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MANAGEMENT OF INTRACAPSULAR FRACTURE NECK OF THE FEMUR IN ELDERLY WITH BIPOLAR HEMIARTHROPLASTY

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ABSTRACT: OBJECTIVES: To evaluate the results of bipolar hemiarthroplasty with respect to pain, range of motion, clinical functional outcome and complications in cases of Intra capsular fracture neck of femur treated with bipolar hemiarthroplasty. **METHODS:** The present study consists of 22 adult patients of Intra capsular fracture neck of the femur, who are treated with Bipolar hemiarthroplasty in Government General Hospital, Vijayawada from 01-07-2012 to 31-06-2014. The patients were followed up at an interval of 6 weeks, 3 months and 6 months and their functional outcome assessed using Harris Hip score. **RESULTS:** The mean age of our patients was 65.3 years with range from 60 to 75 years. There were 8 males and 14 females. 12 fractures were left. Sided and 10 were right sided. Type of fracture is Type-3 8 and Type-4 are 14 according to Garden's classification. Hospital stay range from 7-30 days with average of 15 days. We observed that 16 patients in our series had no pain. Out of 6 patients who had slight pain, one patient had superficial infection and rest of the patients had no post-operative complication. Seven of our patients have varying degree of limping. 7 patients had excellent results with Harris Hip Score, 12 patients had good results and 2 had fair results.

KEYWORDS: Intracapsular fracture of neck of femur, Bipolar prosthesis, Posterior approach.

INTRODUCTION: Femoral neck fractures, recognized since the time of Hippocrates, still remain a vexing clinical problem for orthopaedic surgeons. The fracture neck of femur is one of the commonest fractures in elderly. With life expectancy increasing with each decade, our society is becoming increasingly an active geriatric society, with significant number of hospitalized and nursing home patients with femoral neck fractures and their sequelae. It has always presented great challenges to orthopaedic surgeons and even today it remains an unsolved fracture as far as treatment is concerned.¹ Intracapsular femoral neck fractures account for about 50% of all hip fractures. The lifetime risk of sustaining a hip fracture is high and lies within the range of 40% to 50% in women and 13% to 22% in men. Life expectancy is increasing worldwide, and these demographic changes can be expected to cause the number of hip fractures occurring worldwide to increase from 1.66 million in 1990 to 6.26 million in 2050.² Various methods of treatment have been employed since ages. The prolonged immobilization in elderly, will further lead to decubitus problems and associated complications, and hence surgery was resorted to achieve early ambulation. It is known fact that the hip is a weight bearing joint performing many functions. A successful surgery at the joint should provide painless, stable hip with wide range of movements.

Several authors have considered replacement of the femoral head as an alternative due to the frequent development of nonunion, failure of osteosynthesis and avascular necrosis of the femoral head.^{3,4} Prosthetic replacement of femoral head with hemiarthroplasty has been the gold standard now in the management of intracapsular fracture neck of femur in geriatric patients. The advantages being early weight bearing to return to activity and help avoid complications of the fracture healing

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like nonunion and osteonecrosis. Selection of the type of prosthesis is very important in hemiarthroplasty as different types are available. Although the fixed head endoprosthesis like Austin-Moore Prosthesis has produced excellent results,^{5,6} persistent pain and protrusion acetabuli have been associated with this device and led many surgeons to choose a bipolar system. This prosthesis is very useful and results are encouraging. Since the last two decades, bipolar replacements of the femoral head have gained popularity for treating femoral neck fractures. These devices incorporated the principles of low-friction arthroplasty including fixation with polymethyl methacrylate. In this, the majority of motion is supposed to occur between the small inner metallic head and the ultrahigh molecular weight polyethylene socket. The polyethylene socket is bonded to an outer stainless steel shell and this shell articulates with the acetabulum. The lessening of motion at the outer metallic shell-acetabular interface reduces erosion and penetration of the acetabulum.

AIMS AND OBJECTIVES: To evaluate the results of bipolar hemiarthroplasty with respect to pain, range of motion, clinical functional outcome and complications in cases of Intra capsular fracture neck of the femur treated with bipolar hemiarthroplasty. The subjects were patients admitted to Government General Hospital, Siddhartha Medical College, Vijayawada between 01-07-2012 to 31-06-2014.

METHODS: The present study consists of 22 adult patients of Intracapsular fracture neck of the femur, who are treated with Bipolar hemiarthroplasty in government general hospital, Vijayawada from 01-07-2012 to 31-06-2014. The patients were followed up at an interval of 6 weeks, 3 months and 6 months and their functional outcome assessed using Harris Hip score.

Inclusion Criteria:

1. Patients with Intracapsular fracture neck of the femur with age>60 years.
2. Patients who were able to walk and live independently prior to the fracture.
3. A hip with no or minimal osteoarthritic changes.

Exclusion Criteria:

1. Age of the patient <60 years.
2. Neurological disorders that may significantly influence walking ability.
3. Pathological fractures secondary to malignant disease.
4. Concomitant other fractures.
5. Acute infections of the hip joint or anywhere systemically.
6. Very high surgical risk.

OBSERVATION & RESULTS: The average age of patients in our series range from 60 years to 75years. We had intra operative complications in five patients, in two increasing duration of surgery and in another three increased amount of blood loss. Duration of surgery was also noted as one of the factor which was considered in our study. The duration of surgery ranged from 60min to 120min.

The amount of blood loss is also an important factor because we operated many patients 15 (68.18%) whose hemoglobin was less than 10gm %. So pre-operative blood transfusions as well as intra-operative and post-operative blood transfusions were done. The blood loss was noted from 250ml to 500ml with average of 300ml.

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Minimal reaming was done in all cases to prevent fat embolism and proper placement of the femoral stem in the proximal femoral shaft. In all cases in the intra-operative period close monitoring of the blood pressure and SPO2 was done by the anaesthetist.

Post-operative Complications: There was superficial infection in two patients (9.09%). No patient had deep infection, dislocation of prosthesis or loosening of the stem. Limb length discrepancy seen in 2 (9.09%) patients, of which lengthening was noted in both patients. However, the limp was corrected with a shoe raise for the shorter limb. No patient developed Heterotopic Ossification, Periprosthetic fractures. In our study we did not find any case of DVT/PE and there were no mortalities.

Follow up: The activity level was checked at regular interval at 6 weeks, 3 months, and 6 months. Most patients were able to perform house hold activities and were able to walk outside and to their work. The ambulation was started on 3rd -10th post-operative day. All the patients were able to walk comfortably with partial weight bearing walking with walker except few. But after 6weeks, many patients walked comfortably without walker just holding the walking stick. Harris Hip Score was evaluated at 6 weeks, 3months, and 6months. We assessed all patients during follow up visits with check X-ray and follow up X-rays for positioning of the prosthesis, any radiological signs of loosening.

Acetabulum was normal till the last follow up in all cases; no acetabular erosion was noted in our study. Range of movements was calculated in all patients. All the patients were able to do more than 90 degree flexion, more than 30degree of abduction at regular follow up. We did not allow patients to cross leg sitting and squatting in our follow up. At the follow up we noted that few patients were squatting against our advice and used to sit on the floor comfortably. Others used to sit on chair and they used western toilet. The pre fall activity level was achieved by 10 (45.45%) patients by the end of 3 months and 20 patients (90.91 %) by the end of 6 months. Only 2 patients (9.09 %) unable to get their pre fall level.

DISCUSSION: Management of fracture of femoral neck still remains major and difficult undertaking for an orthopaedic surgeon. The pendulum is swinging between reduction and internal fixation with various supplementary methods as osteosynthesis to total hip replacement. It is now the general feeling that reduction and internal fixation should be reserved for the younger patients in whom if needed revision surgery may be done at a later date. Primary prosthetic replacement should be considered in older patients who are active and need early mobilization. The concept of dual bearing surfaces offers considerable advantage, it results in sharing of motion at the two surfaces and hence

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reduction of net wear at either surface, thus reducing erosion at the acetabular–joint interface. In addition, the total range of motion of joint is increased.

In India, the technically demanding procedure of total hip replacement lacks universal application and the hemireplacement procedure needs to have continued application to fill the lacuna produced by deficient resources and finances. In this context we undertook the present study to evaluate the immediate and early results of hemiarthroplasty in fracture neck of the femur using bipolar prosthesis keeping in view the living condition of an average Indian.

Age Distribution: - The average age of our patients was 65.3 years. Majority of the patients were between 60-70years. The physiological age of our patients is more than the chronological age and hence these patients are considered old for all practical purposes. Similar age distribution is reported by other authors. Saxena & Saraf⁷ (1978) 66 years, Mukherjee & Puri⁸ (1986) 65 years, Nottage and Mc Master (1990)⁹ 65 years, Garrahan and Madden (1990)¹⁰ 66 years, La Belle et al (1990)¹¹ 72.5 years, Gallinaro et al (1990)¹² 75 years, Lestrangle (1990)¹³ 79.7 years, Gupta et al (1994)¹¹ 54 years.

Sex Incidence: In our series the intracapsular fracture of femoral neck were found to be more common in females. The elderly females are more prone to fracture neck of femur due to osteoporosis (Choudhari & Mohite¹⁴ 1987). Female preponderance has been reported in several series. Moore¹⁵ (1957): 62.5%, Campbell (1960): 80.9%; Cone (1963): 73.6%; Anderson & Neilson (1972): 85%; Sikroski & Barrington (1981): 66.7%; Arwade (1987): 68.3%, John E. Kenzora (1998): 77.4%. In our series 63.64% of the patients were females.

Side of Fracture: Left side is more affected than right in our series. Similar results were observed in several studies. Boyd and Salvatore¹⁶ (1964) reported 55% fractures on left side. D'Acry and Devas¹⁷ (1976) similarly found 55.4% fracture in left hip of their patients. In our series 54.55% of patients had left side fractures.

Type of Fracture: All the fractures in our series belonged to displaced fractures of Garden Type III and IV. Depending on the anteroposterior radiographs available, we could group 8 patients (36.36%) into type III and 14 patients (63.64%) into Garden type IV. G.S. Kulkarni¹⁸ (1987) had grouped type III and type IV into one group of 'displaced fractures' and reported it in 82.5% of his patients. Mukherjee & Puri⁸ (1986) had 85% patients of Garden type III and IV fractures.

Nature of Injury: 86.36% of our patients had trivial trauma and 13.64% of the cases of fracture were due to severe trauma like road traffic accidents. This is in accordance with majority of the series reported-[Gyepes¹⁹ (1962), Solomon (1968), Evarts²⁰ (1973), Seth²¹ (1987) etc.], several other authorities believe that the intracapsular fracture are stress fractures through pathological bone secondary to osteoporosis or osteomalacia.

Associated Medical Problems: The common problems in our series were anaemia, hypertension, diabetes mellitus, chronic bronchitis and bronchial asthma. Fifty percent of our patients had one or more of the problem. Hinchey and Day²² (1964) reported similar problems in 84.6% of their patients, whereas rest also had slight anaemia and mild hypertension with good health. Anaemia was a major problem which is not commonly found in western literature. Most of the patients were anemic and received pre-op, intra-op, and postoperative blood transfusions as required. Ischaemic heart diseases are common in western series, which are not found so common in our series.

Type of Prosthesis: We have used the Uncemented Bipolar Hemiarthroplasty technique in all of our cases. Some studies showed better clinical ratings with uncemented bipolar than cemented bipolar.^{23,24,25} The peri-operative variables like duration of surgery, amount of blood loss, length of hospital stay and postoperative complications (DVT, chest infection, mortality) were found to be less in the uncemented prosthesis group. The size of prosthesis commonly used was 41mm & 43mm for female and 45mm & 47mm for male cases. The average duration of surgery was 75min. The average blood loss in surgery was 300ml. Other series show that cemented hemiarthroplasty is better than uncemented.^{26,27} These studies found that a cemented hemiarthroplasty led to less pain in the hip, improved return of mobility and a reduced hospital stay compared to an uncemented prosthesis.

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COMPLICATIONS: The complications following the hemiarthroplasty for fracture neck of femur is reported in varying incidences. Moore (1957)¹⁵ reported 16.6% mortality; Stinchfield and Cooperman (1957) reported 4% dislocation, 6% fractures of the proximal femur. Temporary mental confusion was the commonest complication in the immediate post-operative period of Hinchey and Day (1964)²² series. Salvatti et al (1973) reported 14.3% mortality, 8.3% superficial infection in their patients. C.M Robinson et al²⁸ (1994) reported 11% mortality within one year, 5% infection, 2% deep vein thrombosis and 3% dislocation in their series. We had no operative deaths in our series.

Infection: In our series 2 patients (9.09%) had superficial wound infection. One patient was diabetic. They developed signs of infection in the first week of operation. They were treated with proper antibiotics and dressings. These infections were found when the patients were still in the hospital and this resulted in prolongation of their hospital stay.

The organisms isolated in the above cases were: *Staphylococcus aureus*. Gingras et al (1980) stated that infection was the devastating complication of hemiarthroplasty. Superficial infection could be successfully treated with antibiotics, local measures and drainage. Deep infections most of the time need removal of the prosthesis. Early deep infections may present as an acute, potentially fatal clinical course with septic shock to mild low grade pain in the thigh or groin (Salvatti et al (1974),²⁹ Moore (1940), and Wood et al (1980) have reported extremely high mortality following infection of the prosthesis. We had no mortality in our series.

Dislocation of the Prosthesis: Dislocation of the Bipolar prosthesis is a rare phenomenon. It has been reported in literature ranging from 1.1% at one year follow up to 5% at 20 years.³⁰ However, in our series, no dislocation has occurred at final follow up. In 1998, John E. Kenzora et al.³¹ noted that all 6 dislocation in their series followed after posterior approach. Dislocation is a well-known complication of posterior approach. In our series, we had done 15 cases through posterior approach, but there was no dislocation.

Periprosthetic Fractures: No patient in our series sustained Periprosthetic fracture. Hinchey and Day²² (1964) emphasize that all fractures occur when the surgeon attempts to reduce the prosthesis

Painful Prosthesis: We observed that 16 patients (72.73%) in our series had no pain. Out of 6 patients who had slight pain, one patient had superficial infection and rest of the patients had no post-operative complication.

Pain following hemiarthroplasty is a major concern.

Approximately 20% of unipolar prostheses implanted in the mobile independent elderly need revising because of pain.^{32,33} Up to 50% of these revisions are required within 3 years.³³

Hinchey and Day²² in their series of 294 patients found pain following hemiarthroplasty in 22 patients in the early post-operative period. They could not find any definitive cause in them. They suspected poor muscle control as the probable cause of pain. The pain was mild to moderate and required treatment. Lanceford³ (1965) felt that the pain following hemiarthroplasty should not be the cause for condemning the procedure. He listed following causes for pain: Infection, improper prosthetic seating, metallic corrosion and tissue reaction, improper sized femoral head, contractures, periarticular ossification, toggle or acetabulaar wandering and redundant ligamentum teres.

Pain was the main criteria for assessing the functional results in majority of the series.

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Hinchey and Day (1964)²² reported the use of radiotherapy and intraarticular steroids. It relieved pain in 15 patients and failed to do so in 7. Intraarticular steroids gave relief in one patient. Revision arthroplasty was also reported in one patient. Active exercises of gluteal and quadriceps muscles relieved in 7 patients after a period of 8 to 20 months. Coventry (1964)³⁴ recommended physiotherapy, local intraarticular steroids, revision, replacement, girdle stones arthroplasty and Milch Bachelor arthroplasty for painful prosthesis. Now total hip arthroplasty (Muller 1984) is the procedure of choice.

Our 6 patients required treatment for pain. Four of them are partially relieved by analgesics.

Two patients with slight pain were regularly on analgesics. In our study we did not find any case of Deep Vein thrombosis or Pulmonary Thromboembolism³⁵ and there was no mortality.

Total Functional Results: Various criteria were used to assess the functional results following hemiarthroplasty. How best the patient could be returned to the pre-fracture state has been the main criteria. In India, our customs demand squatting and sitting cross legged without difficulty. To achieve this patient should have good range of flexion, abduction, adduction and external rotation at the hip and full flexion at the knee. The distance patient could walk with or without support and the amount of movements at the hip are the major factors determining results in the western series whereas ability to squat and sit cross-legged was principally emphasized by Indian series. The final results at final follow-up after hemiarthroplasty in our series were analyzed by modified Harris hip scoring system.³⁶

In our series, 7(31.82%) patients had excellent results with Harris Hip Score more than 90, 12 (54.55%) patients had good results with 80 to 90 score, 2(9.09%) had fair results with score 70 to 80 and 1 (4.55%) had poor results with score <70.

The difference between excellent and good results is minimal and therefore they can be grouped together as satisfactory (good) results.

The results are compared with the available western and Indian series where hemiarthroplasty was done for the treatment of fracture neck of femur in elderly patients.

The satisfactory results in our series were 86.37%. Our results are comparable with other series: Hinchey and Day²²: 72.8%; Lanceford³ 81%; 80.3%; Salvatti et al: 57%; Saxena and Saraf⁷: 90.9%, Mukherjee⁸: 78%.

Mean Harris Hip Score for Bateman's Bipolar prosthesis was 85 and for Unipolar hemiarthroplasty was 77 in other series³⁷ and in our series was 85.

RADIOGRAPHIC RESULTS: In our series, at the end of final follow-up, there was no evidence of loosening, radiolucent zones, distal migration or subsidence of prosthesis.

CONCLUSION AND SUMMARY:

- Hemiarthroplasty is a common procedure in the treatment of femoral neck fractures in elderly. Decision to perform hemiarthroplasty using either unipolar or bipolar prosthesis remains controversial with proponents on either side.
- Unipolar hemiarthroplasty has been shown to produce good results, though there is high incidence of erosion, protrusion and needs revision in future.

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- The concept of dual bearing surfaces offers considerable advantage, it results in sharing of motion at the two surfaces and hence reduction of net wear at either surface, thus reducing erosion at the acetabular–joint interface. In addition, the total range of motion of joint is increased.
- From our relatively short-term prospective nonrandomized study, we conclude that bipolar hemiarthroplasty produces good functional outcomes with minimal complications for displaced intracapsular femoral neck fractures and has several advantages; these results are comparable to the other studies.

SUMMARY: This series consisted of 22 cases of intracapsular fracture neck femur treated surgically by Bipolar hemiarthroplasty. In the present study, out of the 22 patients 14 were females accounting to 63.64% and 8 were males making up the remaining 36.36%. Females are more affected than males. Age of all the patients in this study, ranged above 60 years. Majority of the patients were in the age group between 60 to 70 years. In this study group, left side (54.55%) was more commonly involved than the right (45.45%). The average interval between admission to the hospital and surgery was 4.5 days with a range of 2 to 15 days. The average duration of hospital stay was 15 days with a range of 7 to 30 days. The commonest mode of injury occurred due to fall on a slippery floor (86.36%) and Road Traffic Accident (13.64%). Harris hip score was used to evaluate the functional results. Using this rating scale, the functional outcome was measured. There were Seven patients (31.82%) with excellent results, Twelve patients (54.55%) with good results, Two patients (9.09%) with fair results and One patient (4.55%) with poor outcome.

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