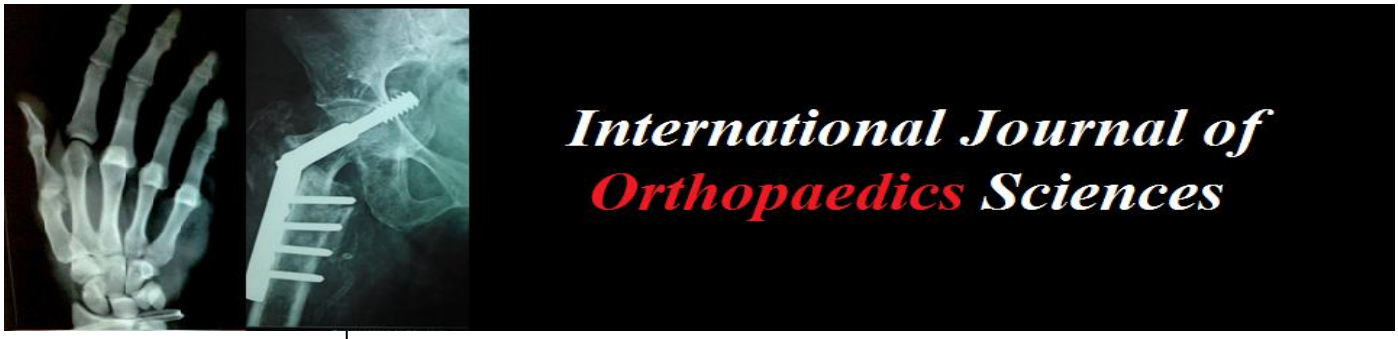

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A comparative study of the results of unstable intertrochanteric fracture treated with cemented bipolar hemiarthroplasty with and without reconstruction of the greater trochanter

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Abstract
Background: Osteosynthesis of unstable intertrochanteric fractures (IT) in elderly population, needs prolonged rest to prevent implant failure which in turn results in many complications. Cemented bipolar hemiarthroplasty has been the established method of treatment for unstable intertrochanteric fractures in literatures. Our study aimed to compare the effectiveness between reconstruction of greater trochanter V/S without reconstruction of Greater Trochanter in Unstable intertrochanteric fractures treated with cemented bipolar.
Materials and Methods: 40 elderly patients with unstable IT femur fractures were included in the study of which 24 patients underwent Reconstruction of greater trochanter and in remaining 16 greater trochanter reconstruction were not done. Clinico radiological evaluation was done at 6 weeks, 3 months and 6 months. The functional outcome between the 2 techniques was evaluated using Harris hip score.
Results: It was found that, there is statistically significant difference in functional outcome between the 2 groups at the end of 6 weeks, 3 months and 6 months (p<0.01).
Conclusion: Our study concludes that the results of this procedure when done together with Reconstruction of greater trochanter have a better functional outcome and has no abductor lurch.

Keywords: Unstable intertrochanteric fracture, bipolar hemiarthroplasty, greater trochanter reconstruction, harris hip score, abductor lurch

Introduction
With the increasing life expectancy around the world, the older population continues to expand at an uncontrolled rate. Today, 8.5 percent of people worldwide (621 million) are aged 60 and over, this percentage is likely to jump to nearly 18 percent of the world's population by 2050 (1.6 billion) [1]. The number of elderly individuals is increasing in every region; however the statistics are set to change with more senior citizens living in developing countries. The elders have osteoporotic bone and are more likely to fall due to poor balance, drug side effects, and difficulty manipulating around environmental hazards. It is estimated that the amount of hip fracture will rise from 1.68 million in 1991 to 6.36 million by 2050[1]. The incidence of hip fracture in male are projected to increase by 320% and 250% in females, compared to rates in 1991[2]. The lifetime risk of hip fracture is 17.5 percent for women and 6 percent for men [3].
Proximal femur fractures are divided into three categories: femoral neck and intertrochantric fractures account for 90%, subtrochantric fractures occurring in 5-10% [4]. Intertrochanteric fractures unite readily due to broad fracture surfaces, adequate blood supply and they rarely lead to non-unions.
If proper precautions are not taken fractures unite in malposition resulting in shortening, limp and restricted movements [6]. Intertrochanteric fractures are major cause of morbidity and mortality in the elderly. The incidence of all hip fractures is approximately 80 per 100,000 persons and is expected to double over the next 50 years as the population ages [5]. Intertrochanteric fractures make up 45% of all hip fractures [5].
Intertrochanteric fractures of unstable variety with severe displacement and comminution are common in elderly patients with poor bone quality and are often associated with

complications. Stable fractures can be easily treated with osteosynthesis with predictable results. However, the management of unstable intertrochantric (Evan's type III, IV, V and VI) fractures in elderly patients is a challenge because of difficulty in obtaining anatomical reduction and associated with high rates of morbidity and mortality, although the results have improved with the use of internal fixation [6]. Recent publications indicate concern with excessive sliding of these fixation devices when used in unstable intertrochanteric fractures which can result in unacceptable shortening and external rotation deformity of the limb. Bendo *et al*. [23] reported that most of the patients with moderate or severe collapse had poor functional results.

Primary cemented bipolar hemiarthroplasty rather than internal fixation as definitive treatment of unstable intertrochanteric fractures in elderly with significant osteoporosis helps in early weight bearing and could perhaps return these patients to their preinjury level of activity more quickly, thus obviating the postoperative complications caused by immobilization or failure of the implant. However, this surgery is an extensive surgery compared to fixations and may have higher intraoperative and post operative complications.

Management of intertrochanteric fractures has gone through many advances and changes since then but not many studies are published regarding the method of greater trochanter (GT) reconstruction. Success of a hemiarthroplasty depends on multiple factors like posteromedial cortical comminution, cementing technique, abductor tension, restoration of limb length and greater trochanteric reconstruction [8]. Greater trochanteric reconstruction in osteoporotic and comminuted trochanteric fractures is a technically demanding job. Multiple methods of trochanteric reconstruction have been described [9, 10]. Circlage wiring, cancellous screw fixation, K wire fixation, cable system, ethibond sutures are among the procedures most commonly used [11, 12, 13]. This mainly helps in reducing the incidence of abductor weakness and abductor lurch postoperatively.

Materials and methods

This study was done in Yenepoya Medical College, Mangalore, India after obtaining the Ethics committee clearance of the institution. Duration of the study was for 20 months from March 2016 to October 2018. This is a Hospital based comprehensive study (both prospective and retrospective).

Inclusion criteria for the study

- Patients who have sustained unstable intertrochanteric femur fractures as per EVAN'S classification.
- Patients who have undergone hemiarthroplasty for intertrochanteric fracture with and without reconstruction of the Greater trochanter.
- severe osteoporosis (≤ grade 4 Singh index)
- Above 60 years of age
- No other fractures associated

Exclusion Criteria

- Age below 60 years.
- Patients with other associated fractures.
- Patients who are medically unfit for surgery.
- Polytrauma patients

40 elderly patients with unstable IT femur fractures were included in the study and underwent Bipolar Hemiarthroplasty of which 24 patients underwent Reconstruction of greater trochanter and in remaining 16 greater trochanter reconstruction were not done. All cases were operated through Hardinge approach. Cemented hemiarthroplasty was done primarily in the index case as per standard described technique. Then GT reconstruction was done using either SS Tension band wiring or cement reconstruction. Trochanteric bursa is sutured over greater trochanter to prevent bursitis. Patient are made to weight bear from 2nd to 10th post operative day. Radiograph shows good fixation of the greater trochanter. Clinico radiological evaluation was done at 6 weeks, 3 months and 6 months. The functional outcome between the 2 techniques was evaluated using Harris hip score.

Results

The mean HHS was improved, from 51.5 (range 17-72) preoperatively to 88.6 (range 68-100; P = .001) postoperatively. The mean postoperative HHS of the trochanteric reconstruction group and no reconstruction group was 90.5 ± 2.6 and 81.3 ± 5.2, respectively. There was a statistical difference in the postoperative HHS between the 2 groups (P = .026). The abductor function was restored in all patients in whom GT reconstruction was done, while other patients had an adductor lurch. There were 28 women and 12 men with an average age of 76.60 (63-92) years. The Singh index was grade 3 in 24 patients, grade 2 in 10, and grade 1 in 6. Average interval between hospitalization and operation was 6.60 days. Numerous medical problems were noted upon admission, including hypertension, diabetes mellitus, heart disease, neurological disease, lung disease and others. The average surgery time was 81 min (range, 45-150 min) with an average intraoperative blood loss of 360 ml (range, 150-700 ml). The patients started full weight bearing at an average 3.45 days after surgery (range, 2-10 days). One patient had a renal failure post operatively and was bed ridden and had a poor result (HHS 25.4) and was excluded. Six patients developed superficial wound infection postoperatively, and required IV antibiotics and all were resolved before discharge. At last follow-up, 26 patients were walking without any aid, 13 used a stick or a walker for walking and 1 patient had a dislocation of prosthesis after 6 weeks post op and she was taken up for closed reduction but failed and subsequently went for revision Total hip replacement. 8 patients had shortening of the operated limb with an average shortening of 1.4 cm.

Fig 1: Pre op X Ray of a patient with Evans Type V fracture (with GT communition)

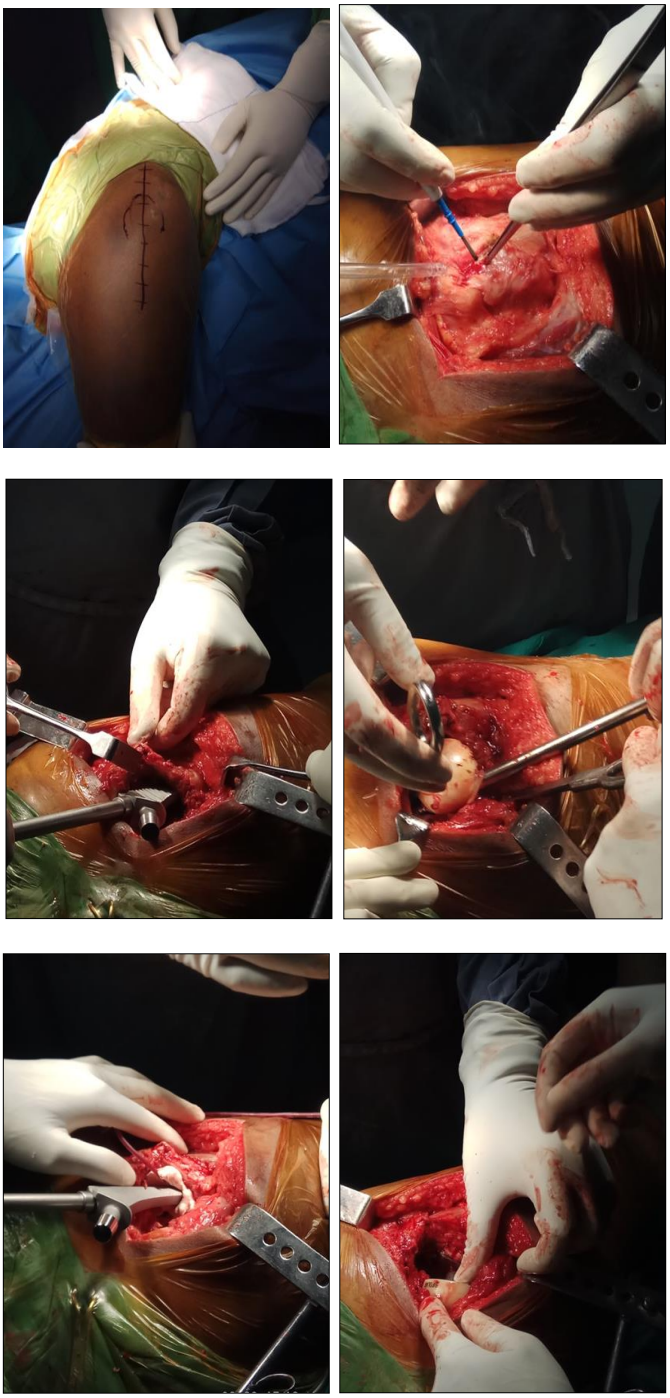

Fig 2: Intraoperative Photos

Fig 3: Post op X ray showing bipolar prosthesis with GT reconstruction (immediate post op on left and 3 months follow up on right)

Discussion

Intertrochanteric fractures of unstable variety with severe displacement and comminution are common in elderly patients with poor bone quality and are often associated with complications. These complex unstable osteoporotic fractures pose many challenges to treating surgeon along with added increased morbidity and mortality. In Stable fractures osteosynthesis is the rule with high success in achieving fracture union. But in unstable fractures complications as loss of reduction, screw cut out, plate failure, Z collapse, screw penetration into joint were common amounting to high failure rates. Many of the complications of internal fixation to achieve union can be avoided by performing bipolar hemiarthroplasty.

In our study we evaluated the functional outcome of 40 elderly patients with unstable intertrochanteric femur fractures who were managed with primary bipolar hemiarthroplasty with and without reconstruction of the Greater trochanter using Harris Hip Score. The mean postoperative HHS of the trochanteric reconstruction group was slightly better than the no reconstruction group. Subramanian G V [16] did a study on Greater Trochanter Reconstruction in Unstable Intertrochanteric Fractures Treated with Cemented Bipolar Hemiarthroplasty. He concluded that reconstruction of greater trochanter is an essential technical step to avoid complications like abductor lurch gait. This gives a stable fixation of greater trochanter and avoids cut out, slippage of implant. All patients were made to mobilize within 15 days of surgery and all patients were able to bear full weight before the discharge. The mean mobilization day for post op patients were at an average 3.45 days after surgery (range, 2-15 days). So all patients were able to get early mobilization and which is why no patients had any immobilization complications like bed sore, Deep vein thrombosis, pulmonary embolism and electrolyte imbalance.

Conclusion

Our study concludes that the results of Hemiarthroplasty when done together with Reconstruction of greater trochanter have a better functional outcome and has no abductor lurch. According to our results cemented bipolar hemiarthroplasty with greater trochanter reconstruction has an important role to play in the management of unstable intertrochanteric fractures in elderly. It can be the surgical procedure of choice in presence of comminution, instability and osteoporosis in intertrochanteric fractures of femur in elderly however a larger prospective randomised study comparing the use of intramedullary devices against primary hemiarthroplasty for unstable osteoporotic fractures will be needed. Hemiarthroplasty helps in early weight bearing and mobilization and prevention of many complications of prolonged immobilization in case of fixations. It has acceptable rate of complications and results in good outcome.

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