*Original Article*

# Evaluation of Replacement Hemiarthroplasty in Femoral Neck Fracture by Bipolar Prosthesis through lateral approach

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***ABSTRACT:***

***Introduction****: Fractures of the neck of the femur, which is common in elderly people, remain in many ways an unsolved fracture to regain full anatomic and functional results. In our country many patients appear late at hospital and internal fixation in the elderly causes high incidence of non-union and avascular necrosis of the head of femur. To avoid these complications and to regain early ambulation, replacement hemiarthroplasty is preferred. We have studied the outcome of the hemiarthroplasty by bipolar prosthesis in lateral approach to hip.* ***Methods****: This prospective observational study was carried out in Dhaka Medical College Hospital (DMCH), National Institute of Traumatology and Orthopedic Rehabilitation (NITOR) and Clinics in Dhaka during the period of January 2006 to December 2007. 20 patients of both sexes were included by purposive sampling. Patients were followed up and evaluated by modified Harris Hip rating system.* ***Results****: Age of the patients varied between 45-84 years (average 65 years). 75% of the patients attended to hospital within 3 weeks and 25% patients between 3-12 weeks of injury. Patients were followed up at 6 weeks, 18 weeks, 30 weeks & 48 weeks after operation. At final follow up, 6 patients (30%) had no pain, 8 patients (40%) had slight pain, 6 patients (30%) had moderate pain. Limping- 5 patients (25%) had no limping, 10 patients (50%) had slight limping & 5 patients (25%) had moderate limping. 9 patients (45%) could walk long distance, 7 patients (35%) up to 6 block, 3 patients (15%) up to 3 block, 1 patient (5%) indoors only. 18 patients (90%) had good range of motion (>90%). Overall results using bipolar prosthesis were excellent in 8 patients (40%), good in 7 patients (35%), fair in 2 patients (10%), poor in 3 patients (15%); excellent and good results were considered satisfactory (75%).* ***Conclusion****: Replacement hemiarthroplasty by bipolar prosthesis is an effective method of treatment for displaced femoral neck fractures; it mobilizes the patient faster, decreases the morbidity rate and thus maximally improves overall results.*

***Keywords****: hemiarthroplasty, femoral neck fracture, bipolar prosthesis.*

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## INTRODUCTION:

Fractures of the of the neck of the femur have always presented great challenges to orthopaedic surgeons and remain in many ways the unsolved fracture as far as treatment and results are concerned.[1] This is a common fracture in the

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elderly. Anatomical reduction of skeletal parts and internal fixation with or without muscle pedicle bone graft are different modalities of treatment, are associated with prolonged immobilization, high incidence of non-union and avascular necrosis. Because of various problems, replacement hemiarthroplasty by using unipolar Austin Moore, Thompson prosthesis or bipolar prosthesis can be considered as one of the acceptable means of treatment. Conventional one piece Moore or Thompson device represents a significant step forward. However, the incidences of unsatisfactory results remain unacceptably high in many studies, which led to the development of bipolar prosthesis introduced by Bateman. The bipolar concept was born of the need to establish fixation of the stem in the femoral shaft, yet eliminate shear forces between metallic prosthetic head and acetabular cartilage. Most motion would occur at the inner bearing whereas outer bearing would provide stability but remain free to allow motion during extreme demands of excursion.

**METHODS AND MATERIAL:**

This is a prospective observational study done between January 2006 to December 2007 in the department of Orthopaedic Surgery of DMCH, NITOR and some clinics in Dhaka. All patients with clinical and radiological evidence of femoral neck fracture were admitted in the hospital for surgery. Twenty patients of both sexes were included by purposive sampling.

All patients were on surface traction, analgesics and prophylactic antibiotic. After proper clinical-radiological examinations and all relevant investigations, they were operated in lateral (Hardinge) approach to the hip under spinal anesthesia. After exposure and removal of femoral head, prosthetic head selected to fit snugly in the acetabulum, shaping of the neck and prepare tract in the femur, prosthesis was inserted. After the end of first week, active abduction, extension, leg raising (upto $40^0$) exercises are encouraged along with quadriceps and ankle movements. Patients were discharged 15 to 21 days after surgery and by this time gait training was complete. Patients were followed up at outpatient department at 6 weeks, 18 weeks, 30 weeks and 48 weeks after operation and evaluated by using modified Haris Hip rating system.

**RESULTS:**

**Table-1: Result Analysis in Terms of Function:**

| Factors | No of Patients | Percentage |
|---|---|---|
| A) Pain | | |
| ▪ No pain | 6 | 30% |
| ▪ Slight pain | 8 | 40% |
| ▪ Moderate pain, occasional | 5 | 25% |
| ▪ Moderate pain, constant | 1 | 5% |
| B) Limping | | |
| ▪ No limping | 5 | 25% |
| ▪ Slight limping | 10 | 50% |
| ▪ Moderate limping | 5 | 25% |
| C) Gluteal muscle wasting (Trendelenburg test) | | |
| ▪ Non or negligible | 13 | 65% |
| ▪ Mild to moderate degree of gluteal muscle wasting | 7 | 35% |
| D) Function | | |
| ▪ Could walk unlimited | 9 | 45% |
| ▪ Could walk up to 6 block | | |

| Factors | No of Patients | Percentage |
|---|---|---|
| ▪ Could walk up to 3 block<br>▪ Could walk indoor only | 7<br>3<br>1 | 35%<br>15%<br>5% |
| E) Squatting, sitting<br>▪ Sitting in low chair, squatting & praying<br>▪ Sitting in high chair, No squatting or praying | <br><br>11<br><br>9 | <br><br>55%<br><br>45% |
| F) Range of motion<br>▪ Good range of motion > $90^0$<br>▪ Less range of motion < $90^0$ | <br>18<br>2 | <br>90%<br>10% |

**Table-2: Outcome of the procedure:**

| Category | No of Case | Percentage |
|---|---|---|
| Excellent | 8 | 40% |
| Good | 7 | 35% |
| Fair | 2 | 10% |
| Poor | 3 | 15% |
| Total | 20 | 100% |

Excellent & Good results together are considered as satisfactory in this study. Fifteen patients (75%) had satisfactory results and five patients (25%) had unsatisfactory outcome.

Modified Haris Hip score was calculated according to pain, function- gait, support, distance walked and functional activities- stairs, socks/shoes, sitting, public transportation- in each patients and the average was 81.75.

The complications encountered due to surgery had been described in 3 groups- per-operative, early post-operative, and late postoperative. Since all patients concerned were discharged from hospital within 4 weeks after surgery. It was chosen 4 weeks as dividing line between early & late. Per-operative complications were, difficulty in reaming in two cases, in which medullary canal was reamed with intramedullary nail reamer, separation of polyethylene covered cup from inner head in 1 patient which was assembled again and transfusion reaction in one case. Early superficial infection encountered in one case. Late complications were deep infection in one case, which was diagnosed by aspiration of pus and culture sensitivity and radioisotope scan. Organism identified by culture sensitivity was staphylococcus epidermidis, which was treated accordingly. Radiolucent zone > 2 mm around femoral stem (loosening), in 3 patients. Sinking of prosthesis was seen in 1 patient.

**DISCUSSIONS:**

The problem of hip fracture is one of the oldest chapter in orthopaedics. Despite numerous technical advances, the goal is to rapid return of all patients to full function, has remained elusive.[2] Whatever the treatment to be adopted for femoral neck fracture in the aged patient, it should allow immediate and unrestricted movement.

Many researchers noted that as age advances, both the percentage and speed of union decline sharply following treatment of femoral neck fracture with internal fixation. Their opinion was that internal fixation should not be used with elderly patients, since there were no advantages in terms of morbidity and mortality, and there were significant disadvantages for obtaining adequate mobility. There was a high rate of technical failure (60%), and more than one-third of all the internally fixed fractures require revision, persistent pain was also a major problem.[2]

The present series which include 20 cases of femoral neck fracture in the aged patients, treated with replacement hemiarthroplasty with bipolar prosthesis, with a mean follow up period of 10

months 18 days (range 6 months to 18 months), shows satisfactory result in 75% cases.

During the period of January 2006 to July 2007, these 20 patients with femoral neck fracture were treated in DMCH and NITOR, of which 13 (65%) were female and 7 (35%) were male. Similar sex incidence was observed by Lausten in 1986 (77.50% women and 22.50% men), Gallinaro in 1988 (79.58% women and 20.56% men), Moshein in 1989 (74.75% female and 23.25% male), Mistry in 1989 (70% female and 30% male) and Nottage in 1989 (75% female and 25% male).[3,4,5,6,7] But another study in this institute differ in sex incidence, which was done by Talukder in 1995 showed 56.25% male and 43.75% female.[8] The difference is probably due to the small series of Talukder and statistically the difference is not significant. All these studies suggest that fracture neck of femur is more common in females.

In this study, the average age was 65 years, range 45-84 year. The most common age group was between 65-74 years which constituted 45% of the series. This result corresponds to the series reported by Moshein (Range 58-92 year, average 74.2 years), Lausten (47-99 years, average 77 years). Nottage (Range 22-89 year average 65 years) and Talukder (Range 55-75 years, average 63 years). The most common causes of fracture neck of femur in the present series was minor trauma, such as fall on slippery ground and stumbling, which constitute 75% of cases. Fall from Rickshaw and direct trauma made of 25% cases. This is consistent with Talukder's study.[8]

The mean period of Hospital stay in this present study was 36.1 days. This is similar to Talukder study in this Hospital, which was 38.6 days.[8] In other studies outside this country average Hospital stay was lesser, such as 10.90 days by Lestrange series.[2]

Pain is a subjective sensation and sensitivity varies from person to person. There is no definite method available to measure pain. In the present study 70% of patient had no or slight pain. This is similar to 85% reported by Moshein, and 90% reported by Gallinaro, and 88.4% reported by Labelle. [4,5,13] The slight differences probably due to their long term follow up.

In the present series 75% of patients had no or slight limping. And 80% of patients achieved good function and activities which corresponds with the study of Lausten, which was 90%.[3] Regarding the movement of hip, 90% of patients had acquired almost full ranges of motion (Flexion $90^0$ or more, abduction > $15^0$, adduction > $15^0$, external rotation > $30^0$& internal rotation> $15^0$) with satisfaction which is similar to the study of Surya Bhan.[9]

In a study of patients with displaced sub capital femoral neck fractures treated by hemiarthroplasty through both antero-lateral and postero-lateral approach, it was noticed that dislocation and infection were more common after posterior approach.[13] In this series there was no dislocation but infection occurred in one case (5%). In the recent literature the rate is under 1% and is not higher than open reduction and internal fixation.[10] The relatively higher infection rate of the present series is probably because of the small sample size.

No erosion of the acetabulum was found in this series. In other series also very little or no acetabular erosions were seen.[11,12]

The overall outcome of the study is similar to two other studies conducted at NITOR; Talukder in 1995 studied replacement hemiarthroplasty by Austin Moore prosthesis in femoral neck fracture in elderly on 16 patients with mean follow up of 9 months and 4 days with satisfactory result of 68.75% and in 1989 Mistry studied 30 patients with mean follow up of 13 months and 19 days with satisfactory result of 86.67% and statistically the difference is not significant. West and Mann reported 91% good to excellent result in 48 cases with an average follow up period of 19.5 months. In several studies of Bateman bipolar arthroplasty, there were good to excellent results in their fracture groups.[12,13,14]

Welterell and Hinves conducted a trial with bipolar Hasting prosthesis in 161 fractures and found movement of the hips to be better than with Moore or Thompson type with no acetabular erosion in

four years fallow up.[15] In the present series also had no acetabular erosion. Labelle found that seventy nine percent of surviving patients had no or slight pain after their primary procedure of Bateman bipolar hip prosthesis in 5 to 10 years follow up. This is similar to the present study, though the follow up in the present series was very short in comparison to Labelle's series.[13]

The average hip score of Labelle series in 80 cases of arthroplasty for femoral neck fracture treated by bipolar prosthesis was 81.75 (range 32-98). This is similar to the present series. In present study all bipolar prosthesis done was non-cemented. So, no comparison has been done with cemented prosthesis. Labelle showed that cement enhances fixation and decrease pain and bipolar component prevent protrusion. The cemented Bateman bipolar prosthesis appears to yield result as good as or better than non-cemented bipolar Bateman prosthesis.[13]

Although the Harris hip scores system was used for comparison to previously reported series. This is not an accurate method for comparing pre-operative function in elderly hip fracture patient. A more accurate scoring system would compare the patient's pre-operative and post-operative status.[5] In this series, average hip score of 81.75 compares favorably to other bipolar studies in the literature. Moshein studied 87 elderly patients with sub capital hip fractures treated by Bateman bipolar hip hemiarthroplasty, using Harris hip score. In his study the mean follow up was 24 months and the average hip score was 82.4 point. He also has questioned the significance of radiolucent line, sclerosis at the hip prosthesis and subsidence of femoral component.[5] Lucent lines occurred in 15% cases in the present study, subsidence occurred in 5% cases. No sclerosis at the hip of prosthesis occurred. It is seen that replacement hemiarthroplasty for the displaced fracture of femoral neck in the elderly does not carry excessive risk of morbidity and mortality. After a good technical expertise during the procedure, good supportive care, prophylactic antibiotic, adequate physical therapy and nursing care, replacement hemiarthroplasty by bipolar prosthesis is preferred choice in the treatment of displaced femoral neck fractures; it mobilizes the patient faster, decreases the morbidity rate and thus maximally improves overall results.

**CONCLUSION:**

Despite refinement of the guidelines for the use of an internal fixation or endo-prosthesis of either unipolar or bipolar prosthesis, in the management of femoral neck fracture, no universally accepted treatment regimen currently exists for the "unsolved fracture."

Replacement hemiarthroplasty by bipolar prosthesis can be considered as a rational choice in the treatment of femoral neck fracture in the active younger patient. Less tissue handling, close post-operative follow up and active muscle exercise are essential for producing good results. As acetabular erosion and protrusion appears to have been reduced to some extent, a bipolar hip prosthesis is found to be a good alternative to conventional hemiarthroplasty in the elderly patients with fracture of the femoral neck.

In the present study we did not use cemented bipolar prosthesis. Different studies concluded that fixation of the prosthesis with cement improve the clinical outcome, which can be studied in future studies. The long term results are beyond the scope of this study. So this can be followed up by a long term study.

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