



Short-Term Outcome of Uncemented Modular Bipolar Hemiarthroplasty in Femoral Neck Fractures

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Abstract

Background: The femoral neck fracture is often described as a fracture of necessity. This fact dictates that surgical treatment of this fracture is more or less necessary. Approximately 95% to 97% of these fractures occur in the older adult population. The cause is usually due to a combination of baseline osteoporosis and minor trauma such as a fall. A femoral neck fracture in adults is complicated by non-union and osteonecrosis. These complications limit the use of osteosynthesis in femoral neck fractures in elderly. Modular bipolar hemiarthroplasty eliminates the complications of non-union and osteonecrosis and thus decreases the need of multiple surgeries.

Methods: After seeking approval from institutional ethics committee the present study was conducted in Post Graduate Department of Orthopedics of SKIMS Medical College Hospital, Bemina from October 2018 to February 2020. Thirty patients were taken up for the study. All patients meeting the criteria of case selection for this study were admitted in our department. Following admission all patients were operated *via* posterolateral approach by a single surgeon using same implant. The outcome was assessed with HIP HARRIS SCORE.

Results: The mean age in our study was 67.63 years (range from 60 to 85). The study group consisted of 19 females and 11 males. Twenty-nine patients presented with fractures resulting from trivial trauma during fall while 1 patient had history of high energy trauma due to road traffic accident. Right and left hip were affected equally contributing 15 cases each. Seventeen patients had Garden type IV fracture while 13 patients reported Garden type III fracture. The mean femoral head diameter was 46.3 ranges (41 to 53). The mean femoral stem size was 3.8 ranges (3 to 5). Femoral stem was aligned neutrally in 22 patients, valgus in 3 patients and varus in 5 patients. The average period of follow up was 9.83 months (range 9 to 12 months). The average post-op Harris Hip score was 88.3 at final follow-up with excellent in 14 patients, good in 12, fair in 2 and poor results in 2 patients. One patient developed prosthesis dislocation while 1 patient developed prosthesis infection.

Conclusion: Modular bipolar hemiarthroplasty provides early ambulation in adults with displaced femoral neck fractures while avoid the complications of non-union and osteonecrosis associated with osteosynthesis and internal fixation.

Introduction

The femoral neck fracture is often described as a fracture of necessity. This fact dictates that surgical treatment of this fracture is more or less necessary. More than 95% of these fractures present in elderly population [1]. The cause is usually due to a combination of baseline osteoporosis and minor trauma such as a fall. Hip fractures commonly involve the neck region and more than 85% of these fractures are displaced [2]. Displaced femoral neck fractures managed with osteosynthesis is complicated by non-union neck femur and osteonecrosis which demand repeated surgical intervention. Lu-Yao et al. determined the rate of non-union to be 33% (95% CI, 23% to 37%) and an osteonecrosis rate of 16% (95% CI, 11% to 19%) [3]. Several methods of treatment are in vogue, but broadly the treatment groups are divided into arthroplasty and osteosynthesis. Arthroplasty is the preferred method of treatment in the older patient population. Hemiarthroplasty involves removal of the native femoral head and most of the femoral neck. The hip joint is reconstructed by implantation of femoral component of prosthesis in the femoral canal on which prosthetic head is subsequently fixed. Hemiarthroplasty aims at giving the patient a new well-functioning, painless, mobile and stable hip. This surgical procedure improves the function, biomechanics and kinematics in numerous other hip pathologies too. Treatment by hemiarthroplasty in displaced femoral neck fractures is indicated in patients aged above 60 years who are community ambulatory prior to injury. The prosthetic hip is available as unipolar, biolar and modular bipolar designs. Modular bipolar

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implants have the advantage of adjusting offset and conversion to total hip arthroplasty if desired in future. All these designs can be divided into cemented and uncemented/cementless implants. Though cemented implants are still popular, lately the uncemented prosthesis has gained popularity [4]. This study was conducted to assess the short-term efficacy of modular bipolar hemiarthroplasty in displaced femoral neck fractures.

Material and Methods

After seeking approval from institutional ethics committee the present study was conducted in Post Graduate Department of Orthopedics of SKIMS Medical College Hospital, Bemina Srinagar from October 2018 to February 2020. Thirty patients were taken up for the study. All patients meeting the criteria of case selection for this study were admitted in our department. The outcome was assessed with HIP HARRIS SCORE [5].

Inclusion criteria

- Age: >60 years.
- Gender: Garden Type 3 and 4 fractures.
- Patients with recent (4 weeks old) trauma.
- Dorr 7A and B femori.
- Abbreviated mental test score >6 {Hodkinson HM, 1972}

Exclusion criteria

- Physiologically (<60 years) patients with undisplaced/impacted fracture neck of femur amenable to osteosynthesis (CCS).
- Un-displaced fractures {Garden type 1st and 2nd}
- Patients with any medical contraindication to major surgery.
- Patients with lower than normal life expectancy because of cancer, severe inflammatory disease or cardiopulmonary disease.
- Dorr C femori.
- Patients of polytrauma.
- Patients with pre-existing osteoarthritis, rheumatoid arthritis.

Patient with pathological fractures

All patients with fracture neck of femur and meeting the inclusion criteria were admitted in the Department of Orthopedics and evaluated. Pre-op templating was done to do away with guess work during prosthesis placement. All the patients were operated by a single surgeon after receiving pre-op cefuroxime. Post-op drain was removed on second POD after measuring drain output. Partial weight bearing with walker support was started on day 3. Patients were discharged on the 3rd POD. Follow-up was done at 2 weeks, 6 weeks, 3 months and final follow-up at 9 months.

Statistical analysis

Data was entered on Microsoft excel software and analysis was done with SPSS version 20.0 software.

Results

The mean age in our study was 67.63 years (range from 60 to 85). The study group consisted of 19 females and 11 males. Twenty-nine patients presented with fractures resulting from trivial trauma during



Figure 1: Draping and marking.



Figure 2: Pre-op X-ray.



Figure 3: Post-op final follow up X-ray.



Figure 4: Flexion at final follow up.

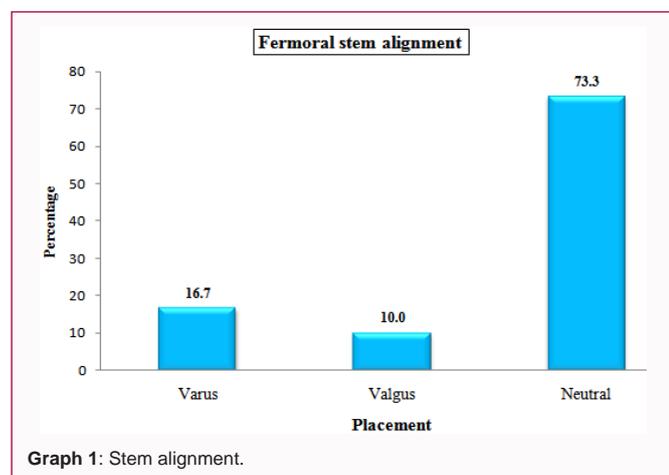
fall while 1 patient had history of high energy trauma due to road traffic accident. Right and left hip were affected equally contributing 15 cases each. Seventeen patients had Garden type IV fracture while 13 patients reported Garden type III fracture. Hypertension, diabetes and COPD were the prominent co-morbidities affecting our study group. Most of the patients were operated within 10 days of sustaining trauma. The mean femoral head diameter was 46.3 ranges (41 to 53). The mean femoral stem size was 3.8 ranges (3 to 5). Femoral stem was aligned neutrally in 22 patients, valgus in 3 patients and varus in 5 patients. The average duration of surgery was 101 minutes (range

Table 1: Epidemiology.

Mean age	67.63
Gender ratio	19:11 (F:M)
Side involvement	15:15 (Rt:Lt)
Garden class	17:13 (IV:III)
Mean time till surgery	7.5 days



Figure 5: Dislocated prosthesis.

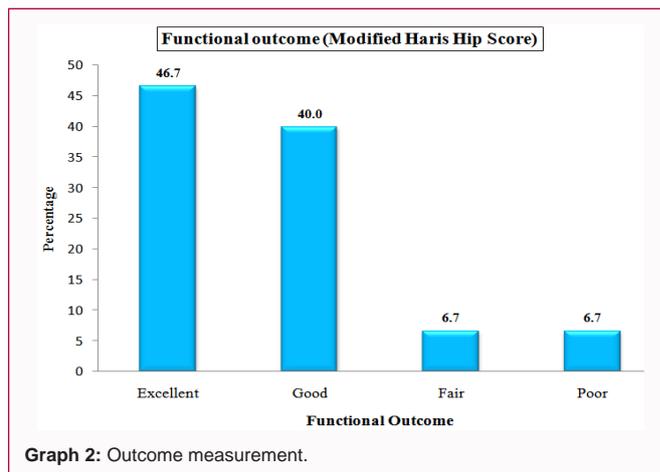


Graph 1: Stem alignment.

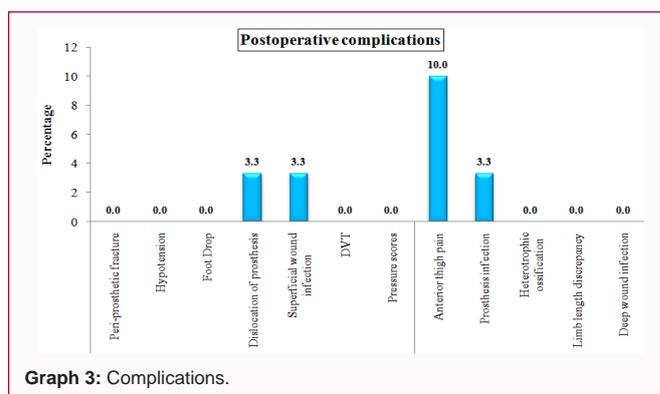
80 to 120). The average blood loss was 241.6 ml (range 150 to 350). Limb shortening was present in 3 patients with LLD of <2 cm. The average period of follow up was 9.83 months (range 9 to 12 months). The average post-op Harris Hip score was 88.3 at final follow-up with excellent in 14 patients, good in 12, fair in 2 and poor results in 2 patients. One patient developed prosthesis dislocation while 1 patient developed prosthesis infection.

Discussion

Fracture neck of femur affects the population of all ages especially in elderly. The management of these fractures is defined by the fracture displacement. Undisplaced fractures are managed with osteosynthesis using cannulated cancellous screws in young and elderly. Displaced femoral neck fractures in elderly population are managed with hemiarthroplasty or THA. Modular bipolar Arthroplasty provides mobile hip joint, early weight bearing and can be converted to total hip arthroplasty in future if needed. The mean age in our study was 67. Sixty-three years which is comparable to the studies of Daddimani et al. [8], zahid bashir et al. [9], Sharanprasad et al. [10] and Ram kumar et al. [11]. Elderly age group is more prone to frequent falls with delayed protective reflexes resulting in fall with impact directly on side of body which results in neck femur fracture. Also age associated decrease in bone mineralization makes elderly population more susceptible to femoral neck fractures. There is female preponderance to femoral neck femur fractures in our study which is the case with the studies of Daddimani et al. [8], Zahid basher et al.



Graph 2: Outcome measurement.



Graph 3: Complications.

[9] 62, Sharanprasad et al. [10] and Ram kumar et al. [11]. The female propensity of femoral neck fractures is attributed to female gender being non-modifiable risk factor of femoral neck fracture. This can be explained by the fact that elderly female have lower BMD as compared to age related male matches. Only displaced femoral neck femur fractures were included in our studied. Our studied showed higher incidence of Garden type IV fractures than type III fractures. This was comparable to the studies of Daddimani et al. 2016 [8], Sharanprasad et al. 2019 [10], Jabreel muzaffar et al. 2017 [12]. Displaced femoral neck fractures in adults are best managed by arthroplasty in view of non-union and osteonecrosis complications. Most of the fractures in our study were the result of trivial falls as against the high energy road traffic accidents. This again can be explained by the lower bone mass and higher frequency of falls in elderly age group. The results of our study were comparable to the studies of Daddimani et al. [8], Zahid bashir et al. [9], Sharanprasad et al. [10] all the patients in our study were managed by uncemented modular bipolar hemiarthroplasty. The head sizes ranged from 39 mm to 51 mm. Most of the head sizes in our study ranged from 45 mm to 51 mm which was higher than the average head sizes in the studies of Mohammed Abdul Azeem et al. 2016 [13] and Reddy GR et al. 2017 [14]. The femoral stem alignment was evaluated with regards to central, varus and valgus position. Our study reported 73.3% of centrally aligned femoral stems followed by 16.7% of varus alignment. This was comparable to the studies of Zahid Bashir et al. 2020 [10], Bloomfeld et al. 2007 [15] and Nottage et al. 1990 [16]. The outcome of our study was evaluated by modified Harris hip scoring. Mean post-operative HHS in our study was 88.3 graded as excellent. This was comparable to the studies of Daddimani et al. [8], Zahid Bashir et al. [9], Sharanprasad et al. [10]. Modular bipolar hemiarthroplasty provides immediate hip range of movement

with standard hip precautions. The outcome was graded as excellent in 46.7% good in 40%, fair in 6.7% and poor in 6.7%. The grading of HHS was comparable to the studies of Daddimani et al. [8]. Zahid bashir et al. [9], Sharanprasad et al. [10], Mohammed Abdul Azeem et al. 2016 [13] and Reddy GR et al. 2017 [14]. The average blood loss in our study was 241.7 ml which is comparable to the studies of , Zahid Bashir et al. [9] and Ram kumar et al. 2014 [11]. This was slightly higher than the study of Daddimani et al. [8]. The average operative time in our study was 100.8 min which is comparable with the studies of Daddimani et al. [8]. Zahid Bashir et al. [9] and higher than the study of Ram kumar et al. 2014 [11].

Our study was complicated by superficial skin infection in one case and one patient developed prosthetic joint infection. One of our patients developed prosthesis dislocation which was managed by closed reduction under c-arm guidance. Three patients had shortening of less than 2 cm while as three patients had post-operative lengthening which was less than 2 cm.

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