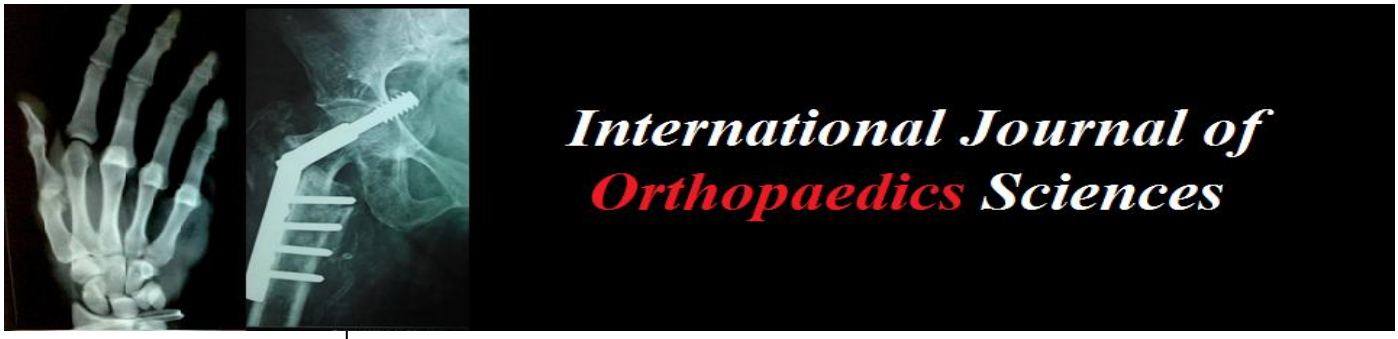


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**Dr. Santosh Shridhar Borkar**
Professor, Dept of Orthopaedics, MIMER Medical College, Talegaon Dabhade, Pune, Maharashtra, India

**Dr. Shivraj Satish Konde**
Associate Professor, Department of Orthopaedics, MIMER Medical College, Talegaon Dabhade, Pune, Maharashtra, India

**Dr. Sameer Desai**
Resident, Department of orthopaedics, MIMER Medical College, Talegaon Dabhade, Pune, Maharashtra, India

**Dr. Abha Namjoshi**
Intern, MIMER Medical College, Talegaon Dabhade, Pune, Maharashtra, India

**Dr. Namrata Deshpande**,
Intern, MIMER Medical College, Talegaon Dabhade, Pune, Maharashtra, India

**Correspondence**
**Dr. Shivraj Satish Konde**
Associate Professor, Department of Orthopaedics, MIMER Medical College, Talegaon Dabhade, Pune, Maharashtra, India

# Study to compare the results of osteosynthesis of unstable intertrochanteric femoral fractures in elderly osteoporotic patients versus coxafemoral bypass by cemented bipolar prosthesis

**Dr. Santosh Shridhar Borkar, Dr. Shivraj Satish Konde, Dr. Sameer Desai and Dr. Abha Namjoshi**

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**Abstract**
**Introduction:** Intertrochanteric fractures constitute about 45% of all hip fractures. Dynamic hip screw and plate (DHS) and Proximal femoral nail are commonly used for osteosynthesis. However, there are many studies which prefer hemiarthroplasty, i.e. coxafemoral bypass with cemented bipolar prosthesis as they claim that it allows early mobilization and decreases the complications of osteosynthesis. Hence, we decided to carry out this study.
**Material and methods:** The present study was a retrospective review of all unstable or comminuted intertrochanteric fractures in elderly (above age 65 years) patients who were operated with osteosynthesis with DHS and plate and those with cemented hemiarthroplasty with bipolar prosthesis at MIMER Medical College, Talegaon (D) between January 2009 to December 2016. Data was collected from in-patient hospital files and out-patient department follow up. Unstable fracture patterns were included in the study. Patients in group one were operated with osteosynthesis by dynamic hip screw and plate while those in group two were operated with coxafemoral bypass surgery with cemented bipolar prosthesis. Patients were followed up in out-patient department after discharge, clinically and radiologically
**Results:** There were 54 patients in group one (osteosynthesis with DHS plate) and 48 patients in group two (coxafemoral bypass with bipolar prosthesis). There were 21 males out of these in group one and 14 males in group two. In our study, we got less pressure sores and incidence of deep vein thrombosis in group of patients who underwent coxafemoral bypass with cemented bipolar prosthesis. Also need for blood transfusion was less than DHS group. Also hospital stay was significantly less. Operative time was, however, significantly more in bipolar group. However, there were not significant differences in implant or prosthesis related failure, pulmonary complications, dislocations or mortality in both groups. Bipolar cemented prosthesis group has better Harris Hip Score.
**Conclusion:** Cemented bipolar prosthesis gives better results in unstable intertrochanteric femur fractures as compared to osteosynthesis

**Keywords:** Intertrochanteric, osteosynthesis, bipolar prosthesis, hemiarthroplasty, cemented

## Introduction

Intertrochanteric fractures constitute about 45% of all hip fractures.[1] Mortality in these fractures is about 20% in first year itself [2] Hence, operative treatment is aimed to mobilize these patients early and decrease morbidity and mortality associated with these fractures [3] Many implants and prosthesis are available to treat these fractures. Dynamic hip screw and plate (DHS) and Proximal femoral nail are commonly used for osteosynthesis [4] However, there are many studies which prefer hemiarthroplasty, i.e. coxafemoral bypass with cemented bipolar prosthesis as they claim that it allows early mobilization and decreases the complications of osteosynthesis [5] Hence, we decided to carry out a study to find out whether osteosynthesis with dynamic hip screw and plate is better or coxafemoral bypass procedure with cemented bipolar prosthesis.

## Material and Methods

The present study was a retrospective review of all unstable or comminuted intertrochanteric fractures in elderly (above age 65 years) patients who were operated with osteosynthesis with DHS and plate and those with cemented hemiarthroplasty with bipolar prosthesis at MIMER Medical College, Talegaon (D) between January 2009 to December 2016. Data was collected from in-patient hospital files and out-patient department follow up. We excluded patients with age less than 65 years, compound fractures, pathological fractures, stable fractures, hip arthritis and polytrauma patients. Unstable fracture patterns like reverse oblique, transtrochanteric fractures, intertrochanteric fractures with subtrochanteric extension, intertrochanteric fractures with large posteromedial fragment, intertrochanteric fractures with loss of lateral wall or comminution were included in the study. Preoperative and intraoperative data collected included age, sex, fracture type, type of anaesthesia, operative time, number of units of blood transfused, duration of stay at the hospital etc. Postoperative data collected included time to full weight bearing, pulmonary problems, deep vein thrombosis, operative site infection (superficial or deep), pressure sores, fixation failure (like screw cut out, implant breakage), dislocation and mortality etc. Patients in group one were operated with osteosynthesis by dynamic hip screw and plate while those in group two were operated with coxafemoral bypass surgery with cemented bipolar prosthesis. Most patients were operated as soon as they became stable for surgery about 3 to 10 days after trauma.

Dynamic hip screw and plating was done on a fracture table in supine position under spinal or epidural anaesthesia. Closed or open reduction was obtained and single dynamic hip screw of appropriate size was passed into femoral head in centre under image intensifier control. Then, the plate of dynamic hip screw plate system was fixed to the dynamic hip screw to maintain reduction till union with top nut and cortical screws. Apex tip distance of about 25 mm was achieved. If necessary, a derotation screw was passed superior to DHS for additional rotational stability.

For coxafemoral bypass with bipolar prosthesis, patients were operated in lateral position under spinal or epidural anaesthesia. Lateral approach to hip was taken. Approach to the femur head was done through the fracture itself. Head was extracted (after freeing it from adjacent soft tissues) with a corckscrew. Appropriate size fixed bipolar was used to replace femur head. Second generation cementing technique was used to fix it, after insertion of the stem of bipolar into femur side. Head gauge was used to select appropriate size of bipolar prosthesis. It was difficult to achieve exact anteversion in the absence of the lesser trochanteric landmark in most cases but the implant was put parallel to the knee joint line in those cases. Whenever in doubt, C-arm guidance was used for anteversion, depth of insertion of prosthesis, etc. Then, trochanteric wiring was done to fix the greater trochanter to the femur shaft with stainless steel wire. After this, reduction of bipolar was done and closure done after keeping a drain.

Postoperatively, patients were given antibiotics and analgesics. Static quadriceps exercises and ankle pump exercises were started same day. Sitting was allowed from the second postoperative day. In group one, unloaded walking with crutches or walker was allowed from third postoperative day. However, partial weight bearing was allowed after about six weeks. Full weight bearing without support was allowed after almost three months in those patients who showed good union on X-rays. In group two, full weight bearing was allowed after about 3 to 12 days as the aim of doing bipolar prosthesis was early weight bearing. However, squatting and cross legged sitting was prohibited. Patients were discharged as early as possible if wound condition was healthy. Sutures were removed after about 14 days in both group patients. Patients were followed up in out-patient department after discharge, clinically and radiologically. Radiographs were taken at 1, 3, 6 months and 1 year postoperatively. Patients in group two were monitored for dislocation or loosening and those in group one for implant position, bridging callus etc.

### Statistical Analysis

Data were reported as mean, standard deviation, median (range) or number (percentage). T-test was used to assess numerical parameters, whereas Chi Square test was used for categorical variables such as gender, premorbid conditions and postoperative complications. P value less than 0.05 was considered as significant.

## Results

There were 54 patients in group one (osteosynthesis with DHS plate) and 48 patients in group two (coxafemoral bypass with bipolar prosthesis). There were 21 males out of these in group one and 14 males in group two. These results were statistically not significant and groups were comparable.

**Table 1:** Operative time and blood units transfused

| | Group One | Group Two | P value |
|---|---|---|---|
| Operative time (in minutes) | 112 +/- 29 | 142 +/- 31 | < 0.001 |
| Number of blood units transfused | 1.92 +/- 1.22 | 1.37 +/- 0.89 | = 0.012 |

Hospital stay in group one (DHS) was 7.8 +/- 2.3 days while it was 6.3 +/- 1.8 days in group two (Bipolar). P value was < 0.001.

**Table 2:** Complications

| Complication | Group one (DHS) | Group two (Bipolar) | P value |
|---|---|---|---|
| 1.Pressure sores | 11 (20.4%) | 3 (6.3%) | < 0.001 |
| 2.Deep vein thrombosis | 4 (7.4%) | 0 (0%) | < 0.001 |
| 3.Implant failure / Prosthesis breakage | 4 (7.4%) | 2 (4.2%) | >0.05 |
| 4.Pulmonary complications | 9 (16%) | 6 (12.5%) | >0.05 |
| 5.Mortality at 1 year | 9 (16%) | 6 (12.5%) | >0.05 |
| 6.Dislocation | ------- | 1 | >0.05 |

Full weight bearing was possible in 1.26 (+/- 0.68) weeks in group two but as late as 9.6 (+/- 2.28) weeks in group one. P value was < 0.0001.

Harris Hip Score calculated was 68.17 +/- 5.22 in group one and 80.35 +/- 4.98 in group two. P value was < 0.0001.

## Discussion

Though osteosynthesis with DHS and plate for intertrochanteric fractures has been shown to have overall good results, in literature, those unstable patterns like reverse oblique, transtrochanteric fractures, those with subtrochanteric extension, those with large posteromedial fragment, comminution or loss of lateral wall have relatively high failure rate and thus reoperation rates particularly in elderly osteoporotic patients [6] Early return to activities of daily living plays an important role in preventing recumbency related complications of this fracture [7]. The aim of operative treatment is to mobilize the patient early to avoid morbidity and mortality due to recumbency related complications [8]. Primary arthroplasty theoretically allows early mobilization and secure fixation and thus decrease chances of non-union, pulmonary complications, bed sores etc [9].

Primary arthroplasty is generally a preferred treatment method in reoperation of failed fixation in intertrochanteric fractures [10]. So, there is an increasing trend towards arthroplasty in unstable intertrochanteric fractures in elderly. Though proximal femoral nail has been claimed to give better results in these unstable intertrochanteric fractures, still there are many reports which refute this claim [11]. In literature, still there is about 35% reoperation rate with osteosynthesis than arthroplasty which gas about 9% reoperation rate [12]. Though total hip replacement can be an ideal replacement in these fractures to decrease acetabular wear as compared to bipolar prosthesis, it has higher dislocation rates and is a lengthy and invasive procedure which is difficult in less active, comorbid patients besides being costlier [13]. Controversy in arthroplasty is now unipolar or bipolar prosthesis. However, due to advantages of bipolar prosthesis such as less protrusio acetabulae complication and dislocation, bipolar is generally preferred. Uncemented bipolar is not possible in intertrochanteric fractures as usually calcar is lost which is an essential prerequisite for doing uncemented bipolar and hence increased prosthesis survival is possible after cemented prosthesis only [14] Hence, cemented bipolar prosthesis is generally preferred. There are numerous studies in literature like by Liang *et al.*, Tronzo RG *et al.*, Grimsrud *et al.*, Stern MB *et al.*, Pcifu Tang *et al.*, Jun Shan *et al.*, Kim SY *et al.*, Haentjens P *et al.* which have claimed superiority of cemented bipolar prosthesis [14-17] However, there is not much Indian literature supporting this.

In our study, we got less pressure sores and incidence of deep vein thrombosis in group of patients who underwent coxafemoral bypass with cemented bipolar prosthesis. Also need for blood transfusion was less than DHS group. Also hospital stay was significantly less in this group of patients. Operative time was however, significantly more in bipolar group. However, there were not significant differences in implant or prosthesis related failure, pulmonary complications, dislocations or mortality in both groups. Hence, morbidity, though not mortality was decreased by changing the surgical procedure. Implant or prosthesis related complications were not significantly different in both groups, probably because in two patients bipolar stem broke few months after mobilization probably because of cheaper, fixed bipolar use in poorer patients in our institution. However, patients were still relatively mobile though re-surgery was not possible due to fitness issues or refusal. Significant pressure sores or deep vein thrombosis in group one was probably due to relatively late mobilization in this group. Bipolar cemented prosthesis group has better Harris Hip Score as it is a load bearing prosthesis, has a short lever arm and there is no medialisation of distal fragment as in dynamic hip screw and plate and is thus biomechanically and clinically better [17].

## Conclusion

Cemented bipolar prosthesis gives better results in unstable intertrochanteric femur fractures as compared to osteosynthesis. However, our sample size was small and ours was a retrospective study. Hence, there could be a bias involved and more meta-analysis and randomized control trials will be required to reach a final conclusion.

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