment fixation cemented bipolar hip prosthesis (modular in 14 cases) were used. The range of motion and stability was checked, capsule was repaired, the short external rotators were reattached to greater trochanter. Wound was closed after placing a suction drain.

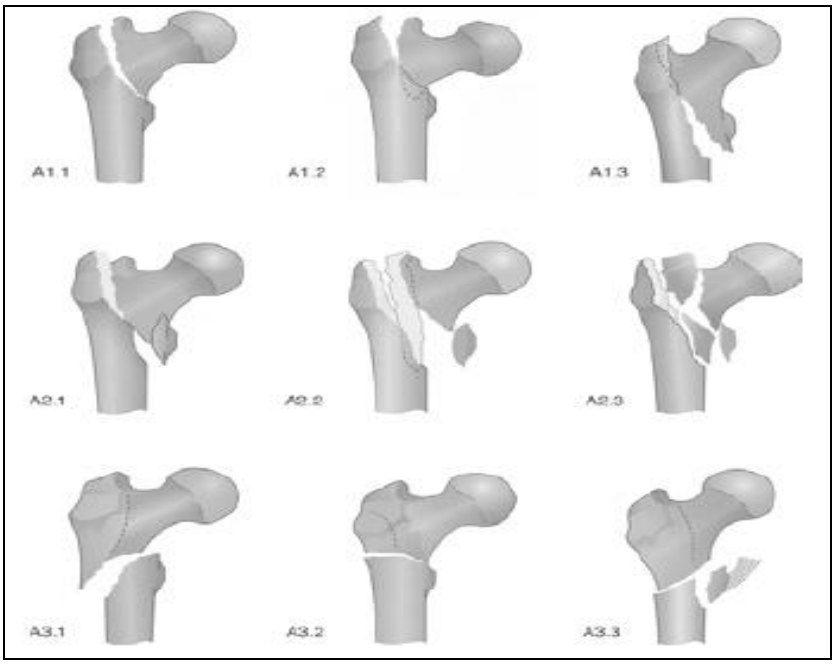

Fig 1: AO Classification of intertrochanteric fracture of femur A1, Simple (2-fragement) pertrochanteric area fracture: A1.1 Fractures along the intertrochanteric line. A1.2 Fracture through the greater trochanter; A1.3 Fractures below the lesser trochanter; A2. Multifragmentary pertrochanteric fracture; A2.1With one intermediate fragment (lesser trochanter detachment); A2.2 With 2 intermediate fragments; A2.3 with more than 2 intermediate fragments; A3. Intertrochanteric fractures; A3.1 Simple, oblique; A3.2 simple, transverse; A3.3 With a medial fragment.

Post-operative instructions

Limb was kept in abduction, post op haemoglobin level was assessed and blood transfusion were given if haemoglobin was less than 10mg/dl. Drains were removed after 48 hours and check x ray was done. Patients were advised to avoid excessive flexion and adducion. Patients were taught static quadriceps exercise, gluteal exercise, ankle stretching exercise from 1stpost operative day. Weight bearing was advised on 2nd post operative day using walker. Sutures were removed on 13th day and discharged after complete rehabilitation. Patients were followed at 6 weeks then 3 months and at 6th, 9th and at 12 months. Patients were assessed for functional outcome using harris hip score and radiologically. There was no incidence of loosening of the prosthesis or an acetabular erosion on follow up.

Results

Twenty patients of comminuted inter trochanteric fractures were operated by cemented bipolar hemiarthroplasty. There were 12 female and 8 male patients with mean age of 71. 29 (60 -84) years treated by cemented bipolar hemiarthroplaty. The average surgery time was 96.34 min (64- 125min), the average intraoperative blood loss was 355ml and average stay in hospital was for 14.5 days. patients were followed up at 6 weeks, 3months, 6 month and 1 year. At one year follow up with help of Harris Hip Score 8 patients (40%) were graded as excellent, 10 patients (50%) as good and 2 patients (10%) as fair.

The mean day for full weight bearing was the 4.5th day. There was one case of superficial infection and treated with antibiotics and regular dressing, which healed up without any complications. There was no incidence of post-operative dislocation of the prosthesis in the study. The mean Harris Hip score was 86 at the end of one year follow up. A majority of patients had a pain free mobile hip joint by the end of one year.

Table 1: Demographic and preoperative data

Number	20
Age	60-84
Sex (Female : Male)	3:2
AO/OTA fracture classification	
A2.1	4
A2.2	9
A2.3	5
A3.3	2

Table 2: Intra operative data

Type of anaesthesia	20 (7/13)
Average operative time in minutes	96.34
Amount of average drain in ML	120
Amount of blood loss in ML	355
Average no of hospital stay	14.5 days

Table 3: Post-operative complications

Mortality Rate	0
Pulmonary complications	0
Urinary tract infection	0
Deep vein thrombosis	0
Cardiovascular complications	0
Prosthetic / Fixation failure	0
Wound infection superficial	0
Deep	0
Pressure sores	0

Table 4: Functional outcome

Harris hip score (100)	
6 week followup	68
3 month followup	72
6 month followup	78
12 month followup	86
Return to normal daily activities (days)	35

Table 5: Harris hip score

Score	No. of cases	Percentage
Excellent (90-100)	8	40%
Good (80-90)	10	50%
Fair (70-80)	2	10%
Poor (60-70)	0	0%
Total	20	100

Fig 2: intra operative picture showing reconstruction of greater trochanter using SS wire

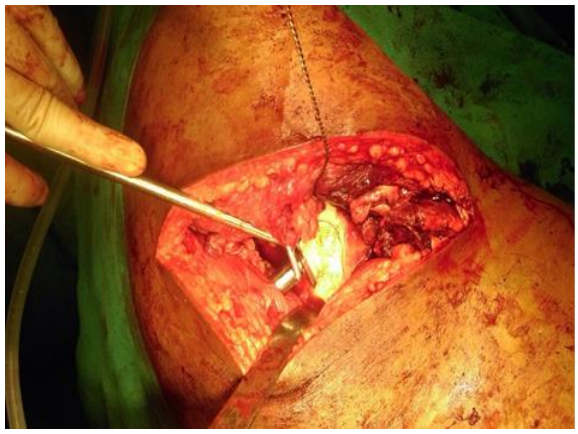

Fig 3: insertion of cemented bipolar prosthesis

Fig 4: pre-operative x ray of case 1

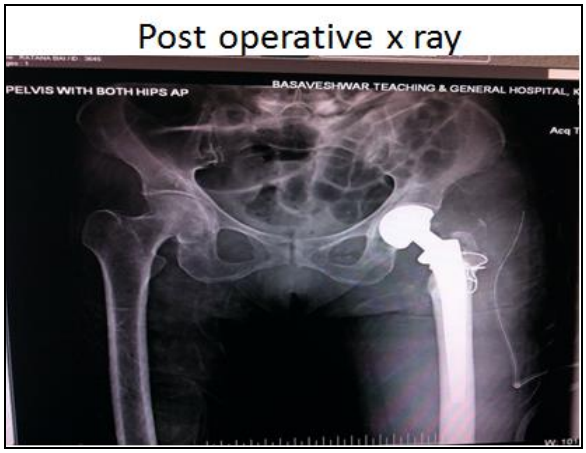

Fig 5: post-operative x ray

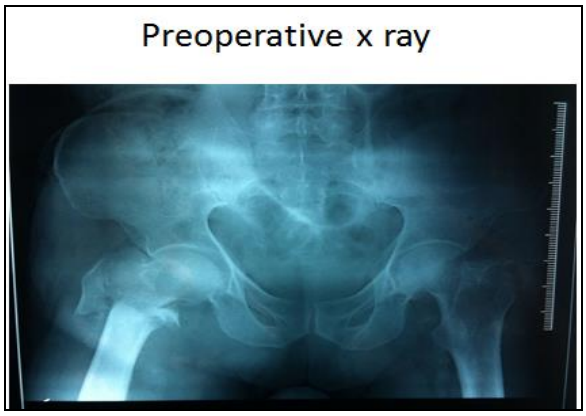

Fig 6: pre-operative x ray of case 2

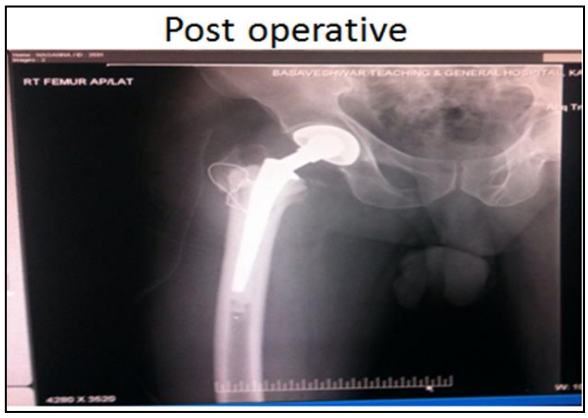

Fig 7: post-operative x ray of case 2

Discussion

Comminuted Inter trochanteric fractures in elderly patients with osteoporotic bones is difficult to manage due to its complex nature with an associated risk of increased morbidity and mortality. Stable fractures can be treated with internal fixation nails with high union rates, But in case of comminuted inter trochanteric fractures the poor mechanical properties of the weak and osteoporotic bones in elderly patients do not provide a good purchase for the screws, which subsequently lead to an early biomechanical failure and also there is complication of implant cut out from the femoral head leading to disabilities. Internal fixation may reduce the morbidity of pain but it does not allow for early ambulation of the patient for the fear of implant failure, which indirectly keeps the fracture morbidity as same.

Hemiarthroplasty is an option in such comminuted intertrochanteric fractures of elderly patients as it gives stability and allows for early mobilization of the patient. use of cemented prosthesis in such cases gives stability for the implant and allows rapid rehabilitation.

Harwin *et al*. [15] reported on fifty-eight elderly patients with osteoporosis in whom a comminuted intertrochanteric femoral fracture had been treated with a bipolar Bateman-Leinbach prosthesis and who were followed for an average of twenty eight months. The average patient age was seventy-eight years, and 91% walked prior to discharge. Two patients had a nonunion of the greater trochanter. There were no deep infections, dislocations, acetabular erosions, or cases of stem loosening. Broos*et al*. [16] reported on ninety-four elderly patients treated with a bipolar Vandeputte prosthesis. They found that the average operating time was shorter, the mortality rate was lower, and the functional results were better in the group treated with the bipolar hemiarthroplasty. Recently, Rodop *et al*. [17] reported on fifty-four elderly patients who had been treated with a bipolar Leinbach hemiprosthesis (Protek; Sulzer Orthopedics, Baar, Switzerland). A good to excellent result, as assessed with the Harris hip-scoring system, was reported in 80% of the patients. There were no dislocations or cases of stem loosening.

In our study, patients were ambulated full weight bearing from the second post-operative day, so there were no complications of recumbency. The functional outcomeat the end of 12 month follow up is given in table no 3. Our study also shows that cement used for the stability of implant also transmit the stress of weight bearing directly into the femoral diaphysis bypassing the postero medial area of the proximal femur.

Conclusion

As per our study we believe that hemiarthroplasty with cemented bipolar prosthesis in elderly patients with comminuted inter trochanteric fractures is a better treatment option as they have advantage of early ambulation and avoiding complications relating to loss of mobility and bed rest. Cemented hemiarthroplasty also provides stable and mobile hips and revision surgeries are avoided in elderly patients.

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