Original Research Article

Five-years long term outcomes of bipolar hemiarthroplasty in femoral neck fractures

Mohit Khanna[1], Rakesh Sharma[2], Hemant More[3], Jitendra Wadhwani[4*], Pradeep Kamboj[5], Roop Singh[6], Ramchander Siwach[7]

[1]Associate Professor, Department of Orthopaedics, Pt.B.D.S. PGIMS, Rohtak, Haryana, India
[2]Junior Resident, Department of Orthopaedics, Pt.B.D.S. PGIMS, Rohtak, Haryana, India
[3] Assistant Professor, Department of Orthopaedics, Pt.B.D.S. PGIMS, Rohtak, Haryana, India
[4]Assistant Professor, Department of Orthopaedics, Pt.B.D.S. PGIMS, Rohtak, Haryana, India
[5]Senior Professor, Department of Orthopaedics, Pt.B.D.S. PGIMS, Rohtak, Haryana, India
[6]Senior Professor, Department of Orthopaedics, Pt.B.D.S. PGIMS, Rohtak, Haryana, India
[7]Senior Professor and Head, Department of Orthopaedics, Pt.B.D.S. PGIMS, Rohtak, Haryana, India

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Abstract

Introduction: Bipolar hemiarthroplasty is indicated in older age groups. Its advantages in femoral neck fractures in better pain relief, which allows early rehabilitation and ambulation of older individuals, early weight bearing. We aimed to do a retrospective outcome analysis of patients operated with bipolar hemiarthroplasty for fracture neck of femur with minimum five years follow up. **Material and Methods:** A retrospective study was conducted to evaluate the clinical and radiological outcome in 53 patients operated with bipolar hemiarthroplasty hip for femoral neck fractures with minimum five years long term follow-up period. Functional outcomes was assessed with use of Harris Hip score, pain, range of motion, satisfaction rate and limb length discrepancy. Satisfaction rate was calculated using likert scale. **Results:** The mean age was 73.62 ± 6.22 (Range, 60-92 years). Stem subsidence was seen in 15 patients (28.3%). Acetabular erosion was seen in 3 (5.66%) patients. Stem loosening wass seen in 2 patients (3.76%) and protrusio acetabuli in 1 (1.88%) patients. Hip arthritis was seen in 4 (7.54%) patients. 28 patients (52.84%) complained of pain at hip. There was no case of superficial or deep infection in any of the patients. The satisfaction rate on likert scale in our study was 77.35%. Mean Harris hip score in the present study was 83.41±4.11. **Conclusion:** Hemiarthroplasty is an effective treatment modality that provides satisfactory pain relief for the lifetime of the majority of elderly population. Good prosthesis survivorship is seen in elderly patients with good overall satisfaction rate.

Key words: Bipolar Hemiarthroplasty, long term follow up, Harris hip score, Likert scale.

Introduction

Femoral neck fractures have always presented greater challenges to the orthopaedic surgeons. These are devastating injuries commonly sustained by elderly people, although these can occur at all ages and in both sexes[1,2]. The incidence of femoral neck fracture of femur increases dramatically after the age of 70 years[3]. Significant mortality during the first year after a femoral neck fracture has been documented. The one year mortality rates are estimated to be 12-37% and up to half of survivors do not live independently[1-6]. Femoral neck fracture is important because of its complications like non-union, avascular necrosis of femoral head and prolonged immobilization of the patient[7]. There is still controversy about the choice of treatment of displaced fractures of the neck of femur. Internal fixation either by multiple screws or by sliding plate is associated with less operative trauma but complications such as displacement of the fracture, non-union, and avascular necrosis may require revision subjecting the already high-risk patients to further revision surgery[8]. The bipolar concept was to establish firm fixation of the stem in femoral shaft, yet eliminate shear forces between the metallic prosthetic head and acetabular cartilage[9,10]. The bipolar prosthesis was designed so that primary articulation would be at inner bearing of the prosthesis-cartilage interface, thereby decreasing the amount of acetabular erosion and pain that the patient encountered[11]. Bipolar hemiarthroplasty is indicated in older age groups. Its advantages in femoral neck fractures in better pain relief, which allows early rehabilitation and ambulation of older individuals, early weight bearing thereby preventing complications of prolonged convalescent period.

Total hip replacement is another procedure for management of intracapsular fractures in elderly population. Total hip replacement surgery is a safe procedure with high efficacy, higher success rate and lower need for operative revision. On the other hand, it is associated with higher dislocation rates and higher general complications. While bipolar hemiarthroplasty is associated with higher stability and lower dislocation rates[1,2]. The role of total hip arthroplasty for the treatment of displaced intracapsular fractures of the proximal femur in active patients is controversial. Some authors have shown that such patients, when treated with a bipolar or unipolar hemiarthroplasty are at increased risk of developing acetabular erosion that may later require revision to total hip replacement surgery. However, other authors have strongly recommended avoiding total hip replacement in active elderly patients without pre-existing acetabular disease[1,2]. Till date very few studies in Indian context, which have addressed the clinical, functional and the radiological follow up outcome of patients receiving bipolar prosthesis for fracture neck of femur. Therefore we aimed to do a retrospective outcome analysis of patients operated with bipolar hemiarthroplasty for fracture neck of femur with minimum five years long term follow up.

*Correspondence
Dr. Jitendra Wadhwani
Assistant Professor, Department of Orthopaedics, Pt.B.D.S. PGIMS, Rohtak, Haryana, India.
E-mail: drjitendra28.03@gmail.com

Material and methods

A retrospective study was conducted at author's tertiary care hospital from September 2018 to February 2020 to evaluate the clinical and radiological outcome in 53 patients after obtaining approval from the institutional review board and ethical committee. Patients who were operated in author's tertiary care hospital with bipolar hemiarthroplasty hip for femoral neck fractures with minimum five years postoperative follow-up period were included in the study. Patients having a pathological fracture secondary to malignant disease, primary bone malignancy, neurological deficit in lower limb, periprosthetic fracture, preoperative non ambulatory patients were not included in the study were excluded from the study.

From the hospital records it was found that 206 patients operated between 2012 to 2015 with bipolar hemiarthroplasty for femoral neck fracture. Out of these 53 patients were followed in present study. These patients were called for follow up for clinical and radiological evaluation. Data was collected in the form of patient's demography, radiographs or any complaints of patient regarding pain, range of motion, difficulty in doing daily work and limb length discrepancy. The radiological and other clinical records available in the institute were used for study. Functional outcomes was assessed with use of Harris Hip score [12], pain, range of motion, satisfaction rate and limb length discrepancy. Satisfaction rate was calculated using likert scale [13] after enquiring from the patients about their satisfaction with the surgery during follow up.

Statistical analysis

A sample size of minimum of 53 patients was taken. The functional outcome good to excellent found in the articles ranges from 85% to 95%. Therefore, assuming the same (p)=85% with 10% margin of error, the minimum required sample size at 5% level of significance and with power of 80% was 53. Pre-structured subjects performa was used for data collection. The quantitative variables was expressed as mean ± SD and compared using Student t-test (paired/unpaired t-test). The qualitative variables were expressed as frequencies/percentages. p-value < 0.05 was considered statistically significant.

Results

The mean age of the patients in present study in years was 73.62 ± 6.22 (Range, 60-92 years). Out of 53 patients, 31 (58.49%) were females and 22 (41.51%) were males. Trivial trauma like simple fall was the only mode of injury in all the cases. Pre-operative mobility status of the study patients showed that maximum number of patients i.e. 42 (79.24 %) did not use any support while walking. 11 patients (20.75 %) patients used cane as a walking aid prior to the fracture and after 5 years of follow-up 36 patient (67.9%) used support while walking. Modular prosthesis was used in 13 (24.52%) patients and Fixed prosthesis was used in 40 (75.47%) patients depending upon patient's preference (Figure 1A-C), (Figure 2A-C).

Fig 1A-C: Five year follow up clinical and radiological pictures of a 60 year old female operated with fixed bipolar hemiaryhroplasty

Figure 2A-C: Five year follow up clinical and radiological pictures of a 65 year old male operated with fixed bipolar hemiaryhroplasty

Cementing for intramedullary stem fixation was done in 33 (62.22%) patients. Stem subsidence was seen in 15 patients (28.3%). There was no dislocation in any of the patient. Acetabular erosion was seen in 3 (5.66%) patients. Stem loosening was found in 2 patients (3.76%) and protrusio acetabuli in 1 (1.88%) patients. Hip arthritis was seen in 4 (7.54%) patients. 28 patients (52.84%) complained of pain at hip after 5 years of follow up. There was no case of superficial or deep infection in any of the patients. Limb length discrepancy in the form of shortening was seen in 15 (28.30%) patients in the present study. The satisfaction rate on likert scale in our study was 77.35% (Figure 3A-D).

Figure 3A-D: Five year follow up clinical and radiological pictures of a 58 year old male operated with fixed bipolar hemiaryhroplasty

Mean Harris hip score in the present study was 83.41±4.11. Excellent results were seen in 4 (7.57%) patients, good results were seen in 37 (69.81%), fair results in 12 (22.64%). Excellent to good results were seen in 41 (77.41%) patients. Mean follow up time of the present study was 6.10 years. Minimum follow up period was 5 years and highest follow up period was 8 years.

Discussion

Femoral neck fractures are among the most frequent fractures occurring in the elderly population[14]. Various types of hemiarthroplasty prosthesis have been used in the clinical practice[15]. Hemiarthroplasty prosthesis can be divided in unipolar or bipolar prosthesis and based on fixation of implant it can be divided into cemented or uncemented hemiarthroplasty. Bipolar articulation has a theoretical advantage of translating part of the hip movement to inner bearing of the prosthesis thus reducing movement in the prosthesis–acetabulum interface[16,17]. The Harris hip score in bipolar hemiarthroplasty for femoral neck fractures are almost comparable with the total hip arthroplasty. The major advantage of treatment with cemented bipolar endoprosthesis is the early weight bearing and rehabilitation of these patients to their pre-fracture level more quickly than is achieved with various fixation devices[18-20].

Mean time of follow up of our study is 6.1 years. Modified harris hip score in our study is 83.4 which implies better outcome and less morbidity and disability whereas in study by Haidukewych et al [9] mean time of follow up is 5.8 years and in study by Schneider et al [21] mean time of follow up is 2.5 years and harris hip score is 85.

The weak point of our study is that we did not have much postoperative radiograph so that we are unable to compare immediate postoperative radiograph and radiograph after 5 years of follow up and also the harris hip score at immediate postoperative or after 1 year of follow up. Most of the patients use walking aid after the 5 years of follow up of operation which is attributed to deterioration in walking ability due to advanced age and presence of comorbidities such as stroke, dementia, parkinsonism in the elderly population. Before the surgery, 11 (20.3%) patients were using walking aid out of 53 patients in our study. After the 5 years of follow up of bipolar hemiarthroplasty 36 (67.92 %) patients of 53 patients use support while walking. Change in walking ability after the bipolar hemiarthroplasty after 5 years of follow up is significant as p value (<0.0001, chi square test).

Complications in our study were very few (Figure 4 A-D). Bipolar hemiarthroplasty allows early ambulation of the patients and thus it prevents further complications in the elderly patients. Stem subsidence was the most common complication in 15 patients (28.3%) and acetabular erosion was seen in 3 out of 53 patients. Stem loosening was seen in 2 out of 53 patients and protusio acetabuli was seen in 1 out of 53 patients. There was no dislocation seen in our study. Satisfaction rate in our study is 77.35 % as compared to 85% in Schneider et al study.

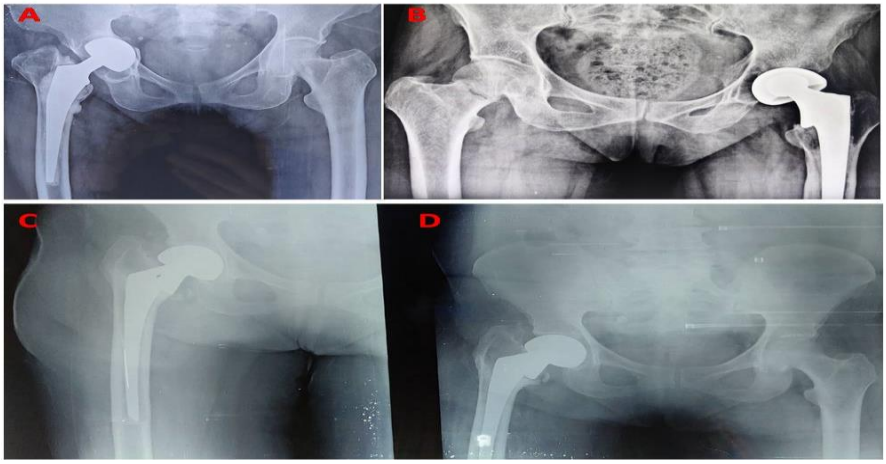

Figure 4A: Protrusion in operated hip joint.; Figure 4B: Erosion of acetabular cartilage by prosthesis ; Figure 4C-D: Subsidence of prosthesis

Conclusion

Hemiarthroplasty is an effective treatment modality that provides satisfactory pain relief for the lifetime of the majority of elderly population, allowing early ambulation as soon as possible, thereby reducing the risk of respiratory infection and pressure sores and complication rate is low. Good component survivorship is seen in elderly patients treated with bipolar hemiarthroplasty for femoral neck fractures with good overall satisfaction rate. We recommend using a Bipolar hemiarthroplasty cemented for treatment of femoral neck fractures in patients aged 60 years or older.

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