

UNSTABLE INTERTROCHANTERIC FRACTURE IN ELDERLY TREATED WITH CEMENTED BIPOLAR HEMIARTHROPLASTY AND TROCHANTERIC RECONSTRUCTION

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HOW TO CITE THIS ARTICLE:

Jagadeesh Kumar Jayapalan, Parthasarathy Pandian, Sankaralingam Pandian, Chakravarthy Rajendiran, Venkatesh Duraisamy. "Unstable Intertrochanteric Fracture in Elderly Treated with Cemented Bipolar Hemiarthroplasty and Trochanteric Reconstruction". Journal of Evidence based Medicine and Healthcare; Volume 2, Issue 26, June 29, 2015; Page: 3905-3913.

ABSTRACT: INTRODUCTION: Unstable inter-trochanteric fracture in the geriatric population is a common injury and is associated with poor bone quality, excessive collapse, loss of fixation, and cut-out of the lag screw, are the common problems of attempts to fix these fractures. Present study is an attempt to evaluate the functional outcome of primary cemented bipolar hemiarthroplasty and trochanter reconstruction in these patients. **MATERIALS AND METHODS:** This prospective study included 30 cases of elderly osteoporotic patients with mean age of 65.4 years who sustained comminuted inter-trochanteric femur fracture treated with cemented bipolar hemiarthroplasty & tension band wiring for greater trochanter reconstruction. It is an essential technical step to avoid complication like abductor lurch gait. We here describe a technique of reconstruction and fixation of greater trochanter using tension band wiring in figure of eight pattern. The patients were followed up at six week, three month, six month and one year postoperatively and assessed using Harris Hip Score (HHS). **RESULTS:** The mean HHS score was 85.6+SD 9.5 (range from 74 to 96). By the end of one year. The main clinical measures were early post-operative full weight bearing, post-operative complication & functional outcome. The time to full weight bearing, the rate of post-operative complications & functional outcome was significantly better in cemented bipolar arthroplasty group. **DISCUSSION:** The changes in HHS up to six months periods are much greater which starts showing a stable trend thereafter. Fair to good scores were observed in all the patients. The purpose of its use was that while Harris Hip Score (HHS) provides information on a multitude of factors. Superficial infection in 2 patients, anterior thigh pain in a patient, shortening less than 2cms in 2 patients, abductor lurch in a patient are the complications noted in post-operative period, but no patient required revision surgery. **CONCLUSION:** The authors believe that primary cemented bipolar hemiarthroplasty for unstable inter-trochanteric fractures of femur in elderly does provide early ambulation, good functional outcome, pain free joint with minimal complications without the need for revision surgery.

KEYWORDS: Bipolar, Elderly, Osteoporosis, Hemiarthroplasty, Intertrochanteric fractures, greater trochanter fixation, Tension band wiring, Harris hip score (HHS).

INTRODUCTION: Intertrochanteric fracture make up 45% of all hip fractures.¹ Most inter-trochanteric fractures occur in elderly people (above 65 years) which is three times more frequent in women than men because women tend to be less active and develop postmenopausal

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osteoporosis and with reported mortality rates ranging from 15 to 30%.² Severe osteoporosis in these patients is responsible for high incidence of trochanteric fractures with minimal to moderate trauma.³

Intertrochanteric fractures in elderly people are usually comminuted and unstable because of indirect forces which include pull of the iliopsoas muscle on the lesser trochanter and pull of the abductor muscle on the greater trochanter. Hence they are associated with high rates of morbidity and mortality due to complications like pressure sores, pulmonary infection, atelectasis, malunion etc. and we aimed at early rehabilitation and mobilization.

Internal fixation with devices like dynamic hip screw is gold standard for intertrochanteric fracture. However, comminution, osteoporosis, and instability often preclude the early resumption of full weight bearing.⁴ Elderly patients often are unable to cooperate with partial weight bearing. Complications like loosening implant penetration, loss of fixation due to excessive sliding of fixation devices, cut through of implant, unacceptable shortening, external rotation and coxavara, medial migration of femoral shaft with penetration of screw across the hip joint may occur. All these result in implant failure.

Cemented Bipolar hemiarthroplasty offers a durable and versatile solution for comminuted unstable Intertrochanteric fractures in elderly patients with osteoporosis. The primary treatment goal is a stable fixation and an immediate full weight bearing mobilisation⁵. Incidentally these methods of treatment also precludes the inevitable complications like decubitus ulcers, respiratory tract infections etc, which otherwise would ensue if the conservative line of treatment or internal fixations, in which involving prolonged immobilization is adopted.

The present study was conducted to review our experience with cemented bipolar prosthesis hemiarthroplasty in unstable intertrochanteric fractures in elderly age patients.

- a) To analyze outcome of cemented bipolar prosthesis.
- b) To study the complications associated with this treatment modality.
- c) To compare the efficacy and complications with the available literature.

MATERIALS AND METHODS: The present study was a prospective study conducted in the Department of Orthopaedics, Meenakshi Medical College and Hospital, Ennathur, Kanchipuram. In present study we evaluated the outcome of cemented bipolar prosthesis in unstable Comminuted intertrochanteric fractures in elderly between July 2012 and May 2014 and followed up for 6wks, 3mths, 6mths, 1 year.

INCLUSION CRITERIA:

- Unstable intertrochanteric fractures.
 - I. (AO Classification A2, A3/ Boyd and Griffin's type 2, 3 and 4/Evan's unstable fractures).
- Elderly patients (> 60 years) with severe osteoporosis i.e., SINGHS index < 4.

EXCLUSION CRITERIA:

- Intertrochanteric fractures in younger patients with no osteoporosis.
- Patients have intertrochanteric fractures associated with cerebral palsy, polio etc.

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- Intertrochanteric fractures in elderly patients who have other medical problems which make them bed ridden or unfit for anaesthesia.

PRE-OPERATIVE WORK UP: Routine preoperative workup with pre anaesthetic check-up done.

MATERIALS: In our study we have used non modular bipolar prosthesis in all our cases. 40gms of simplex cement is used for trochanteric reconstruction and prosthesis insertion. SS wire for stabilization of trochanters

OPERATIVE PROCEDURES: All surgeries were performed in the elective theatre using standard aseptic precautions by a single surgeon direct lateral (modified hardinge's) approach. Cemented bipolar hemiarthroplasty (Non modular bipolar hip prosthesis) with greater and lesser trochanter stabilization with SS wire.

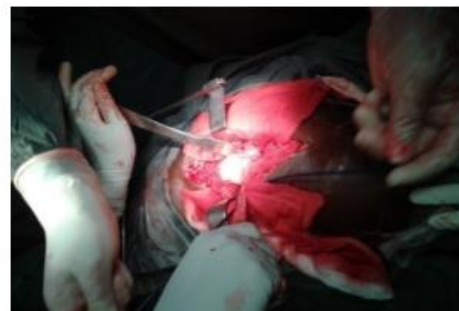
Reconstruction of trochanters: Reconstruction of greater trochanter and lesser trochanter was done with in figure of eight (tension band technique).⁵ lesser trochanter and calcar were reconstructed with encirclage or collar of cement at the site of calcar during insertion of prosthesis. Calcar reconstruction should be done such that the center of femoral head and apex of greater trochanter should be at same transverse level. It should be coplanar. Both trochanters assessed and reconstruction done with thick SS wire following an acceptable trial fit, leg length and hip stability.

Assessment of neck and calcar deficit done and using 40gm cement appropriate bipolar prosthesis with 10 to 15 degree anteversion fit into shaft taking care of shortening of limb into account and cement hardening. Under continued traction in extension and pressure over anterior aspect of implant, head is reduced into acetabulum. Final tightening done in figure of eight or possible way to stabilize trochanters.

SURGICAL PROCEDURE PHOTOS:



Direct lateral (modified Hardinge's) approach



Head exposed for extraction

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cementing and implant fixation



Final tightening of trochanters



After thorough wash abductors to be sutured



wound closed in layers with drain in situ



Figure 1: pre-op x-ray



Figure 2: post op x-ray

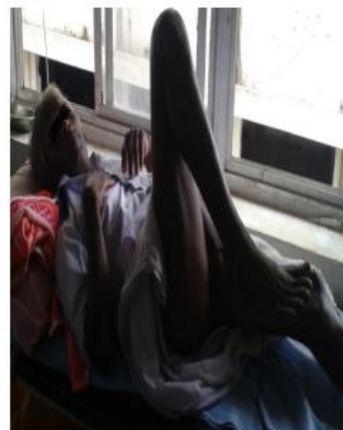
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Figure 3: Six months follow up



Figure 4: one year follow up



Flexion 100 *



Abduction 35 *



Internal rotation 25 *



External rotation 40 *

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Post Operatively patient was on Intravenous Antibiotics for five days. On 2nd post-operative day, patients were allowed to sit on side of bed or upright in a chair. Gait training was begun and weight bearing was permitted earliest or as tolerated. Physiotherapy by knee flexion, isotonic quadriceps exercises were started from 2nd post op day and patients were mobilized with walker with partial weight bearing as tolerated and if patients are comfortably walking, patient was discharged on 7th or 8th post-operative day and advised them to come for suture removal on 14th post-operative day, provided wound is healthy, otherwise patient discharged after removal. Patient was advised to use straight high chair with arms to facilitate getting out of chair. The patient was advised not to sit cross-legged or squat on the floor or squat on Indian style of toilet and patient was advised not to involve in activities that place heavy load or stresses on the hip joint. The patient was advised to carry out the isotonic and isometric exercises to strengthen the muscles around the hip. Patients were advised walking with support if they had more pain at 3 months.

Subsequently they were followed up at 6 weeks, 3 months, 6 months, and 1 year. The results were evaluated using Harris Hip Score rating maximum points possible 100.

INTRAOPERATIVE DIFFICULTIES/COMPLICATIONS: We have encountered difficulty in reconstruction of greater and lesser trochanter comminution. The problems in intertrochanteric fractures especially in comminuted fractures with loss of medial buttress and greater trochanter comminution, reconstruction of bony support at the time of bipolar hemiarthroplasty can be technically demanding and if not properly done may lead to weak abductor lever arm. Duration of surgery was 60min to 120 min on average of 90 min.

Intra operative blood loss was 250 ml to 600 ml with average of 300 ml including mops and suction drain collection.

Minimal reaming was done in all cases to prevent fat embolism and proper placement of the femoral stem in the proximal femoral shaft. In all cases in the intraoperative close monitoring of the blood pressure and SPO₂ was done by an anesthesiologist while cementing. Because it is known that sometimes sudden fall of blood pressure can occur while cementing.

STATISTICS: Analysis of data: It is a prospective study conducted at Narayana general hospital, where 30 cases of comminuted intertrochanteric fracture (Boyd and Griffin's type 2, 3 and 4) in elderly osteoporotic patients were studied.

All cases were reviewed for clinical and radiological examination by using the Harris Hip Score at regular intervals 6 weeks, 3 months, 6 months and 1 year after the surgery.

Age Group	No. of patients	Percentage
60-69	21	70%
70-79	06	20%
80-85	03	10%

Age Incidence: Showing number of patients and age group

The average age of patients in our series was 65.4 years with a range of 60 years to 85 years.

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Sex	No. of patients	Percentage
Male	12	40%
Female	18	60%

Sex incidence: Showing number of patients and sex group

Out of 30 patients, 18 (60%) female and 12 (40%) male. Female predominance due to post-menopausal osteoporosis and decrease activity than males in elderly age group

Diseases	No. of patients	Percentage
Hypertension	15	50%
Diabetes mellitus	12	40%
Anaemic	8	26.67%
COPD	4	13.33%
Ischemic heart disease	2	6.67%

Co-morbid conditions: Showing number of patients and co-morbid conditions

Patients were evaluated for associated diseases before surgery most of the patients found to be hypertensive (50 %) followed by diabetes mellitus (40 %), anaemia (26.67 %), COPD (13.37 %) and ischemic heart disease (2 %).

Duration in days	No. of patients	Percentage
10-12 DAYS	18	60%
12-18 DAYS	07	23.37%
>18 DAYS	05	16.67%

Duration of hospital stay: Showing number of patients and duration of hospital stay

The average duration of hospital stay was 11 days, with a range of 10-20 days.

Complications	No. of patients	Percentage
Superficial infection	2	06.67%
Anterior thigh pain	1	03.37 %
Limb shortening	2	06.67 %
Abductor lurch	1	03.37 %
Heterotopic ossification	1	03.37 %

Post-operative complication: Showing number of patients and post-operative complications.

RESULTS: Outcome of study based on harris hip score.

In our study out of 30 patients, 25(83.33%) had excellent outcome, 04(13.33%) had good and 1(3.33%) fair outcomes respectively. The average hip score for all the patients in our study was 85.6+SD 9.5(range from 74 to 96).

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Harris Hip Score	Out come	No. of patients	Percentage
>90	Excellent	25	83.33 %
80-89	Good	04	13.33 %
70-79	Fair	01	03.33 %
<70	Poor	-	-

Outcome of study based on harris hip score

CONCLUSION: The authors believe that primary cemented bipolar hemiarthroplasty for unstable inter-trochanteric fractures of femur in elderly does provide early ambulation, good functional outcome, pain free joint with minimal complications without the need for revision surgery. Early mobilization decreases the complication like deep vein thrombosis and pulmonary infections in elderly. Trochanteric reconstruction gives very good functional outcome avoiding abduction lurch. Hence this can be considered a better surgical option over traditional dynamic hip screw fixation in elderly patients.

DISCUSSION: In our study all 30 patients have comminuted unstable Intertrochanteric fractures of proximal femur with severe osteoporosis, singhs index < 4, age above 60 years. The fracture was treated with cemented bipolar hemiarthroplasty with reconstruction of greater and lesser trochanter with s s wire. The study was conducted over a period of 2 years from July 2012 to May 2014. The concept of dual bearing surfaces offers considerable advantages in sharing of motion at the two surfaces and hence reductions of net wears and tear at either surface, thus reducing erosion at the acetabulum.

Unsatisfactory surgical outcome is common in elderly patients with intertrochanteric fractures; medical illness, osteoporosis,¹ and fracture instability are contributing factors. Early mobilisation may decrease the risk of mortality and morbidity, although older patients are unable to walk well and only capable of partial weight bearing in the postoperative period. In patients with osteoporotic fractures, maintenance of reduction can be a major problem during the healing period. To reduce the healing time, dynamic devices are replaced with the static ones. Biomechanical studies show that dynamic implants have more weight-bearing capacity than static implants. Furthermore, partial weight bearing creates a micro movement in the dynamic systems which increases union rate. However, cut-out is the main complication of internal fixation. Central positioning of the screw in the femoral neck has been recommended, which yields cut-out rate of about 13%.

So we preferred cemented bipolar hemiarthroplasty for the treatment of unstable trochanteric fractures in the elderly in order to decrease complications. The observations were made and results analyzed and outcome was evaluated with Harris hip score.

The study was compared with studies of other authors who had done bipolar hemiarthroplasty in unstable intertrochanteric fractures.

All the patients were admitted at an average of 4.5 days from the day of injury. It was mainly due to delay in referring from primary health centers other places after 2-3 days of the injury and some had underwent osteopath procedure of applying some bandage and coming a week later.

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All patients were operated at an average of 3.2 days from the time of admission. The delay was to optimize the patient for co –morbid conditions and make them medically fit for surgery. Patients presented with hypertension in 15 cases (50%), Diabetes Mellitus in 12 cases (40%), anemia in 8 cases (26.67 %), which delayed the surgery.

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Date of Submission: 15/06/2015.
Date of Peer Review: 16/06/2015.
Date of Acceptance: 22/06/2015.
Date of Publishing: 29/06/2015.