ORIGINAL ARTICLE

Functional Outcome of Bipolar Hemiarthroplasty by Using Hip Harris Score (HHS) in Fractures of Neck of Femur

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ABSTRACT

Objective: To determine the functional outcome of bipolar hemiarthroplasty by using Hip Harris score (HHS) in femoral neck fractures

Methodology: Thiscross-sectional study was done at the Orthopaedics department of Dr. Ruth K. M. Pfau, Civil Hospital Karachi, Pakistan between March 2019 to March 2020. All patients who were scheduled to have bipolar hemiarthroplasty for femoral neck fractures were included in the study. Cannulated screws fixation was applied in un-displaced femoral neck fractures percutaneously with minimal invasive procedure means through small incision with the help of guide pin, image intensifier. Post OP check x-ray was taken to see reduction and screws fixation, neck fracture and placement of implant. Functional outcome was assessed using Hip Harris Score (HHS) by checking the degree of movement of the hip in addition to the radiological assessment of union by the 8th week postoperatively. Data was analyzed using Statistical Package for Social Sciences (SPSS, IBM, version 26).

Results: A total of 259 patients were included in the study with a mean age of 68.7±7.2years. The mean ± SD of pre and postoperative Hip Harris Score was noted as (89.3±9.2 v/s 97.7±9.6; P<0.01). Out of 259 patients, 69 (26.65%) were male. Poor functional outcome was noted in 22 (8.5%) patients, while fair, good, and excellent functional outcome was noted in 51 (19.7%), 60 (23.2%) and 126 (48.6%) patients respectively. Satisfactory functional outcome was noted in 186 (71.8%) patients.

Conclusion: The findings of this study indicate that highly significant difference was noted between pre and postoperative Hip Harris Score. So, findings of this study support the idea that bipolar hemiarthroplasty is an effective treatment modality for the management of elderly patients with displaced femoral neck fractures.

Key Words: Bipolar hemiarthroplasty, Fracture neck of femur, Functional outcome, Hip harris score

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INTRODUCTION

Neck of the femur is a common site of fracture in geriatric patients[1]. The most common cause of femoral fracture is falling directly on the hip joint. These fractures are correlated with high mortality and morbidity rates[1,2]. The management of fractures of the femur neck is quite challenging for the orthopaedic surgeons as there is no single definite technique to manage these fractures[1]. The majority of surgeons are in favour of closed reduction and internal fixation hence, the treatment of choice. However, closed reduction and internal fixation with pinning may not be the optimum management for the elderly population[3,4]. Internal fixation, hemiarthroplasty, or total hip replacement are management options for the femur neck fractures depending on the stability of the fracture[4,5]. In stable fractures, fixation is often possible while preserving the femoral head, but in unstable fractures it may be necessary to use total or partial hip arthroplasty[6,7].

Individuals with unstable femoral neck fractures are at increased risk of developing osteonecrosis and non-union, postoperatively[8]. Increasing age, degree of displacement, and delay in presentation are some of the risk factors that may affect the functional outcome. In the elderly population, hemiarthroplasty is a preferred technique for the management of femoral neck fractures. Nevertheless, there is still debate on the choice of

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management used in individuals with femur neck fractures[8].

Early mobilization, acceptable functional results, low implant relaxation rates, shorter surgical time, less bleeding are some of the objectives of the surgery[8]. Hence, use of bipolar hemiarthroplasty in the management of displaced fractures of the neck of femur in the elderly is preferred over other techniques. Previous researchers remarked that hemiarthroplasty is less aggressive, more cost effective, and it is associated with improved functional outcome[9,10].

The treatment of femoral fractures in the elderly is still a contentious issue due to the high failure rates in the internal fixation. Hemiarthroplasty is one of the preferred treatment options in elderly patients. Cementless hemiarthroplasty for the treatment of femoral fractures in elderly patients is a reliable treatment option with early mobilization, acceptable functional results, low implant relaxation rates, shorter surgical time, and less bleeding. Hence, use of bipolar hemiarthoplasty in the management of displaced femoral neck fractures in the elderly will be interrelated to provide superior results based on Hip Harris Score (HHS).

METHODOLOGY

This prospective cross-sectional study was done at the Orthopaedics department of Dr. Ruth K. M. Pfau, Civil Hospital Karachi, Pakistan between March 2019 to March 2020. The samples of 259 patients were included in the study after taking written informed consent. Sample size was estimated through W.H.O. sample size calculator using frequency of satisfactory functional outcome (78.57%) with 5% absolute precision and 95% confidence level[11]. All patients between the age group 61 to 85 years irrespective of gender, presenting with displaced fractured neck of femur of Type III and IV as per Garden Classification, were included in the study through non-probability consecutive sampling technique. Patients with associated fracture-dislocations determined on X-ray, bilateral fractures, multiple injuries, and head-split fractures, presenting after 72 hours of fracture were excluded from the study. Diagnosis of fractured neck of femur was made when fracture line was visible radiologically or with Hip X-ray showing shortening and angulation of the femoral neck. Patients whose x-ray findings were unclear were confirmed through MRI within 12 hours of injury. Cannulated screws fixation was applied in un-displaced femoral neck fractures percutaneously with minimal invasive procedure means through small incision with the help of guide pin, image intensifier. Post OP check x-ray was taken to see reduction and screws fixation for neck fracture and placement of implant. Functional outcomes were assessed by checking the range of movement of hip, radiological assessment of union, no pain on full weight bearing and Hip Harris Score. The interpretation of Hip Harris Score was based on 100 points. Functional outcomes were measured according to their Hip Harris Scoring system (HHS). The Hip Harris Score consists of four domains which were evaluated as; 1-item with 44 points for pain, 7-item with 47 points for function, 1-item with 4 points for deformity, 1-item with 5 points for range of motion. Hip Harris Score (HHS)varies between 0-100 with score <70 was classified as poor hip status, 70 to 79 as fair, 80 to 89 as good, and 90 to 100 as excellent hip status[21].

After eight weeks of surgery, satisfactory outcome was assessed on the basis of good to excellent Hip Harris Score. Data was entered into SPSS version 26 (IBM, Chicago, IL) to perform statistical analysis. Mean±SD were calculated for age of the patient, duration of surgery (in min), pre and post-HHS, length of hospital stay. Frequency and percentage were calculated for gender, Garden Classification of fractures, type of anaesthesia, mode of injury, site of fracture, and functional outcomes. Paired sample t-test was applied to compare pre and postoperative Hip Harris Score and P=0.05 was considered statistically significant.

RESULTS

This prospective cross-sectional study includes a total of 259 patients. The mean age of the patients was 68.7±7.2 years. Among them, 69 (26.65%) were males and 190 (73.35%) were females. Mean duration of procedures was noted as 60.5±17.1 minutes, length of hospitalization was 6.8±3.5 days while blood loss during procedure was noted as 287.3±22.4 ml. Type III class of Garden classification was observed in 110 (42.48%) patients while Type IV in 149 (57.52%) as mentioned in Table 1.

The mean ± SD of pre and postoperative Hip Harris Score was noted as (89.3±9.2 v/s 97.7±9.6; P<0.01). See table 2.

Out of 259 patients, poor and fair functional outcome was noted in 22 (8.5%) and 51 (19.7%) patients while satisfactory outcome was achieved in 186 (71.8%) patients (Figure 1).

Table 1: Sociodemographic and clinical parameters of study population

Age (years)	68.7±7.2; 95%C.I. (67.81----69.58)
Duration of surgery (hours)	59.9 ± 16.8; 95%C.I. (57.84----61.95)
Gender - Male - Female	 69 (26.65%) 190 (73.35%)
Length of hospital stay (days) Duration of injury (days) Blood loss (ml)	6.7 ± 3.3 ; 95%C. I (6.29----7.10) 2.5 ± 1.3 ; 95%C. I (2.34----2.65) 285.3 ± 23.4 ; 95%C. I (282.43----288.16)
Type of Garden Classification Garden Type III Garden Type IV	 110 (42.48%) 149 (57.52%)
Distribution of side of fractures Right Left	 135 (52.12%) 124 (47.88%)
Type of anaesthesia General Spinal	 171 (66.02%) 88 (33.98%)
Distribution for mode of injury Fall RTA	 157 (60.62%) 102 (39.38%)

Table 2: Mean Hip Harris Score (HHS) (Preoperative versus Postoperative)

HHS Score	mean ± SD	p-value	95%C. I
Pre-operative HHS	89.3 ± 9.2	0.0001	88.17----90.42
Post-operative HHS	97.7 ± 9.6		96.52----98.87

Applied Paired sample t-test

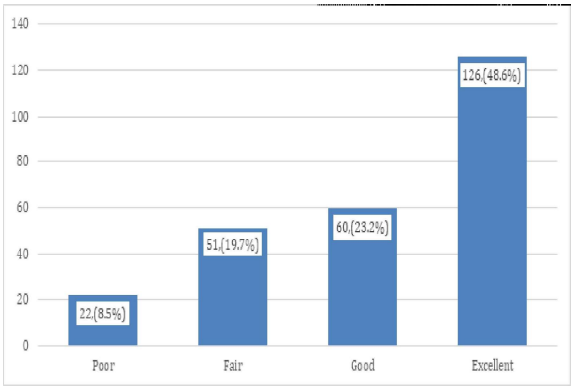

Figure 1: Postoperative Functional Outcome of Patients

DISCUSSION

Femoral neck fractures are managed via various techniques including internal fixation, arthroplasty or total hip replacement. Each technique has its benefits and disadvantages[10]. Therefore, the optimum management for femoral fractures is still controversial. The current study evaluated the functional outcome in patients with fractures of the femur who were managed with bipolar hemiarthroplasty. Hip Harris Score (HHS) which is a validated tool for the evaluation of the functional outcome for hip movements was used in the present study[13].

We reported satisfactory outcomes in 71.8% patients who were managed via bipolar hemiarthroplasty in our setup. The efficacy of bipolar hemiarthroplasty for the management of femur neck fractures was further supported by the findings in the study by Liang et al[14]. Kim et al. revealed that displaced neck fractures of the femur managed with internal fixation and pinning technique lead to an incredibly high failure rate[15]. A 2015 meta analysis conducted by Wang et al. concluded that bipolar hemiarthroplasty led to better Hip Harris Scores compared to total hip replacement in the elderly with fractures of the neck of femur[16].

In the present study, bipolar hemiarthroplasty was preferred over standard management options for displaced femur neck fractures in patients aged over 55. Previous published data has shown that patients who are managed with hemiarthroplasty ambulate quicker than patients who undergo total hip replacement, thereby avoiding the several complications associated with prolonged immobilization[16]. This technique

provides more stability to the hip joint and permits assisted ambulation within a few days of the surgery. Another meta-analysis by Lewis DP et al. compared the effectiveness of hemiarthroplasty with total hip replacement. In contrast to our findings, they found that total hip replacement was a superior alternative in terms of risk of failure, Hip Harris Score, and quality of life of patients, postoperatively[17].

Bipolar hemiarthroplasty has shown satisfactory functional outcome and is considered a safe management option for the elderly population with femur neck fractures. In a study by Keating et al. it was found that hemiarthroplasty was a more effective option with the least rate of secondary surgeries, (5 percent in the bipolar hemiarthroplasty group as compared to 9 percent in total hip replacement group and 39% in fixation group)[18]. A study by Ponraj et al., determined the functional outcome of bipolar hemiarthroplasty for the management of femoral neck fractures in 30 patients over the age of 50 years. They reported excellent functional outcomes in 23.3% patients and good results in 17 (56.6%) patients[11].

In the present study, 71.8% of the patients had good to excellent functional outcomes after bipolar hemiarthroplasty. In contrast to the current findings, Rawate P et al. reported that only 25% patients were graded as excellent while only 31.25% patients had good functional outcomes[19]. Siraj M et al. further reported that 6.3% was graded as excellent while 31.3% patients were documented as good functional outcome[20].

The strength of our study was the use of consecutive sampling best suited for our study design and sample selection, as our inclusion and exclusion criteria were stringent. The use of objective definitions for predictor and outcome variable also minimized the source of bias in our study. The main limitations of our study were small sample size which was collected from only one unit in a single hospital which further confines its generalization. More large-scale multicenter studies are recommended with more parameters to validate the findings of this study.

CONCLUSION

The findings of this study indicate that highly significant difference was noted between pre and post-operative Hip Harris Score. So, findings of this study support the idea that bipolar hemiarthroplasty is an effective treatment modality for the management of elderly patients with displaced femoral neck fractures.

Authors' contribution: MTL cocived the idea Designed and approved manuescript. MZK and BA darfting the article, Revised Critically, ZAM and SAZ analyzed data and interpretated the results. RK Collected Data and heled in drafting.

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