



Orthopaedics

COMPARISON OF FUNCTIONAL OUTCOMES BETWEEN UNCEMENTED UNIPOLAR AND CEMENTED BIPOLAR HEMIARTHROPLASTY FOR INTRACAPSULAR NECK FEMUR FRACTURES IN ELDERLY

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ABSTRACT **Background:** Femoral neck fractures (FNF) are a growing problem in our ageing society and have been associated with high morbidity and mortality. Hemiarthroplasty is the most commonly used treatment for displaced femoral neck fractures in the elderly. There is limited evidence in the literature of functional outcome with cemented implants compared to AMP in aged more than 70 years. Hence an attempt is made to compare the outcome with unipolar vs cemented bipolar prosthesis for displaced fracture neck of femur in patients aged more than 70 years. **Materials And Method:** Ours is a prospective comparative study conducted, involving 40 patients with short term follow up of one year. Elderly patients above 70 years of age, with displaced fracture neck of femur were included. 20 patients were operated with Austin Moore Prosthesis (AMP) and 20 with bipolar prosthesis. The functional hip score was assessed using Harris Hip Score (HHS). The statistical software SPSS 15.0 (Statistical Package for Social Sciences) was used for the analysis of our data. **Result:** In our study, mean duration of surgery in uncemented group was 70 minutes and mean duration of surgery in cemented group was 82 minutes. On the basis of HHS the results were at 6 weeks follow up we had 70.2 for uncemented group and 77.5 for cemented group and in the last follow up at 6 months, we found HHS 84.2 for uncemented group and 85.6 for cemented group. There were 3 complications in cemented as a cement reaction and 2 superficial infection one in cemented and other in uncemented group. **Conclusion:** Both cemented and uncemented prostheses can be recommended according to our study because they were equally good regarding functional outcome and health-related quality of life, contrary to the generalized and limited published evidence. The seeming advantages of shorter duration of surgery and potentially less blood loss with the uncemented implant are of little importance compared with the important findings of equivalent functional results. Both implants may be used with good results after displaced femoral neck fractures.

KEYWORDS : Hemiarthroplasty, Uncemented, Cemented , Intracapsular neck of femur fracture

INTRODUCTION

Intracapsular fractures of the proximal femur form a major share of fractures in the day to day orthopaedic practice. As age increases, bones become weak; even trivial trauma can lead to neck of femur fracture. It is estimated that the incidence of femoral neck fracture with a change of lifestyle will grow from 1.6 million in 1990, as estimated to 6.25 million in 2050 in the world.¹

Femoral neck fractures (FNF) have been associated with high morbidity and mortality. Hemiarthroplasty is the most common treatment for displaced fractures of the femoral neck in the elderly and is associated with better functional outcome and fewer reoperations than internal fixation.^(2,3,4)

However, controversy still exists regarding whether cemented or uncemented implant fixation is preferable in this patient population. Evidence suggests that cementing prevents loosening by improving prosthesis anchorage to the bone⁵. This is an advantage since a loose prosthesis can cause pain, delay patient mobilization, and require further surgery. However, the use of cement can complicate revision surgery and has been reported to cause rare but severe cardiovascular complications. For this reason, uncemented femoral stems offer clinicians a way to decrease the risk of this potentially catastrophic complication.⁶

Our study was undertaken with the objective of assessment of functional outcome in elderly patients, treated with uncemented unipolar v/s cemented bipolar prosthesis for displaced fracture neck of femur.

MATERIALS AND METHODS

Our study included 40 patients with an acute displaced femoral neck fracture (Garden stage III or IV). patients presented to Government Karwar medical college hospital between January 2020 and December 2021 were included in the study.

Inclusion Criteria

- Displaced intracapsular hip fracture (Garden III–IV) in the patients aged over 70 years.
- No concurrent joint disease.

- Intact cognitive function.
- Ability to ambulate independently with or without walking aids

Exclusion Criteria

- Undisplaced or minimally displaced intracapsular hip fracture (Garden I–II).
- Patients with a pathological fracture secondary to malignant disease.
- Patients with rheumatoid arthritis or symptomatic osteoarthritis.
- Previous treatment to the same hip for a fracture.
- Patients with a pre-existing hip abnormality requiring total hip replacement.
- Patients who were deemed unsuitable for the surgical procedures by the anaesthesiologist.

Operative Technique

All operative procedures were performed by the attending orthopaedic surgeon with the assistance of the house staff. The anaesthetic used (spinal or general) was determined by the attending anaesthesiologist independent of the hemiarthroplasty randomization. The patient's randomization assignment (cemented or uncemented) was known to the anaesthesia team before induction. Once anaesthetized, the patient was placed in the lateral decubitus position, and a standard posterolateral approach was used⁷. The hemiarthroplasty was completed using the assigned component (cemented or uncemented) in accordance with the standard technique.

In patients treated by uncemented unipolar prosthesis, Austin moore prosthesis was used, whereas for those treated by cemented bipolar femoral prosthesis, Sharma surgicals prosthesis was used. Whenever possible, the hip capsule was re-approximated. Postoperatively, all patients were allowed to weight bear to tolerance on the operative extremity.

All patients received a dose of 1 g of cephazolin, intraoperatively and two further doses at eight and sixteen hours postoperatively unless a prerecorded allergy existed. A radiograph was obtained immediately after the operation. Each patient received routine observation, analgesia and prophylaxis against deep venous thromboembolism. Patients in both groups were allowed to mobilize with full weight-bearing as tolerated.

Outcome Measures

Patients were followed up at one and half, three, and at six months after surgery. The main outcome measures of this study include functional results and complication rate between cemented and uncemented hemiarthroplasty groups. Functional outcome was measured using HHS, ranging from 0 to 100 points and covering a maximum of 44 points for absence of pain, 47 points for function, and 9 points for range of motion and absence of deformity.

Anatomical outcome was measured by acetabular protrusion and femoral stem subsidence.

Pain was graded according to visual analogue scale with responses ranging from 0 to 10 to patient's functional status during follow up.

Surgical methods were evaluated while accounting for the following aspects: operating time, intraoperative blood losses, suspected fat-embolic events. Both groups were compared in terms of intra operative and postoperative complications and hip function. During the postoperative follow-up period, periprosthetic fractures, dislocations, and infections were recorded.

Statistical Analysis

The statistical software namely SPSS 15.0 (Statistical Package for Social Sciences) was used for the analysis of data and Microsoft's Word and Excel were used to generate table and figures. The results were considered significant, if the p-value was less than 0.05.

RESULTS

In our study, we had a total of 40 patients; 20 patients in each group. The most common age group was 71-80 years of age (mean 72.77). Mean age in cemented group was 72.30 years and mean age in the uncemented group was 72.90 years. We had total of 17 males and 23 females in our study.

Table 1. Baseline Characteristics

Characteristics	Uncemented	Cemented
Male	07	10
Female	13	10
Mean age	72.90	72.30

Subjective outcomes included the visual analogue pain score. The mean visual analogue pain score was better in the cemented group than in the uncemented group at each follow-up time point, although none of the differences reached significance.

The mean duration of surgery in our study in cemented group was 82 minutes and in the uncemented group, it was 70 minutes.

On the basis of HHS the results were at 6 weeks follow up we had 70.2 for uncemented group and 77.5 for cemented group and in the last follow up at 6 months, we found HHS 84.2 for uncemented group and 85.6 for cemented group.

There was no acetabular protrusion or femoral stem subsidence at 6 months follow up time in both the techniques.

There were 3 complications in our study. Two patient in cemented group, one had post-operative superficial infection on 12 th day after surgery and other had a cement reaction who had to be put on non invasive ventilation due to fall in oxygen saturation post surgery. Another surgical site infection was noted on 7th post operative day in uncemented group.

Table 2. Comparison of uncemented v/s cemented hemiarthroplasty

Parameter	Uncemented	Cemented
1. Visual Analogue Scale		
a. 6 Weeks	5	4.5
b. 6 Months	2	2
2. Mean Duration Of Surgery	70 min	82 min
3. Harris Hip Score		
a. 6 Weeks	70.2	77.5
b. 6 Months	84.2	85.6
4. Complications	1	2

DISCUSSION

Rapid restoration of pre-injury functional and ambulatory status of

elderly patients with fracture neck of femur is the ultimate objective with any treatment. Arthroplasty is the common treatment for the displaced fracture neck of femur in elderly patients. There is no conclusive evidence regarding the type of arthroplasty to be chosen in fracture neck of femur in elderly, even though cemented arthroplasty do well with regard to postoperative pain and improved mobility many hip-fracture patients endured significant cardiovascular and cerebral comorbidities with little functional reserve. In these frail patients, operative time and blood loss greatly influence outcomes. Therefore, some surgeons prefer to apply the uncemented hip arthroplasty technique, because they believe it can reduce operation times and intraoperative blood losses and prevent Bone Cement Implantation Syndrome (BCIS). Even though there are reports of more than 20 years' survival of AMP, there are many disadvantages due to poor femoral fixation and acetabular erosion. In hemiarthroplasty there is a tendency for femoral neck resorption and sinkage of stem into the medullary cavity. Lo WH et al., reported that cemented replacement require relatively more time and hence more blood loss compared to uncemented hemiarthroplasty⁸. Other studies show no significant difference in operative blood loss and operative time. In this study, blood loss and surgery time were significantly higher for bipolar prosthesis group. No significant difference in pain score between unipolar and bipolar group in our study. This was similar to observation made in other study by Raia FJ et al., and Stoffel KK et al.,^{9,10} According to Malhotra R et al., a comparative study of unipolar vs bipolar hemiarthroplasty showed a significant improvement of pain in the latter group^{11,12,13}.

In the present study, the functional outcome assessed using HHS was better for cemented group at final follow up (6 months), but there were certain studies unable to prove the theoretical advantage of bipolar prosthesis in terms of functional outcome. This may be due to age related neuromuscular changes, lack of proper balancing by coordination of various muscles and decreased pain tolerance in elderly. But Jeffcote B et al., reported a significant difference in functional outcome for bipolar group at three months, when compared to unipolar group in contrast to the result obtained in this study^{14,15}.

CONCLUSION:

Both cemented and uncemented prostheses can be recommended because they were equally good regarding functional outcome and health-related quality of life, contrary to the generalized and limited published evidence. The seeming advantages of shorter duration of surgery and potentially less blood loss with the uncemented implant are of little importance compared with the important findings of equivalent functional results. Both implants may be used with good results after displaced femoral neck fractures.

LIMITATION OF THE STUDY:

The limitation of our study is small sample size and lack of randomization in treatment which will lead to selection bias and we had a short follow-up period.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AUTHORS' CONTRIBUTIONS

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

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None

DATA AVAILABILITY

All datasets generated or analyzed during this study are included in the manuscript.

ETHICS STATEMENT

Ethical committee clearance obtained.

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