Scholars Journal of Applied Medical Sciences
Abbreviated Key Title: Sch J App Med Sci
ISSN 2347-954X (Print) | ISSN 2320-6691 (Online)
Journal homepage: www.saspublishers.com

OPEN ACCESS

Orthopedic- Surgery

Replacement Hemiarthroplasty by Unipolar and Bipolar Prosthesis in the Treatment of Displaced Femoral Neck Fracture in Elderly

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DOI: 10.36347/sjams.2019.v07i08.007 | **Received:** 02.07.2019 | **Accepted:** 25.07.2019 | **Published:** 18.08.2019

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Abstract **Original Research Article**

This study was done in department of orthopedic- Surgery SMMAMC, sirajgonj from October 2016 to December 2018. A total 30 elderly patients with femoral neck fracture. Out of 30 patients 16 patients treated with unipolar hip prosthesis Group-I and 14 patients treated with bipolar prosthesis Group-II. In Group-I age ranges where 52 to 85 years average age 67.75 years and Group-II age ranges 51-81 years average 65 years. Out of 30 cases 19 (63.3%) were female and 11 (36.6%) were male. Average follow up was Group- I 10 months 10 days (range 8 months to 15 months) and Group- II 14 months 10 days (9 months to 18 months). Functional out come of treatment was analyzed by using the modified Harries hip rating system. In this study Group – I there were 5(31.25%) excellent, 3(18.75%) good and 6 (37.5%) fair and 2(12.5%) poor functional out come and in Group-II 7(50%) excellent, 5(35.7%) good and 1 (7.14%) fair and 1(7.14%) poor functional out come. Regarding final clinical out come in this series in Group-I 8 (50%) satisfactory and 8(50%) unsatisfactory result. In Group-II 12(85.71%) satisfactory and 2(14.28%) unsatisfactory result. Bipolar prosthesis with bone cement allows better fit of the stem in medullary canal and femoral head in the acetabulum. Approximation of ideal neck length greater range of movement, decrease stem loosing and acetabular erosion, less prosthetic pain and easy conversion of total hip revision than unipolar prosthesis [1].

Key words: Replacement, Hemiarthroplasty, Unipolar Prosthesis, Bipolar Prosthesis, Femoral Neck, Fracture.

INTRODUCTION

The femoral neck is the commonest site of fracture in elderly mainly due to senile osteoporosis; old people often have bone loosing disorders such as osteomalasia, diabetes, stroke (disuse) alcoholism and chronic debilitating disease, weak muscles, poor balance resulting in an increased tendency to fall [2]. Fractures of the neck of the femur have always presented great challenges to orthopedic surgeons and remain in many ways today the unsolved fracture as far as treatment and results are concerned [3]. Any treatment which requires prolonged immobilization brings about the hazards like thromboembolism, cardio-pulmonary problems, urinary tract infection, decubitus ulcer etc. in the elderly patients. Therefore, the aim of all treatment is to provide pain free immediate and unrestricted mobilization to reduce the morbidity and mortality. Anatomic reduction of skeletal parts and internal fixation with or without muscle pedicle bone graft are the different modalities of treatment of femoral neck fractures to avoid prolonged immobilization. But internal fixation of displaced femoral neck facture in aged group cause high incidence of non-union and vascular necrosis [4]. Despite the most accurate anatomic alignment and most rigid fragment fixation many patients fail to normally use their hips. More than 85% of the population lives in the rural area in our country. Due to illiteracy, superstition, poor socioeconomic condition, unavailability of orthopedic-centers and bad communication system, majority of the patients attend the hospital late ranging from several days to months. They usually present with non- union, absorption of neck, avascular necrosis and associated other medical problems. As a result the first basic principle of treatment that is early anatomic reduction and internal fixation is very often beyond our reach. Also many surgeon had come to believe that prognosis of displaced subcapital fracture is so poor that treatment by reduction and internal fixation should be abandoned

in favor of primary prosthetics replacement [5]. Endoprosthetic replacement of the femoral head can provide early ambulation, weight bearing, restoration of stability, walking activities and reasonably good range of movement to accomplish the functional activities such as squatting and sitting, on prayer position [6]. Because of above benefits, replacement hemiarthroplasty by using unipolar Austin Moore, Thompson prothesis or bipolor prosthesis can be considered as one of the acceptable means of treatment of displaced femoral neck fracture in the elderly patients. The conventional one piece Moore or thompson device used in the treatment of fracture of the proximal femur represents a significant step forward. However, the incidence of unsatisfactory results remained unacceptably high in many studies. The most significant problems observed were femoral stem loosing. Acetabular erosion, intrusion of the prosthesis in to the pelvis and difficulties with total hip revision when the stem was cemented [7]. These factors led to the development of bipolar prosthesis introduced by Batemen. Prosthesis devised by Austin Moore and Thompson have been used extensively during last 40 years and result have been gratifying in older, more sedendary individuals who do not stress their hip excessively But slight younger and physically active patients tend to development problem [8]. The bipolar concept was born of the need to establish firm fixation of the stem in the femoral shaft and eliminate shear forces, between the metallic prosthetic head and acetabular cartilage. Most motion would occur at the inner bearing whereas the outer bearing would provide stability of excursion. This was essentially charnley's total hip concept built into one piece prosthesis. But bipolar prosthesis is costly.

MATERIALS AND METHODS

This prospective randomized comparative study of replacement hemiarthroplasty between unipolar and bipolar prosthesis in the displaced femoral neck fracture in elderly patients carried out in department of orthopedic - surgery Shaheed M. Monsur Ali Medical College, Sirajgonj from October 2016 to December 2018. A total number of 30 patients were selected for this study. Patients were diagnosed on clinical and radiological basis at the outpatient department. The follow up and rehabilitation protocol were explained to the patient. After admission of the patient each treatment method was allocated by random selection with the help of lottery. Selected patient were divided into two groups. Group-I (16 patients) treated by (Austin- Moore) unipolar prosthesis and Group -II (14 Patients) Bipolar prosthesis. The data which were collected for each patient including age, gender, side involved, cause of injury, time interval between injury and surgery, occupations of the patients and associated medical problems. Operative procedure: Out of 30 patients of this study all were admitted throughout patient department. Clinic- radiological examination was performed and all relevant investigations were completed. Any associated illness such as hypertension, diabetes mellitus was controlled. As soon as the general condition of the patients got settled operation was contemplated. In all patient one gm IV ceftriazon injection given prophylactically during anesthesia. All 30 patients were operated under sub arachnoid block. The patients lie in true lateral position with affected hip upper most. Moore approach was used. After removal of femoral head selection of prosthetic head, shaping of the neck and preparing tract in the femur, then insertion of prosthesis. In Group-I, 16 patients were used unipolar Austin- Moore prosthesis and Group- II 14 patients were used bipolar prosthesis with bone cement (Methyl Methacrylate) The prosthesis was inserted ensuring anteversion and neck snugly fitted with calcar and maintained up to hardening of bone cement. A closed drain was used between superficial and deep layer of muscles and skin was closed and wound was dressed. The operated limb was abducted by using a pillow between the knees. Post-Operative Management: The Principal aim of the operation was to set the elderly patients back to mobility and independence as quickly as possible. The day of operation: The limb was kept abducted by pillow flexion, adduction, and internal rotation was prohibited. All patients were administered prophylactic antibiotic, pain-killer, H2 blocker, DVT prophylaxis was given some patients with low molecular heparin 40 I U. First Post-operative day: The day after operation each patient was instructed to stand out of the bed with the aid of walking frame along with assistance. Static quadriceps exercise, active movement of toes and ankles were encouraged. Each patient was advised to take deep breath and cough out secretion from the respiratory tract.

Second post-operative day and onwards: The drain was removed in all case after 48 hours. All patients were walked at least for 20-30 minutes twice a day. After the end of first week: Active abduction external rotation and leg raising (up to 40 degree) exercise were encouraged along with static quadriceps exercise, ankle and toes movement for 5 to 10 minutes in every hour. Stitches were removed at 12-14 days after operation. Patients were discharged on 15 to 21 POD. All the patients were allowed to use chair with elevated seat for 4 months until squatting practice was permitted. All the patients were allowed to walk independently after 6 weeks. All patients were discouraged for high impact sports.

Further followed up at outpatient department

1st follow up = 6 weeks after operation
2nd follow up = 18 weeks after operation
3rd follow up = 30 weeks after operation
4th follow up = 48 weeks after operation

During final follow up radiological features of the patients were assured. Ultimately every patient was evaluated both clinically using modified Harries hip score system and radio-logically. parameters are- pain, limp, support, distance walk, stair, shoes, socks, sitting,

squatting and praying , public transport, deformity, leg length discrepancy.

STATISTICAL ANALYSIS

Data was collected, compiled and tabulated according to key variables using different statistical methods and formulas and analysis and interpretation of data was performed manually with the help of scientific calculator.

RESULTS

During the period extending from October 2016 to December 2018 a total 30 patients with femoral neck fracture were selected consecutively 16 patients were treated by unipolar Austin Moore prosthesis and 14 patients were treated by bipolar prosthesis with bone cement. To assess the functional result of hip arthroplasty every patient was evaluated both clinically using modified Harris hip score [9] System and radiologically parameters, are- pain, limp, support, distance walk, stair, shoes, and socks, sitting, squatting and praying, public transport, deformity, leg length discrepancy. The success of operation, prosthesis replacement of femoral head in aged patients depend on restoration of pain free mobile hip, restoration of adequate movement of hip, restoration of function of hip eg. Limp, walking ability to prayer and toilet use and to avoid deformity. According to the score ranges the following four rating system were evolved in an attempt to determine significant advantages in the treatment of femoral neck fracture by unipolar hip prosthesis and bipolar hip prosthesis.

Score ranges	Rating
90-100	Excellent
80-89	Good
70-79	Fair
<70	Poor

In this series in Group- I there were 5 (31.25%) cases with excellent 3(18.75%) good and 6(37.5%) fair, and 2(12.5%) poor outcome. while in group-II 7(50%) Excellent, 5(35.71%) good, 1(7.14%) fair and 1(7.14%) poor. Functional outcome: In the final clinical out come in Group-I 08(50%) satisfactory and 08(50%) unsatisfactory on the other hand in Group-II 12(85.71%) satisfactory and 2(14.28%) unsatisfactory result.

Table-I: Age distribution of the patients (n=30)

Age group (years)	N	%
51-60	05	16.66%
61-70	14	46.66%
71-80	08	26.66%
81-90	03	10%

Table -II: Age distribution between the groups. (n = 30)

Treatment Methods	N	Age (years)		Mean (years) ± SD
		Minimum	Maximum	
Group-I	16	52	85	67.75±8.60
Group-II	14	51	81	65±8.91

t – 2.09 P < 0.05 (significant)

Table-III: Sex distribution of cases. (n = 30)

Sex	N	%
Male	11	36.66%
Female	19	63.33%

z = 2.14, P < 0.05 (significant)

Table -IV: Side distribution.(n =30)

Side	N	%
Right	09	30%
Left	21	70%

z = 3.38, P < 0.05 (significant)

Total-V: Showing Occupational Status of Patients.(n =30)

Occupations	N	%
Sedentary	24	80%
House wife	03	10%
Service	02	6.66%
Farmer	01	3.33%

Table-VI: Pain distribution in this series. (n =30)

Nature of pain	No. of patients			
	Group-I	%	Group-II	%
No pain or Slight pain	09	56.25%	12	85.71%
Moderate to Marked pain	07	43.75%	02	14.28%

x2 = 3.06, p < 0.05 (Significant)

Table-VII: Result of follow up. (n =30)

Limping	Number of patients			
	Group-I	%	Group-II	%
a. No limping or slight limping	09	56.25%	13	92.85%
b. Moderate limping	07	43.75%	01	07.14%

x2 = 4.99, p < 0.05 (Significant)

Table-VIII: Result of follow up (n =30)

Range of motion	No. of patients			
	Group-I	%	Group-II	%
a. Full range of motion	08	50%	12	85.71%
b. Restricted motion	08	50%	02	14.28%

x2 = 3.06, p < 0.05 (Significant)

Table-IX: Functional outcome. (n =30)

Functional out come	Group-I	% (n =16)	Group-II	%(n =14)	Remarks
Excellent	05	31.25	07	50	x2 = 2.26 P < 0.05
Good	03	18.75	05	35.71	x2 = 1.23 P < 0.10
Fair	06	37.50	01	7.14	x2 = 4.08 P < 0.05
poor	02	12.50	01	7.14	x2 = 0.06 P > 0.10

Table –X: Final clinical outcome. (n =30)

Result	Group- I		Group- II	
	N	%	N	%
Satisfactory	08	50%	12	85.71%
unsatisfactory	08	50%	02	14.28%

DISCUSSION

The problem of hip fracture is one of the oldest in orthopedics. Despite numerous technical advances the goal is to rapidly return of all patients to full function has remained elusive. Whatever the treatment to be adopted for fracture neck of femur in the aged patient, it should allow immediate and unrestricted movement. Many researches note that as age advances both the percentage and the speed of union decline sharply following treatment of femoral neck fracture with internal fixation. Their opinion was that internal fixation should not be used with elderly patients, since there was no advantage in terms of morbidity and mortality. There was a high rate of technical failure (60%) and more than one -third of all the internally fixed fracture requires revision. Persistent pain was also a major problem [10]. In this series which includes 30 cases of femoral neck fracture in elderly patients treated with Group-I by unipolar (Austin- Moore) prosthesis (16 cases) and Group-II by bipolar prosthesis with bone cement (14 cases). Mean follow up period in Group-1 10 months 10 days (range 6 months to 15 months) and Group-II 14 months 10 days (range 9 months to 18 months) satisfactory result in Group-I 50% and unsatisfactory 50% and Group-II Satisfactory result 85.71% and unsatisfactory 14.25%. During the period of October 2016 to December 2018, 30 patient with femoral neck fracture were treated in department of orthopedic- surgery, SMMAMC Hospital, Sirajgonj of which 19(63.33%) were female and 11 (36.66%) were male. Average age was 67.75 years in Group-I 16 cases (range 52-85 years) and Group-II 14 cases average age 65 years (range 51-81 years). Most common age group was between 61-70 years which constitute 46.66%. The most common cause of fracture neck of femur in present series was minor trauma such as fall on slippery ground and stumbling which was 73.33%. In the study fracture neck femur of right side was 9(30%) and left

side 21(70%) cases. Interval between injury and operation in Group-I 17 days (Minimum) and 48 days (Maximum) average 31± 9.71 and Group- II 14 days (Minimum) 44 days (Maximum) average 27± 8.82 days. Post-operative hospital stay in Group-I 10 days (Minimum) to 22 days (Maximum) mean 12.43 days. In Group-II 10 days (Minimum) to 24 days (Maximum) mean 12.78 days. Longer hospital stay was due to wound infection and other complications. In present study no pain or slight pain 9 (56.25%) in Group-I and 12 (85.71%) in Group-II. No Limping or slight limping in 9 (56.25%) cases in Group-I and 13(92.85%) cases in Group –II. Regarding movement of hip 8(50%) cases in Group-I and 12(85.71%) cases Group-II acquired almost full range of motion. The average hip score of Labelle series in 80 arthroplasty for femoral neck fracture treated by bipolar prosthesis average 81.75 range (32-98). In present series average hip score in Group- I 75(32-98) and Group-II 89 (60-99). In this series bipolar prosthesis was done with bone cement. Labelle showed that cement enhances fixation and decrease pain and bipolar component prevent protrusion. The cemented Batement [11] bipolar prosthesis appears to yield result better than non-cemented bipolar Batement prosthesis. It is seen that replacement hemiarthroplasty for the displaced fracture of femoral neck in the elderly does not carry excessive risk of morbidity and mortality. After a good technical expertise during the procedure good supportive care replacement hemiarthroplasty is a rational choice in the treatment of displaced femoral neck fracture. Especially bipolar prosthesis which mobilizes the patient faster, decrease the morbidity rate and thus maximally improves overall results.

CONCLUSION AND RECOMMENDATIONS

As seen from the result of the study, replacement hemiarthroplasty by bipolar prosthesis can be considered as a rational choice in the treatment of displaced femoral neck fracture in active younger patients. But it is costly for our low socioeconomic background. Less tissue handling, closed post-operative follow up and active muscle exercises are essential for producing satisfactory result. As acetabular erosion and protrusion appears to have been reduced to some extent, a bipolar prosthesis is found to be a good alternative to conventional unipolar prosthesis in elderly patients with fracture femoral neck. Large scale studies with longer follow up are required for an optimum outcome evaluation.

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