

Primary Hemireplacement Arthroplasty in the Management of Unstable Intertrochanteric Fractures

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ABSTRACT

BACKGROUND

Intertrochanteric fractures¹ are a major cause of morbidity and mortality in the elderly population. They make up to 55% of all hip fractures. 35-40% of these fractures are unstable three- and four-part configurations with displacement of posteromedial cortex. Comminuted and unstable² inter-trochanteric fractures in the elderly osteoporotic patients pose challenging problems with increased rate of morbidity and mortality. Conservative treatment with traction and prolonged immobilization result in several dreaded complications. Surgery in these fractures is very important for the prevention of complications associated with conservative treatment like pressure sores, pulmonary infection, atelectasis, malunion etc. Osteosynthesis³ by internal fixation does provide immediate fracture fixation, but in elderly patients with osteoporotic bones, complications like implant loosening, implant penetration, loss of fixation, cut through of implant are not uncommon. As a result, unstable intertrochanteric fractures in elderly patients are associated with high rates of morbidity and mortality⁴

METHODS

In our study during the period from April 2017 to April 2019, 30 patients with comminuted intertrochanteric fracture femur were operated by using the cemented bipolar prosthesis at Osmania General Hospital who were more than 70 years of age with osteoporotic bone.

RESULTS

Functional evaluation was done by Harris hip score. Excellent to fair results were obtained in 28 (93%) cases, and in 2 (7%) cases the results were poor. Mean hospital stay was 12+/- 0.6 days. There was one case of a superficial operative site infection and one case of a deep infection. There was one case with implant loosening⁵, and sinking noted in one case. Limb length discrepancy was noted in 3 cases. Osteoporotic bones with comminuted fractures do not provide a good purchase for the implants, which subsequently leads to an early implant failure resulting in collapse of the fracture. Early mobilization is very essential particularly in patients with other medical co-morbidities. Both, stability and early ambulation are only possible with primary cemented hemiarthroplasty. It thus helps in preventing postoperative complications of prolonged recumbency such as pressure sores, pneumonia, atelectasis, etc. The concept of dual bearing surfaces offers considerable advantages, it results in sharing of motion at two surfaces and thus reducing erosion⁶ at the acetabular joint surface.

CONCLUSIONS

Primary hemi replacement bipolar arthroplasty offers early painless mobility, ease of rehabilitation and early return to function, especially in complex trochanteric fractures, in the elderly and osteoporotic group. Our results are comparable to previous studies described in literature.

KEY WORDS

Intertrochanteric Fracture, Hemiarthroplasty, Bipolar Prosthesis

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BACKGROUND

Intertrochanteric fractures are a major cause of morbidity and mortality in the elderly population. The incidence of all hip fractures is approximately 80 per 100,000 persons. Intertrochanteric fractures make up to 55% of all hip fractures. 35-40% of these fractures are unstable three- and four-part configurations with displacement of posteromedial cortex. Surgery in these fractures is very important in the elderly patients for the prevention of complications associated with conservative treatment like pressure sores, pulmonary infection, atelectasis, malunion etc. Osteosynthesis by internal fixation does provide immediate fracture fixation, but in elderly patients with osteoporotic bones, complications like implant loosening, implant penetration⁷, loss of fixation, cut through of implant are not uncommon. The failure rates of these unstable fractures fixed with sliding hip screws averages approximately 6-32%. PFN failure⁸ rates are 5-15%. As a result unstable intertrochanteric fractures in elderly patients are associated with high rates of morbidity and mortality.⁹ Thus, is the emerging role of cemented bipolar hemiarthroplasty in the management of unstable intertrochanteric fractures, aimed at early rehabilitation and mobilization.

The aim of this study is to evaluate the functional and clinical outcomes of cemented bipolar hemiarthroplasty as a primary treatment of choice for unstable intertrochanteric fractures in the elderly age group.

METHODS

During the period from April 2017 to April 2019, 30 patients with unstable intertrochanteric fracture femur were treated by using the cemented bipolar prosthesis at Osmania general Hospital. This study was approved by the institutional ethics committee. All the patients provided written informed consents.

Inclusion Criteria

1. Patients more than 70 years of age with fresh and old intertrochanteric fracture femur.
2. With osteoporotic bone.

Exclusion Criteria

1. Intertrochanteric fracture femur in patients below 70 years.
2. Intertrochanteric Fracture femur associated with fracture shaft of femur, and acetabular fracture.
3. In the presence of any sepsis or any localized septic focus in the body.

Preoperative templating of radiographs was done to determine the approximate size and position of the stem and the approximate femoral neck offset. All surgical procedures were performed by using Moore's approach, with the patients in the lateral position. Skin incision was taken from a point 10 cm distal to posterior superior iliac spine and extended distally and laterally parallel to the fibres of gluteus maximus to the posterior margin of the greater trochanter and then directed about 10 cms parallel to the femoral shaft. After

incising the deep fascia gluteus maximus was split in the direction of its fibres by blunt dissection. By retracting the proximal fibres of the muscle proximally, the greater trochanter is exposed. Distal fibres are retracted distally and partly divided at their insertion into the linea-aspera in line with the distal part of the incision. The fractured greater trochanter is reflected anteriorly. The external rotators and the piriformis tendons were divided at their insertions after tagging them for easier identification and reattachment. After incising the capsule and exposing the neck of the femur, osteotomy¹⁰ was done on the neck, and the hip was dislocated posteriorly. The head of the femur was levered out of the acetabulum and the size was measured using template, the size was confirmed using a trial prosthesis¹¹. The femoral shaft was rasped using a broach (rasp) and prepared for the insertion of the prosthesis. Bipolar stem was cemented in place in 10-15° of anteversion using standard cementing techniques – lavage, cleaning, drying and plugging of the canal. Then the greater trochanter was put back in place, in case of comminution it was fixed using a SS wire or TBW¹². After suturing the capsule, the external rotators were sutured back, the wound was closed in layers over a suction drain, which is removed at the first change of dressing after 48 hours.

Postoperative Care

Mobilization- From the first postoperative day, the patient was allowed to weight bear depending on his/her pain tolerance and encouraged to walk thereafter. Sitting cross-legged and squatting were not allowed. Suture removal was done on the 10th to the 12th postoperative days and the patients were discharged later.

Protocol for Follow Up

All patients were followed up at 6 weeks, 3 months and 6 months post-operatively with the longest interval being one year. Clinical evaluation was done by using Harris Hip score¹³. The HHS score gives a maximum of 100 points. Pain receives 44 points, function 47 points, range of motion 5 points, and deformity 4 points. Function is subdivided into activities of daily living (14 points) and gait (33 points). The higher the HHS, the less dysfunction¹⁴.

Statistical analysis of HHS is given below.

RESULTS

In the present study, thirty (30) cases of Intertrochanteric fracture femur were treated with cemented bipolar hemiarthroplasty between April 2017 to April 2019. Of them 18 were female and 12 male. 15 were in the age group of 70-75. Remaining 15 were >75 years age. In our study commonest mode of intertrochanteric injury was due to trivial fall, while walking at house. This is probably due to severe osteoporosis in elderly age group. 2 patients had type I fractures, 13 patients had type II fractures, 9 had type III fractures, and 6 had a type IV fracture (Boyd and Griffin's Classification). Singh's index (grades of osteoporosis) was grade III in 19 patients and it was grade II in 11 patients. The mean operative time was 90±11 minutes. The average duration of hospital stay was 14 days, with a range of 10-25

days. The follow up period ranged from fourteen months to twenty-four months with an average follow up of eighteen months. Functional evaluation was done by Harris Hip Score.

Range of Movement		No. of Patients	Percentage
Excellent	90-100	6	20%
Good	80-89	18	60%
Fair	70-79	4	13.3%
Poor	<70	2	6.7%
Total		30	

Harris Hip Score (At the End of One Year)

Excellent to fair results were seen in 28 (93%) cases and in 2 (7%) cases, results were poor.

Superficial infection noticed in 2 cases and in one case deep infection was noted. Limb length discrepancy¹⁵ was noted in 3 cases [>1 cm]. There was no incidence of postoperative dislocations of the prosthesis. Implant loosening was noted in one case, and sinking noted in one case. Most of the patients had a pain free mobile hip with a full range of flexion, abduction, adduction and adequate range of rotations.



Case 1. 71-Year-Old Female Patient- One Wk. Old Rt. IT # Comminuted



Case 2. 73-Year Female- Lt. IT# 10 Days Old



Case 3. 70-Year-Old Male- Rt. IT# Comminuted



Case 4. 70-Year-Old Male-Lt. IT# 5 Days Old



Case 5. Comminuted IT# Rt. in a 70-Year-Old Male



Case 6. Comminuted IT# Rt. in a Male pt. of 74-Year-Old



Case 7. Comminuted IT # Lt. 2 Weeks Old

Results	Score	Sherwani	Moshein	Lestrangle	Gilberty	Present Study
Excellent	91-100	31%	40%	39.6%	64%	06(20%)
Good	80-89	46%	25%	31.2%	28%	18(60%)
Fair	70-79	15%	23%	15.3%	-	04(13.3%)
Poor	<70	08%	12%	13.9%	0.8%	02(6.7%)

Analysis of Results

DISCUSSION

Comminuted and unstable inter-trochanteric fractures in the elderly osteoporotic patients poses challenging problems with increased rate of morbidity and mortality. Till the third decade of the twentieth century trochanteric fractures were treated conservatively. Conservative treatment regimens included, simple support with pillows or splinting to the opposite limb, Buck's (Skin) traction, well-leg traction, plaster spica immobilization, Russell's balanced traction and skeletal traction through the lower femur or upper tibia. In 1931, Smith-Peterson⁷ reported their series of open nailing with the triflanged nail. In 1937, Lawson developed a plate to be attached to the Smith Peterson nail. In 1950, Earnest Roll in Germany was the first to use a sliding device for internal fixation of trochanteric fractures. In 1964, The Richards Manufacturing Company and Mr. Ian McKenzie of the Royal National Orthopaedic Hospital developed the Sliding Compression Screw¹⁶. Clawson made several modifications, and in its current form the device is known as the Richards Compression Screw. Dissatisfaction with use of a sliding hip screw in unstable fracture patterns led to the development of intramedullary devices.

In a stable, and well-reduced inter trochanteric fractures that were treated by osteosynthesis with dynamic hip screw fixation or proximal femoral nailing, the union rates are as high as 90% to 100%. But only 50% union rates have been noted in unstable fractures, with postero medial comminution, and severe osteoporosis. Internal fixation of these unstable fractures though reduces the pain, does not permit early mobilization with the fear of failure of fixation and thus the morbidity remains same. Early mobilisation of the patient following surgeries are very important in the

elderly age group for preventing severe cardiorespiratory complications and bed sores.

Osteoporotic bones with comminuted fractures do not provide a good purchase for the implants, which subsequently leads to an early implant failure --implant loosening, implant penetration, loss of fixation, cut through of implant resulting in collapse of the fracture, with migration of the femoral head into the varus¹⁷ and retroverted¹⁷ position, resulting in shortening and decreased abductor lever arm, as a result instability and limp. Hemiarthroplasty is the best alternative. Both, stability and early ambulation are only possible with cemented hemiarthroplasty. Early mobilization is very essential particularly in patients with other medical co-morbidities. Many of the complications associated with internal fixations can be avoided by performing hemiarthroplasties. Primary hemiarthroplasty helps in preventing postoperative complications of prolonged recumbency such as pressure sores, pneumonia, atelectasis, etc. Bipolar hemiarthroplasty was introduced to address the complications of unipolar implants like acetabular wear, protrusion, loosening and dislocation. The concept of dual bearing surfaces in prosthesis, offers considerable advantages. It results in sharing of the motion at the two surfaces and hence, it reduces the net wear at either surface, thus reducing erosion at the acetabular joint interface¹⁸. In addition, the total range of motions at the joint is increased. Stems were designed, more in lines with total hip replacement designs, to lessen component loosening. Cemented fixation is advantageous for achieving the initial implant stability and a rapid rehabilitation. In our study of bipolar hemiarthroplasty of the hip, we have evaluated 30 cases that were performed using Bipolar Prosthesis at our Hospital. The study was conducted over a period of 2 years i.e. April 2017 to April 2019.

The data collected in this study was assessed, analysed and compared with previous series and the results are evaluated. In the present study the average age of occurrence of intertrochanteric fracture femur is 73.2 years with the range of presentation being 70 to 85 years. The average age incidences reported by other series were Launsten et al 77.1; Gilberty 72.5; Lestrangle 79.7 In our study the no female patients are 18 (60%) and the number of male patients 12 (40%). The sex incidence reported in previous series were Launsten et al 77.3/22.7; Gilberty 81/19; Lestrangle 81.8/18.2. The prosthesis size¹⁹ used varied from 39 mm to 51 mm. with nearly 76.67% requiring size 41 mm to 47 mm. Prosthesis size used in males ranging from 43 mm to 51 mm, females ranging from 39 mm to 45 mm. The study of Langen (1979) had reported that majority of the patients (82%) in their study, required prosthesis sizes between 44 mm-48 mm. The difference in the sizes in these study groups compared, may be partly due to racial differences in the build of patients. In the present study, 93 % of patients had none to slight pain. Only 2 patients had mild pain in our study. This can be compared to other studies-- Launsten et al 75.6; Gilberty 82.5; Lestrangle 69.7. This confirms that, bipolar prosthesis provides pain free hip in most of the patients. In the present study, 66.67% of the patients could walk for long distances with single cane support. This can be compared with other authors Wetherall & Hinves 69 % Gallannaugh 66%. In the present study, there were no fixed deformities²⁰.

Two patients (6.67%) had shortening of 1.5 cm and one patient (3.33%) had lengthening of 1 cm. This study when compared to other authors: Gallinaro (1990) has reported < 1 cm leg length discrepancy in 6.6% of his patients. Labelle (1990) has reported one patient with hip flexion contracture of > 5°. In the present study, most of our patients did not have restriction of daily activities. All patients could climb stairs with or without the help of railing, could sit comfortably on chair for long hours and all of them had no problem in putting on shoes & socks. In our study, the final Harris Hip Score ranged from 56 to 93 with an average of 82. Final Harris Hip Score of our study has been compared to other studies.

CONCLUSIONS

This study concludes that, though osteosynthesis by using dynamic hip screw or proximal femoral nail is most commonly preferred choice of treatment in stable intertrochanteric fractures, primary hemi replacement bipolar arthroplasty offers early painless mobility, ease of rehabilitation and early return to function, in complex unstable trochanteric fractures in the elderly and osteoporotic group. Our results are comparable to previous studies described in literature.

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