

Original Research Article

A study of prospective analysis of unipolar versus bipolar hemiarthroplasty of hip joint in patients with fracture neck of femur

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ABSTRACT

Background: Femoral neck fractures occur most commonly in elderly females and are a major cause of morbidity and mortality in this age group and require immediate and appropriate management. Aim of the study was to compare the functional outcome of unipolar Austin Moore's prosthesis (AMP) hemiarthroplasty (HA) and bipolar (BHA) HA with femoral neck fractures using Harris hip score system.

Methods: The study was conducted on 60 patients aged above 50 years with fractured neck of femur admitted in Vinayaka missions Kirupananda Variyar medical college and hospital from August 2017 to August 2019. Patients with femoral neck fracture were allocated randomly to have 30 cases of AMP.

Results: Out of the 60 cases, the patients in the bipolar (nonmodular) HA group II showed better functional outcomes compared to unipolar (AMP) HA group I after six months follow-ups. At 12 months of follow-up, there was no significant difference between group I (AMP) and group II (BHA).

Conclusions: Our study demonstrates, hemiarthroplasty of the hip for femoral neck fractures is a good option in elderly patients. The mortality and morbidity are not high, the operative procedure is simple, complications are less disabling, early weight-bearing and functional results are satisfactory and second surgery are less frequently required.

Keywords: Hemiarthroplasty, Femur neck, Harris hip score system

INTRODUCTION

A femoral neck fracture, one of the most common traumatic injuries in the elderly patients are a serious problem in the elderly and continue to be unsolved fractures and management guidelines are still evolving.¹ In younger patients, femoral neck fractures are often caused by high-velocity trauma. However, in elderly and osteoporotic individuals, femoral neck fractures may occur in trivial injury. Osteoporosis is a skeletal disease characterized by the loss of bone mass and density, which results in an increased risk of fractures.² Osteoporosis is a silent disease, which means that osteoporosis does not

have a dramatic clinical presentation except when fractures occur.³ The most common three bones affected in osteoporotic patients are femoral neck, spine and distal radius. The risk of femoral neck fractures in an osteoporotic patient is difficult to predict because most patients show no symptoms.⁴ It is a known fact that the hip is a weight-bearing joint and has to perform many functions.⁵ A successful operation at the hip joint should provide a painless, stable hip with a wide range of movements. There are many options for these fractures including internal fixation, hemiarthroplasty, and total hip arthroplasty.⁶ The main reasons for the failure of internal fixation are avascular necrosis and nonunion. HA is a common surgical procedure in elderly patients with

fractures of the femoral neck, either as a primary operation for displaced fractures or as a secondary procedure after failed internal fixation.⁷ While the unipolar HA has a single articulation of the joint, the bipolar HA articulates at two different levels and this design is thought to be associated with less acetabular wear, an increased range of motion, potentially less hip or groin pain and patient in squatting position also without causing prosthetic failure compared to the unipolar prosthesis.⁸

METHODS

This retrospective study was conducted. The study population consists of all patients aged above 50 years fracture neck of femur admitted in Vinayaka Mission’s Kirupananda Variyar medical college and hospital, Salem from August 2017 to August 2019 were allocated using either unipolar (AMP) or bipolar endoprosthesis. Data were collected preoperatively, immediately postoperatively and 6 months and 12 months postoperatively. Group 1 being patients who have treated with unipolar (AMP) prosthesis and group 2 being patients who were treated with bipolar prosthesis. All the patients were assessed at 6 months and 12 months using a modified Harris hip score. Final functional results were compared between two groups at 6 months and 12 months.

Inclusion criteria

Fracture of the neck of the femur, neglected fracture neck of femur in male and female patients aged 50 years and above, nonunion fracture neck of femur in elderly patients, presence of intact and adequate calcar, cases with Dorr 1 and 2 classification were included in the study.

Exclusion criteria

Fracture neck of the femur in younger patients less than 50 years of age, fracture neck of the femur with deficient calcar, associated with any other ipsilateral or contralateral fracture of extremities, patient with neurological disorders, no ambulatory patients, severe osteoporotic cases with Dorr 3 classification were excluded in the study.

Once the patient got admitted, all the patient particulars were recorded in the proforma prepared for this study. These patients were observed regularly till their date of discharge. Ethical committee approval was obtained from institutional ethical committee.

Statistical analysis

A percentage that reveals how confident you can be that the population would select an answer within a certain range. For example, a 95% confidence level means that you can be 95% certain the results lie between x and y numbers. Various data were expressed in percentages. All the categorical data were expressed in means and standard deviation were calculated. A comparison of the functional outcome on follow-up between two groups was done by

student t and the p value was calculated (If $p < 0.05$ the result was taken as statistically significant and if the $p > 0.05$ it was considered that there was no statistical significance between two variables).

RESULTS

In our study population majority of patients in both the groups were around age 61 to 70 years of age, comparable to other studies' average age was 66 years. Around 55% of the study population are males in both groups. The male and female population are more or less similar in each group (Table 1).

Table 1: Distribution of study population according to age

Sex	Unipolar		Bipolar	
	Number	%	Number	%
50-60	10	33.33	8	26.67
61-70	12	40	15	50
71-80	7	23.34	5	16.67
>80	1	3.33	2	6.66
Total	30	100	30	100

Majority of the study population (60% of the unipolar group and 57% of the bipolar group) have a left-sided injury (Table 2).

Table 2: Distribution of study population according to side of injury.

Side of injury	Group I (Unipolar prosthesis)		Group I (Bipolar prosthesis)	
	Number	%	Number	%
Left	18	60	17	56.7
Right	12	40	13	43.3
Total	30	100	30	100

Majority of the study population (80% of the unipolar group and 77% of the bipolar group) have trivial trauma while the rest 20% met with an RTA (Table 3).

In both groups, around 53% had associated injuries among which, around 7% of the study population had a head injury, 10% had Colle’s fracture and lacerated injury. (Table 4).

Table 5 shows majority of patients more than 50% of both groups had less than 10 days of postoperative hospital stay, in our study population.

In our study population, unipolar (90%), bipolar (83.5%) had nil post-operative complications (Table 6).

Table 7 shows around 40% showed none or slight pain in the unipolar group while around 77% showed better pain reduction after six months of surgery in the bipolar group.

Bipolar group seems to better in overall improvement after six months of surgery (53% versus 23%) compared to the unipolar group. But at twelve months post-surgery, both groups are similar concerning Harris hip score (Table 8).

There is a significant difference in mean harris hip score between unipolar and the bipolar group at six months post-surgery, while there is no significant mean difference between both groups at twelve months post-surgery (Table 9).

Table 3: Distribution of study population according to mechanism of injury.

Mechanism of injury	Group I (unipolar prosthesis)		Group II (bipolar prosthesis)	
	Number	%	Number	%
Trivial trauma	24	80	23	76.7
RTA	6	20	7	23.3
Total	30	100	30	100

Table 4: Distribution of study population according to associated injuries.

Associated injuries	Group I (unipolar prosthesis)		Group II (bipolar prosthesis)	
	Number	%	Number	%
None	14	46.7	14	46.7
Abrasions	6	20	4	13.3
Head injury	2	6.7	2	6.7
Lacerated injury	3	10	2	6.7
Colle's fracture	3	10	3	10
Clavicle fracture	1	3.3	2	6.7
Old fracture neck of femur opposite side	1	3.3	1	3.3
Spine injury and rib fracture	0	0	1	3.3
Abdominal injury	0	0	1	3.3
Total	30	100	30	100

Table 5: Distribution of study population according to post-operative duration of hospital stay.

Stay (in days)	Group I (unipolar prosthesis)		Group II (bipolar prosthesis)	
	Number	%	Number	%
<10	16	53.34	16	53.34
11-20	10	33.33	8	26.66
21-30	3	10	5	16.66
>30	1	3.34	1	3.34
Total	30	100	30	100

Table 6: Distribution of study population according to post-operative complications.

Sex	Group I (Unipolar prosthesis)		Group II (Bipolar prosthesis)	
	Number	%	Number	%
No complications	27	90	25	83.5
Bed sore	1	3.34	3	9.99
Superficial infections	2	6.66	2	6.66
Total	30	100	30	100

Table 7: Distribution of study population according to pain after 6 months of surgery.

Pain score	Group I (Unipolar prosthesis)		Group II (Bipolar prosthesis)	
	Number	%	Number	%
None	3	10	13	43.3
Slight	9	30	10	33.3
Mild	10	33.3	4	13.3
Moderate	8	26.7	3	10
Total	30	100	30	100

Table 8: Distribution of study population according to Harris hip score at 6 months and 12 months of surgery.

Harris hip score	At 6 months				At 12 months			
	Group I (Unipolar prosthesis)		Group II (Bipolar prosthesis)		Group I (Unipolar prosthesis)		Group II (Bipolar prosthesis)	
	Number	%	Number	%	Number	%	Number	%
Excellent (90 -100)	7	23.3	16	53.3	18	60	19	63.3
Good (80-90)	4	13.3	3	10	4	13.3	3	3
Fair (70-80)	9	30	7	23.3	4	13.3	4	4
Poor (<70)	10	33.3	4	13.4	4	13.4	3	4
Total	30	100	30	100	30	100	30	100

Table 9: Comparison of mean score between unipolar and bipolar group at 6th and 12th month using independent t test.

	Group I (Unipolar prosthesis)	Group II (Bipolar prosthesis)	P value
At the end of 6 months	73.4	84.97	0.012
At the end of 12 months	86.10	87.90	0.66

DISCUSSION

Fracture neck femur is a relatively common injury among elderly individuals. To reduce morbidity and mortality, the aim of management should be towards active painless, early mobilization of the patient. Factors that need to be considered for choosing treatment modality in an elderly patient with fracture neck femur are age, medical condition and co-morbidities, lifestyle, ambulatory and cognitive status, availability of facilities for surgery and socio-economic status.⁹ Management of fracture of the femoral neck remains major and difficult for undertaking orthopedic surgeon.¹⁰ The pendulum is swinging between reduction and internal fixation with various supplementary methods as osteosynthesis to total hip replacement. It is now the general feeling that reduction and internal fixation should be reserved for the younger patients in whom if needed revision surgery may be done at a later date. Primary prosthetic replacement in older patients who are active and need early mobilization should be considered.¹¹ HA is advocated as the best modality of the management of these fractures.¹² Although the fractured neck of the femur is common in elderly females around 55 percentage of the patients in the study were males. This difference in gender ratio might be because of the preference of native treatment among the socially and educationally backward population present in this locality.¹³ The usual trend is that most of the female patients with fractured neck of femur following a long course of native treatment presents late for treatment. The majority of our study population (60% of the unipolar group and 57% of the bipolar group) have left-sided involvement. The left side (58%) was more commonly fractured in our study.¹⁴ The common problems in our study were hypertension, diabetes mellitus, anaemia, coronary artery disease (CAD), chronic obstructive pulmonary disease and benign prostatic hyperplasia. Anemia was a major problem that is not

commonly seen in western literature and hypertension. DM is common after 40 years of age and India is called the diabetic capital of the world. DM leads to complications like poor wound healing, infection, which will make the patient more disable.¹⁵ In this study, 23% of patients were known cases of T2DM. 10% of people were diagnosed to have CAD. We had two patients with COPD and one patient with BPH. Hypertension and diabetes mellitus was commonly detected after got admitted with a fractured neck of the femur. Around 47% of our patients did not have associated injuries. Involving both groups around 53% had associated injuries among which, around 7% of the study population had a head injury, 10% had Colles fracture and lacerated injury. Minor abrasions were present in 10 patients.¹⁶ In our study 52 (87%), did not have any complication. 3 patients (9.99 %) had bed sore in group II and 1 patient (3.33%) had bed sore in group I, treated with regular dressing and injectable antibiotics, 2 patients (6.66%) had superficial wound infection, in both the group, patients were to be with diabetic and hypertensive. Signs of infection developed in the first week of operation.¹⁷ They were treated with proper antibiotics and dressings. There were no cases of deep infection in our study. This infection resulted in the prolongation of hospital stay. Dislocation is a well-known complication of the posterior approach.¹⁸ In our study, there was no posterior dislocation so it is not great enough to reach statistical significance. The periprosthetic fracture occurs when the surgeon attempts to reduce the prosthesis emphasize by Hinchey and Day (1964). In our series, no patients had a periprosthetic fracture.¹⁹ The functional outcome is measured by the evaluation of functional results at 6 months and 12 months using the Harris hip score system. By this system, the assessment was done under pain, function, range of motion, absence of deformity. In our study, around 40% showed none or slight pain in the unipolar group while around 77% showed better

pain reduction after six months of surgery in the bipolar group. This confirms that bipolar prosthesis provides pain free hip in most of the patients when compared to unipolar prosthesis at 6 months, but both groups have similar pain free hips at 12 months follow up.²⁰

Limitations

A limitation of the study was that, although all clinical variables except hip motion were assessed by an unbiased observer, this observer was not blinded to the type of surgical intervention, which may add a risk of bias. However, as most of the outcome measures, including EQ-5D and HHS, except for range of motion, were self-reported, the risk of bias is assumed to be limited. Furthermore, the fact that our interpretation of the quality-of-life data is based on our patients' ability to correctly recall their health status prior to the hip fracture may be considered a weakness.

CONCLUSION

HA of the hip for femoral neck fractures is a good option in elderly patients. The mortality and morbidity are not high, operative procedure is simple, less disabling complications, early weight-bearing, early functional results are satisfactory and second surgery is less frequently required. Bipolar has good functional results at 6 months. But finally, we conclude that both unipolar and bipolar prostheses have no statistically significant difference in Harris hip scores at 12 months of follow-up. However, since it is not possible to collect preinjury HRQOL data prospectively in trauma studies, we have to rely on preinjury recall or a comparison with population figures.

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