Zagazig University Medical Journal
www.zumj.journals.ekb.eg
https://dx.doi.org/10.21608/zumj.2020.15977.1428 Volume 28, Issue 6, November 2022(97-103) Supplement Issue

Manuscript ID ZUMJ-1908-1428 (R1)
DOI **10.21608/zumj.2020.15977.1428**

ORIGINAL ARTICLE

EARLY FUNCTIONAL RESULTS OF BIPOLAR PROSTHESIS IN FEMORAL NECK FRACTURES

Mohammad ezzat email [1]; Mohamed Ala[2]; Khalid Edris Abdelrahman [(1)], Alsayed Al Etewy Saody [(1)], Mohammed Abdel Fatah Sebaei [(2)] and Bilal Abdulsalam Ali Sawan [(3)]

(1) Professor of Orthopedic Surgery, Faculty of Medicine – Zagazig University, Egypt.
(2) Lecturer of Orthopedic Surgery, Faculty of Medicine – Zagazig University, Egypt.
(3) M.B.B.Ch., department of Orthopedic Surgery, Faculty of Medicine – Al-Zawia University, Libya

Corresponding author:
Bilal Abdulsalam Ali Sawan
E-mail :
bilal.alawamy@gmail.com

Submit Date 2019-11-04
Revise Date 2020-03-31
Accept Date 2020-04-15

ABSTRACT

Background: The femoral neck fractures increased with the older age. Surgery considered the main treatment for femoral neck fractures displacement. There is no evidence for the treatment of displaced fractures of the neck of the femur which give the best clinical and functional results. **Aim of the study:** The aim of the work was to assess the functional outcome and quality of life in terms of pain, mobility, stability using Harris Hip Score in patients with femoral neck fracture, treated with bipolar hemiarthroplasty. **Patients & Methods:** The current prospective study was carried in the Department of Orthopedics at Faculty of Medicine, Zagazig University during the period from June 2018 to April 2019. The study included 18 patients over 50 years with intra-capsular fracture neck of femur and the fracture treated by hemiarthroplasty using Bipolar endoprosthesis. **Results**: the study group had excellent outcome according to Harris hip score, had good outcomes. Patients didn't have pain, (27.8%) had slight pain and (5.5%) had moderate pain. This study showed that (50.0%) of the study group didn't have limping, (38.9%) had slight limping and (11.1%) had moderate limping and (50.0%) of the study group didn't need support. **Conclusions:** Cemented bipolar hemiarthroplasty for fracture neck of femur is a good option in elderly patients. Mobilization and early functional results are good to satisfactory. With this procedure the complication rate is very low and pre injury functional status is restored in majority of patients.

Keywords: Bipolar Prosthesis, Femoral Neck Fractures, Bipolar hemiarthroplasty.

INTRODUCTION

Fracture of the femoral neck is and intracapsular which occur in the elderly subjects [1]. The methods of treatment include non-surgical technique, fixation percutaneously;, open reduction with internal fixation, and partial or total hip arthroplasty[2] . Femoral neck fracture is a serious injury which mostly affect the elderly subjects and have a greet effect on the health care system and society. The lifetime of sustaining the hip fracture in women about 40% to 50% and in men 13% to 22%. The increase in expected life worldwide, can be expected to increase the occurrence of hip fractures worldwide from 1.66 million in 1990 to 6.26 million in the year 2050 [3]. The success operation in the hip joint should give painless and stable hip with a great

lower limb fracture and deformity of knee or ankle joint. Pathological fractures and those who lost to follow-up. Active infection.

Methods: Surgery Management: Surgical management using bipolar hemiarthroplasty, Hemiarthroplasty was indicated for patients with femoral neck fractures displacement, Antibiotic impregnated cement was used for some high-risk patients. Patients with dialysis, may be prone to sepsis, so antibiotics-impregnated cement should be given for them. The suitable antibiotics including vancomycin, tobramycin, cefazolin, and erythromycin.

Preoperative Planning: Preoperative planning is important, so, the preoperative X-ray was reviewed and templated for suitable size and for the fixation. Upon these findings, suitable implant selection should be done to proceed with a tapered stem and a full coated madullary locking stem, or include a cemented stem.

The patient should carry preoperative workup including medical, cardiac, and anesthesia evaluations, in addition to availability of Banking blood, preoperative laboratory investigations, and radiological evaluation.

Selection of patients: All patients were treated by cemented bipolar hemiarthroplasty.

Preoperative assessment: The patients were admitted where the following measures were undertaken:

A) Clinical evaluation: **Full History taking:** this included Personal data: name, age, sex, occupation; Mechanism of trauma; Medical history as diabetic mellitus (DM), hypertension, bronchial asthma, or stroke; Pre-fracture level of activity;Patient fit for surgery

Physical examination includes: General assessment to assess the general fitness to surgery, and to identify any potential source of infection.

Local examination: The skin and soft tissue condition around the hip joint including any previous scars or any bedsores; Leg length discrepancy; Presence of deformity

B) Radiographic evaluation: Anteroposterior radiographs of the pelvis and both hips were taken for all the patients, and lateral X-ray plain of the affected hip.

C) Routine Clinical investigations:

These include: Complete blood count (CBC) (Hb, TLC, and platelets), Routine blood investigations (Blood grouping, typing, and RBS) Renal function include (Serum Urea and creatinine), Fasting blood sugar, Coagulation profile, Prothrombin time (PT) and partial Prothrombin time (PPT), and INR, Electrocardiography (ECG), Chest X-ray, Liver function tests (ALT, AST, bilirubin, and albumin), range of movements. The prolonged immobilization in elderly, could lead to decubitus problems with associated complications, so surgery was resorted to get early ambulation [4].

Hemiarthroplasty (Unipolar or Bipolar) is the common treatment for displaced fractures of the femoral neck in the elderly which associated with good functional results and lower reoperations than internal fixation[5]. Hemiarthroplasty is associated with a great initial operative trauma but has a less risk of implant failure which need reoperation of the hip than that in internal fixation, which considered a cost-efficient treatment [6].

The decisions for femoral neck fractures treatment is based on two factors. The first factor is the clinical condition of patients, such as age, level of activity and comorbidities. The second factor is the type of fracture and, presence or absence of displacement [7].

Recently the bipolar hip prosthesis is considered the best treatment, particularly the modular bipolar prosthesis with or without cement which could give a good outcomes with active life for the treated patients. Another advantage is the modular stem which could be retained in the patient who needs a replacement of total hip in future[8].

AIM OF THIS WORK

The aim of the work was to assess the functional outcome and quality of life in terms of pain, mobility, stability using Harris Hip Score in patients with femoral neck fracture, treated with bipolar hemiarthroplasty.

PATIENTS AND METHODS

The current prospective study was conducted on **18** patient over 50 years old with intra-capsular fracture neck of femur treated by hemiarthroplasty using Bipolar endoprosthesis to assess the functional outcome and quality of life regarding pain, mobility, stability using Harris Hip Score, in the Department of Orthopedics at Faculty of Medicine, Zagazig University during the period from June 2018 to April 2019. The work has been carried out according to the Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

Written informed consent was obtained from all participants, the study was approved by the research ethical committee of Faculty of Medicine, Zagazig University

The inclusion criteria: Patients with age ≥50 years. Patients presenting with intra-capsular femoral neck fractures. Gender includes both male and female.

The exclusion criteria: Patients who refuse to participate in the study. Patients with acetabular or

(38.9%) had good outcome, (5.5%) had fair outcome and (5.5%) had poor outcome. Table (3) showed that **regarding the Side of injury**, 9 patients (50.0%) had left sided injury and 9 patients (50.0%) had right sided injury in the study group. **Regarding the pain** 12 patients (66.7%) of the study didn't have pain, 5 patients (27.8%) had slight pain and one patient (5.5%) had moderate pain. **Regarding limping** 9 patients (50.0%) of the study group didn't have limping, 7 patients (38.9%) had slight limping and 2 patients (11.1%) had moderate limping**. Regarding the need of support** 9 patients (50.0%) of the study didn't need support, 8 patients (44.5%) need cane for long walk and one patients (5.5%) need two canes. **Regarding Distance walk** 12 patients (66.7%) of the study could walk unlimitly chair and 5 patients (27.6%) could walk for 600 meters, while one patient (5.5%) can walk indoor only. **Regarding range of motion** 10 patients (55.6%) of the study had rang of motion from 161 to 210 and 8 patients (44.4%) of the study group had rang of motion from 211 to 300. **regarding Leg length discrepancy**, 15 patients (55.6%) had No leg length discrepancy and only 3 patients (16.7%) had leg lengthening of the study group. **Regarding post-operative complications** 16 patients (88.9%) didn't have any operative complications and only 2 patients (11.1%) had superficial infection. **Regarding Radiological results** 15 patients (83.3%) had central femoral stem, varus in 2 patients (11.1%) and one patient (5.6%) had valgus femoral stem in the study group.

Figs 1, 2, 3 demonstrated a Case of Male patient 74 years old admitted with displaced intracapsular femoral neck fracture left side. It was treated by cemented bipolar hemiarthroplasty.

HbsAg, HCV Ab, and HIV tests were done, Optimization of any medical problem like diabetes and hypertension

The suitable treatment were given for patients with medical problems such as anemia, hypertension, ischemic heart disease (IHD), diabetes, asthma and COPD, etc before the surgery.

The patients were followed up post-surgery at the end of one month, three months and then six months. At each follow up patients were assessed clinically and functionally for pain, limp, support and range of movements. Radiological assessment was done (during follow up visits at 6 weeks , 3 months and 6 months). At final follow up results were rated as excellent, good, fair or poor according to modified Harris Hip Score. All patients improved completely after 6 months

Statistical analysis: The collected data was entered to and analyzed by computer using Statistical Package of Social Services, version 25 (SPSS). Results were presented by tables and graphs. Quantitative data was presented as mean and standard deviation. Qualitative data was presented as frequencies and proportions. Pearson Chi square test ($\chi 2$) and fisher's exact were used to analyze qualitative independent data. P value of ≤ 0.05 was taken as significant.

RESULTS

Table (1), showed that the mean age of the study group was (64.2±5.7) and 10 patients (55.6%) of them were above 65 years, while 8 patients (44.4%) ages were between 50-65 years. Also, showed that that (55.6%) of the study group were females and (44.4%) were males. Table (2), showed that (50.0%) of the study group had excellent outcome according to Harris hip score,

Table (1): Age and sex distribution of the study group:

Variable	NO(18)	%
Age (mean ± SD)	64.2±5.7	
50-65	8	44.4%
>65	10	55.6%
Sex		
Male	8	44.4%
Female	10	55.6%

Table (2); Harris hip score evaluation in the study group:

Variable	The study group(18) (Range) median	
Harris hip score (mean ± SD)	88.9±4.7	
Variable	**No (18)**	**%**
Excellent	9	50.0%
Good	7	38.9%
Fair	1	5.5%
poor	1	5.5%

Table (3): distribution of in the study group according to Side of injury, pain, limping, support, distance walk, range of motion, Leg length discrepancy, Post-operative Complications and Radiological results (Position of the stem)

Variables	NO (18)	%
Side of injury		
Left	9	50.0%
Right	9	50.0%
Pain		
None	12	66.7%
Slight	5	27.8%
Moderate	1	5.5%
Limping		
None	9	50.0%
Slight	7	38.9%
Moderate	2	11.1%
Support		
None	9	50.0%%
Cane for long walks	8	44.5%
Two canes	1	5.5%
Distance walk		
Unlimited	12	66.7%
600 meters	5	27.8%
Indoor only	1	5.5%
Range of motion		
161-210	**10**	**55.6%**
211-300	**8**	**44.4%**
Leg length discrepancy		
No leg length discrepancy	**15**	**83.3%**
leg lengthening	**3**	**16.7%**
Post-operative complications		
No complications	**16**	**88.9%**
Superficial Infection	**2**	**11.1%**
Radiological results (Position of the stem)		
Central	**15**	83.3
Varus	2	11.1
Valgus	1	5.6

Fig. (I) Pre-operative X-ray

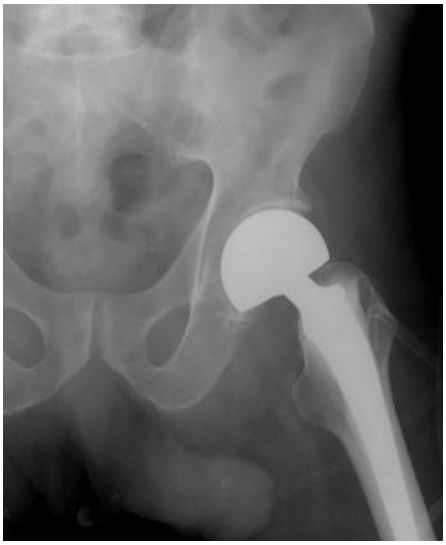

Fig. (II) Immediate postoperative X-ray

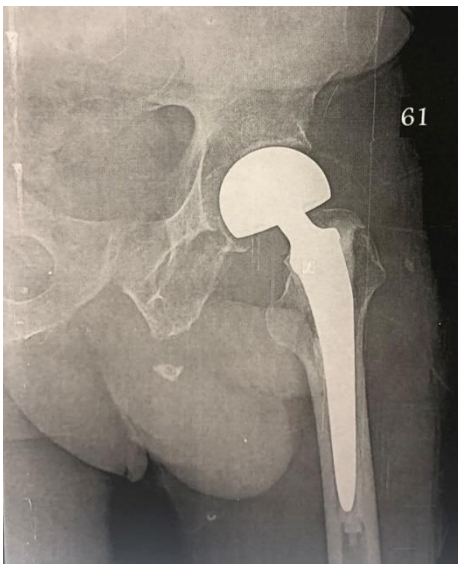

Fig. (III) Seven months follow-up X-ray

DISCUSSION

Fracture neck of femur was commonly seen in old age patients due to osteoporosis and generally associated with history of trivial injury.[9] The limited and unprotected blood supply of the femoral head, the intra capsular location of fractures and osteoporosis were the main factors that inhibit healing which lead to avascular necrosis of femoral head[10].

Surgery being the best treatment for fractures of femoral neck and internal fixation which was initially introduced had a high rate of failure which cause complications like nonunion and avascular necrosis[11]. These complications were addressed with hemiarthroplasty surgery for fracture neck of femur. However many studied have demonstrated a good results with internal fixation, and hemiarthroplasty had been accepted as the best treatment for femoral neck fractures with displacement. Total hip arthroplasty considered the best technique for active patients with a long life expectancy and arthritic joints[12].

A much controversy exists regarding treatment of neck of femur fractures in elderly. Currently, choices available for an orthopaedic surgeon for treating these fractures in elderly are unipolar hemiarthroplasty, bipolar hemiarthroplasty and total hip arthroplasty. Bipolar hemiarthroplasty is the best treatments of displaced fracture of femoral neck in elderly [13].

Bipolar hemiarthoplasty is the most opted surgical treatment modality for displaced fracture neck of femur among the elderly population. The immediate functional recovery and the reduced rate of reoperation when compared to internal fixations had made the surgeons to opt for hemiarthroplasty. However the results of all hemiarthroplasties are not the same which could be probably due to the different variety of prosthesis that is being used, the surgical approach chosen and the postoperative rehabilitation which were practiced [14].

This study showed that age of the study group was (64.2±5.7) ranged from (53-77 years) and (55.6%) of them were above 65 years which in agreement with the study of Jindal et al., [9] who reported that the majority of the patients were between 56 to 70years. Similar age distribution has been reported by Mue et al.,[15], who reported a mean age of 65 years in their study groups.

This study showed that (55.6%) of the study group were females and (44.4%) were males. Similar sex distribution has been reported by Rezaie et al.,[16] who reported that 60.9% were females and 39.1% were males.

Our study showed that (50.0%) of the study group had left sided injury and (50.0%) had right sided ones. Which in agreement with the study of **Nelson** et al., [17] who found found 47.1 % fracture in left hip and 52.9% in right side of their patients

In the current study (50.0%) of the study group had excellent outcome according to Harris hip score, (38.9%) had good outcome, (5.5%) had fair outcome and (5.5%) had poor outcome. which in agreement with the study **Patel** et al., [13], where results were graded according to Modified Harris Hip Score. There were 64% excellent results, 28% good results and 8% fair results.

In the current study (66.7%) of the study group didn't have pain, (27.8%) had slight pain and (5.5%) had moderate pain. In a study by **Shukla et al., [18]** who found that 64.9% of patients had no

pain during follow up, 26.5 % had slight pain and 9.6% had moderate pain.

This study showed that (50.0%) of the study group didn't have limping, (38.9%) had slight limping and (11.1%) had moderate limping which in agreement with the study of **Bűcs et al., [19]** who found 52.3% had no limp, 36.1% had slight limp and Moderate limp was seen in 11.6 % of the subjects whereas only none of the subjects had severe limp.

This study showed that (50.0%) of the study group didn't need support, (44.5%) need cane for long walk and (5.5%) need two canes. In a study by **Patel et al., [13]** they advised the patients to use a cane in the opposite hand but most of patients did not use cane for daily activity as they could comfortably walk without support. Majority of patients (54%) did not require any form of support for routine activities, (47%) were using cane only for long walk and 9% need two canes.

This study showed that (66.7%) of the study group could walk unlimited, (27.6%) could walk for 600 meters and (5.5%) could walk indoor only which in agreement with the study of **Boese et al., [20]** who reported that 63.5% could walk unlimited, (26%) could walk for 6 blocks, (3.3) % could walk for 2-3 blocks and (7.5%) in door only.

Our study showed that 83.3% patients have no limb length discrepancy while 16.7% showed limb lengthening. Which in agreement with the study of **Patel et al., [13]** who found that 84% of the patients with no limb length discrepancy, while 16% showed limb lengthening. There were no cases of stem failure, and no deformity was found in any of the cases.

This study shows that (55.6%) of the study group had range of motion from 161 to 210 and (44.4%) of the study group had range of motion from 211 to 300. In a study by Morshed et al., [21] who reported a similar result to our study

In our study there were 16 patients (88.9%) didn't have any operative complications and only 2 patients (11.1%) had superficial infection. These patients developed local signs of infection within first week of surgery. They were treated with intravenous antibiotics and regular dressings. All these patients had prolonged hospital stay as they were administered intravenous antibiotic till they got discharged, which in agreement with the study of **Jindal et al., [9]**, where 2 patients (6.67%) had superficial wound infection and 3(10%) patients had bed sores.

In our study femoral stem was central in (83.3%) of the study, varus in (11.1%) and (5.6%) of the study group had valgus femoral stem. Which in agreement with the study of **Morshed et al., [21]** who reported varus in (11.11%), (5.65%) for valgus femoral stem and 83.24% have central femoral stem in their studied groups.

Conclusion

Cemented bipolar hemiarthroplasty for fracture neck of femur is a good option in elderly patients. Mobilization and early functional results are good to satisfactory. With this procedure the complication rate is very low and pre injury functional status is restored in majority of patients.

REFERENCES

1. **Johnson B, Gill T.** Hip Fractures. In Orthopedic Surgery Clerkship (pp. 259-265). Springer, Cham. (2017).
2. **Miyamoto RG, Kaplan KM, Levine BR, Egol KA, Zuckerman JD**. Surgical management of hip fractures: an evidence-based review of the literature. I: femoral neck fractures. J Am Acad Orthop Surg. (2008). 16(10):596–607.
3. Prashanth YS, Niranjan M. Comparative Study of Surgical Management of Fracture Neck of Femur with Cemented Versus Uncemented Bipolar Hemiarthroplasty. J Clin Diagn Res. 2017 ; 11(2): RC17–RC21.
4. **Punnoose A, Gallagher C, Matthews J, Khanduja V.** Rehabilitation of a National Taekwondo Player Following Arthroscopic Hip Surgery: Successfully Achieving a Return to Gold Medal Winning Performance Levels. J Nov Physiother. (2015). 5(262):2.
5. **Rogmark C, Leonardsson O.** Hip arthroplasty for the treatment of displaced fractures of the femoral neck in elderly patients. Bone Joint J. (2016); 98-B(3):291–297.
6. **Bjørnelv GW, Frihagen F, Madsen JE, Nordsletten L, Aas E.** Hemiarthroplasty compared to internal fixation with percutaneous cannulated screws as treatment of displaced femoral neck fractures in the elderly: cost-utility analysis performed alongside a randomized, controlled trial. Osteoporos Int.. (2012); 23(6):1711–1719.
7. **Pauyo T, Drager J, Albers A, Harvey EJ.** Management of femoral neck fractures in the young patient: A critical analysis review. World J Orthop. (2014); 5(3):204–17.
8. **Kanto K, Sihvonen R, Eskelinen A, Laitinen M.** Uni-and bipolar hemiarthroplasty with a modern cemented femoral component provides elderly patients with displaced femoral neck fractures with equal functional outcome and survivorship at medium-term follow-up. Arch Orthop Trauma Surg.. (2014).;134(9):1251–1259.
9. **Jindal RC, Gill SS, Singh M GR.** Functional Outcome of Bipolar Arthroplasty for Fracture Neck Femur in Elderly People. Indian J Res. 2016; 5 (11): 7-10.

10. **Lonnroos E, Kautiainen H, Sund R, Karppi P, Hartikainen S, Kiviranta I, et al.**. Utilization of inpatient care before and after hip fracture: a population-based study. Osteoporos Int. 2009 ; 20 (6):879-886.

11. **GRÜBL A, Chiari C, Gruber M, Kaider A, Gottsauner-Wolf F.** Cementless total hip arthroplasty with a tapered, rectangular titanium stem and a threaded cup: a minimum ten-year follow-up. J Bone Joint Surg Am (2002); 84(3):425-431...

12. **Lu-Yao GL, Keller RB, Littenberg B, Wennberg JE.** Outcomes after displaced fractures of the femoral neck. A meta-analysis of one hundred and six published reports. J Bone Joint Surg Am. (1994); 76(1):15–25.

13. **Patel KC, Moradiya N, Gawatre P DT.** Early outcome of hemireplacement arthroplasty using cemented bipolar prosthesis in fracture neck femur in elderly: A study of 50 cases. Int J Orthop Sci (2017); 3(1): 303-307.

14. **Lakshman Prasath Govindarajan D, Rajamanickam A, Krishnan SR**. Comparison between cemented and un-cemented hemiarthroplasty among the patients with fracture neck of femur. Int J Orthop. (2018); 4(1):647–51.

15. **Mue D, Salihu M, Awonusi F, Yongu W, Kortor J, Elachi C.** Early result of hemiarthroplasty in elderly patients with fracture neck of femur. Niger Med J. 2015; 56(1): 64–68.

16. **Rezaie W, Wei W, Cleffken BI, van der Vlies CH, Cleffken BI, Roukema, GR.** Internal fixation versus hemiarthroplasty for displaced intra-capsular femoral neck fractures in ASA 3-5 geriatric patients. Open Orthop J. 2016; 10: 765–771..

17- Nelson KO, Guilherme DA, Emerson KH, Giancarlo CP, Rodrigo PG, Walter RJ. Hemiarthroplasty in the treatment fractures of the femoral neck. Rev Bras Ortop. **2010;** 45(4):382-8.

18- Shukla R, Singh M, Jain RK, Mahajan P, Kumar R. Functional outcome of bipolar prosthesis versus total hip replacement in the treatment of femoral neck fracture in elderly patients. Malays Orthop J. 2017; 11(1): 1–5.

19- Bűcs G, Dandé Á, Patczai B, Sebestyén A, Almási R, Nöt LG. Bipolar hemiarthroplasty for the treatment of femoral neck fractures with minimally invasive anterior approach in elderly. Injury 2020; S0020-1383(20) 30128-5

20- Boese CK, Buecking B, Bliemel C, Ruchholtz S, Frink M, Lechler P. The effect of osteoarthritis on functional outcome following hemiarthroplasty for femoral neck fracture: a prospective observational study. BMC Musculoskelet Disord 2015, 16(1), 304.

17. **21- Morshed T, Sarkar D, Hoque MA, Tabassum F, HasanMasud M.** Evaluation of the functional outcomes of modular bipolar femoral prosthesis in the treatment of neglected femoral neck fractures. Int J Sci Res. 2019, 8 (9):1-4.

How to cite

sawan, B., Abdelrahman, K., soudy, E., Sebaei, M. EARLY FUNCTIONAL RESULTS OF BIPOLAR PROSTHESIS IN FEMORAL NECK FRACTURES. Zagazig University Medical Journal, 2020; (97-103): -. doi: 10.21608/zumj.2022.15977.1428