

Intertrochanteric Fractures of Femur in Elderly Patient Treated With Cemented Bipolar Hemiarthroplasty -Clinical Study



Medical Science

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CEMENTED BIPOLAR HEMIARTHROPLASTY.

***DR.SRINATH.S.R**

Associate Professor, Dept. of Orthopaedics, SSIMS and RC, Davangere, Karnataka, India.
*Corresponding Author

Dr.SiddeshPatil G.S

Assistant Professor, Dept. of Orthopaedics, SSIMS and RC, Davangere, Karnataka, India.

Dr.ManjunathReddy.J

Professor & HOD, Dept of Orthopaedics, SSIMS and RC, Davangere, Karnataka, India

Dr.Venkataramana Rao

Professor, Dept of Orthopaedics, SSIMS and RC, Davangere, Karnataka, India .

Dr.Karibasappa.A. G

Professor, Dept of Orthopaedics, SSIMS and RC, Davangere, Karnataka, India

ABSTRACT

Unstable intertrochanteric fractures in elderly are surgical challenge to treating surgeon. When treated with internal fixation to achieve osteosynthesis they have higher rates of complications. Many of these problems have been addressed by introduction of hemiarthroplasty as primary surgical procedure for these fractures. Although cemented hemiarthroplasty itself has technical issues because of fracture comminution, osteoporosis and difficult surgical exposure, it has given good results.

We did a prospective clinical study to evaluate clinical and radiological outcome of cemented bipolar hip hemiarthroplasty with bipolar prosthesis in elderly patient with unstable intertrochanteric fractures. We operated on 16 cases (12 male & 4 female patients) of unstable intertrochanteric fractures of femur in elderly (> 70 yr) in our institution from June 2011 to Feb 2014. Twelve patients (75%) were operated after preoperative evaluation with modified Moore's approach with in 72 hours of admission. Early mobilization and prevention of perioperative complications was the main goal of the surgery. Patients were followed up for a minimum of 12 months. Out of 16 patients operated there was one perioperative death, two were lost to follow up. Remaining 13 patients were assessed for clinical and radiological outcome using Harris hip score. Harris hip scoring showed excellent outcome in 2 patients (15%), good outcome in 8 patients (62%), fair outcome in 2 patients (15%) and poor in one patient (8%) with an average score of 71.5.

Conclusion: Cemented bipolar hemiarthroplasty has an important role to play in the management of unstable intertrochanteric fractures in elderly. It helps in early weight bearing and mobilization and prevention of many complications of prolonged recumbency. It has acceptable rate of complications and results in excellent-good outcome.

INTRODUCTION¹⁻⁷.

The incidence of intertrochanteric fractures has increased because of increase in elderly population. Most of these elderly patients have other systemic co-morbidities as diabetes, ischaemic heart disease, degenerative neurological and chronic renal problems. In presence of multiple co-morbidities these intertrochanteric fractures pose a challenge to treating surgeon because of presence of osteoporosis & comminution of fracture. The primary goal of treating surgeon is to bring back the pre-fracture activity status, to allow early weight bearing and to avoid possible re-operation. Because of posteromedial comminution many of these fracture are unstable even after reduction and to bring back the functional anatomy by osteosynthesis and saving the natural hip joint is difficult. Osteosynthesis of these fracture is fraught with high percentage of re-surgeries for complications as excessive collapse of fracture, loss of fixation, pulling out of screws, cut out of lag screw². Partial weight bearing is very difficult to follow by these patients, early full weight bearing increases the incidence of failure of internal fixation. Many of these problems have been addressed by introduction of cemented bipolar hemiarthroplasty as primary surgical procedure for these fractures. Our prospective clinical study was conducted to evaluate clinically and radiologically the early results of cemented bipolar hemiarthroplasty in the management of unstable intertrochanteric fractures in elderly in our institution.

Patients and methods.

We conducted a prospective clinical study in which sixteen elderly patients (>70 yr) with unstable intertrochanteric fracture of femur were treated with cemented Bipolar hemiarthroplasty from June 2011 to May 2014 at our institution. After obtaining ethical clearance for the study, Patients who presented to our hospital emergency department were identified by the attending orthopaedic surgeon. The patients were then screened for suitability, and, if they met our study criteria, they were approached

for enrolment in the study group and informed written consent was obtained for study participation.

Our inclusion criteria included; patient > 70 years, Patients who had comminuted intertrochanteric fracture (Boyd & Griffin type 2, type 3, type 4) with osteoporosis. Patients with good acetabular cartilage, patients who were not candidates for osteosynthesis with DHS or PFN. We excluded if they can be managed by osteosynthesis with DHS /PFN, Patients with subtrochanteric fractures, segmental fractures, Concomitant other fractures in the same limb, Patients with pathological fracture, delayed presentation (more than four weeks), prior osteoarthritis of hip joint, inflammatory arthritis of hip, cancer, renal failure, hemophilia, or a medical contraindication for surgery, head injury and unwillingness to participate in the study.

Surgical Technique¹⁻⁴

All surgeries were performed as soon as the conditions of the patients were stabilized. Twelve of sixteen patients were operated with in 72 hours (75%). Fractures were classified according to Boyd and Griffin classification. Preoperative planning was done with help of routine pelvis with both hip joint and lateral view of hip joint radiographs. Opposite hip joint was used as template to determine the position and size of stem and offset of the femoral neck. All the patients were administered prophylactic antibiotic one hour before surgery. Thirteen of the patients were operated under spinal anesthesia, three under general anesthesia. Patient in lateral position, hip was approached by modified Moore's approach². After gluteus maximus was split, the intertrochanteric fracture fragments were dissected carefully. The greater trochanter and its fragments was identified and tagged with ethibond sutures. Head neck fragment was identified and extracted. Acetabular cartilage inspected and if found healthy then surgery proceeded with hemiarthroplasty. Femoral canal was identified and prepared. Appropriate size implant was se-

lected after trial reduction. Drill holes were placed in proximal end of femur whenever attachment of trochanteric fragments was required. When ever calcar fragment was present it was placed in near anatomical position with its distal beak into the femoral canal so that it supports the prosthesis after implantation. We reconstructed calcar using bone cement when ever calcar fragment was not available. Definitive stem was implanted with cement taking care of neck length, offset and version. After reduction of hip and assessment of stability the trochanteric pieces were reduced and sutured back to proximal femur with the help of ethibond sutures in 8 patients (50%). Care was also taken to repair the abductors in all patients with non absorbable suture keeping soft tissue tension in to account. Haemostasis was achieved and closed in layers over drain. Drain was removed on 1st post operative day and in bed mobilization along with quadriceps strengthening exercises were started . Patient was made to stand with full weight bearing as tolerated by patient from third day with the help of walker. Patients were on intravenous antibiotics for three days then were on oral antibiotics until suture removal and discharged. Patients were instructed to avoid strictly squatting and sitting on floor. Patients were followed up regularly in OPD at 4 weeks, 8weeks,12weeks , six months and at one year. Clinical assessment and radiological evaluation was done. Harris hip score was calculated for assessment of final outcome.

RESULTS.

Sixteen patients were enrolled in this study. All the patients suffered fall from standing height .The average age 73.7 years (range 70 to 83).There were 12 males and 4 females. Twelve had Boyd & Griffin's type 2 fracture and 4 had Boyd & Griffin's type 4 fracture .Osteoporosis was graded according to Singh's index²⁸ ; grade 3 in eleven male patients and grade 2 in five patients (4 female and one male). Twelve of the patients were operated with in 72 hours of admission (75%). Mean operative time was 95 min (80 to 120 min). Greater trochanter was reconstructed in 8 patients (50%) ,abductors repaired in all patients. We had nil intra-operative complications. We had one deep vein thrombosis recognized on third post operative day (6%). Patient refused IVC filter and was treated conservatively with injection heparin and oral anticoagulants subsequently. We had one superficial wound infection which settled with regular dressing and IV antibiotics. No deep infection occurred in our series. Limb length discrepancy more than + 2cm and less than +4cm was found in 6 patients(37%) . None of the sixteen patients had shortening post operatively. No gross rotational deformity was found in any patents. No flexion deformity .No post-operative dislocations. Seven of the 15 patients were able to stand and walk with support by third post-operative day(46.6%). Remaining eight walked before discharge . Mean day for full weight bearing was 5.8 post operative days. Patients were discharged after suture removal. Mean stay at hospital was 13.8 days (range12 days to 21 days).

Unfortunately we had one post operative death on 4th day due to cardiac arrest(6%). Patient was a known ischaemic heart disease patient who was on regular cardiac medication. Two patients were lost to follow up after discharge from hospital.

Thirteen patients were available for evaluation at the end of study. Patients were followed up regularly in OPD at 4 weeks, 8 weeks ,12 weeks, six month , 12 months and at 18 months .Mean time for follow up was 13.4 months (minimum of 12 months to maximum 18 months).All but one patients had pain-free mobile hip with good functional range of motion at the end of last follow up. At end of study no loosening, subsidence or acetabular erosion was noticed .No revision surgeries done. According to Harris hip scoring system we had mean score of 71.5 points (excellent in two 15%, good in eight patients 62% , fair in two patients 15% and poor in one patient 8%) at final follow

up.



Radiographs of 76 year old male with intertrochanteric fracture femur treated with cemented bipolar prosthesis at 18 month follow-up.

Discussion : As the life expectancy in general population increases ,the total load of elderly patient in society increases .These elderly patient has increased prevalence of osteoporosis along with multiple comorbidities as diabetes, cardiovascular, neural and renal diseases. The incidence of intertrochanteric fractures also has increased because of increase in elderly osteoporotic population^{1-9,28}. These complex unstable osteoporotic fracture poses many challenges to treating surgeon along with added increased morbidity and mortality.In Stable fractures osteosynthesis is the rule with high success in achieving fracture union. But in unstable fractures complications as loss of reduction, screw cut out, plate failure, Z collapse, screw penetration into joint were common amounting to failure rates as high as 56%¹⁻⁹ .Pneumonia, bed sore, deep vein thrombosis and CVA add to complication list in these elderly patients. Rate of re-surgery in osteosynthesis group of patients ranges from 8 to 16 %¹⁰⁻¹⁷.

Many of the complications of internal fixation to achieve union can be avoided by performing bipolar hemiarthroplasty¹. Cemented bipolar hemiarthroplasty has shown very good results¹¹⁻¹⁴. It has given good results in terms of early ambulation , prevention of complications and good mid term survival rates on comparison to results from osteosynthesis patients. Bipolar hemiarthroplasty has advantages as reduced incidence of acetabular wear , loosening, protrusion acetabulii or dislocation on comparison to regular hemiarthroplasty^{15-20,31}.

In treatment of intertrochanteric fractures Tronzo first used long straight stemmed prosthesis to replace the fractured head-neck fragment²¹. Leinbach prostheses was used subsequently by others with good results^{15,17}. Harwin et al used Bateman -Leinbach bipolar prosthesis for intertrochanteric fractures in 58 patients with osteoporosis and followed up to 28 months. With patient average age of 78 years, 91% of their patients walked before discharge. None of them had deep infection, dislocation, acetabular erosion, or stem loosening at 28 months¹⁵.

In our series also 7 patients(46.6%) were able to stand and walk with support by third post operative day. All fifteen patients walked with help of walker before discharge. Partial weight bearing is difficult in elderly patients. With proper cementing and good fixation of the prosthesis , weight is directly transmitted to proximal shaft of femur which is of great advantage in cemented bipolar hemiarthroplasty¹⁶⁻²⁰.

The incidence of deep infection ranges from 0 to 3 % in these

surgery²²⁻²⁴. Meticulous aseptic precautions, use of prophylactic antibiotics prevented any deep infection in our cases. We had one superficial wound infection which healed with IV antibiotics and regular dressing. We had one deep vein thrombosis of calf muscle recognized on third post operative day (6%). Patient refused IVC filter and was treated conservatively with injection heparin and oral anticoagulants subsequently. At one year patient had persistent mild limb edema.

Bross et al reported good to excellent results with bipolar Leibach prosthesis in 44 elderly patients without any dislocation or loosening of implant⁹. We also didn't had any dislocation or loosening in our patients as meticulous attention was given for restoring version and soft tissue repair of abductors. We preferred lengthening to achieve good soft tissue tension in abductor and hence prevent chances of post operative dislocations.

Posteromedial comminution and inability to reattach lesser trochanter were two major problems we encountered. Whenever calcar fragment was present it was placed in near anatomical position with its distal beak into the femoral canal (3 patients, 18%) so that it supports neck of prosthesis after implantation^{3,19}. Whenever calcar fragment was not available we reconstructed calcar using bone cement (4 patients, 25%)^{2,19}, nine patients had their calcar intact. Many studies have shown the cemented mantle used to fix prosthesis in the femoral shaft is able to transmit the stress of weight bearing directly to femoral shaft bypassing the posteromedial comminution in elderly patients with low functional demand^{1-5,25-27}. The unattached lesser trochanter resulted in mild pain on hip flexion and minimal lurch on walking in four patients.

In 2001 Kim et al concluded unstable fractures with osteoporosis had failure rate of more than 50% with DHS fixation and thus DHS should not be the first choice of treatment¹⁰. Rodop et al in 2002 in their study obtained good results with bipolar hemiarthroplasty for intertrochanteric fracture¹¹. George J et al in 2002 has shown ten year survival of cemented bipolar prosthesis for intertrochanteric fracture was 93%³³. In 2010 Khaldoun Sinno et al concluded cemented bipolar hemiarthroplasty is the treatment of choice in freely mobile elderly patients above 70 years of age with an intertrochanteric fracture in presence of comminution and osteoporosis³.

As supported by literature^{1-5,11,13-23,29-30} we opted for cemented bipolar hemiarthroplasty as first choice of treatment in freely mobile elderly patients above 70 years of age with an unstable comminuted intertrochanteric fracture. We were able to operate within 72 hours of admission in 12 patients (75%) and mobilise as early as possible to prevent all problems of recumbency^{2,17}. Commercially available Indian made bipolar implant was used in our patients. We used modified Moore's approach². The head neck fragment was reached through the fracture fragments sparing the short external rotators in all cases. We used standard technique advised by Zhang et al for fixation of greater trochanter and other bone fragments by using ethibond suture material (8 out of 16 were repaired, 50%). Care was also taken to repair the abductors with non absorbable suture keeping soft tissue tension in to account. Meticulous reconstruction of trochanter and abductors is important to maintain stability of hip joint¹⁻⁵. We didn't had any dislocation in our patients.

Kesmazar et al¹⁴ have reported increased mortality in hemiarthroplasty group in comparison to internal fixation group. Khaldoun Sinno et al have in their series of patients noted mortality rate was similar in internal fixation and hemiarthroplasty groups after two years of follow-up³. We had one death on fourth postoperative day. This patient was a known ischemic patient with diabetes. Although he was completely evaluated before surgery and with all precautions we had this compli-

cation. Age, co-morbidity, stress of surgery played adverse role in outcome^{3,8,14}.

Many studies have shown Harris hip score will be significantly better in hemiarthroplasty group than in internal fixation group at follow-ups. In study conducted by Khaldoun Sinno et al, at two years hemiarthroplasty group results were "good" and in internal fixation group 'fair' using Harris hip score³. They recommended hemiarthroplasty as primary procedure of choice in elderly osteoporotic intertrochanteric fractures. In our study group we had thirteen patients assessed to get mean score of 71.5 points (excellent in two 15%, good in eight patients 62%, fair in two patients 15% and poor in one patient 8%) at the time of final follow up which is in range of published studies.

LIMITATIONS. Our prospective clinical study had Small sample size, short term follow up and no control group which are the main drawbacks. Long term follow up study is needed to assess stem subsidence, loosening, acetabular wear in these patients.

Conclusion:

Cemented bipolar hemiarthroplasty has an important role to play in the management of unstable intertrochanteric fractures in elderly. It is the surgical procedure of choice in presence of comminution, instability and osteoporosis in intertrochanteric fractures of femur in elderly. It helps in early weight bearing and mobilization and prevention of many complications of prolonged recumbency. It has acceptable rate of complications and results in excellent-good outcome.

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