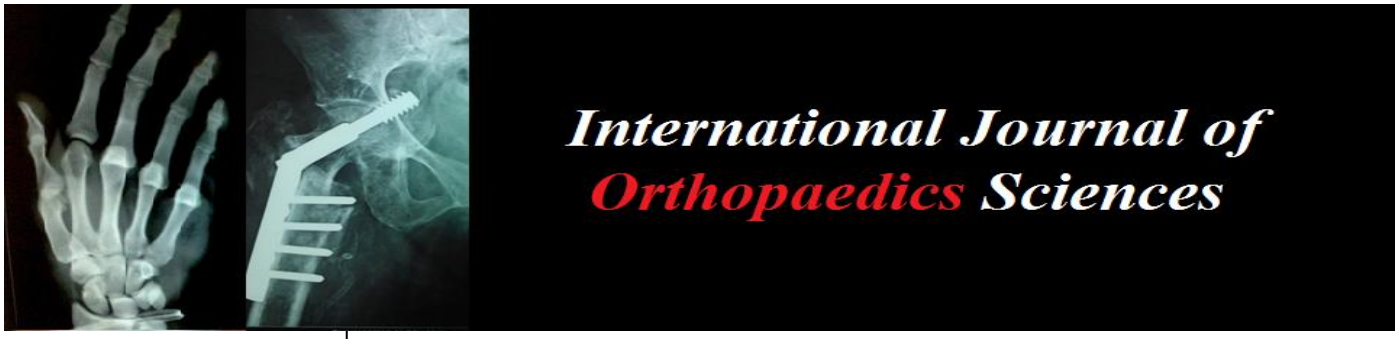

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Prospective study of hemiarthroplasty for intracapsular fracture neck of femur using modular bipolar prosthesis

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Abstract
Fracture neck of femur is a leading cause of hospital admissions in elderly age group. The number of such admissions is on a rise because of increased longevity, osteoporosis and sedentary habits. Conservative methods of treatment is not acceptable because it results in nonunion with unstable hip and limitation of hip movement as well as complications of prolonged immobilization like bed sores, deep vein thrombosis and respiratory infections. Hemiarthroplasty remains the most common modality of treatment in our country. The time-tested unipolar prosthesis is being slowly replaced by bipolar prosthesis which is claimed to have a lower incidence of complications.
Aim: This study was conducted to analyze the results of surgical management of fracture neck of femur using modular bipolar hemiarthroplasty.
Methodology: The present study was a prospective study of fracture neck of femur admitted to Bapuji Hospital, and Chigateri General Hospital attached to J.J.M. Medical College, Davangere, treated with modular bipolar prosthesis.
Results: In our series of 20 cases there were 8 males and 12 females, with a maximum age of 92 yrs, minimum age of 50yrs and an average age of 65 years. At the final one year follow up assessment with Harris Hip Score, 75% of the patients achieved an excellent or good result.
Conclusion: Modular Bipolar hemiarthroplasty for fractures of the femoral neck provides better range of movement, freedom from pain and more rapid return to unassisted activity with an acceptable complication rate. Though out of the purview of the present study our experience with modular bipolar prosthesis have been significantly better than that with Austin Moore's Prosthesis.

Keywords: fracture neck femur, elderly, hemiarthroplasty, modular bipolar prosthesis, harris hip score

Introduction
Femoral neck fractures, one of the most common injuries in the elderly, have always presented great challenges to orthopaedic surgeons. With our society becoming more and more a geriatric society, the burden of this fracture and its sequelae continues to be on the rise [1]. The goal of treatment of femoral neck fractures is restoration of pre-fracture function without associated morbidity [2]. The introduction of a single piece unipolar metal prosthesis by Thomson in 1954 and Austin Moore in 1957, to replace the femoral head ushered in the era of hemiarthroplasty of the hip as a treatment for these fractures. Experience of the last four decades has shown that hip arthroplasty is the best treatment for intracapsular fracture neck of femur in elderly in terms of both short-term and long-term results [3]. The problems encountered with unipolar prostheses (Austin Moore's Prosthesis and Thomson's Prosthesis) were acetabular erosion and loosening of stem giving rise to pain. Bateman in 1974 introduced the Bipolar prosthesis which had mobile head element and had additional head surface to allow movement within the acetabulum. This led to reduced wear of acetabular surface and hence reduced incidence of pain and acetabular protrusion because motion is present between the metal head and the polyethylene socket (Inner bearing) as well as between the metallic head and acetabulum (outer bearing) [4].
The advantage of the system is in the modularity obtained from the different sized stems, shell which are available in increments of size allow exact matching of the head and the ease with bipolar system was to allow early and full mobilization in the immediate postoperative period and to maintain a balance between mobility and stability.

Which the system can be converted to Total hip Arthroplasty without replacing the stems[5]. The objective of modular The long-term benefits would be a reduced incidence of acetabular erosion and prevention of stem loosening and subsequent pain [5].

Materials and Methods

The present study was a prospective study of 20 cases of intracapsular fracture neck of femur admitted to Bapuji Hospital, and Chigateri General Hospital attached to J.J.M. Medical College, Davangere, between the study period of October 2015 to October 2017. Cases were selected according to inclusion and exclusion criteria i.e., patients with intra-capsular fracture neck of femur above the age of 50yrs.

Procedure: All cases were done under regional anaesthesia which included spinal or epidural anaesthesia.

Surgical Approach - Moore's posterior approach to the hip: After induction of either spinal or epidural anaesthesia the patient was placed on the lateral position on the operative table with the affected side facing up. A curved incision is taken from 8 cm distal to the posterior superior iliac spine, extended distally and laterally, parallel with fibers of gluteus maximus muscle to the posterior margin of the greater trochanter. The incision is then directed distally 5-8 cms along the femoral shaft. The deep fascia is exposed and divided in line with the skin incision. By blunt dissection the fibers of the gluteus maximus are separated taking care not to disturb the superior gluteal vessels in the proximal part of the exposure. The gluteus maximum muscle is split and short external rotators are exposed. Stay sutures are applied to the short external rotators, and a tenotomy of the short external rotators is done close to their insertion on the inner surface of the Greater trochanter. The short external rotators are retracted to protect the sciatic nerve and expose the posterior hip capsule. The capsule is incised by a T-shaped incision, and the hip flexed, adducted and internally rotated to dislocate the hip joint. Using a head extractor and bone levers, head is delivered out of the acetabulum and the acetabulum is cleared of debris. The size of the extracted head is measured by using measuring gauze, and the size of prosthesis is selected.

Preparation of proximal femur and insertion of trial implants: The neck is trimmed leaving 1cm medial calcar, on which the shoulder of the prosthesis would eventually sit. The femoral canal is reamed with increasing sizes of the reamers. The proximal femur was reamed with rasp, the length of the rasp corresponding to the stem of the prosthesis. After cortical reaming is felt, broaches are placed precisely. The fit of the broach within the canal is assessed. Adequate axial and rotational stability is tested with no motion of the broach in the canal.[5,6] The direction of the insertion of the rasp and trial implants was ascertained by using the lesser trochanter as a guide to achieve correct seating of the prosthesis in 10-15° anteversion. Then appropriate size of head and neck trial implants was snapped over the trial stem and whole assembly was reduced, and stability and limb length was checked. Once the reduction was satisfactory, remove the trial implants and insert original prostheses [6].

Insertion of the modular bipolar prosthesis: The appropriate sized prosthesis (as measured from trial implants) is inserted into the reamed canal taking care to place it in 10-15° of anteversion. The final seating of the prosthesis is by gentle blows with the help of a mallet and the insertor. Adequate seating of the prosthesis on the calcar is visualized directly. The hip joint is reduced by gentle traction with external rotation of the hip and simultaneous manipulation of the head of the prosthesis into the acetabulum. The range of movement in all directions is checked by taking the joint through the whole range of movements. The stability of the prosthesis and its tendency to dislocate is checked by flexing and adducting the hip. The limb is kept in slight abduction and external rotation for suturing the wound. Great care is taken to achieve adequate closure of the posterior capsule and anatomical reattachment of the short external rotators. The rest of the wound is closed in layers over a suction drain placed beneath the gluteus maximus. Haemostasis is maintained throughout the procedure.

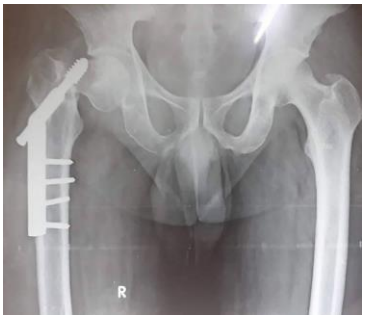
Results

In our series of 20 cases there were 8 males and 12 females, with a maximum age of 92 yrs, minimum age of 50yrs and an average age of 65 years. There was a slight predominance of left sided fractures when compared to the right. The mean duration of hospital stay was 22 days.

At the final one year follow up assessment with Harris Hip Score 6 patients (30%) achieved 'Excellent' result, 9 patients (45%) achieved 'Good' result, 2 patients (10%) achieved 'fair' result and 3 patients (15%) achieved 'poor' result. Overall, 75% of the patients achieved an excellent or good result. On enquiry regarding the overall satisfaction with the procedure and return to pre-fracture levels of activity, 8 patients (35%) were 'very satisfied', 12 (50%) were 'fairly satisfied' and 2 (15%) were 'not satisfied'.

Final Harris hip score and clinical result

Grade	Harris hip score	No of patients	Percentage
Excellent	90-100	6	30
Good	80-89	9	45
Fair	70-79	2	10
Poor	<70	3	15

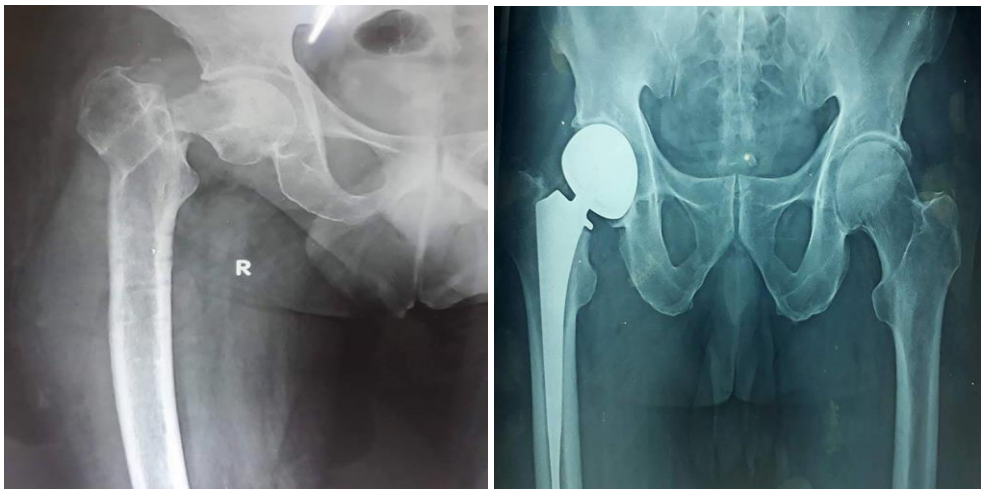


Pre op

Post op

Flexion, Abduction and Adduction movements

Case 1: Patient details – Srinivas, 54 years male



Pre op Post op

Case 2: Patient details- Rangappa, 65 years male

Discussion

The aim of replacement surgery in trans-cervical fracture neck femur is early return to daily activities. This is particularly applicable to the elderly age group where complications need to be prevented.

The mean age of the patients in the present study was 65 years. The aim of assessing age is to estimate the patient's mean survival time and their ability to comply with rehabilitation protocol. Patients with hip fractures have an increased mortality rate during the first year after fracture but after one year the mortality rate is comparable to that of the general population.

As in most standard studies, the present study also had a higher number of females with the left side more commonly affected than the right.

Majority of our study patients (70%) sustained the injury due to a trivial trauma like tripping or slipping. Most of such injuries can be classified as "indirect" trauma. Other patients (30%) due to a Road Traffic Accident.

Majority of the patients (80%) had a trans-cervical fracture while 3 patients had a basicervical and sub-capital fracture in one. The anatomical type of fracture and the displacement did not have any bearing on the final function.

All patients were operated after being put into lateral decubitus position by the posterior approach of Moore.

Technical difficulties encountered with the procedure were most often related to the operating surgeons' learning curve. The main difficulty faced was calculating the angle of the

neck osteotomy which in the case of the bipolar prosthesis was more vertical as compared to the traditional Austin Moore's Prosthesis. This resulted in poor seating of the prosthesis collar on the neck and calcar. The second difficulty encountered was difficulty in reduction with proper size prosthesis in old, neglected fracture neck of femur cases because of soft tissue contracture even though after putting on skeletal traction.

Most of our study patients were mobilized in bed on day one of surgery and with weight bearing as tolerated within the 72 hours postoperative period. Delay if at all was due to medical reasons.

The minimum duration of hospital stay amongst the study patients was 10 days and maximum duration was 18 days with the average being 14 days. Average hospital stay of 21 days with bipolar hemiarthroplasty has been reported by Lestrange [8]. Drinker and Murray have reported an average hospital stay of 23 days with the same procedure [9].

All patients were followed up regularly at 6wks, 3 months, 6 months, 9 months and one year. Only the patients who completed a one year follow-up were included in the final analysis. The Harris Hip Scores were recorded at each follow-up visit.

Comparison of clinical result with standard studies

Grade	Our Study	Moshein [7]	Lestrange study [8]
Excellent	30	40	39.6
Good	45	25	31.2
Fair	10	23	15.3
Poor	15	12	13.9

Conclusion

Modular Bipolar hemiarthroplasty for fractures of the femoral neck provides better range of movement, freedom from pain and more rapid return to unassisted activity with an acceptable complication rate. The end functional results depend on the age of the patient, associated co-morbidity and optimum post-operative rehabilitation.

Through out of the purview of the present study our experience with modular bipolar prosthesis have been significantly better than that with Austin Moore's Prosthesis. The advantage of the system is in the modularity obtained from the different sized stems and, neck which is available in different sizes; and the ease with which the system can be convert into total hip arthroplasty without replacing the femoral stem.

The long term results using modular bipolar hemiarthroplasty needs further study for a longer period in a larger sample.

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