

**Original article:**

**Cemented bipolar hemiarthroplasty in unstable osteoporotic fractures of intertrochanteric neck femur in elderly patients: A prospective study.**

**Dr Milind Ingle , Dr Ulhas Sonar , Dr M R Koichade , Dr Avinash Yelne , Dr Ashish Radke**

**Name of corresponding authors:** Dr Ulhas Sonar

Department of orthopaedics,

Indira Gandhi Government Medical College, C A road, Nagpur, Maharashtra , India.

---

**Abstract:**

**Objective:** To prospectively evaluate the results of cemented bipolar hemiarthroplasty in patients with unstable osteoporotic intertrochanteric neck femur fractures in elderly patients.

**Method:** Thirty patients 65 years or older with unstable osteoporotic fractures of intertrochanteric neck femur were treated with cemented bipolar hemiarthroplasty. Results were evaluated by Harris hip score.

**Results:** Mean age of patients was  $78.07 \pm 6.16$  years. There were 17 males and 13 females. 18 fractures were left sided and 12 were right sided. Average trauma surgery interval for was 6.56 days (range 2 to 12 days). The average surgery time was 86.33 minutes (range 65 to 115 minutes).

The type of fracture in 13 patients was A2.2 and in 17 patients it was A2.3. The average blood loss was 300 ml (range 150 to 550 ml). On an average partial weight bearing was achieved after  $3 \pm 1.05$  days and full weight bearing was achieved on an average after  $5.8 \pm 1.45$  days. Complications included two superficial and one deep infection. Less than two centimeters shortening seen in two patients. There were four death during study period. Results at one and half year showed excellent, good and fair results in 17, 8 and 1 patient each.

**Conclusion:** Primary hemiarthroplasty provides stable pain free mobile joint and is a better modality of treatment in unstable osteoporotic intertrochanteric fractures. Early mobilization is possible avoiding the problems of recumbency.

**Key Words:** Osteoporotic intertrochanteric fractures, hemiarthroplasty.

---

**Introduction**

Unstable osteoporotic intertrochanteric neck femur fractures of elderly patients are associated with high rates of morbidity and mortality due to the need for prolonged immobilization, although results are improved with use of recent modalities of internal fixation.<sup>1</sup>

These old age patients generally have many associated diseases like diabetes mellitus, hypertension etc. In these patients due to combination of osteoporosis and instability, early resumption to full weight bearing is difficult. So because of prolonged immobilization, complications like deep vein thrombosis, hypostatic

pneumonia, pressure sores, dehydration, atelectasis, metabolic disturbances, etc are likely. So they have increased the morbidity and mortality threshold.

The comminuted intertrochanteric fractures being in cancellous area, fixation of all fragments is difficult. The posteromedial void is generally present which makes the fracture very unstable.<sup>2</sup> Recent modality of fixation of these fractures is by 4<sup>th</sup> generation of intramedullary nails like the proximal femoral nails<sup>3</sup> but even with these implants immobilization is required for few weeks. Management of such cases with primary hemiarthroplasty permits early mobilization, thus

avoiding most of these complications<sup>4</sup>. The patient is mobilized early giving good rehabilitation and better options for dependence free living.

#### **Aims and objectives**

- To prospectively evaluate results and functional outcome of cemented bipolar hemiarthroplasty in patients with unstable osteoporotic intertrochanteric fractures of neck femur in elderly patients.
- To analyse complications of procedure and its effect on morbidity.

#### **Material and methods**

This study comprises of a series of unstable osteoporotic intertrochanteric fractures of neck femur treated by cemented bipolar hemiarthroplasty between September 2011 to March 2014, in the Department of Orthopaedics at Indira Gandhi Government Medical College, Nagpur, and Maharashtra, India.

Patients aged above 65 years having unstable osteoporotic intertrochanteric fractures who are willing to participate in study were included in study.

A thorough clinical examination was done. Associated co-morbidities were noted. AO/ASIF classification (A1-A3) was used to classify the fractures. The bipolar prosthesis consists of femoral stem and head. Cement is used for fixation of the stem. Head consists of one inner bearing of metal on polyethylene interface metal polyethylene cup. Intravenous antibiotics were given for five days followed by oral antibiotics for eight days. Regional anaesthesia was used for all procedures.

All patients were operated in lateral position. The posterolateral approach was used as it gives adequate exposure with minimal bleeding. After removing head, size of head was measured.

Femoral canal was prepared using reamers. Entry point was made as lateral as possible in line with the inner wall of the lateral cortex. Whenever posteromedial comminution was found, it was reconstructed with Kirschners wires and stainless steel wires. Femoral canal cleaned with normal saline and dried with roller gauze. Cement is then pushed into the femoral canal with a cement introducer and to prevent sinking of cement distally in canal, a cement restrictor was used. After the initial setting of the cement, implant of appropriate size was fitted after ascertaining the correct degree of anteversion and length. Joint was relocated with gentle traction to limb with thumb pressure and external rotation. Joint movements and stability was checked. Wounds were closed over negative suction drain.

DVT prophylaxis was given if patient was at high risk. Static exercise in bed for glutei, hamstrings and quadriceps and breathing exercises were started on first post operative day. Drains were removed after 48 hours. Full weight bearing was allowed from third day. Postoperative dressings were done on third and fifth post operative day. Sutures were removed between 12-14 days. Patients were followed at three months, six months, one year and one and half year.

Systemic grading of patients was done using Harris hip scoring system; formulated by W.H Harris as described in Table no.1.<sup>5</sup>

#### **Observation and results**

In our study we derived the following results:-

Mean age of patients was  $78.07 \pm 6.16$  years. There were total seventeen males and thirteen females in study group. Eighteen fractures involved left side and twelve were right sided. Average trauma surgery interval was 6.56 days (range 2 to 12 days). The average surgical time was 86.33 minutes (range 65 to 115 minutes). Average stay at the hospital was 18.77 days

(range 14 to 26 days). The type of fracture in thirteen patients was A2.2 and in seventeen patients it was A2.3. Ten patients were suffering from hypertension with ischaemic heart disease, four patients were suffering from diabetes mellitus, four patients were suffering from both hypertension and diabetes mellitus, two patients were suffering from cataract and two patients were suffering from chronic obstructive pulmonary disease (COPD). Twenty eight patients were community ambulatory and two were household ambulatory. The average blood loss was 300 millilitres (range 150 to 550 millilitres). Fifteen patients were given one unit of Blood transfusion each, while three patients were given two units of Blood Transfusion each. Average partial weight bearing was achieved after  $3 \pm 1.05$  days (Range 2-5 days). Full weight bearing was achieved on an average after  $5.8 \pm 1.45$  days (Range 4-9 days). Complications included two superficial and one deep infection. Shortening was seen in two patients but was below two centimetres and there were no cases of dislocation. There were no cases of pressure sores, pneumonia or any other respiratory complications. There were no cases of deep venous thrombosis (DVT).

Out of thirty patients, four expired due to myocardial infarction. There was one death on third post operative day. One patient expired between first and second follow-up and two patients expired before final follow-up. So the final functional assessment of twenty six patients was done at the last follow-up of one and half year. Functional results using Harris hip score at three months, six months, one year and at the end of one and half year are depicted in table no 2, 3, 4 and 5 respectively.

## Discussion

Outcome of treatment of intertrochanteric fractures depends on quality of bone, age of patient, general health, trauma surgery interval, and adequacy of treatment, co-morbidities, and stability of fixation.<sup>6,7,8</sup>

Literature concerning the treatment and results of unstable osteoporotic intertrochanteric fracture of the hip is extensive. Various authors including Holi Dimon and Hughston, Sarmentio and William's have done outstanding work in attempt to change an unstable intertrochanteric fracture into a stable one and fix it with a appropriate implants until it heals. The reported complication rate in literature for treating unstable intertrochanteric fracture range from 18-50%.<sup>9,10</sup> Intertrochanteric fractures in the elderly pose certain special problems. In this age group the fracture configuration is generally comminuted with presence of extensive osteoporosis. There is problem of correct and accurate placement of the implant and hold of the implant hence prolonged immobilization is required for achieving complete union. On the other hand there is a need for rapid full weight bearing mobilization of this group of patients as they are generally medically compromised due to age and associated diseases. In addition, these patients may not have adequate psychomotor skills required for graded and protected weight bearing which is needed after internal fixation. Hence there are two conflicting requirements that need to be addressed to in a balanced way.

So till date the treatment of unstable intertrochanteric neck femur fractures in osteoporotic elderly patients is still controversial. Extensive literature is available in forms of randomized trials<sup>11</sup> and comparative studies.<sup>6,12</sup>

<sup>13</sup> Elderly patients even if they are in good health cannot usually be mobilized without some weight

bearing on the involved limb. This has led to the design of several types for the operative treatment of these fractures and new fixation devices that has been introduced periodically. Excessive collapse and loss of fixation resulting in poor function remain problems associated with internal fixation of unstable intertrochanteric fractures in elderly patients with osteoporotic bones. So to allow earlier post operative weight bearing and to avoid excessive collapse at the fracture site, some surgeons have recommended prosthetic replacement for the treatment of unstable osteoporotic intertrochanteric fractures.<sup>14</sup>In 1973, Rosenfield *etal.*<sup>15</sup> and In 1984, Mark B Stern and Angerman<sup>16</sup> reported study of Leinbach prosthesis for intertrochanteric fractures. They had fewer complications and a better postoperative result. In 1974, Bateman<sup>17</sup> introduced the Bateman prosthesis for the management of the fractures of proximal femur which was of bipolar in nature. In 1975, Harrington<sup>18</sup> studied the use of cement for treatment of intertrochanteric fractures with osteoporosis.

In 1986-1995 Altay *etal.*<sup>19</sup> and in 1999, Eksioğlu et al.<sup>20</sup> studied bipolar prosthetic replacement for the management of unstable intertrochanteric fractures in elderly and reported good results. Other published reports from literature include study of Rodop *etal.* in 2002<sup>21</sup>, Liang YT et al. in 2005<sup>22</sup> and Casey Chan and Gill *e al.* in 2000.<sup>23</sup> All of them derived satisfactory outcomes with minimal rate of complications.

In old osteoporotic patients surgeon is often confronted with a challenge and dilemma between achieving bony union in a weakened bone stock with poor implants hold, against need for early mobilization. The special problems associated with unstable fractures in the geriatric

age group are possibly due to one or more of the following factors :

- Osteoporosis.
- Comminution.
- Age related medical illnesses.
- Need for rapid mobilization.
- Lack of psychomotor skills for partial and graduated weight bearing.

All these problems are addressed by bipolar hemiarthroplasty. Early mobilization is possible as the technique bypasses of fracture healing and provides immediate stability and mobility thereby avoiding the problems of recumbency.

We did cemented bipolar hemiarthroplasty in 30 patients with unstable osteoporotic intertrochanteric fractures. We tried minimizing trauma surgery interval and total hospital stay so that morbidity can be decreased. Surgical time and required skills are more for this procedure compared to conventional internal fixation techniques and so is the blood loss. But early weight bearing is possible so morbidity of immobilization can be decreased. There were no cases of pressure sores, pneumonia or any respiratory complications post operatively. None of patient developed deep venous thrombosis (DVT) probably because of prophylaxis given to high risk patients. No revisions were required as seen many times with the use of traditional internal fixation due to screw cut outs or implant failure. Most of the complications were minor and resolved with minimal interventions without causing any lasting morbidity. Few cases developed infection but resolved with early debridement. Shortening was the possible complication but we were able to minimize them by repeated meticulous intraoperative checks for length before final insertion of implants.

### Conclusion

Primary hemiarthroplasty provides stable pain free mobile joint and is a better modality of

treatment in osteoporotic elderly people who sustained unstable intertrochanteric neck femur fractures.

### References

1. Campbell's operative orthopedics; Philadelphia Mosby Elsevier, 2008.Vol 3; 11th edition: 3239-3256.
2. Grisso JA, Kelsey JL, Strom BL, and Chio GY. Risk factors for falls as a cause of hip fractures in women. *New England journal of medicine*. 1991;324:1326-1331.
3. Meislin RJ, Zuckerman JD, Kummer FJ, et al. A biomechanical evaluation of the gamma nail. *J Bone Joint Surg*.1998; 70-A:239.
4. Sturt green. Bipolar prosthetic replacement for the management of unstable intertrochanteric fractures in the elderly. *Clin Orthop Relat Res*. 1987;224:169-177.
5. Harris WH: Traumatic arthritis of the hip after dislocation and acetabular fractures: treatment by mold arthroplasty. An end-result study using a new method of result evaluation. *J Bone Joint Surg*. 1969 June; 51-A (4):737-55.
6. Kyle RF, Gustilo RB, Premer PF. Analysis of Six hundred and Twenty-two intertrochanteric Hip Fractures. *J. Bone Joint Surg*. 1979 March; 61-A: 216-21.
7. Dahl E. Mortality and life expectancy after hip fractures. *Acta Orthop. Scand*. 1980 Feb; 51(1)163-70.
8. Kaufer H. Mechanics of the treatment of hip injuries. *Clin Orthop Relat Res*. 1980 Jan-Feb;146:53-61.
9. Sarmento. Intertrochanteric fractures of femur 150-degree angle nail plate fixation and early rehabilitation, a preliminary report of 100 cases. *J Bone Joint Surgery*.1963June;45-A:706-722.
10. Dimon JH, Hughston JC. Unstable intertrochanteric fractures of hip. *J Bone Joint Sug*.1967;49-A:440-450.
11. Ender J, Simon Weuidner. *Acta orthop Australia*.1970;1:40-42.
12. Cleas H, Broos P, Stappaerts K. Pertrochanteric Fractures in Elderly patient Treatment with Ender's nail, blade-plate or endoprosthesis? *Injury*. 1985;16(4):261-64.
13. Heyse-Moore G.H, MacEachen AC, and Jameson Evans DC. Treatment of trochanteric fractures of the femur. *J Bone Joint Surg*. 1983;65-B: 262-267.
14. Kim SY, Kim YG, Hwang JK. Hemiarthroplasty compared with intramedullary fixation of unstable intertrochanteric fractures: *J Bone Joint Surg*. 2005 Oct;87-A: 2186-92.
15. Rosenfield. Leinbach prosthesis in intertrochanteric fractures. *J Bone Joint Surg*.1973;55-A:420-424.
16. Stern MB, Angerman A. Communitid intertrochanteric fractures treated with Leinbach prosthesis. *Clin Orthop Relat Res*. 1987;218:75-80.
17. Bateman JE. Experience with a multiple bearing implant in reconstruction for hip deformities. *Orthop Trans*.1981;5:421.

18. Harrington K.D. The use of methyl methacrylate as an adjunct in the internal fixation of unstable comminuted intertrochanteric fractures in osteoporotic patients. J Bone Joint Surg. 1975 Sep;57-A(6):744-50.
19. Altay T, Kaya A. Hemiarthroplasty for intertrochanteric fractures in Elderly patients. Joint Dis Rel Surg. 1998;9(1):22-27.
20. Fatih EKSIÖGLU, Behcet SEPICI, Eftal GÜDEMEZ, Atilla DURMUS. Primary Hip Hemiarthroplasty For Unstable Intertrochanteric Fractures in Elderly Patients. Joint Diseases and Related Surgery. 1998;9(2):77-81.
21. Rodop O, Kiral A, Kaplan H, Akmaz I. Primary bipolar hemiprosthesis for unstable intertrochanteric fractures. Int Orthop. 2002;26:233-7.
22. Liang YT, Tang PF, Guo YZ, Tao s, Zhang Q, Liang XD, Han G, Cui G, Yang MY. Clinical research of hemiprosthesis arthroplasty for the treatment of unstable intertrochanteric fractures in elderly patients. Zhonghua Yi Xue Ze Zhi. 2005 Dec;85(46):3260-2.
23. Chan KC, Gill GS. Cemented hemiarthroplasty for elderly patients with intertrochanteric fractures. Clin Orthop Relat Res. 2000;371:206-215.

**Table no. 1:- Harris Hip scoring for functional evaluation of Hip**

Point scale with maximum of 100 points distributed as follows:-

Pain	44
Function	47
Range of motion	05
Absence of deformity	04
Total	100

<b>I</b>	<b>PAIN</b>	<b>44</b>
1	Totally disabled, crippled, pain in bed, bedridden	00
2	Marked pain, serious limitation of activities	10
3	Moderate pain, tolerable but makes concession to pain	20
4	Mild pain, no effect on average activities	30
5	Slight, occasional, no compromise in activity	40
6	None, or ignores it	44
	Total	
<b>II</b>	<b>Function</b>	<b>47</b>
A	Distance walked	

1	Bed and chair only	00
2	Two or three blocks	05
3	Six blocks	08
4	Unlimited	11
<b>B</b>	<b>Activities</b>	
	<b>Shoes &amp; Socks</b>	
1	Unable to fit or tie	00
2	With difficulty	02
3	With ease	04
	<b>Public transportation</b>	
1	Unable to use public transportation (bus)	00
2	Able to use transportation (bus)	01
	<b>Limp</b>	
1	Severe or unable to walk	00
2	Moderate	05
3	Slight	08
4	None	11
	<b>Support</b>	
1	Two crutches or not able to walk	00
2	Two canes	02
3	One crutch	03
4	Cane most of the time	05
5	Cane for long walks	07
6	None	11
	<b>Stairs</b>	
1	Unable to do stairs	00
2	In any manner	01
3	Normally using a railing	02
4	Normally without using a railing	04
	<b>Sitting</b>	
1	Unable to sit in any chair comfortably	00
2	On a high chair for 30 min	03
3	Comfortably on a ordinary chair for one hour	05

	Total	
<b>III</b>	<b>Motions</b> <b>Flexion+ Abduction + Adduction+</b> <b>External rotation + internal rotation=</b>	<b>05</b>
1	00 to 29°	00
2	30 to 59°	01
3	60 to 99°	02
4	100 to 159°	03
5	160 to 209°	04
6	210 to 300°	05
	Total	
<b>IV</b>	<b>Deformity</b>	<b>04</b>
1	Flexion deformity 30° or more	00
2	Flexion deformity less than 30°	01
1	Fixed adduction 10° or more	00
2	Fixed adduction less than 10°	01
1	Fixed internal rotation(in extension) 10° or more	00
2	Fixed internal rotation(inextension) less than 10°	0
1	Limb length discrepancy more than or equal to 3.2 cms	00
2	Limb length discrepancy less than 3.2cms	01
	Total	
	Total of I+II+III+IV	100

The score is reported as follows:-

HHS between 90 to 100- Excellent results

HHS between 80 to 89- Good

HHS between 70 to 79- Fair

HHS between 60 to 69-Poor, and

HHS below 60:- as a failed result.

\* HHS: - Harris Hip Score



**Table no.2:- Functional Results at 3 months:**

Results	No. of Patients
Excellent (HHS 90-100)	9
Good (HHS 80-89)	11
Fair (HHS 70-79)	8
Poor (HHS 60-69)	1
Failed (HHS below 60)	0

\* HHS: - Harris Hip Score

**Table no. 3:- Functional Results at 6 months:**

Results	No. of Patients
Excellent (HHS 90-100)	14
Good (HHS 80-89)	9
Fair (HHS 70-79)	4
Poor (HHS 60-69)	1
Failed (HHS below 60)	0

\* HHS: - Harris Hip Score

**Table no. 3:- Functional Results at 1 Year:**

Results	No. of Patients
Excellent (HHS 90-100)	16
Good (HHS 80-89)	9
Fair (HHS 70-79)	2
Poor (HHS 60-69)	1
Failed (HHS below 60)	0

\* HHS: - Harris Hip Score

**Table no. 3:- Functional Results at 1 and ½ Year:**

Results	No. of Patients
Excellent (HHS 90-100)	17
Good (HHS 80-89)	8
Fair (HHS 70-79)	1
Poor (HHS 60-69)	0
Failed (HHS below 60)	0

\* HHS: - Harris Hip Score

**Photographs showing X rays prior to and after surgery:**

**Case 1:- a) Pre operative X ray:-**



**b) post operative X ray:-**



**Case 2:- a) Pre operative Xray:-**



**b) Post operative X ray:-**



Date of submission: 12 March 2014

Date of Provisional acceptance: 18 March 2014

Date of Final acceptance: 27 April 2014

Date of Publication: 07 June 2014

Source of support: Nil; Conflict of Interest: Nil