

## A Prospective Study to Evaluate the Functional Outcome and Management of Intracapsular Fracture of Neck of Femur by Cemented Bipolar Hemiarthroplasty

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### Abstract

**Background:** Cemented Bipolar hemiarthroplasty thus appears a good option for fracture neck femur in the elderly population. The aim of this study to evaluate the functional outcome and management of intracapsular fracture of neck of femur by cemented bipolar hemiarthroplasty. **Materials & Methods:** A hospital based prospective study done on 20 patients involving intracapsular fracture of neck of femur at department of orthopaedic and indoor at our centre Government Medical College & attached groups of Hospital, Barmer, Rajasthan. The results were classified as excellent, good, fair and poor based on points scored on Harris Hip Score. **Results:** The present study showed that mean age of 69 years. Male to female ratio was 1.85:1. The clinical results were analyzed using the Harris hip score. Most of the patients showed excellent to fair score. Only 1 patient showed poor Harris hip score. Radiological results were excellent (55%) in the current study. There was only 1 case with poor radiological results. There was no case with subluxation or dislocation of the prosthesis. **Conclusion:** We concluded that cemented bipolar hemiarthroplasty seems to be the best way to get good clinical outcomes in elderly patients with fractured femoral neck. Continuous clinical and radiologically testing is essential for the diagnosis of complications.

**Keywords:** Hemiarthroplasty, Harris Hip Score, Femoral neck, Fracture

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### Introduction

Femoral head replacement is still considered to be an excellent neck brace for older women, although it is controversial. The prevalence of hip fractures is estimated to have broken 1.3 million worldwide in 1990. This is expected to rise to 4.5 million by 2050 with the largest expected increase in Asia and Africa. About 50% of hip fractures will be intracapsular fractures. Treatment for femoral neck fractures has always been controversial, especially in older adults[1]. Femoral Neck Fractures are also classified according to the degree of fracture migration and the most commonly used system is that of the Garden (Garden 1961)[2]. As displacement increases, the risk of disruption of blood supply to the femoral head increases. With the provision of disturbed arteries, the risk of co-morbidity, complications and recurrence increases with IF treatment. The Garden classification is based on the degree of displacement of fractures in the anteroposterior radiographic images. The Garden's classification system has been criticized for its poor integrity of viewers[3]. The most reliable classification of FNFs, which is closely related to secondary problems after IF-like non-union and avascular necrosis, is unknown and disregarded place[4,5].

Internal fixation (IF) remains a treatment option for patients under the age of 65 with displaced fracture due to reduced failure rate compared to older patients where there is a risk of long-term implantation problems and the need for recurrent surgery[6-8]

Moore and Bohlman first reported the use of hemiarthroplasty in 1943[9]. The Thompson and Austin-Moore prostheses are still used extensively for treatment of femoral neck fractures in some countries today[10]. Preliminary results were promising and marked a major step forward compared to internal fixation, but problems remained high in several studies in the following decades[11-14]. The main problems were loosening of the femoral stem, acetabular erosion and protrusion of the prosthetic head into the pelvis. The first step towards a bipolar hemiarthroplasty was introduced by Christiansen in the late 1960s. The Christiansen prosthesis had a built-in trunnion bearing that allowed some movement between the stem and the head of the prosthesis. Again the results were promising[15,16], but acetabular protrusion remained a problem[14]. In 1974, Bateman[17] introduced the Bipolar prosthesis (initially popular as Bateman's prosthesis) having mobile head element and had head surface additional to allow movements in the acetabulum. Greater range of movements, less post-operative pain, reduced incidence of acetabular erosion, reduction in the loosening of stem (when cement is used), higher percentage of satisfactory results, more rapid return to unassisted activity are the advantages of bipolar prosthesis over unipolar endoprosthesis. Total hip arthroplasty is still not popular as a treatment modality for these fractures because majority of the patients do well with hemiarthroplasty and also due to high costs involved. Use of the cement gained in popularity after Sir John Charnley[18] began using PMMA, intended for denture repair, to anchor femoral head prosthesis in the femur during total hip arthroplasties. Cemented Bipolar hemiarthroplasty thus appears a good option for fracture neck femur in the elderly population. With limited evidence for cemented hemiarthroplasty for improved

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functional outcome and one of the meta-analysis showing increased post-operative mortality.

**Materials & Methods**

A hospital based prospective study done on 20 patients involving intracapsular fracture of neck of femur at department of orthopaedic and indoor at our centre Government Medical College & attached groups of Hospital, Barmer, Rajasthan.

**Inclusion Criteria**

1. Displaced intracapsular fracture of neck of femur
2. Age > 50 years

**Exclusion Criteria**

1. Open fractures
2. Age < 50 years
3. Patients not fit for GA/SA due to any medical comorbidity.

Management and Follow up Protocol: The patients with intracapsular fracture neck of femur were operated by cemented bipolar hemiarthroplasty after they present with fracture in OPD/Emergency of Government Medical College & attached group of Hospital. The patients were admitted in MOW/FOW would undergo routine investigations required for preanaesthetic checkup. After anaesthetic clearance patient were taken for elective surgery. Following the operated patients kept under observation for average 10-12 days and discharged after stitches removal and called for follow up at regular intervals for clinical and radiological evaluation.

Post Procedure Follow Up: Follow UP- All patients were followed up at 4 weeks at 6 months and 1 year from date of discharge. The results were classified as excellent, good, fair and poor based on points scored on HARRIS HIP SCORE following functions were taken into consideration.

**Pain:**  
 None or ignores it (44)  Slight, occasional, no compromise in activities (40)  
 Mild pain, no effect on average activities  Moderate Pain, tolerable but makes concession to pain.  
 rarely moderate pain with unusual activity; Some limitation of ordinary activity or work. May require may take aspirin (30)  
 Occasional pain medication stronger than aspirin (20)  
 Marked pain, serious limitation of activities (10)  Totally disabled, crippled, pain in bed, bedridden (0)

**Limp:**  
 None (11)  Slight (8)  Moderate (5)  Severe (0)

**Support:**  
 None (11)  Cane for long walks (7)  Cane most of time (5)  One crutch (3)  
 Two canes (2)  Two crutches or not able to walk (0)

**Distance Walked:**  
 Unlimited (11)  Six blocks (8)  Two or three blocks (5)  Indoors only (2)  
 Bed and chair only (0)

**Sitting:**  
 Comfortably in ordinary chair for one hour (5)  On a high chair for 30 minutes (3)  
 Unable to sit comfortably in any chair (0)

**Enter public transportation:**  
 Yes (1)  No (0)

**Stairs:**  
 Normally without using a railing (4)  Normally using a railing (2)  
 In any manner (1)  Unable to do stairs (0)

**Put on Shoes and Socks:**  
 With ease (4)  With difficulty (2)  Unable (0)

**Absence of Deformity (All yes = 4; Less than 4 = 0)**  
 Less than 30° fixed flexion contracture  Yes  No  
 Less than 10° fixed abduction  Yes  No  
 Less than 10° fixed internal rotation in extension  Yes  No  
 Limb length discrepancy less than 3.2 cm  Yes  No

**Range of Motion (indicates normal)**  
 Flexion (°140°) \_\_\_\_\_ Abduction (°40°) \_\_\_\_\_  
 Adduction (°40°) \_\_\_\_\_ External Rotation (°40°) \_\_\_\_\_ Internal Rotation (°40°) \_\_\_\_\_

**Range of Motion Scale:**  
 211° - 300° (5) 61° - 100° (2) 161° - 210° (4) 31° - 60° (1) 101° - 160° (3) 0° - 30° (0)

**Range of Motion Score:** \_\_\_\_\_

**Total Harris Hip Score** \_\_\_\_\_

**Statistical Analysis**

The data analysis was done for 6 months using parameters ratio, rates and percentage of different outcome as per the HARRIS HIP SCORE, which were computed and compiled.

**Results**

The present study showed that mean age of 69 years. Male to female ratio was 1.85:1. Of 30 patients, 12 were operated on right side while 8 patients were operated on left side. The average hospital stay was 10.68 days. All the patients were prepared for surgery as early as possible. In some patients undue pre op delay occurred because of delay in getting fund from government and in some patients, it was because of delay in getting physician clearance (table 1).

The clinical results were analyzed using the Harris hip score. Most of the patients showed excellent to fair score. Only 1 patient showed poor Harris hip score. The patient showed poor score suffered with various medical problem and poor preoperative general physical health (table 2).

Radiological results were excellent (55%) in the current study. There was only 1 case with poor radiological results. There was no case with subluxation or dislocation of the prosthesis. There was no case with symptomatic loosening of the femoral stem. Only 1 case (5%) with ectopic ossification reported in our study but this patient had good Harris hip score (table 3).

**Table 1: Parameters of patients**

Parameters	No. of patients (N=20)	Percentage
<b>Age (yrs)</b>		
51-60 yrs	5	25%
61-70 yrs	8	40%
>70 yrs	7	35%
<b>Gender</b>		
Male	13	65%
Female	7	35%
<b>Side involvement</b>		
Right	12	60%
Left	8	40%
<b>Hospital stay</b>		
3-5 days	3	15%
6-10 days	5	25%
11-15 days	12	60%

**Table 2: Grading of Harris hip score**

Grading	Number	Percentage
Excellent	2	10%
Good	12	60%
Fair	5	25%
Poor	1	5%
Total	20	100%

**Table 3: Radiological Parameters**

Parameters	No. of patients (N=20)	Percentage
<b>Femoral Anterversion</b>		
15±5°	10	50%
<10°	3	15%
>20°	7	35%
<b>Neck shaft angle</b>		
>140°	9	45%
110°-140°	11	55%
<b>Ectopic orientation</b>		
Present	1	5%
Absent	19	95%
<b>Radiological Grading</b>		
Excellent	11	55%
Good	8	40%
Poor	1	5%

## Discussion

Femoral neck fractures are a common problem in older patients because most patients are weak and have many medical conditions such as osteoporosis and osteomalacia. With the advent of medical technology, life expectancy has now increased. So the number of older people is increasing, with the intertrochantric fracture of femur which is a disease of old age. In fracture neck femur in patients older than 60 years bipolar prosthesis is a standard treatment method that overcomes the problem of joint and AVN. The current study showed that it means he is 69 years old. The average for men to women was 1.85: 1. Of the 30 patients, 12 underwent surgery on the right side and 8 patients underwent surgery on the left side. The average hospital stay was 10.68 days. Yurdakul E et al (2015)[19] found that the mean age of the patients was 78.16 years (range: 60–110 years). YS Prashanth, M Niranjana in 2017[20] found that the age of the patients was 70 years. The average hospital stay for 18 days with bipolar hemiarthroplasty was reported by Lestrang[21]. Drinker and Murray et al[13] reported hospital stay for 23 days with the same procedure. There are no postoperative complications such as loosening, dislocation, erosion, secondary osteoarthritis, protrusion-acetabuli or periprosthetic fracture. All patients were prepared for surgery as soon as possible. In some patients the delay was due to delays in receiving funding from the government and in some patients, it was due to delays in obtaining medical clearance. Clinical outcomes were analyzed using the Harris hip scale. The majority of patients showed significant improvement in scoring. Only 1 patient showed a poor score for Harris. A retrospective study done by Livesley in 1993[22]. 48 hydroxyapatite-coated Furlong bipolar hemiarthroplasties compared with 34 Moore bipolar with a tendency to better performance outcomes and less pain in the HA-coated implants group. In 2004, Bezwada reported excellent results in a series of 256 Taperloc uncemented bipolar hemiarthroplasties with a proximal press-fit design[23]. The most recent systematic review solves this problem by comparing various types of arthroplasties that may have errors and stabilization stability not directly related to whether they are confirmed or not: Parker concludes with a Cochrane review (2006) that there is limited evidence that reinforced implants may be associated with less pain[24]. To overcome these problems, various techniques are used such as gaining geometrically stable pressure between bone and transplantation, rapid bone growth and the use of Polymethyl

Methacrylate (PMMA) cement. Among these systems, the use of PMMA cement offers some advantages as it acts as a grouting agent to replace thinning trabecular bone, contributing to the rapid disruption between implantation and bone, thus greatly facilitating regeneration. Bipolar arthroplasty was introduced to prevent or delay the wearing of acetabulum. These prostheses have a 22 to 32 mm head that features an ultra-high-density polyethylene liner of various sizes. The liner is covered with an exterior polished metal head that exposes the acetabular cartilage. Theoretically, hip movements mainly occur in artificial joints and secondly in the visible metal connector, reducing artistic wear. There is evidence of the use of hemiarthroplasty with cement leading to greater anchoring and a slight reduction in periprosthetic. In this study 55% patients were in excellent radiological grade; 40% patients were in good radiological grade and 5% patient were in poor radiological grade. Early radiological studies of interprosthetic motion in bipolar hemiarthroplasties observed little or no motion between the stem and the head over time when analyzing passive movement of the hip without weight bearing[25,26]

## Conclusion

We concluded that cemented bipolar hemiarthroplasty seems to be the best way to get good clinical outcomes in elderly patients with fractured femoral neck. Continuous clinical and radiologically testing is essential for the diagnosis of complications. Larger sample size for longer follow-up is required to further confirm the disturbances taken from the current study.

## References

1. Bhandari M, Devreaux PJ, Tornetta P et al. Operative management of displaced femoral neck fractures in elderly patients. An international survey. *J Bone Joint Surg Am.* 2005; 87:2122-30.
2. Garden, RS. Low-angle fixation in fractures of the femoral neck. *J Bone Joint Surg.* 1961; 43-B:647-63.
3. Frandsen PA, Andersen E, Madsen F, Skjødt T. Garden's classification of femoral neck fractures. An assessment of inter-observer variation. *J Bone Joint Surg Br.* 1988;70(4):588-90.
4. Alberts KA, Jervaeus J. Factors predisposing to healing complications after internal fixation of femoral neck fracture. A stepwise logistic regression analysis. *Clin Orthop.* 1990;257: 129-33.

5. Nilsson LT, Johansson A, Strömqvist B. Factors predicting healing complications in femoral neck fractures. 138 patients followed for 2 years. *Acta Orthop Scand.* 1993;64(2):175-7.
6. Zetterberg CH, Irstam L, Andersson GB. Femoral neck fractures in young adults. *Acta Orthop Scand.* 1982;53(3):427-35.
7. Gray AJ, Parker MJ. Intracapsular fractures of the femoral neck in young patients. *Injury.* 1994;25(10):667-9.
8. Damany DS, Parker MJ, Chojnowski A. Complications after intracapsular hip fractures in young adults. A meta-analysis of 18 published studies involving 564 fractures. *Injury.* 2005;36(1):131-41.
9. Moore AT, Bohlman HR. Metal hip joint: a case report. 1942. *Clin Orthop Relat Res.* 2006;453:22-24.
10. Crossman PT, Khan RJ, MacDowell A, Gardner AC, Reddy NS, Keene GS. A survey of the treatment of displaced intracapsular femoral neck fractures in the UK. *Injury.* 2002;33(5):383-6.
11. Salvati EA, Wilson PD, Jr. Long-term results of femoral-head replacement. *J Bone Joint Surg Am.* 1973;55(3):516-24.
12. Sarmiento A. Austin Moore prosthesis in the arthritic hip. Experiences with 224 patients. *Clin Orthop Relat Res.* 1972;82:14-23.
13. Drinker H, Murray WR. The universal proximal femoral endoprosthesis. A short-term comparison with conventional hemiarthroplasty. *J Bone Joint Surg Am.* 1979;61(8):1167-74.
14. Soreide O, Lillestol J, Alho A, Hvidsten K. Acetabular protrusion following endoprosthetic hip surgery: a multifactorial study. *Acta Orthop Scand.* 1980;51(6):943-8.
15. Soreide O, Lerner AP, Thunold J. Primary prosthetic replacement in acute femoral neck fractures. *Injury.* 1975;6(4):286-93.
16. Meyer S. Prosthetic replacement in hip fractures: a comparison between the Moore and Christiansen endoprostheses. *Clin Orthop Relat Res.* 1981;160:57-62.
17. Bateman JE. Single assembly total hip prosthesis: Preliminary report. *Orthop Dig.* 1974;2:15-19.
18. Charnley J. Total hip replacement by low friction arthroplasty. *Clin Orthop.* 1970;72:7-21.
19. Yurdakul E, Karaaslan F, Korkmaz M, Duygulu F, Baktir A. Is cemented bipolar hemiarthroplasty a safe treatment for femoral neck fracture in elderly patients? *Clin Interv Aging.* 2015;10:1063-67.
20. YS Prashanth, M Niranjana. Comparative Study of Surgical Management of Fracture Neck of Femur with Cemented Versus Uncemented Bipolar Hemiarthroplasty. *Journal of Clinical and Diagnostic Research.* 2017; 1(2):RC17-RC21.
21. Lestrage NR. Bipolar arthroplasty for 496 hip fractures. *Clin Orthop.* 1990;251:7-18.
22. Livesley PJ, Srivastava VM, Needoff M, Prince HG, Moulton AM. Use of a hydroxyapatite-coated hemiarthroplasty in the management of subcapital fractures of the femur. *Injury.* 1993;24(4):236-40.
23. Bezwada HP, Shah AR, Harding SH, Baker J, Johanson NA, Mont MA. Cementless bipolar hemiarthroplasty for displaced femoral neck fractures in the elderly. *J Arthroplasty.* 2004;19(7 Suppl 2):73-7.
24. Parker MJ, Gurusamy K. Arthroplasties (with and without bone cement) for proximal femoral fractures in adults. *Cochrane Database Syst Rev.* 2006;3:CD001706.
25. Langan P. The Giliberty bipolar prosthesis: a clinical and radiographical review. *Clin Orthop Relat Res.* 1979; 141:169-75.
26. Verberne GH. A femoral head prosthesis with a built-in joint. A radiological study of the movements of the two components. *J Bone Joint Surg Br.* 1983;65(5):544-7.

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