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Cemented modular bipolar in unstable femur intertrochanteric fracture in osteoporotic elderly patients- its functional outcomes

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Abstract
Introduction: Intertrochanteric femur (IT) fracture is a common fracture in old age. The cause of long morbidity and mortality in I/T femur is malunions, nonunions, respiratory tract infection and bed sores etc., As we routinely do treatment modality like DHS and PFN are time tested but with availability of better cemented modular bipolar techniques and implant mortality and morbidity can be reduced.
Aims and objectives: To study functional outcome of cemented modular bipolar for management of unstable intertrochanteric fracture femur in elderly osteoporotic patients.
Method and Materials: 60 yrs. and above 30 patients who were admitted and operated between november 2017 to march 2019 and had fulfilled the inclusion criteria were enrolled for this study. Cemented modular bipolar was done, Total numbers of patient 30, of mean age of 70.2 yrs and F:M ratio is 19:11. A follow up period of total 1 years. Follow up was done at 6 week, 3 months, 6 months and at 1 year by Harris Hip Scoring System assessed post operatively. x ray and bone scan was done to asses osteoporosis.
Result: For result assessment and evalution we use, Harris hip score, Chi- square test, T-test, and statistical analysis. Our *P* value< 0.05 was considering significant. In our study we get 1 had superficial wound infection, no one had deep infection or pulmonary infection.
Over all very less post operative complication and early mobilisation and ambulation was done, excellent result at the end of 1 yr patient who follow up all had good to excellent results.
Conclusion: Functional recovery and early post operative Harris hip score were excellent in osteoporotic patients treated with cemented modular bipolar as compared to routine internal fixation group. Post operative complications were more with DHS and PFN due to osteoporotic bone than cemented modular bipolar group and were comparable with other studies. Thus in conclusion, primary cemented modular bipolar does provide a stable, pain-free, and early mobile joint with acceptable less complication rate as seen in our study; however a larger prospective randomised study comparing the use of dynamic hip screwand proximal femur nail devices against primary cemented modular bipolar for unstable intertrochantric fractures in osteoporosis will be needed.

Keywords: I/T fracture in elderly, Osteoporosis, Cemented Modular Bipolar, DHS dynamic hip screw, PFN proximal femur nail, successful, decrease morbidity.

Introduction
There is a worldwide increase in the incidence of intertrochanteric fracture among elderly patients. Its 45% of total hip fracture, and one of the leading cause for death troll in elderly patients, This is due to the increased life expectancy of people and osteoporosis1-3. Most of the fractures occur from trivial trauma. Intertrochanteric fracture is defined as the fracture extending from the extra artricular greater trochanter region to lesser trochanter region before medullary canal development. Unstable fractures are those with comminution in the posteromedial cortex. Orthopaedic practice demands repetitive, precise and complex decision making. All decisions are usually influenced by non-specific consideration such as limited facilities; financial problem and non compliance from patients etc.
Despite these impediments we all strive. Towards accuracy in our decision making.
The goal of the fracture treatment has shifted from just union of the fracture to the maximal functional recovery of the limb as early as possible. One of the most common fractures has been proximal femoral fracture as emphasized by this anecdote -" human beings come in the

in the world through the pelvis and leave the world through the broken hips."

Various operative procedures with different implants have been described for the treatment of intertrochanteric fractures.' Unstable intertrochanteric fractures are one of those mysteries which become more and more mysterious with advancing knowledge and better imaging modalities. For many decades, attempts have been made to overcome the difficulties which surgeons encounter in the treatment of proximal femoral fractures. Many questions have been raised regarding the configuration of a fixation device. At our institute to overcome this problems of postoperative morbidity and to improve early post operative ambulation, we introduce hemireplacement in unstable intertrochanteric fracture of femur specially in old age group people. No matter how successful we are in other facilities of life, but in this technologically advancing world it is crucial that we upgrade our systems to cope with these fractures to serve the mankind better.

Material and Method

This is a prospective study' of 30 cases of elderly unstable intertrochanteric fractures, treated with primary hemi replacement. Between November 2017 and March 2019, All thirty patients with moderate to severe osteoporosis with an unstable Intertrochanteric femoral fracture having type (AO/OTA type 31A2.2, A2.3, A3.2,) were enrolled in the study, ·which was approved by our institutional review board. Written and informed consent of each of the patient was taken for our study

Inclusion criteria

1. More than 60 years of age.
2. All patients with unstable IT femur fracture type o 3 1-A2.2 and 31- A2.3 (AO/OTA classification)/ Evan category type 3, type 4 and type 5.
3. Patient with moderate to severe osteoporosis.
4. Patient must be ambulatory before sustaining injury

Exclusion criteria

1. Patient below 60 years
2. Stable fractures
3. Patients with active infection
4. Patients had other systemic disorders or not fit for surgical intervention.
5. Patients who lost follow-up.

Preoperative On admission The Intertrochanteric fracture was temporarily given traction with below knee sponge or skeleton traction. Once the patient selected for surgery, pre-operative planning and routine investigations and dexa bone scan for hip was done, patient having T score below -2.5SD are considered osteoporotic, the patients were posted for surgical intervention.

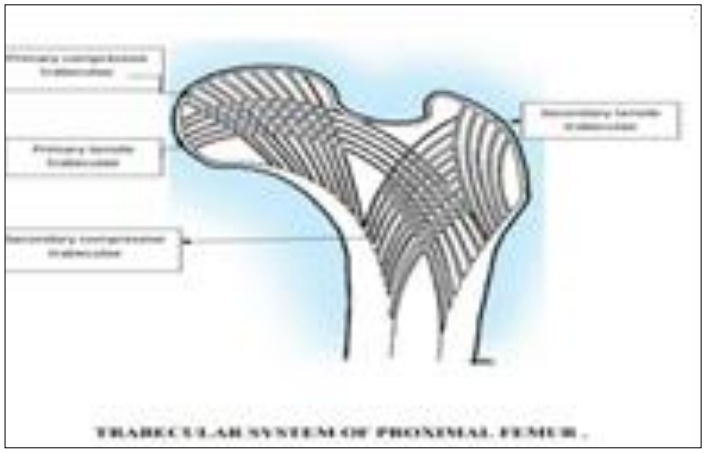

Fig 1: Trabecular pattern of hip

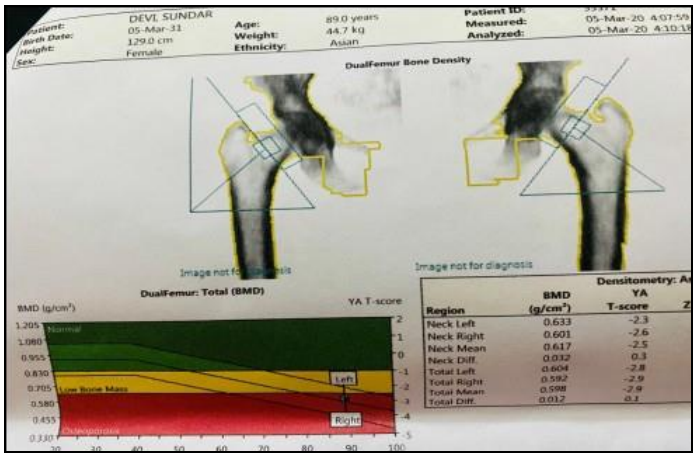

Fig 2: Bone scan of hip

Surgical technique (Cemented Modular Bipolar): Patients were placed in the lateral position, with affected hip draped free. A slightly curved incision was made at the posterolateral aspect of greater trochanter, than the superficial fat and glutius maximus musclev cut with the cautery, rotator cuts, capsule cut, fracture neck exposed dislocated with internal rotation of limb. Head and neck part removed and checked for implat head size, femoral canal prepared, checked with trial stem and head, washed with NS, bone plugged inserted, a stem of appropriate size inserted with bone cement, head applied over stem and reduction done with external rotation of limb, ROM checked, broken greater trochanter is repaired with tension band wiring or Ethibond suture for Strengthening, capsule and rotators sutured with greater trochanter, drain applied, closer done.

Fig 3: Position

Fig 4: Implant insertion

Fig 5: Broken GT

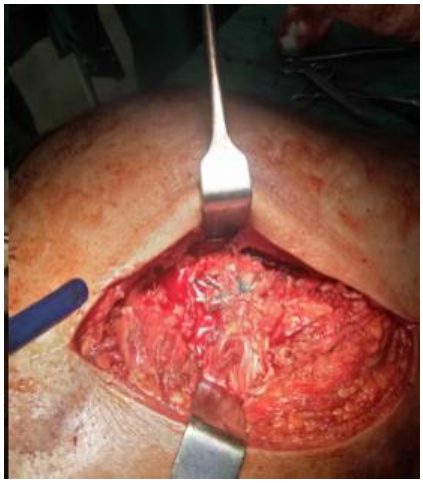

Fig 6: GT repair with TBW and Ethibond

Post-operative care: Post operative Hemogram and serum electrolytes done immediate postoperative and 24 hour post operative static exercise in bed for gluteus, hamstring and quadriceps with regular ankle pumping exercise started if pain permits. Drain removed after 48 hours, sitting started on 2nd post operative day with quadreceps in bed. Non weight bearing walking on operated side after 2 days. ROM exercise actively After 5 days, partial weight bearing started in hemiartrhroplasty when pain permits. In internal fixation groups, partial weight bearing depends upon stability of trochanteric fixation. Post operative dressing done on 2nd,5th and 8th day, and suture removed on or after 14th day, patient discharged after rehabilitation. Prior to discharge check done for late clinical sepsis and Deep Venous Thrombosis.

Follow UP: 6 weeks, 3 months, 6 months and at 1 year. Systemic grading of patients; Harris Hip Scoring system formulated by W.H. Harris. It incorporate s all important variables into single reliable figure, which is both reproducible and reasonably objective. Statistical grading of patients: Data were reported as mean, standard deviation (SD), median(range) or number (percentage). T-test was used to asses significant difference between all numerical parameters of the study within two surgical groups one by one respectively. Whereas, Chi square test was used for statistical analysis among all studied categorical variables such as gender, pre-morbid condition and post operative complications. P-values < 0.05 were considered statistically significant.

Observation and Results: Full weight bearing started significantly earlier in patient who have rigid fixation and had less early complication as with cemented modular bipolar, mean follow up period for internal fixation is 1.1 years. Patient who underwent internal fixation had more early complication than those with cemented modular bipolar. For Osteoporosis evaluation, tests like Dexa scan and X-ray.

Fig 7: Pre OP (Right)

Fig 8: Cemented modular bipolar with Ethibond & TBW

Cemented modular bipolar (BIPOLAR group): Total numbers of patient in this group are 30 of mean age of 70.2yrs and female to male ratio is 19:11. Mean follow up period of 1.1 yrs. Of total 30 patients, 18 are type III fractures, 12 are type IV fractures, Mechanism of injury in this group was mainly trivial trauma in the form of slip and fall, Only six patient had road traffic accident. All were ambulatory pre-fall either community or household. Average trauma admission time was 2.2 days with average stay of 12.53 days in hospital. All

were operated with cemented prosthesis bipolar prosthesis. Complete wt bearing was started after average period of 7.46 days. 1 patient had superficial wound infection which was treated with meticulous wound care and antibiotics no patient had deep infection or pulmonary infection. I had bed sore which was treated with air bad and wound dressing. 1 patient had post-o Perative constipation and abdominal distention (known operated case of carcinoma stomach) GI scopy was done and treate DAccordingly, this increased stay in hospital. After 3 months of follow up fair result in 4 patients, good result in 12 patients and excellent result in 24 patients. Eventually all had good to excellent result after 1 yr. There was no dislocation, acetabular protrusion or aseptic loosening of the stem.

Discussion

Surgical outcome in elderly patient is unsatisfactory with associated co morbid conditions like medical illness, osteoporosis and fracture instability. Elderly patients, even if they are in good general health cannot be mobilized without some weight being borne on the involved limb. Early mobilization may decrease the risk of mortality and morbidity. In patients with osteoporotic fractures, and major comminution, maintenance of reduction can be a major problem, so many surgeons recommend hip to be protected throughout the healing periods '9 2° 2'. To reduce the healing time, dynamic devices are replaced with the static ones. Dynamic implants have more weight bearing capacity than static implants. Partial weight bearing creates a micro movement in dynamic system which increases union rate. The weak and porotic bone tolerates screws poorly so cut out is the major problem in internal fixation. Central position of the screw in the femoral neck is the recommendable position". Use of internal fixation has decreased the mortality rate but rate of complications are high bearing, many surgeons prefer arthroplasty for the treatment of unstable intertrochanteric fractures. The patient's rapid return to the prefacture level of activity has essentially prevented post-operative complications such as bed sores, pulmonary infections and atelectasis.

Stern and Angerman" reported 94% good and excellent results afier mean follow up period of 8 months with 1% cases of pneumonia and 3% cases of deep infection. Haentj ens *et al*. 28 compared results of bipolar arthroplasty and internal fixation and reported 75% satisfactory results with less post operative complications in arthroplasty group.

Rosenfeld *et al*. 29 reported 86% of satisfactory results in early period using arthroplasty.

Failure rates of as high as 56% have been noted in association with unstable fractures, comminution, suboptimal fracture fixation, or poor bone quality treated by DHS in elderly patients. No differences in postoperative mortality in two groups. Broos *et al*. reported on ninety-four elderly patients treated with a bipolar Vandeputte prosthesis. They found that the average operating time was shorter, the mortality rate was lower, and the functional results were better in the group treated with the bipolar cemented modular bipolar than in groups treated with Ender nailing, an angled blade-plate, or a dynamic hip screw. Harwin *et al*. reported on fifty-eight elderly patients with osteoporosis in whom a comminuted intertrochanteric femoral fracture had been treated with a bipolar Bateman-Leinbach prosthesis and who were followed for an average of twenty- eight months. The average patient age was seventy-eight years, and 91% walked prior to discharge. Two patients had a nonunion of the greater trochanter. There were no deep infections, dislocations, acetabular erosions, or cases of stem loosening Recently, Rodop *et al*. reported on fifty- four elderly patients who had been treated with a bipolar Leinbach hemiprosthesis (Protek; Sulzer Orthopedics, Baar, Switzerland). A good to excellent result, as assessed with the Harris hip-scoring system, was reported in 82% of the patients.

In our study, there were no dislocations or cases of stem loosening.

In the current study, 90% patient had excellent to good results after follow up period of 3 months in bipolar group, as early mobilisation and rigid fixation of trochanter was done, At the end of one year 96% good to excellent results and BIPOLAR group had acheived, so the key point is early mobilisation and early recovery.

In patients with Intemal fixation, advised to put minimal weight on the affected limb.

Despite the advice patient bear more weight. It is difficult to teach them to bear weight only on normal limb.

The most serious complication in arthroplasty is deep infection, rate reported to range from 0 to 3%. In the current study rate of deep infection is 0% in arthroplasty.

It should be remembered that even in the conventional total hip replacement, the rate of deep infection is higher in patients who have a previous operation on the hip".

No dislocation was seen in this study. 0 to 7% dislocations were seen in other studies 27 3°. The rate of dislocation is aggravated by improper prosthesis length, larger the femoral component greater the tendency to dislocate.

Conclusion

1. Patients treated with internal fixation (DHS+PFN) started full weight bearing (avg.11.7wks) late as compared to cemented modular bipolar (avg. 7.46 days), hence the functional recovery was delayed with internal fixation group.
2. Early post-operative Harris hip score were good in patients treated with cemented modular bipolar as compared to internal fixation group but at the end of 1 year score was comparable.
3. Post-operative complications were minimum or nil with cemented modular bipolar group. No bedsore, DVT, lacunar infarct, cardiac and respiratory post-operative complication due to pronlong immobilisation noted in our study.
4. Most of the fractures occure above 60 years were due to trivial trauma. As age advances there is weakening of bones due to osteoporosis and decreased mineralization and deterioration of general condition due to which cancellous bones are prone to fracture with trivial trauma.
5. It is a always advisable since elderly patients with multiple medical problems are prone for hazards of immobilization.
6. Small sample size is one of the l imitations of our study. Further, inhomogeneous population in terms of existing co-morbidity is the other limitations.
7. Thus in conclusion, primary cemented modular bipolar does provide a stable, pain-free, and mobile joint with acceptable complication rate as seen in our study; however a larger prospective randomised study comparing the use of dynamic hip screw devices against primary cemented modular bipolar or unstable intertrochantric fractures will be needed

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