



CLINICAL AND RADIOLOGICAL OUTCOME ANALYSIS OF NECK OF FEMUR FRACTURE TREATED WITH BIPOLAR HEMIARTHROPLASTY

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ABSTRACT **Introduction :** Hip fractures are linked to an increased risk of death, with half of patients dying within five years. Early return to a desirable functional condition, as well as the reduction of mortality, morbidity, and the need for re-operation, are the treatment goals for femoral neck fractures. The degree of fracture displacement, patient's age, functional demands, and risk profile, such as level of cognitive function and degree of physical fitness, should all be considered when deciding whether to treat with internal fixation, hemiarthroplasty, or total hip replacement (THR). **Aim and Objectives:** to evaluate the functional and radiological outcome of bipolar hemiarthroplasty in fracture neck of femur. **Methodology:** This study is a descriptive observational type of study done at Dr Ram Manohar Lohia hospital, Lucknow, Department of Orthopaedics during May 2020 to May 2021 on patients of fracture of neck of femur. **Result :** Majority (46%) had excellent outcomes, 20% had poor outcome, 18% subjects had fair outcome, 10% had good score. This treatment failed only in 3 out of 50 patients. Co-relation between age and outcome of the study as measured according to the Modified Harris Hip score was found to be significant. Number of excellent outcomes in patients below the age of 70 was found to be significant. **Conclusion:** Hemiarthroplasty is an excellent treatment for intracapsular neck of femur fracture in terms of pain relief and restoration of function and mobility as near as possible to the pre injury level.

KEYWORDS : femur, hemiarthroplasty, fracture, Harris hip score

INTRODUCTION

The hip joint is a form of ball-and-socket synovial joint that articulates with the pelvis and femur. As a result, the axial skeleton and the lower extremity are linked via the joint. This multi-axial ball and socket joint allows the entire lower extremities to move in three directions while also serving as a shock absorber for the torso and upper body. (1) Hip fractures are one of the most prevalent injuries mainly among the elderly, with high rates of morbidity and mortality. Furthermore, as human longevity has increased, the prevalence of femoral neck fractures has inevitably increased. (2) A fracture through the intracapsular region of the femoral neck, excluding injuries through the lateral section of the collum femoris, is sometimes referred to as a "femoral neck fracture." Intracapsular femoral neck fractures account for about 7-8 percent of all femoral neck fractures, while lateral femoral neck fractures, basocervical fractures, and extracapsular femoral neck fractures are less prevalent. (3)

Hip fractures are linked to an increased risk of death, with half of patients dying within five years. Early return to a desirable functional condition, as well as the reduction of mortality, morbidity, and the need for re-operation, are the treatment goals for femoral neck fractures. The degree of fracture displacement, patient's age, functional demands, and risk profile, such as level of cognitive function and degree of physical fitness, should all be considered when deciding whether to treat with internal fixation, hemiarthroplasty, or total hip replacement (THR). (4)

Arthroplasty has surpassed internal fixation as the preferred treatment for displaced femoral neck fractures in the elderly, owing to the reduced risk of comorbidities (e.g., nonunion and avascular necrosis), early ambulation, and functional recovery. Because of the short operating time, low dislocation rate, and functional benefits attained, bipolar hemiarthroplasty (BHA) is the favoured method. (5) Furthermore, conditions like cotyloiditis, defined as increasing acetabular cartilage and bone degradation induced by friction between the head of the prosthesis and the articular surface of the acetabulum, has been described for HA. This syndrome has been identified as a potential source of pain and revision of Total Hip Arthroplasty. (6)

Bateman produced a bipolar prosthesis with a moveable head part and increased head surface to allow movement within the acetabulum. This lowers acetabulum degradation and pain, as well as the likelihood of protrusion. (7)

In BHA, there is still a lot of debate about whether cemented or cementless stems are superior. Cementless stems are thought to be a preferable option for comparatively younger patients with high bone quality since they are easier to operate and require less cement manipulation time. This method, however, has certain drawbacks, including the risk of thigh soreness and periprosthetic fractures. Cemented stems have been shown to be more effective in achieving initial fixation in older patients with poor bone quality, as well as being less likely to cause thigh pain and stem loosening. However, they have been linked to an increased risk of cardiovascular and respiratory complications due to cement toxicity or pulmonary embolization caused by bone marrow contents and methylmethacrylate particles. (8)

The bipolar system has drawbacks as well. Bipolar implants are often more expensive than unipolar implants. Closed reduction of the bipolar prosthesis may also fail in the event of dislocation, necessitating open reduction. Another drawback is that the bearing surface may develop wear particles, which can contribute to osteolysis. (9)

This study was conducted to assess the outcome in the operated limb in order to assess the functional and radiological result of bipolar hemiarthroplasty in the fracture neck of the femur.

AIM OF THE STUDY

This study was to evaluate the functional and radiological outcome of bipolar hemiarthroplasty in fracture neck of femur.

MATERIAL AND METHODS

This study is a descriptive observational type of study done at Dr Ram Manohar Lohia hospital, Lucknow, Department of Orthopaedics during May 2020 to May 2021 on patients of fracture of neck of femur.

INCLUSION CRITERIA

a) Age 55 years and above,

- b) All isolated fractures neck of femur
- c) Community/ household ambulators.

EXCLUSION CRITERIA

Patients Was Excluded From the Study if He/She:

- a) Non-ambulators,
- b) Patients without X-ray or CT-scan diagnosis,
- c) Patients unwilling for surgery.

METHODOLOGY

A complete history and clinical examination were performed on all patients before to surgery. Skin traction was applied to all of the patients. Medical issues that were linked to the incident were treated. Hypertensive patients had their blood pressure managed, and diabetics on oral hypoglycemic medications were switched to insulin. Deep breathing exercises were initiated on the first day of admission. All precautions were made to ensure that the patients were taken up for surgery as soon as possible. Prior to surgery, patients were maintained nil by mouth for six hours. All patients were given pre-anesthetic medicines and an antibiotic treatment (in which a cephalosporin was administered 30 minutes before surgery and two further doses were given 8 hours afterwards). The majority of patients received Spinal or mixed Spinal Epidural anaesthesia, with only a few receiving general anaesthesia. Moore's posterior approach or a modified Hardinge's lateral approach were used to operate on all of the patients. It was decided to undergo a cemented bipolar hemireplacement arthroplasty. Patients were kept in the ward after surgery with their limbs in wide abduction using an abduction pillow (for Moore's technique). Extreme flexion, adduction, and internal rotation were avoided. The first day began with static quadriceps and gluteal workouts. Patients were allowed to sit up on the second day. Within a week, crutch walking and increasing weight bearing were used to begin ambulation. The sutures were removed on the 12th post-operative day. Under the guidance of the surgeon, strengthening activities such as abduction of the hip joint and active flexion and extension of the knee joint were performed. The major goal of this treatment was to improve hip and knee joint range of motion as well as quadriceps power. All patients were told not to squat or sit cross-legged. For the first three months, all patients were followed up on monthly, then at six and twelve months. A 12-month minimum follow-up was required, as well as a modified Harris Hip Score[3]and radiographs of the afflicted hip.

STATISTICAL ANALYSIS USED:

Sample size was calculated as follows:

$n = 4pq/d^2$

where, p= proportion having excellent/good grades in the Modified Harris Hip score. q= 1-p

d= permissible error in the estimation of p (taken as 20% of p) From the literature, p is taken as

0.7(70%)

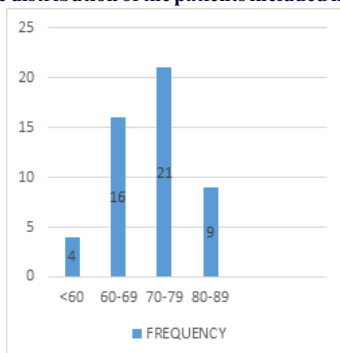
$d = 20 \times 0.7/100 = 0.14, d^2 = 0.196$

Hence, $n = 4 \times 0.7 \times 0.3 / 0.196 = 0.84 / 0.196 = 43$

Hence it was estimated that a sample size of 50 would be sufficient for this study. Data was analyzed using the computer software, Statistical Package For Social Sciences (SPSS) Version 20. Statistical test used.

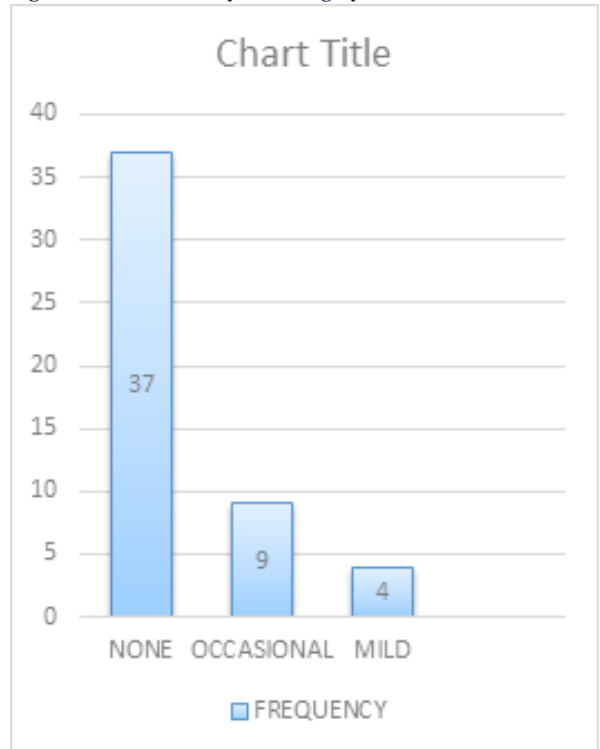
RESULTS

Fig 1- Age wise distribution of the patients included in the study



All patients in this study were above 55 years. Only 9 patients were above 80 years. Maximum number of patients (42%) in the range 70-79 years, 32% subjects were in the range of 60-69 yrs, and only 8% subjects were below 60 yrs.

Fig 2: Pain scores after 1 year of surgery



Majority of the patients i.e.37 patients did not have pain 1 year post-surgery. Only 4 % patients reported mild pain post surgery, whereas 9 patients had occasional pain post surgery.

Table 1: Modified Harris Hip Scores after 1 year of surgery.

MODIFIED HARRIS HIP SCORE	FREQUENCY	PERCENT
EXCELLENT	23	46%
GOOD	5	10%
FAIR	9	18%
POOR	10	20%
FAILED	3	6%
TOTAL	50	100.0%

Majority (46%) had excellent outcomes, 20% had poor outcome, 18% subjects had fair outcome, 10% had good score. This treatment failed only in 3 out of 50 patients.

Table 2: Co-Relation between Age and Outcome of Study at 1 year follow up.

Results	Age				Total			
	Below60	60-69	70-79	80-89				
	Count	%	Count	%	Count	%		
Excellent	3	75%	11	68.75%	4	19.05%	23	46%
Good	0	.0%	3	18.75%	3	14.28%	6	12%
Fair	0	.0%	1	6.25%	8	38.09%	9	18%
Poor	0	.0%	1	6.25%	5	23.81%	10	20%
Failed	1	25%	0	.0%	1	4.76%	2	4%
Total	4	100.0%	16	100.0%	21	100.0%	50	100.0%

Co-relation between age and outcome of the study as measured according to the Modified Harris Hip score was found to be significant.

Number of excellent outcomes in patients below the age of 70 was found to be significant. 75% of patients below the age of 60 years showed excellent results. Only 25% failed in this category. 68.75% patients between 60-69 years showed excellent results. In the 70-79 year age group majority patients (38.09%) had fair results and in the 80 above age group 55.55% had excellent and 44.45% had poor outcome.

Table 3: shows results of co-relation between approach of surgery used and outcome according to Modified Harris Hip score.

Results	Approach				Total	
	Moore's		Hardinge's			
	Count	%	Count	%	Count	%
Excellent	16	42.1%	7	58.33%	46%	
Good	4	10.53%	2	16.67%	12%	
Fair	7	18.42%	2	16.67%	18%	
Poor	8	21.05%	1	8.33%	18%	
Failed	3	7.89%	0	.0%	6%	
Total	38	100.0%	12	100.0%	100.0%	

The co-relation between approach used and outcome according to Modified Harris Hip Score was insignificant. 42.1% patients who were operated by moore's approach showed excellent result, only 7.89% failure rate was seen. Those who had it by hardinge's approach showed excellent outcome in 58.33% patients and no failure was seen in this group.

Table 4: shows results of co-relation between surgical approach used and requirement of a walking aid 1 year post surgery.

Walking Aid	Approach				Total	
	Moore's		Hardinge's			
	Count	%	Count	%	Count	%
2 crutches	16	42.1%	2	16.67%	18	36%
2 canes	5	13.16%	0	.0%	5	10%
Cane for long time walks only	8	21.05%	2	16.67%	10	20%
No support	9	23.68%	8	66.67%	17	34%
Total	38	100.0%	12	100.0%	50	100.0%

The co-relation between surgical approach used and the use of walking aid at 1 year after surgery- it was found that 66.67% of patients required no walking aid after Modified Hardinge's approach as compared to 23.68% in Moore's approach. 16.67% study subjects in modified hardinge approach need 2 crutches, whereas 42.1% need crutches in Moore's approach. 21.05% subjects need cane for long time walk in Moore's approach where as 16.67% need in Modified Hardinge's approach.

DISUSSION

All patients in this study were above 55 years. Only 9 patients were above 80 years. Maximum number of patients (42%) in the range 70-79 years, 32% subjects were in the range of 60-69 yrs, and only 8% subjects were below 60 yrs. In a study by **YS Prashanth** et al (2019)(10) the mean age was 70 (± 2.2) years. All patients were in the range of 50-10 years. In a study by **Venkatesh Kumar N** et al (2017)(11) mean age was 65 years. Mean age was 74.6 years in a study by **Sung Soo Kim** et al(12). In a study by **Somashekar** et al (2013)(13) mean age was 67.35 years. In a study by **Dr. Sahejpreet Singh Chhabra** et al (2020)(14) maximum patients (66.3%) were in the age group 60-69 years. In a study by **Robert Döring** et al (2016)(15) the mean age at the day of the operative treatment was 76.9 (range 43 to 96) years. Seventy-five (74%) patients were older than 70 years. The mean age of the patients was 73.4 years, range from 66 years old to 82 years old in a study by **M.E.Abd El-Naby** et al (2020)(4).

In our present study Majority of the patients i.e.37 patients did not have pain 1 year post-surgery. Only 4% patients reported mild pain post surgery, whereas 9 patients had occasional pain post surgery. In a study by **Yik-Fung Mak** et al (2018)(9) maximum patients (26) had no pain. In a study by **Varun Kumar Agarwal** et al (2016)(16) 38.33% of patients had no pain during follow up. 48.33% had slight pain and none had marked pain. 86.66% of patients had none to slight pain in the operated hip whereas mild to moderate pain was noted in about 13.33% of patients. None of subjects had marked pain and had problems with daily activities. In a study by **Robert Döring** et al (2016)(15) 43% patients had hip pain. In a study by **Dr.T.KALAIYARASAN** et al (2015)(7) 83.3% patients had mild pain and 13.3% cases had moderate pain.

Majority (46%) had excellent outcomes, 20% had poor outcome, 18%

subjects had fair outcome, 10% had good score. This treatment failed only in 3 out of 50 patients. In a study by **Yik-Fung Mak** et al (2018)(9) the mean Harris hip score for pain was 40.6. In a study by **Varun Kumar Agarwal** et al (2016)(16) 86.67% of the hips were classified as having a satisfactory to excellent results. Out of total 17 patients in a study by **Somashekar** et al (2013)(13) 47.1% had excellent score, the mean score in the study was 86.18 \pm 12.18. In a study by **Dr. Sahejpreet Singh Chhabra** et al (2020)(14) mean harris hip score after 6 months post-op was 88.25 \pm 5.25. In a study by **Dr. Pooja Pradeep Suratwala** et al (2019)(1) 60% had excellent harris hip score ranging between 90-100. 20% cases in a study by **Ramesh Kumar** et al (2021)(17) had excellent harris hip score.

In the present study 42.1% patients who were operated by moore's approach showed excellent result, only 7.89% failure rate was seen. Those who had it by hardinge's approach showed excellent outcome in 58.33% patients and no failure was seen in this group. In a study by **Yik-Fung Mak** et al (2018)(9) over 78% of patients were able to walk unaided before sustaining a fracture hip. At 1 year after the operation, 55.3% of the patients were able to walk unaided. In a study by **Somashekar** et al (2013)(13) 52.9% had no limp, 25% could walk without any support and 41.1% could climb stairs without support. In a study by **Dr.T.KALAIYARASAN** et al (2015)(7) 56.6% patients could walk without any support, 20% could climb stairs without support post operatively

In the present study major complications were radiological i.e. improper cement mantle and valgus malalignment of the stem. In a study by **Yik-Fung Mak** et al (2018)(9) Among the 38 living patients, two cases of grade I acetabulum erosion were noted with narrowing of the joint space but no bone erosion. In a study by **Venkatesh Kumar N** et al (2017)(11) out of total 22 patients the number of patients in Grades 0 and 1 acetabular erosion was 16 (72.70%) and in Grades 2 and 3 were 6 (27.30%). In a study by **Varun Kumar Agarwal** et al (2016)(16) out of 67 cases, 1 patient's x-rays showed radiolucent zone of more than 2 mm at the stem of prosthesis, one patients x-ray showed sclerosis at tip of prosthesis, 1 patient had neck resorption and 2 patients had subsidence of prosthesis. In a study by **Somashekar** et al (2013)(13) of the 17 patients operated only 1 had superficial infection and 1 had painful hip. In a study by **Dr. Sahejpreet Singh Chhabra** et al (2020)(14) 2 patients had superficial infection, 1 had deep infection and 1 had dislocation. In a study by **Dr. Pooja Pradeep Suratwala** et al (2019)(1) 4% patients had superficial infection and 4% had posterior dislocation.

CONCLUSIONS:

On the basis of our study we can conclude that Hemiarthroplasty is an excellent treatment for intracapsular neck of femur fracture in terms of pain relief and restoration of function and mobility as near as possible to the pre injury level. The bipolar hemiarthroplasty done for intracapsular neck of femur fracture gave better functional and radiological results in our study

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