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A study on functional outcome of bipolar hemiarthroplasty in fracture neck of femur

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Abstract

Introduction: Neck of femur fractures are commonly seen in the elderly age group. They are mostly seen in patients above 60 years of age.

Materials and Method: Our aim is to assess the functional outcome of bipolar hemiarthroplasty in elderly aged patients. 20 patients above 60 years of age, with fracture of femoral neck, were included in this study. They were treated with either cemented or uncemented bipolar hemiarthroplasty. The clinical and radiological follow-up was done for a minimum period of 12 months. The results were assessed using Modified-Harris Hip Score (HHS).

Results: Total of 20 patients, in which 12 males and 8 females with an average age of 62 years, were 9 patients had associated co-morbidities. After 12 months of follow-up using Modified HHS, 13 had excellent results, 6 had good results, 1 had a fair result and no poor results were seen. The mean Modified Harris hip score was 89.5. There was no mortality and one patient was lost to follow up. There were no acetabular erosion, acetabular protrusion, or heterotopic ossification recorded in any of the patient during the follow-up.

Conclusion: All the patients had a satisfactory functional outcome. To conclude, the bipolar prosthesis is a safe modality in treating femoral neck fractures in elderly patients with good functional outcomes.

Keywords: Bipolar hemiarthroplasty, fracture neck femur, functional outcome, Harris Hip Score

Introduction

In recent years the incidence of neck of femur fracture is increasing in elderly age group and is the commonest injury causing both morbidity and mortality in the old age group^[1].

Fracture neck of femur is commonly seen in old aged people. Mostly low, energy fall is the cause of injury. In rare cases there is no trauma history and maybe pathologic or a stress fracture in nature^[3]. Femoral neck fractures have always been a challenge to orthopaedic surgeons. They are associated with a lot of co-morbid conditions like hypertension, cardiac problems and diabetes, along with prolonged immobilization due to fracture leads to increased morbidity and mortality. So, early mobilization after surgery is essential in femoral neck fractures^[4]. An undisplaced femoral neck fracture is mostly treated with internal fixation^[6]. But mostly, the fractures are displaced and seen in elderly patients in which bones are osteoporotic in nature. Hemiarthroplasty is the most common treatment for displaced femoral neck fractures in the elderly and is associated with better functional outcomes and lesser complications than internal fixation^[5]. Bateman, in 1974 introduced the prosthesis, which had a mobile head element and had an additional head surface to allow movement within the acetabulum^[6]. This led to reduced wear of acetabular surface and the prosthesis. In modern days, the cemented bipolar prosthesis is the best option, but the modular bipolar prosthesis with or without cement can give good active life to the treated patients. Some surgeons would like to do the total hip replacement in an older patient, as a primary procedure. Despite developments in the field of replacement surgery, most surgeons still prefer to do hemiarthroplasty as a primary procedure as it is always possible to do total hip replacement later^[1].

This study was to evaluate the functional outcome of bipolar hemiarthroplasty in fracture neck of femur, by assessing the quality of life and degree of function with the help of Modified Harris Hip score.

Materials and Methods

A prospective study was conducted in the Department of Orthopaedics in Rajah Muthiah Medical College, Chidambaram on 20 patients attending OPD and Emergency unit diagnosed as neck of femur fracture, with a minimum follow-up of 12 months.

Inclusion Criteria:

1. Patients having a fracture of neck of femur.
2. Adult patients aged more than 60 years
3. Medically fit for surgery.
4. Ambulatory before fracture.

Exclusion Criteria:

1. Patients below 60 years of age.
2. Pathological fracture of the neck of femur.
3. Not willing for surgery

All patients were evaluated pre-operatively by a detailed history and clinical examination. Associated medical conditions were treated. Pre-anesthetic medications and the antibiotic protocol were given to all patients. All patients were operated on under Spinal or combined Spinal Epidural. All the patients were operated on using the posterior southern Moore's approach, Starting an incision which is 10cm distal to the posterior superior iliac spine and extending it distally and laterally parallel with the fibers of the gluteus maximus towards the posterior margin of the greater trochanter then directing the incision distally 10 to 13 cm, parallel to the femoral shaft.

- Expose and divide the deep fascia in line with the skin incision.
- The gluteus maximus fibers are separated by blunt dissection, taking care not to disturb the superior gluteal vessels in the proximal part of the exposure.
- By Retracting the proximal fibers of the gluteus maximus proximally, a greater trochanter is exposed and the distal fibers are retracted distally.
- Expose the sciatic nerve and retract it carefully. (After the surgeon becomes familiar with this approach, he or she rarely exposes the sciatic nerve). Divide a small branch of the sacral plexus to the quadratus femoris and inferior gemellus, which contains sensory fibers to the joint capsule.
- Expose and divide the gemelli and obturator internus and, if desired, the piriformis tendon, place tag sutures in the tendons for later identification, and the muscles are retracted medially.
- The joint capsule is now exposed, using an inverted T-shaped incision, incise it from distal to proximal fashion along the line of the femoral neck to the rim of the acetabulum.
- Distal part of the capsule is detached from the femur.
- The fractured femoral head was delivered using a judet head extractor/corkscrew device aided with bone levers after cutting the ligamentum teres.

The anterior and posterior edges of the fascia are bluntly dissected from underlying gluteus medius fibers that insert into the undersurface of this fascia. Suture moist towels to the fascial edges anteriorly and posteriorly to exclude the skin, prevent dissection of the subcutaneous tissues, and collect cement and bone debris during the operation. Insert a Charnley self-retaining retractor beneath the fascia lata at the trochanter level. Excise residual soft tissue along the

intertrochanteric line and expose the upper edge of the lesser trochanter.

Mark the level at an angle of the proposed osteotomy of the femoral neck with the electrocautery or with a shallow cut with an osteotome. Many systems have a specific instrument for this purpose. If not, plan the osteotomy by using a trial prosthesis. Use the stem size and neck length trials determined by pre-operative templating. Align the trial stem with the center of femoral shaft and match the center of trial femoral head with that of the patient. The level of the neck cut should be the same distance from the top of the lesser trochanter as determined by preoperative templating. Make the provisional femoral neck osteotomy 2 mm above this level. Carry out the osteotomy with an oscillating or reciprocating power saw. If this cut passes below the junction of lateral aspect of the neck and greater trochanter, then a separate longitudinal cut will be required. Avoid notching the greater trochanter at the junction of these two cuts because this may predispose to fracture of the trochanter. Remove the remaining soft tissue attachments. Cement fixation is indicated in patients with physiologic age greater than 60 years and when the femoral cortex is thin or osteoporotic and secure press-fit fixation is unlikely.

A small tapered awl is inserted to locate the medullary canal. The tip of the awl is inserted into the lateral most aspect of the cut surface of the neck and then the awl is swung into the greater trochanter to point it toward the medial femoral condyle. This maneuver ensures neutral positioning of the femoral component. The proximal femur is reamed gradually with increasing size reamers. The trial component is introduced and reduction carried out to determine limb length. Depending on the discrepancy, the prosthesis is chosen.

The proximal femur is cleared of the debris. A vent is placed inside the medullary canal and connected to suction. After changing gloves, 40 grams of cement is mixed and the cement is moulded into the shape of a sausage and pushed into the canal using first-generation cementing technique. After the cavity is filled, the cement is pressed with the thumb. If internal fixation devices have been removed from the femoral shaft during the same procedure, then the holes left in the femoral cortex must be occluded to allow pressurization of cement and to prevent egress into soft tissues.

Immediately following introduction of cement, the femoral component is kept ready with the desired amount of anteversion, the prosthesis is introduced manually. Fine pressure is maintained after impacting the prosthesis. The cement protruding out from the region of the collar should be removed so that the stem is inserted fully. The excess cement should be cut and removed and not pulled. Otherwise, the proximal support will be lost.

All debris and blood collected should be removed carefully. Now the wound is irrigated with saline, after which the femoral head is reduced into place. Finally the stability of the hip joint and movements are checked under direct vision.

Post-operatively, patients were kept with limbs in wide abduction, and internal rotation and extreme flexion were avoided to prevent dislocation. Static quadriceps exercises were started from the first day. Partial weight-bearing with help of a walker was started on third day and progressive weight-bearing was started. Suture removal was done on 14th post-operative day. Strengthening exercises like active flexion and extension of the knee joint were done under physiotherapist supervision. All patients were instructed not to sit cross-legged or squat. All patients were followed up at 1 month, 3 months and at 6 months and 24 months. The

minimum follow-up was 24 months and modified Harris Hip Score was noted and radiographs of the affected hip were taken.

Results

The clinical and radiological outcomes of 20 patients were assessed in this study. All patients in this study were above 60 years of age. In the study of 20 patients with a femoral neck fracture, the average age of the patients was 65.2 years. The right side was involved in 12 patients and the Left side in 8, and the male-female ratio was 1.5:1. Out of 20 patients 9 patients had co-morbid conditions. 5 patients had DM and HTN, 3 had HTN alone, 1 had DM only. There were 4 base cervical fractures, 10 transcervical fractures, and 6 subcapital femoral neck fractures. The average duration of surgery was 45min, with an average blood loss of 190 ml. The mean hospital stay duration of was 6.8 days. There was one postoperative mortality. Limb length discrepancy was associated in 2 cases out of 20 cases. Shortening was seen in 1 case, with a maximum shortening of 1cm managed by a shoe raise. A lengthening of 1 cm was seen in 1 case. The complications that occurred were a total of 4 in 20 patients. Two patients had a superficial infection which was managed by aggressive antibiotic therapy according to culture and sensitivity reports and frequent dressings, and the patients recovered from the infection but had a delayed functional recovery according to Modified Harris hip score. At the final follow-up of 24 months, the mean modified Harris hip score was 89.25 ranging from 66 to 93. 12 patients showed excellently, 6 patients showed good, 1 patient showed fair and no poor results were recorded in our study.

There were no acetabular erosions, acetabular protrusion or heterotopic ossification were seen during the follow-up period.

Discussion

A femoral neck fracture is a very common fracture in the elderly population following a trivial trauma. Hemiarthroplasty involves replacing the femoral head with a prosthesis while retaining the natural acetabulum. The aim of hemiarthroplasty for fractured neck of the femur has been the early rehabilitation of patients with various comorbidities. The mean age of cases with femoral neck fracture in the study was 67.2 years. Bansal *et al.* [7] in the study found an average age of 65 years in 25 patients with a neck of femur fracture treated with bipolar hemiarthroplasty. Ponraj *et al.* [3] reported an average age of 65 years in their study of 30 patients with fractured neck of femur treated with bipolar hemiarthroplasty. Tuteja *et al.* [8] reported an average age of 63.5 years. Fractures of the femoral neck are common in the older population due to osteoporosis.

The gender distribution of the cases was 12 males and 8 females, amounting to 60% and 40%, respectively, which is compatible to other studies. Ponraj *et al.* [3] found a similar distribution of cases amongst both genders with 63% males and 30% females in a study of 30 patients undergoing bipolar hemiarthroplasty for fractured neck of femur. Bansal *et al.* [7] reported 56% of females and 44% of males in a study of 25 patients undergoing bipolar hemiarthroplasty fracture neck of femur.

In the present study, out of 20 cases right side was involved in 12 cases amounting to 60% and the left side was involved in 8 cases, amount into 40% of cases. Raghavendra *et al.* [9] in their study of 20 patients of intracapsular fracture neck of femur in elderly patients undergoing cemented bipolar

hemiarthroplasty, reported 50% involvement of both right and left side.

In the present study the most common anatomic fracture pattern was transcervical, followed by subcapital and basicervical. Bansal *et al.* [7] in the study found 84% of patients with transcervical fracture, 12% of patients with basicervical fracture and 4% of patients with subcapital fracture. At the final follow-up of 6 months, the mean Harris hip score was 88.5 points to the standard deviation of 4.96. 12 patients rated excellent, amounting to 50%, 6 patients rated good amounting to 42%, 2 patients rated fair and no poor outcome, according to the modified harris hip score on the final follow up. These results are comparable to other studies. Sharoff *et al.* [10] reported 44.7 percent of cases with excellent harris hip score at final follow up in a study of 43 patients undergoing bipolar hemiarthroplasty for fracture neck of femur.

Somashekar *et al.* [11] reported a mean harris hip score of 86.18.18 in 20 patients undergoing bipolar hemiarthroplasty for fracture neck of femur, which is comparable to the current study. They reported excellent results in 47% of patients, good in 41% of patients, which is comparable to the present study. Balan *et al.* [12] in their final follow up, reported excellent results in 58.8% patients, good in 35.3% patients and fair in 5.9% patients in their study of 34 patients undergoing bipolar hemiarthroplasty for fracture neck femur.

In the present study, most of the patients, amounting to 97%, were able to do their daily activities by themselves at the final follow-up. Similar results were reported by Mazen *et al.* [13], who reported that 89.2% of patients either returned to the functional level that they had before the fracture or used only Again, which they had not needed before.

The complications that occurred were a total of 4 in 20 patients, amounting to 20%. Similar complication rates were reported by Tuteja *et al.* [8] in their study of 20 patients undergoing bipolar hemiarthroplasty for femoral neck fracture, with Infection in 1 patient, dislocation in 1 patient, mortality in 1 patient.

Limb length discrepancy was associated in 2 cases out of 20 cases. Shortening was seen in 1 case the maximum shortening of 1cm in 1 case. Lengthening of 1 cm was seen in 1 case out of 20 cases. Similar results were reported by Tuteja *et al.* [8] who reported a mean limb length discrepancy of 0.47cm with a standard deviation of 0.66cm. Bansal *et al.* [7] reported limb lengthening in 2 cases out of 25 patients in their study. Ponraj *et al.* [3] also reported limb lengthening in 2 cases out of thirty patients with a maximum lengthening of 1 cm.

Conclusion

In our study, all patients had satisfactory functional outcome with majority having excellent to a good outcome and all the patients resumed to their normal daily activity. To conclude, bipolar prosthesis is a good and safe modality in treating femoral neck fracture in elderly age (above 60 years) with good recovery and pain-free function in spite of having several co-morbidities and minimal complications

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