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Midterm Results of Cemented Primary Total Hip Replacement for Femoral Neck Fractures in an Asiatic Population

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Abstract:
Purpose: *To report the midterm outcome of displaced neck of femur fractures in the independent adults in the age range 50-65 years, managed with total hip arthroplasty through a lateral approach.*
Methods: *Between 1998 and 2008, a surgeon performed a cemented hip replacement using a modified lateral approach in 50 consecutive patients with garden type III or IV fracture neck of femur. Their clinical records were reviewed with respect to outcomes, with particular reference to complications. Independent review of functional outcome was completed at one year post surgery and final assessment at 10 years post op.*
Results: *At an average follow-up of 9.8 years (range, 3–10 years), two patients needed further surgery. All other medical complications were successfully treated. The overall prevalence of early medical complications was 43%. There was one dislocation, and 80% of patients had a good clinical outcome at their last follow-up.*
Conclusion: *The modified lateral approach of Hardinge's minimises the incidence of postoperative dislocation. However, there was a high incidence of medical complications and aggressive treatment of such complications was necessary, both preoperatively and postoperatively. The number of pre-existing medical conditions was a significant factor influencing patient morbidity.*
Key words: ***F****emoral neck fractures; medium-term results; total hip replacement.*

I. Introduction

Fracture neck of femur is an important orthopaedic problem and constitutes a major portion of the workload of an orthopaedic surgeon.[1] The fracture has a tremendous impact on the health care system of the society as it consumes a significant chunk of the health care resources. As the life expectancy increases and the population ages, the incidence of fracture neck of femur is bound to increase.[2] Primary goal of treatment in fracture of the neck of femur is to return the patients to their pre-fracture activity level as early as possible so as to avoid complications of prolonged recumbency.[3] Management of undisplaced intra-capsular neck of femur fractures is invariably internal fixation. However, the management of displaced femur neck fracture is variable and different methods of treatment have been used, which goes on to prove that no method is perfect. Most of the surgeons favour reduction (open or closed) and internal fixation for displaced fractures in patients less than 60 years old.[4] In elderly individuals, internal fixation is associated with very high rate of re-operations, avascular necrosis and non-union.[5,6] Because of these reasons, most of the surgeons prefer to replace the head in elderly individuals with displaced fracture of neck of femur. The conventional Austin-Moore and Thompson's prosthesis have fallen in disrepute due to their poor outcomes in active patients because of poor femoral fixation and acetabular erosion.[7,8] Currently modular hemiarthroplasty (unipolar or bipolar) is the preferred implant in this group of patients. Primary total hip replacement (THR) is traditionally recommended in patients with co-existing osteoarthritis, rheumatoid arthritis, osteoporosis or conditions with acetabular involvement.[9] However, recently there has been an increased interest in primary THR in active elderly patients with displaced neck fractures.The present study was done to evaluate mid-term results of primary THR using cemented Charnley components in displaced neck of femur fractures in patients aged between 50 and 70 years.

II. Material and Methods

The study was conducted in the Bone & Joint Surgery Hospital, the associated hospital of Government Medical College, Srinagar, India between 1998 and 2007. All the displaced neck of femur fractures (Garden type III and IV) admitted to the orthopedic unit and fulfilling the inclusion criterion of the study were given the choice of THR after explaining the advantages and disadvantages of the procedure. The inclusion criterion included patients in the age group of 50-70 years who were independently mobile before fracture, without any

pre-existing hip disorder and agreeing for the procedure. Patients with major medical problem, progressive neurological disease, active infection and any other factor contraindicating total hip arthroplasty were excluded.

After initial assessment and evaluation in the emergency department of our hospital, radiographs of pelvis with both hips AP and internal rotation view of the affected hip were taken. A detailed and informed consent was taken from all patients. The patients were operated in the earliest possible operation list. The surgery was carried out in lateral decubitus position via the lateral approach. Acetabulum was exposed and prepared after removal of the femoral head. Deepening and expanding reamers were used to prepare the acetabulum. Three large anchor holes and multiple small drill holes were made in the acetabulum. Trial components were used to evaluate the fit and bony coverage of the components when placed in optimum position. The cup was placed using cement in 40°-50° of abduction and 15°- 20° of anteversion. The femoral canal was prepared by removal of all loose cancellous bone and meticulous drying. A cement plug was placed distally, and the cement gun was used to introduce cement in a retrograde manner. We used standard Charnley's components in all the patients since they were available in the hospital and were provided free to the patients. A stainless-steel polished flatback femoral stem with a 22.25-millimeter-diameter head, and an ultra-high molecular weight polyethylene acetabular component were inserted.

Wound was closed in a standard fashion. Intravenous antibiotics (cefazolin) was started prior to surgery and continued for 5 days post-operatively, while amikacin was started post-operatively and continued for 3 days. Bedside physiotherapy was started on the first post-operative day, followed by partial weight-bearing with crutches for six weeks and progressing to full weight-bearing as tolerated. Patients were followed regularly at 3 months, 6 months, 1 year and every two years. For radiographic evaluation standard pelvis AP and lateral radiographs of the hip were taken. The Harris Hip Score was used to determine the functional level at the most recent follow up.

III. Results

During the study period sixty two patients underwent THR for displaced fracture of the neck of femur consisting of 45 males and 17 females. The age of the patients ranged from 51 years to 69 years, with the average age of our patients being 59.27 years. The right and left sides were involved almost equally. 55 patients had a fall from standing height, 3 had fall from height and 4 patients sustained fracture following road traffic accident. 43 patients had Garden type IV and 19 patients had Garden type III fracture. Three patients were lost to follow up and four patients died due to causes unrelated to the fracture before completing a minimum follow-up of 5 years. Thus, the results are based on the 55 patients who had a minimum follow up of at least five years. At the latest follow-up, 51 patients were alive while 4 patients had died due to unrelated causes. The latter had been following up regularly before their deaths and none of these patients had required a revision before death. The prosthesis was functioning in 46 patients while 5 patients had undergone revision.

Eighteen patients had no pain, 25 had slight or occasional pain and 7 had mild pain. Three patients had moderate pain and two had marked pain. Nine patients had a slight limp, two had moderate limp while the rest of patients had no limp. In the patients with moderate limp, one had limb length discrepancy of more than one inch while the other had loosening of implant. 29 patients needed no support for walking while 12 used a cane for long distances. Seven patients used one crutch, three patients required two canes and four patients used a walker. Two patients were confined indoors while 28 patients were able to walk unlimited distances. Six patients had shortening of less than 1.5 cm and none of these had any symptoms, while one patient had shortening of 2.5 cm. Two patients developed lengthening of approximately 1.5 cm. Forty patients had a good range of motion, 10 had mild restriction and 5 patients had severe restriction of range of motion

The Harris Hip Score (HHS) at final follow-up ranged from 38 to 96 with the mean Harris Hip Score of 80.24. There were 22 excellent (HHS 90 and above), 19 good (HHS 80-89), 10 fair (HHS 70-79) and 4 poor results (HHS less than 70).

Osteolysis was seen around the acetabular component in 19 (34.5%) and around the femoral component in 23 (41.8%) patients. In the acetabulum, four patients had osteolysis in zone I, two in zone I and II, 3 in zone I and III, 7 in zone II and III and three patients in zone III. DeLee and Charnley zone III was the most common site of osteolysis. On the femoral side osteolysis was most commonly seen in the Gruen zone I and VII. 14 patients had osteolysis in zone VII alone and four patients had femoral osteolysis in zone I and VII.

Early complications which occurred in our patients include dislocation in two patients and superficial infection in three patients. The dislocations were managed by closed reduction and traction for 6 weeks and the patients did not report any further episodes of dislocation. The superficial infections were managed with antibiotics and the patients continued to do well. Two patients developed deep infection which required debridement, removal of implants and girdlestone arthroplasty as the patients did not agree for revision arthroplasty. Two patients developed aseptic loosening on the acetabular side and one on the femoral side. All these patients had pain on weight bearing, relieved on rest with radiological evidence of loosening of 2 mm or more. All the three patients underwent revision. Two patients developed heterotopic ossification, which in turn

lead to a restriction of hip movements. Foot drop occurred in the post-operative period in two patients which recovered completely in both the patients. None of the patients had a periprosthetic fracture during the follow-up.

IV. Discussion

Treatment of undisplaced fracture neck of femur is universally accepted to be osteosynthesis whereas treatment of displaced fractures continues to be controversial. In young patients attempts are always made to preserve the native head, while in the elderly most of the surgeons prefer replacement. The patients in the 6th and 7th decades of their life present a dilemma as both methods have their proponents, with a lot of emphasis being laid on the physiological age of the patient. Internal fixation, despite its advantages of preserving the native head, is associated with a number of complications like non-union and avascular necrosis. Meta-analyses have shown internal fixation to be associated with a high rates of revision surgeries.[10-15]

Primary THR has an established role in the treatment of displaced neck of femur fractures. Studies have shown that primary THR for displaced neck of femur fractures have better long term hip function and significantly low re-operation rate as compared to internal fixation without increasing mortality.[16-21]

Dislocation rate in our study was 10%. Ghazi et al[22] In a long term follow-up study over a period of 17 years in a group of healthy, elderly, patients with a displaced femoral neck fracture found that THR provided better hip fixation and significantly fewer re-operations compared to internal fixation without increasing mortality. They used cemented femoral and acetabular component via postero-lateral approach. Dislocation was found in 9 out of 43 patients, lateral pain in 1, periprosthetic fractures in 2. Total number of patients with Hip complication was 14. J. Rai et al[23] in a series of 50 patients of displaced femoral neck fracture treated with primary THR after an average follow up of 56 months noted 6% incidence of loosening of femoral components which were asymptomatic. Woo and Morrey found the dislocation rate to be 5.8% when a postero-lateral approach was used compared with 2.3% when an antero-lateral approach was used because there is tendency to retrovert the socket when THR is performed through a posterolateral approach.[24]

Cement loosening was seen in three patients in our series (two on acetabular side and one on femoral side). Some authors have defined stem loosening into probable and possible categories, based on the number and extent of radiolucency present in the bone cement interface.[25] An acetabular cup is said to be loose if there is migration of the cup and if there is a complete circumferential radiolucency between bone and cement around the cup.[26,27]

Osteolysis and polythene wear which is the most serious long term complication and most common indication of revision occurs due to host response to particulate debris. Radiolucencies to massive bone loss and implant failure are the clinical consequences of osteolysis.[28] Tanzer et al reported osteolytic lesions in 13% of patients and this was first noted radio graphically at a mean 39 months of the surgery.[29] Osteolysis was seen in 15% of patients in our series.

Aseptic loosening was seen in three of our patients and all the patients were revised. Loosening has been found to be more frequent in young, more active patients than elderly patients and has been found to correlate with the activity level.[28] This was comparable to the series by Exeter [5%][30] and in the Zoran and Cupic series [2%][31]

Heterotopic ossification was seen in 15% of our patients but most of them were asymptomatic. Anterior an antero lateral approach carry a higher risk of heterotopic ossification than transtrochanteric or posterior approaches. Heterotrophic ossification was seen in 50% of patients by Riegller and Harris.[32] NSAIDS and low dose radiation have been used in prevention of heterotopic bone formation. Hedley et al reported no clinical evidence of loosening, subsidence or radiolucent lines around cemented prosthesis after irradiation.[33] Various Hip scores are available and are convenient for rating the results of total hip arthroplasty. Among these, Harris hip score is the widely used scoring system available. It combines different parameters including functions and pain relief. Using Harris hip score, we had 22 excellent (HHS 90 and above), 19 good (HHS 80-89), 10 fair (HHS 70-79) and 4 poor results (HHS less than 70). Zoran Cupic (31) had 91% patients classified as good, 6% as fair and 3% as poor. Bhan et al [28] had results as good in 75% cases, fair in 18% cases and poor in 7% cases.

V. Conclusion

We conclude that modified Harding's approach for total hip arthroplasty minimises the chances of immediate postoperative and long term complications. Also, functional score of the hip joint is good to excellent in patients in the midterm follow up. Moreover, Charneley s hip system still has a role in as it provides good midterm results and can be compared with the advanced systems available at present.

Declarations
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Conflict of interest: Nil

Ethical approval: All patients gave written informed consent to be included in this study, and the study was authorized by the local ethical committee and performed in accordance with the ethical standards of the 1964 Declaration of Helsinki as revised in 2000.

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