

Outcome of Replacement Hemi-arthroplasty by Non-Cemented Bipolar Prosthesis of Femoral Component of Hip

*Hossain SN,¹ Hoque E,² Islam MM,³ Rahman M,⁴ Alam MS⁵

Most femoral neck fractures are osteoporotic fractures in elderly persons. The aim of this study was to evaluate the outcome of replacement hemi-arthroplasty by non cemented bipolar prosthesis of femoral component of hip. This prospective interventional study was conducted in the department of Orthopaedic Surgery, Dinajpur Medical College Hospital and Ideal Hospital, Dinajpur from January 2012 to December 2014. Total 29 cases were selected with femoral neck fracture of both sex and age group within 60 to 85 years. They were treated by non-cemented bipolar prosthesis of femoral component of hip. Final outcome of 'Non-Cemented Bipolar Prosthesis of femoral component of Hip' was measured by grading the result as excellent, good, fair and poor. This study reveals that almost full ranges of motion were acquired in 28 (96.56%) cases with no residual deformity. Excellent functional outcome were achieved in 12 (41.39%) cases according to the Modified Harris Hip Score (MHHS); although Hip Outcome Score (HOS) revealed excellent outcome in 10 (34.48%) cases. Considering the excellent and good outcomes as satisfactory 22 (75.87%) cases according to HOS and 23 (79.30%) according to MHSS. This study finding revealed that non-cemented bipolar prosthesis of femoral component of hip provided good functional outcomes with minimal complications for displaced intracapsular fracture of neck of femur for elderly active patients.

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Introduction

Fracture of the neck of femur is the second most common fracture in the elderly with an annual incidence of 86 per 100,000 in UK. Hip fractures are a major public health problem in the world and estimated to be 2.6 million by the year 2025, and 4.5 million by the year 2050.¹ Among them fracture of neck of femur frequently occur in elderly patients (female more than male), where a considerable reduction in bone strength, tendency to fall and simple low-energy trauma are most common risk factors.²

The management of this fracture has been changing from time to time. However the numbers of procedures available and practiced show that no one is universally applicable and surgeon has to select one which would be ideal in a given situation. Conservative treatment brings about the hazards like thromboembolic phenomena, cardiopulmonary problems, urinary tract infection, decubitus ulcer, etc. and therefore the aim of treatment is to provide immediate and unrestricted pain free mobilization to reduce the morbidity and mortality.³

1. *Dr. Syed Nadir Hossain. Assistant Professor, Department of Orthopedics, Dinajpur Medical College, Dinajpur, Bangladesh.
2. Dr. Enamul Hoque. Assistant Professor, Department of Orthopedics, Dinajpur Medical College, Dinajpur, Bangladesh.
3. Dr. Md. Mahabubul Islam. Assistant Professor, Department of Community Medicine, Dinajpur Medical College, Dinajpur, Bangladesh.
4. Dr. Md. Mostafizur Rahman, Assistant Professor, Department of Orthopedics, Rangpur Medical College, Rangpur, Bangladesh.
5. Dr. Md. Shahidul Alam, Senior Consultant, Orthopedics, General Hospital, Pabna

*For correspondence

Operative treatment is the treatment of choice for the majority of the displaced femoral neck fractures. The choice depends on many factors including the health and age of the patient, ambulatory demands of the patients, osteoporotic status, the degree of displacement of the fractures and the available resources.

Introduction of single piece unipolar metal prosthesis in 1950's, to replace the femoral head has undoubtedly played an important role in the treatment of these fractures. However, acetabular erosion and loosening of stem giving rise to pain are significant long term complications of one piece hemiarthroplasties. To decline these problems bipolar prosthesis was designed which consists of polished femoral head prosthesis with a locking internal ultra high molecular weight polyethylene bearing reducing friction between the outer head and acetabulum.

Despite continued discussion regarding treatment of these fractures, controversies continued regarding their optimal treatment, including the choice of implant and their fixation method,^{4,5} and hence called the 'unresolved fracture'.⁶ Factors such as age, level of activity, associated co-morbid conditions of the patient also influence outcome of treating such injuries.⁷

Non displaced femur neck fractures are commonly treated by internal fixation (IF) but treatment of displaced fractures seems to vary with age.² Options include reduction and fixation of the fracture, hemiarthroplasty or total arthroplasty.^{8,9} Most surgeons prefer to perform reduction and internal fixation (RIF) in displaced fractures of patients under the age of 60 years and Hemiarthroplasty (HA) or less commonly total hip arthroplasty (THA) in patients over 60 years.² RIF of the fracture has a shorter hospital stay and lower mortality rates but failure and reoperation rates are high

with an incidence up to 30%.¹⁰ Total hip arthroplasty has shown better pain relief and clinical outcome, but in elderly population who often suffer from fracture neck of femur, mortality rates are high.¹¹ Hemiarthroplasty gives good pain relief and predictable results with lower reoperation rates.¹² The choice between unipolar and bipolar prosthesis is less clear where a theoretical advantage of a bipolar over a unipolar prosthesis is in the reduction of acetabular erosion due to movement taking place within the implant rather than between the head of the prosthesis and acetabulum. Again replacement hemiarthroplasty by Austin Moore prosthesis cause more pain, decrease range of motion (ROM), acetabular erosion and loosening of femoral stem.¹³ Cemented prosthesis have been used with high success rates¹⁴ but associated with high perioperative morbidity and mortality. Use of a non-cemented bipolar stem has been claimed to reduce operation time, with less blood loss, lower mortality rate and fewer post operative complications.

Considering those issues, this study was performed to evaluate the experience with the use of non-cemented bipolar prosthesis of femoral component of hip.

Methods

This was a prospective interventional study. The study was conducted in the department of Orthopaedic Surgery, Dinajpur Medical College Hospital and Ideal Hospital, Dinajpur. Study period was from January 2012 to December 2014. Total 29 cases were selected with femoral neck fracture of both sex and age group within 60 to 85 years. They were treated by non-cemented bipolar prosthesis of femoral component of hip. The selected cases were mentally competent, alert and oriented to time and place. Patients with, i) Age less than 60 years; ii) Active sepsis or coxitis; iii) Acetabular arthritis; iv) Widened proximal femoral medullary cavity; v)

Abductor insufficiency of hip joint; vi) Unstable medical illness were excluded.

A complete history was taken from the selected cases with particular emphasis to the time and mechanism of injury, past treatment and any coexisting illness (Diabetes Mellitus, Chronic Hypertension, Bronchial Asthma, Myocardial Infarction, Angina) which was followed by a thorough physical and general examination to exclude any associated injuries. X-rays of the pelvis including both hips and lateral view of the affected hip was done for radiological diagnosis. To assess final outcome of 'Non-Cemented Bipolar Prosthesis of femoral component of Hip' the results were graded as excellent, good, fair and poor.

Results

During the period of January 2012 to December 2014, 29 patients with femoral neck fracture were treated by 'Non-Cemented Bipolar Prosthesis of femoral component of Hip' in the development of Orthopaedic Surgery, Dinajpur Medical College Hospital, Dinajpur and Ideal Hospital, Dinajpur of which 15 (51.72%) patients were male and 14 (48.28%) patients were female (Table-I). The range of age was 60 – 85 years.

The most common cause was minor trauma such as fall on a slippery ground and road traffic accidents which constituted 74.25 %; fall from stair constituted 24.75%. Right femoral neck fracture for 15 persons (51.73%) and left femoral neck fracture occurred for 14 persons. Post operative hospital stay ranged from 4 to 14 days with an average of 8 days.

Table II reveals 28 (96.56%) had no or slight limping. Majority 18 (62.06%) of the patients could walk independently even without a stick or cane. Also majority of the patients 15 (51.73%) could walk a long distance without a stick.

Table III reveals 15 (51.72%) patients could climb the stairs with the help of railing and 10 (34.48%) patients independently. All the cases were able to use high chairs. Twenty five (86.21%) patients used the public transport confidently.

Table IV reveals almost full ranges of motion were acquired in 28 (96.56%) cases with no residual deformity. Excellent functional outcome were achieved in 12 (41.39%) cases according to the Modified Harris Hip Score (MHHS); although Hip Outcome Score (HOS) revealed excellent outcome in 10 (34.48%) cases. Considering the excellent and good outcomes as satisfactory 22 (75.87%) cases according to HOS and 23 (79.30%) according to MHSS.

Table I: Distribution of the cases (n=29) according to age and sex

Age in years	No.	%	Sex	Frequency	%
60 – 75	24	82.76	Male	15	51.72
76 – 85	05	17.24	Female	14	48.28
Total	29			29	
		100			100

Table II: Distribution of cases by their functional outcome

Limp	No.	%	Support	No.	%	Walking distance	No.	%
No limp	16	55.18	No support	18	62.06	Unlimited	15	51.73
Slight limp	12	41.38	Cane for long walk	06	20.69	Blocks	10	34.48
Moderate limp	01	03.44	Always on cane	05	17.25	Indoor	04	13.79
Total	29	100	Total	29	100	Total	29	100

Table III: Distribution of cases by their activity outcome

Sitting	No.	%	Climbing stairs	No.	%	Public transport	No.	%
Ordinary chair	29	100	Normal	10	34.48	Able	25	86.21
High chair	00	00	Using railing	15	51.72	Unable	04	13.79
Unable	00	00	Any manner	04	13.79			
Total	29	100	Total	29	100	Total	29	100

Table IV: Distribution of cases by post operative outcome

Complications	No.	%	Hip outcome score	No.	%	Modified Harris Hip Score	No.	%
Post operative fracture	00	00	Excellent	10	34.48	Excellent	12	41.39
Sinking prosthesis	00	00	Good	12	41.39	Good	11	37.91
Steam valgus	00	00	Fair	06	20.69	Fair	05	17.25
Infection	01	03.45	Poor	01	03.44	Poor	01	03.45
Total	01	100	Total	29	100	Total	29	100

Discussion

Treatment of choice for intracapsular femoral neck fracture among young people is anatomical reduction followed by stable fixation while preserving the femoral head. But there are numerous debates on the optimum surgical management in elderly patients. Internal fixation (IF) and arthroplasty (HA or THA) are two current options but debate continues on the role of IF versus HA, unipolar versus bipolar and whether or not prosthesis should be cemented. HA in comparison to IF, HA has a lower rate of surgical complications and better cost effectiveness than IF for the management of displaced femur neck fractures. On the other hand, IF has a less significant rate of deep wound infection, shorter operation time, less intra operative bleeding and lower rates of early mortality than arthroplasty. But HA is preferred rather than IF in patients older than 60 years in an acute or neglected Garden type III or IV fracture. Hemiprosthesis eliminate concerns about fixation failure, nonunion and avascular necrosis although they are associated with prosthetic loosening, acetabular erosion, late groin and thigh pain, and infection. Thompson HA was initially the treatment of choice to avoid a prolonged period of non or partial-weight bearing and

second surgery. But Thompson HA often produced pain, acetabular erosion and protrusion acetabuli that lead to bipolar HA design resulting better pain relief at longer follow-up and better Harris hip scores.

Most common cause of fracture femoral neck was minor trauma. Limping status improvement (no or slight limp) was 76.56 and lesser than that of Mazen (78.30%).¹⁵ In this study, majority 18 (62.06%) of the patients could walk independently even without a stick or cane which is near to the study of Gallanaugh (66%).¹⁶ This study achieved better functional activity score than Lausten's series (76% climbing stairs in relation to 86.2% for present study). Post operative complication was minimal; only one patient got infection (3.45%) out of 29 patients. This study reveals Hip Outcome Score (HOS) and Modified Harris Hip Score (MHHS) from fair to excellent was 96.56% and 96.55% respectively.

Conclusion

This study has shown that non-cemented bipolar prosthesis of femoral component of hip provided good functional outcomes with minimal complications for displaced

intracapsular fracture of neck of femur for elderly active patients.

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