Original Research Article

A Hospital Based Prospective Clinical Study to Evaluate the Efficacy of Bipolar Hemiarthroplasty in Arthritis of The Hip Joint

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Abstract

Background: Replacement of the femoral head is still recognized as the best scheme for elderly displaced femoral neck fracture, despite its controversial. Cemented Bipolar hemiarthroplasty thus appears a good option for fracture neck femur in the elderly population. With limited evidence for cemented hemiarthroplasty for improved functional outcome and one of the meta-analysis showing increased post-operative mortality. The aim of this study to evaluate the efficacy of bipolar hemiarthroplasty in arthritis of the hip joint.**Materials & Methods:** A hospital based prospective clinical study done on 50 patients involving intracapsular fracture of neck of femur admitted in Department of Orthopedic at Jeevan Jyoti Hospital, Bahadurgarh, Haryana, India during one year period. All patients were operated under General/Spinal anesthesia for bipolar cemented hemiarthroplasty. The data analysis was done for 6 months using parameters ratio, rates and percentage of different outcome as per the HARRIS HIP SCORE, which were computed and compiled. The results were classified as excellent, good, fair and poor based on points scored on HARRIS HIP SCORE following functions were taken into consideration.**Results:** The present study included that maximum age of patients was 90 year and minimum age of 50 year with mean age of 65.27 years. Male to female ratio was 1.77:1. Among 50 patients 30 were operated on right side while 18 patients were operated on left side and only 2 patients operated both side. The average hospital stay was 4.65 days. Results were excellent in 10% patients, 60% patients were having good Harris hip score, 26% patients were having fair Harris hip score and only 4% patients fell in poor Harris hip score. 56% patients were in excellent radiological grade, 40% patients were in good radiological grade and 4% patient were in poor radiological grade.**Conclusion:** We concluded that cemented bipolar hemiarthroplasty appears to be an excellent procedure to achieve good clinical results in elderly patients with fracture femoral neck. A continued clinical and radiologically evaluation is essential for identifying complicating factors.

Keywords: Hemiarthroplasty, Femoral Neck Fracture, HARRIS Hip Score, Radiological Outcome.

Introduction

Fractures of the hip have been described as an orthopaedic epidemic with an estimated global incidence of 1.3 million fractures in 1990. Hip fractures are common and are often devastating in the geriatric population[1].More than 250,000 hip fractures occur in the United States each year; however, as reported by Koval and Zuckerman, with an aging population, the annual number of hip fractures is expected to double by the year 2050[2].A number of factors predispose the elderly population to fractures, including osteoporosis, malnutrition, decreased physical activity, impaired vision, neurologic disease, poor balance, and muscle atrophy. Different classification systems for FNFs have been proposed by various authors. In 1935, Pauwels Classified of femoral neck fractures based on varying angles and anatomic specifications to differentiate the three fracture grades. Pauwels type I is fracture 30^0 from horizontal plane, type II is 50^0 from the horizontal plane and type III is 70^0 from horizontal plane. Pauwels generated the new concept for the relation of fracture line type to the intervening shearing forces: the more horizontal lines are more stable and the vertical lines are more unstable[3]. However it has not been shown to predict the rate of non-union (Parker and Dynan 1998)[4]. The AO classification has been difficult to use due to poor intra and inter-observer reliability and lack of predictive utility for the outcome of treatment (Blundell et al. 1998)[5].Femoral Neck Fractures are also classified according to the degree of fracture displacement and the most widely used system is that of Garden (Garden 1961)[6]. As displacement increases, the risk of disruption to the blood supply to the femoral head increases. With a disrupted vascular supply, the risk for healing disturbances, complications and reoperations increases when treated with IF. The Garden classification is based on the degree of fracture displacement on the anteroposterior radiographic images. Garden I and II represent a valgus impacted or a complete fracture without displacement and are considered as undisplaced types. Garden III and IV represent a partially displaced or fully displaced fracture and are considered as displaced fracture types, which represent two thirds of the FNFs. Garden's classification system has been criticized for its poor inter-observer reliability (Frandsen et al. 1988)[7].The most reliable subdivision of FNFs, which corresponds well to secondary complications after IF such as non-union and avascular necrosis, are undisplaced and displaced FNFs(Alberts and Jervaeus 1990, Nilsson et al. 1993)[8, 9]. Replacement of the femoral head is still recognized as the best scheme for elderly displaced femoral neck fracture, despite its controversial[10]. Hemiarthroplasty is a procedure in which the head and neck of the femur are replaced with a prosthesis, but the acetabulum is not modified. Hemiarthroplasty may be unipolar (in which the head is fixed to the stem) or bipolar (in which there is an

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additional polyethylene bearing between the stem and the endoprosthetic head component).Intracapsular fractures of the proximal femur account for a major share in hospital inpatients. Treatment of fracture neck of femur has always remained a debate, especially in the elderly. Prosthetic replacement of the femoral head with Austin Moore or Thompson prosthesis hemiarthroplasty has undoubtedly played an important role. However, acetabular erosion is a significant long-term complication.

United nation has proposed 60 years and above as elderly age group as they were prone for various type of fracture and other co-morbid illness leading to increased mortality rate[11]. In view of associated impaired mobility and increased mortality rate in elderly age group due to fracture neck of femur, immediate surgical intervention with cemented bipolar hemi arthroplasty had shown better outcome in early mobilization and return to live an independent life.[12] Bipolar hemi arthroplasty had more advantages than others because of decreased acetabular wear due to dual bearing system[13]. Hemi arthroplasty was the commonest choice for fracture neck of femur in elderly[14].High rate of non-union and avascular necrosis are the poor outcomes of the patient treated with open reduction and internal fixation. Currently, choices for orthopedic surgeons for treating these fractures in elderly are unipolar hemiarthroplasty, bipolar hemiarthroplasty and total hip arthroplasty. Acetabular erosion and loosening of stem giving rise to pain are the main problems encountered with unipolar prostheses (Austin Moore's Prosthesis[15] and Thompson's Prosthesis[16]). In 1974, Bateman[17]introduced the Bipolar prosthesis (initially popular as Bateman's prosthesis) having mobile head element and had head surface additional to allow movements in the acetabulum. Greater range of movements, less post-operative pain, reduced incidence of acetabular erosion, reduction in the loosening of stem (when cement is used), higher percentage of satisfactory results, more rapid return to unassisted activity are the advantages of bipolar prosthesis over unipolar endoprosthesis. Total hip arthroplasty is still not popular as a treatment modality for these fractures because majority of the patients do well with hemiarthroplasty and also due to high costs involved. Use of the cement gained in popularity after Sir John Charnley[18] began using PMMA, intended for denture repair, to anchor femoral head prosthesis in the femur during total hip arthroplasties. Cemented Bipolar hemiarthroplasty thus appears agood option for fracture neck femur in the elderly population. With limited evidence for cemented hemiarthroplasty for improved functional outcome and one of the meta-analysis showing increased post-operative mortality. The aim of this study to evaluated the efficacy of bipolar hemiarthroplasty in arthritis of the hip joint.

Materials & Methods

A hospital based prospective clinical study done on 50 patients involving intracapsular fracture of neck of femur admitted in Department of Orthopedic at Jeevan Jyoti Hospital, Bahadurgarh Haryana, India during one year period. All patients were operated under General/Spinal anesthesia for bipolar cemented hemiarthroplasty.

Inclusion Criteria

1. Displaced intracapsular fracture of neck of femur
2. Subcapital fractures
3. Transcervical fractures
4. Age>50 years
5. Road traffic accident
6. Pathological fractures

Exclusion Criteria

1. Open fractures
2. Age <50 years
3. Patients not fit for GA/SA due to any medical comorbidity.

Management and Follow up Protocol

The patients with intracapsular fracture neck of femur were operated by cemented bipolar hemiarthroplasty after they present with fracture in OPD/Emergency of Jeevan Jyoti Hospital. The patients were admitted in MOW/FOW would undergo routine investigations required for pre-anesthetic check up. After anesthetic clearance patient were taken for elective surgery and record were maintained as per proforma of study. Following the operated patients kept under observation for average 3 to 5 days and called for follow up at regular intervals for clinical and radiological evaluation.

Post Procedure Follow Up

Follow UP- All patients were followed up at 4 weeks, 10 weeks and every 6 weeks from date of discharge. Then at 6 months, 9 months and 1 year from date of discharge.

Statistical Analysis

The data analysis was done for 6 months using parameters ratio, rates and percentage of different outcome as per the HARRIS HIP SCORE, which were computed and compiled.

The results were classified as excellent, good, fair and poor based on points scored on HARRIS HIP SCORE following functions were taken into consideration.

Results

The present study included that maximum age of patients was 90 year and minimum age of 50 year with mean age of 65.27 years. Male to female ratio was 1.77:1. Among 50 patients 30 were operated on right side while 18 patients were operated on left side and only 2 patients operated both side. The average hospital stay was 4.65 days (table 1). Our study showed that results were excellent in 10% patients, 60% patients were having good Harris hip score, 26% patients were having fair Harris hip score and only 4% patients fell in poor Harris hip score (table 2 & Graph 1).

In this study 56% patients were in excellent radiological grade, 40% patients were in good radiological grade and 4% patient were in poor radiological grade (table 3).

Table 1: Demographic profile of patients

Data	No. of patients (N=50)	Percentage
Age (Mean±SD) (yrs)	65.27±8.16	
Sex		
Male	32	64%
Female	18	36%
Affected site		
Right	30	60%
Left	18	36%
Bilateral	2	4%
Hospital stay (Mean±SD) (days)	4.65±1.23	

Table 2: Grading of Harris hip score

Grading	Number	Percentage
Excellent	5	10%
Good	30	60%
Fair	13	26%

Poor	2	4%
Total	50	100%

Table 3: Radiological Results

Grading	Number	Percentage
Excellent	28	56%
Good	20	40%
Poor	2	4%
Total	50	100%

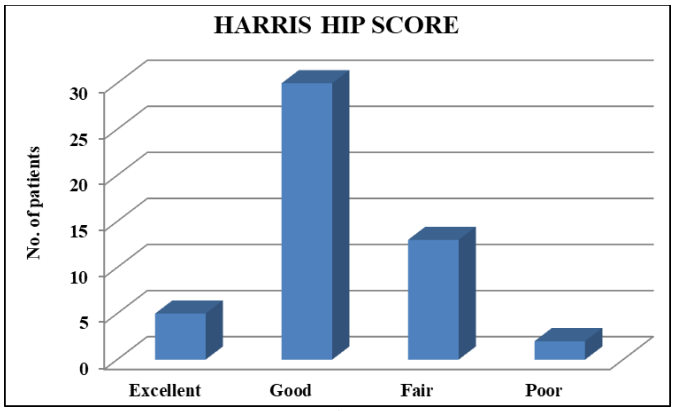

Fig 1: Grading of Harris hip score

Discussion

Femoral neck fracture is a common problem in the elderly patients because most of patients are frail and have many pathological conditions like osteoporosis and osteomalacia. With the advancement in medicine the life expectancy is now increased.In older patients the risk of nonunion fracture was very high. Nonunion fracture is uncommon in below 50 years of age but increases to approximately 40% for patients in their seventies. In younger patients (below 60 to 70 years of age), the femoral head should be maintain as fracture union is higher and any possibilities of the long-term complications of arthroplasty are avoided [19,20].However, avascular necrosis of the head of femur is more common in younger patients. Our study showed that mean age of patients was 65.27 years (range 50-90 years). A study done by Yurdakul E et al (2015)[21]found that mean age of patients was 78.16 years (range: 60-110 years). Another study done by YS Prashanth, M Niranjan in 2017[22] found that mean age of patients was 70 years. Average hospital stay of 18 days with bipolar hemiarthroplasty has been reported by Lestrange[23]. Drinker and Murray et al[24] have reported an average hospital stay of 23 days with the same procedure. There were no late postoperative complications like loosening, dislocation, erosion, secondary osteoarthritis, protrusioacetabuli or periprosthetic fracture. Our study showed that the average hospital stay was 4.65 days. All the patients were prepared for surgery as early as possible. In some patients undue pre op delay occurred because of delay in getting fund from government and in some patients it was it was because of delay in getting physician clearance.Yurdakul E et al (2015) found that pain scores and walking ability were better in the cemented arthroplasty group in the early follow-up period[21].Mohsen Khorami et al (2016)[25] found that the mean pain score was significantly reduce in the cemented group compared to the uncemented group (P=0.001). Hinchey and Day[26] in their series of 294 patients found pain following hemiarthroplasty in 22 patients in the early postoperative period. They could not find any definitive cause in them. Lunceford[27] stated that the causes of pain could be due to improper prosthetic seating, infection, tissue reaction, metallic corrosion, contractures, improper-sized head of femur and periarticular ossification.

These results encouraging as more than 90% patients obtained good range of motion and they were able to do routine daily activities and maintained there independence in old age. Various series analyzing the interprosthetic motion during weight-bearing have, however, showed a protect movement of the inner joint during the stance phase of gait[28,29].To defeat these problems, various strategies are used such as achieving a geometrically stable press fit between bone and implant, prompt bone growth and use of Polymethyl Methacrylate (PMMA) cement. Among these schemes, use of PMMA cement offers definite advantages as it acts as a grouting agent to replace thinning trabecular bone, contribution immediate interference stability between implant and bone, thus greatly simplifying rehabilitation. Bipolar arthroplasty was introduced to prevent or retard wearing of acetabulam. These prostheses have a 22 to 32 mm head that articulate with a ultra-high density polyethylene liner of varying sizes. The liner is covered with polished metal outer head that articulates with the acetabular cartilage. Theoretically, movement of hip primarily occurs at prosthetic joint and only secondarily at metal cartilage interface, minimizing articular wear. There is evidence for use of cemented hemiarthroplasty resulting in greater anchoring and lesser periprosthetic fracture.In this study 56% patients were in excellent radiological grade, 40% patients were in good radiological grade and 4% patient were in poor radiological grade. Early radiological studies of interprosthetic motion in bipolar hemiarthroplasties observed little or no motion between the stem and the head over time when analyzing passive movement of the hip without weight bearing[30,31].Our study had its own limitations because the degree of intra-prosthesis motion at the inner- bearing of prosthesis was not evaluated. Longer term studies were required to improve the long term functional outcome of cemented bipolar hemi arthroplasty for fracture of neck of femur in elderly. The strength of the study was that the functional outcome of cemented bipolar hemi arthroplasty had shown an increased in quantity and quality of life with a better outcome.

Conclusion

We concluded that cemented bipolar hemiarthroplasty appears to be an excellent procedure to achieve good clinical results in elderly patients with fracture femoral neck. A continued clinical and

radiologically evaluation is essential for identifying complicating factors. Larger sample size with longer follow up is required to further strengthen the interference drawn from the present study.

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