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ORIGINAL ARTICLE

A STUDY OF PRIMARY CEMENTED BIPOLAR HEMIARTHROPLASTY OF HIP IN ELDERLY PATIENTS WITH OSTEOPOROTIC, UNSTABLE INTERTROCHANTERIC FRACTURE

Maheshwar Lakkireddy[1], Radhakrishna Rapaka[2], Naveen Gouru[3], Shivaprasad Rapur[4]

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ABSTRACT: BACKGROUND: Intertrochanteric fractures are a major cause of morbidity and mortality in geriatric population. Osteoporosis contributes significantly to the comminution and instability in such fractures. Internal fixations in unstable intertrochanteric fractures are associated with high rates of implant failures and gross restriction of hip movements. This study was undertaken to evaluate the efficacy of cemented bipolar hemiarthroplasty in elderly patients with osteoporotic, unstable intertrochanteric fractures. **PATIENTS AND METHODS:** 52 patients aged above 60 years with unstable, comminuted intertrochanteric fractures with Singh's index < 4 were operated with primary cemented bipolar hemireplacement arthroplasty. All the patients were mobilized early with full weight bearing in the post-operative period as permitted. 50 patients were evaluated for the functional outcome with Harris Hip score. **RESULTS:** The average age of patients was 65 years with female predominance (64%). Left side (56%) was commonly involved and the commonest mode of injury was due to a trivial fall at home. Hypertension (30%) was the commonest co-morbid condition. Limb shortening was the commonest complication (8%). The mean±S.D. of the Harris Hip score was 85.6±10.59 with a range from 56 to 96. Results were excellent in 62%, good in 22%, fair in 12% and poor in 4% of cases. **CONCLUSION:** Elderly osteoporotic patients with comminuted, unstable intertrochanteric fractures have an increased prevalence of unsatisfactory functional results with conventional internal fixation devices. Primary cemented bipolar hemiarthroplasty with anatomical reconstruction of the trochanters allows early mobilization, improved functional outcome with relatively low incidence of associated complications.

KEYWORDS: Osteoporosis, Inter-trochanteric fracture, Cemented Bipolar Hemiarthroplasty, Full weight bearing, Early mobilisation.
MeSHTerms: Osteoporosis, Hemiarthroplasty.

INTRODUCTION: Intertrochanteric fractures constitute 45% of all the hip fractures[1] and are a major cause of morbidity and mortality in elderly population.[1,2] They are usually comminuted and unstable because of concomitant osteoporosis.[2] Although the results have improved with the use of internal fixation, unstable intertrochanteric fractures in elderly are still associated with high rates of morbidity and mortality as comminution, osteoporosis and instability results in excessive sliding of these fixation devices[3] leading to severe collapse at the fracture site and loss of fixation with development of unacceptable deformity, shortening, coxa vara and excessive medialisation of the shaft with cut out screws (Figure 1) and penetration of the joint with severe restriction of

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hip movements.[4,5,6,7] Osteosynthesis by internal fixation in unstable fractures often precludes early resumption of full weight bearing and is associated with poor functional out comes in performing activities of daily living.[3] Treatment with primary cemented bipolar hemireplacement arthroplasty by calcar sparing prosthesis for osteoporotic, unstable intertrochanteric fracture rather than conventional osteosynthesis by internal fixation may facilitate early return of these patients to their pre-injury state of activity more quickly by allowing immediate full weight bearing postoperatively, thus avoiding the postoperative complications caused by immobilization and implant failure.[8,9,10,11]

Very often it is debated, whether cemented bipolar hemi-arthroplasty using a standard femoral stem is a reasonable alternative to osteosynthesis by reduction and fixation with devices[9,12,13,14] like sliding hip screws, medoffplate, PFN etc for elderly osteoporotic patients with unstable intertrochanteric fractures with a goal to reduce mortality and morbidity[15] in terms of early weight bearing, decubitus ulcers, deep vein thrombosis and pulmonary complications associated with prolonged immobilization and rehabilitation.[10,16]

AIMS AND OBJECTIVES:

1. To evaluate the efficacy of cemented bipolar hemiartroplasty in intertrochanteric fractures in elderly with severe osteoporosis.
2. To evaluate the scope of bipolar hemiarthroplasty in minimizing the perioperative complications that would arise with internal fixation.
3. To assess the functional outcome of bipolar hip prosthesis in Intertrochanteric fractures in elderly patients.

PATIENTS AND METHODS: It is a non-randomized prospective study conducted on 50 cases of unstable, comminuted intertrochanteric fracture in elderly osteoporotic patients admitted in our hospital for free treatment.

Inclusion Criteria: Comminuted, unstable intertrochanteric fractures in elderly osteoporotic patients above the age of 60 years with Singh's index[17] <4 (Table 1).

Exclusion Criteria:

1. Intertrochanteric fractures in younger patients with no osteoporosis.
2. Patients having intertrochanteric fractures associated with Progressive Neurological disorders and neurological deficits.
3. Intertrochanteric fractures in elderly patients who have other medical problems which make them bed ridden or unfit for anaesthesia.
4. Patients with any localized septic focus in the body.

All the patients were selected from the admissions in the department of Orthopaedics who fulfilled the inclusion and exclusion criteria. The selected patients were then recruited for the study after a written informed consent was taken. They were counseled about all the possible post-operative complications. Out of 52 patients in our study, 2 patients died within 2 weeks after surgery due to unrelated causes. The remaining 50 patients were followed, out of which 32 were

women and 18 were men. Post operatively the patients were reviewed by clinical and radiological examination by using the Harris Hip score[18] at regular intervals of 6 weeks, 3 months, 6 months, 1 year and yearly thereafter.

Once the patient is diagnosed with intertrochanteric fracture, thorough physical examination is done to rule out other injuries. Vital data was recorded and the fracture was temporarily immobilized using a below knee skin traction to which a weight of 3kg was applied.

Anterio-posterior radiograph of the pelvis with both the hip joints in 15 degrees of internal rotation was performed. Thickness of cortex of femur, width and shape, medullary canal bone stock, type of fracture (stable or unstable), Pre-operative size of head (magnification deducted), severity of osteoporosis by Singh's index[17] (Table 1) were noted. Evans classification system[19] was used for the determination of type of fracture (Table 2). Pre anaesthetic checkup was done prior to surgery in all cases. All the patients were trained to do static quadriceps, ankle pump, and deep breathing exercises pre operatively so that the same could be carried out post operatively.

All surgeries were performed in the elective theatre using standard aseptic precautions. Standard posterior/Osborne approach was used for all cases. Cemented bipolar hemi-arthroplasty with non-modular bipolar hip prosthesis of OSIM make (Figure 2) with or without greater and lesser trochanter fixation was carried out (Figure 3 and 4). All the patients were mobilized with support in the post-operative period with full weight bearing as permitted by the patient. Patients were followed up and evaluated at regular intervals.

RESULTS: The average age of patients in our series was 65 years, range (60-75yrs) with female predominance (64%) due to post-menopausal osteoporosis was noted. Left side was more commonly involved (56%) and the commonest mode of injury was due to trivial fall while walking in the house. Hypertension (30%) was the commonest co-morbid condition (Table 3). Average interval between injury and admission to hospital was 7.6 days with a range of 0-10 days and the average duration of hospital stay was 14 days, with a range of 10-25 days. The commonly used head size of the bipolar prosthesis was 41mm and 43mm in females and size 45mm and 47mm in males. Limb shortening was the commonest complication (Table 4). The outcome of the study was measured by Harris Hip score and the mean±S.D. of the Harris Hip score was 85.6±10.59 with range from 56 to 96 (Table 5). There were no cases of dislocation or deep seated infection necessitating revision over a mean follow up of 2 years.

DISCUSSION: Unstable intertrochanteric fractures in geriatric osteoporotic patients pose different set of challenges for the operating team. Concomitant co morbid conditions often add to the difficulties. There is ample evidence in the literature that universal approach of aiming osteosynthesis using conventional devices may not hold good in unstable fracture patterns in view of inadvertent complications with high failure rates, morbidity and mortality.[6,9,12,13,14,20,21] Hemi-replacements with monopolar prosthesis have been associated with increased long term failure rates in comparison with bipolar prosthesis which are considered to preserve acetabular cartilage owing to the self-centering nature and two planes of movement to reduce wear and tear at the acetabular interface.[22,23,24] As modular bipolar and total hip replacement using un-

cemented prosthesis could not be provided for all the patients with unstable intertrochanteric fractures in a government setup where surgeries were offered free of cost, a cost effective modality of treatment like primary cemented bipolar hemireplacement arthroplasty of hip was chosen to tackle such cases.

Having accomplished the task in 50 prospective patients and on comparison of our study with the published series by authors who preferred bipolar hemi-arthroplasty in intertrochanteric fractures the following observations were made.

The average age in our series was 65 years with a range of 60-75 years. The average age in the reported series by Chan KC[25]was 84.2 years and Rodop O[26] was 75.6 years. The age incidence in our series is on the lower side probably due to malnutrition, early onset of senile osteoporosis in our country. The average life expectancy of an Indian is 10 years less than western standards and majority of our older individuals in our country are mobile and active when compared to western countries and so are at risk of fall and fractures.

In our series, it was observed that the male to female ratio was 18:32, the females being 64%. The sex incidence in our series is almost similar to the reported 65.38% of Long and knight.[27] This may be due to the hormonal imbalance in post-menopausal age with poor hormonal replacement therapy and malnutrition in our country.

22(44%) patients had fracture on right side and 28(56%) patients had fracture on left side. No specific reasons can be given for the more frequent involvement of left hip and it could be an incidental finding.

We operated most of the patients with an average of 7 days from the day of injury. There was a delay in referral of such patients to our centre from peripheries and some of them have undergone osteopath procedure of oil massage and application of native bandages for few days before referral. The delay was also due to the co morbid conditions which warranted stabilization of vital parameters before the patient is taken up for surgery. The average hospital stay was 14 days with a range of 7 to 25 days as comparable to the average stay of 10.90 days reported by lestrange.[28] The average stay in our study is marginally high owing to the delayed presentation, stabilization of co morbid conditions, and retention of certain group of patients till the suture removal.

In comparison with Mericevic A et. al[29] study with 2.3% infection rate we had one case (2%) of superficial infection which subsided with appropriate antibiotic for 1 week. Few other complications in comparison with the literature are shown in (Table 6).

The functional outcome of the present study from India is comparable with the ones reported from the West (Table 7). Marginal variations in outcome may be attributed to the sample size, pattern of fracture, instability, severity of osteoporosis, effective muscle strength around hip, functional age of the studied group, surgical skill of the operating team in restoring abductor mechanism, proper seating of the prosthesis and effective post-operative rehabilitation facilities.

CONCLUSION: Elderly osteoporotic patients over 60 years of age with comminuted, unstable intertrochanteric fractures form a special group with unique problems. They have a high prevalence of unsatisfactory functional results like unacceptable shortening, rotational deformity of the limb, Screw cut out and functional implant failure following treatment with conventional

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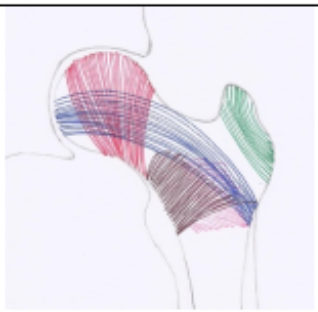
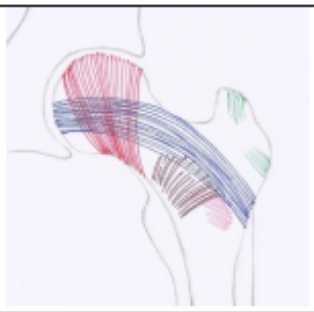
internal fixation devices. Careful management of the co-morbid conditions and proper surgical technique of hemireplacement in distorted anatomy is essential for a successful outcome. Cemented bipolar hemiarthroplasty with anatomical reconstruction of the trochanteric region preserves the abductor mechanism and allows early mobilization, safe early weight bearing on the injured hip with relatively low incidence of associated complications. The results of hemiarthroplasty are more predictable than conventional internal fixation with inadvertent collapse and complications in elderly patients with unstable intertrochanteric fractures compounded by osteoporosis. However large multicentric randomized studies are needed in this regard to further the recommendation of primary cemented bipolar hemireplacement for elderly osteoporotic patients with unstable intertrochanteric fractures.

Grade	Description	Depiction*
6	All the trabecular groups of proximal fermur are visible	
5	Attenuated trochateric, secondary tensile and compressive trabeculae	
4	Complete loss of trochateric, secondary tensile and compressive trabeculae.	

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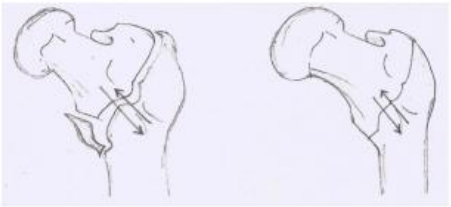
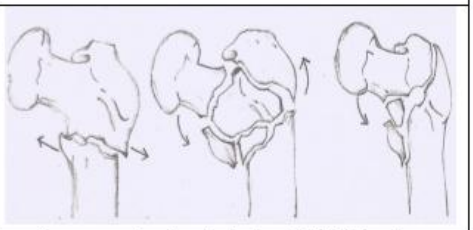
3	Break in the continuty of principal tensile trabeculae.	
2	Complete loss of principal tensile trabeculae sparing Principal compressive trabeculae	
1	Grossly attenuated Principal compressive trabeculae.	

Singh's Index [17]. *Redrawn sketch - Source: Bucholz Robert W, Heckman James D et.al, editors: Fractures in Adults, 5th edi. Philadelphia: Lippincott Williams & Wilkins;2001.P.1582

Table 1

Description	Depiction*
Stable Fracture pattern: Intact posteromedial cortex or with minimal Comminution	
Unstable Fracture pattern: Comminution of the posteromedial cortex, reverse oblique fracture	

Evans Classification[19]. *Redrawn sketch - Source: Bucholz Robert W, Heckman James D et.al, editors. Fractures in Adults, 6th edi, Philadelphia: Lippincott Williams & Wilkins: 2006.p.1797.

Table 2

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Variables	No. of patients	Percentage
Age group		
60-65	38	76%
66-70	10	20%
71-75	2	4%
Sex Incidence		
Male	18	36%
Female	32	64%
Side Involved		
Left	28	56%
Right	22	44%
Mechanism of Injury		
Fall on slippery floor	26	52%
Fall from cycle	4	8%
Fall from stairs	13	26%
Road Traffic Accident	5	14%
Miscellaneous	2	4%
Co-Morbid Conditions		
Hypertension	15	30%
Diabetes Mellitus	12	24%
Anaemia	8	16%
COPD	4	8%
Ischemic Heart disease	2	4%

Tabulated results of the study

Table 3

Variables	No. of patients	Percentage
Interval between Injury and Admission		
0-3 days	10	20%
4-7 days	15	30%
8-10 days	25	50%
Duration of hospital stay		
10-15 days	30	60%
16-20 days	12	24%
>21 days	8	16%
Size of Prosthesis		
39mm	7	14%
41mm	11	22%
43mm	15	30%

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45	8	16%
47mm	6	12%
49mm	3	6%
Postoperative Complications		
Superficial infection	1	2%
Limb shortening	4	8%
Limb lengthening	2	4%
Peri prosthetic #	1	2%
Aseptic loosening	1	2%

Tabulated results of the study

Table 4

Harris Hip Score	Out come	No. of Patients	Percentage
>90	Excellent	31	62%
80-90	Good	11	22%
70-80	Fair	6	12%
<70	Poor	2	4%
Functional Outcome			

Table 5

Study	Shortening	Dislocation	Mortality
Lestrange[28]	72.1%	-	3.4%
Wesley m nottage[30]	62.3%	-	4.6%
Mericevic[29]	-	2.6%	1.3%
Present study	>1.5 cm (6%) <1.5 cm (2%)	0%	4%

Comparative statistics of complications

Table 6

Study	Total No. of reported Patients	Result	No. of patients	Percentage
Mericevic[29]	28	Fair to Excellent	28	99.9%
Sternand Angerman[10]	-	Good to excellent	-	94%
Sancheti et.al[8]	35	Fair to excellent	32	91%
Rosenfeld et al.[30]	-	Satisfactory	-	86%
Haentjens et al.[9]	-	Satisfactory	-	75%

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Present study	**50**	**Fair to Excellent**	**48**	**96%**
Mean Harris Hip score				
Wesley m nottage[31]			85	
Kho DH and Shin JY[32]			84.7	
Sancheti et.al[8]			84.8	
Present study			85.6	
Comparative Statistics of functional outcome				

Table 7

Figure 1: Sequential post-operative radiographs of a patient treated with Dynamic Hip Screw for unstable intertrochanteric fracture showing cut out Richard screw from the femoral head.

Figure 2: Photograph of Bipolar Prosthesis used in the study.

Figure 1

Figure 2

Figure 3: Intra-operative photograph depicting the reconstruction of trochanters with stainless steel wires and proper seating of the prosthesis in a cemented femoral canal.

Figure 3

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Figure 4: Pre and post-operative radiographs of patients with IT fractures treated with Primary cemented bipolar hemiarthroplasty.

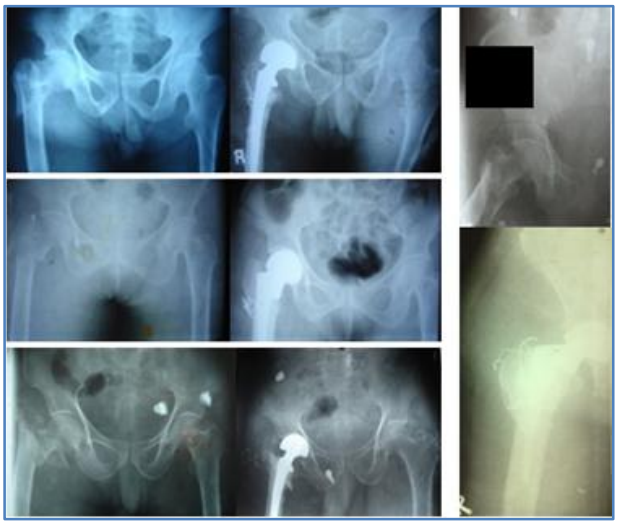

Figure 4

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REFERENCES:

1. Zuckerman JD. Hip fracture. N Engl J Med 1996; 334(23): 1519-23.
2. Jensen JS. Trochanteric Fractures. An Epidemiological, Clinical and Biomechanical Study. Acta Orthop. Scandinavica, Supplementum 1981; 188.
3. Bergman GD, Winquist RA, Mayo KA, Hansen ST Jr. Subtrochanteric Fracture of the Femur. Fixation Using the Zickel Nail. J.Bone Joint Surg Am 1987; 69(7): 1032-40.
4. Bendo JA, Weiner LS, Strauss E, and Yang E. Collapse of intertrochanteric hip fractures fixed with sliding screws. Orthop Rev Suppl 1994; 30-7.
5. Harwin SF, Stern RE, Kulick RG. Primary Bateman-Leinbach Bipolar Prosthetic replacement of the hip in the treatment of unstable intertrochanteric fractures in the elderly. Orthopedics 1990; 13(10): 1131-6.
6. Rosenfeild RT, Schwartz DR, Alter AH. Prosthetic replacement for trochanteric fractures of the femur. J.Bone Joint Surg Am1973; 55: 420.
7. Weon-Yoo Kim, Chang-hwan han et al. Failure of intertrochanteric fracture fixation with dynamic hip screw in relation to pre-operative fracture stability and osteoporosis. International Orthop 2001; l25(6); 360-2.
8. Sancheti Kh, Sancheti P, Shyam A, Patil S et.al. Primary hemiarthroplasty for unstable osteoporotic intertrochanteric fractures in the elderly: A retrospective case series. Indian J Orthop. 2010; 44(4): 428-34. doi: 10.4103/0019-5413.67122.

9. Haentjens P, Casteleyn PP, De Boeck H, Handelberg F et.al. Treatment of unstable intertrochanteric fractures in elderly patients. Primary bipolar hemiarthroplasty compared with internal fixation. J Bone Joint Surg Am.1989; 71(8): 1214-25.
10. Stern MB, and Angerman. Comminuted intertrochanteric fractures treated with Leinbach bipolar prosthesis. Clin.Orthop.1987; 218: 75-80.
11. Broos PL, Rommes PM, Deleyn PR, Geens VR et al. Peri and intertrochanteric fractures in the elderly: are there any indications for primary prosthesis replacement. J Orthop Trauma 1991; l5(4): 446-51.
12. Heinman M.L. Leinbach prosthesis in unstable intertrochanteric fractures. Contemp.Orthop 1982; 5: 37.
13. Stern, M.B, Goldstein. The use of Leinbach Bipolar Prosthesis in intertrochanteric fractures of the hip. Clin. Orthop 1977; 218: 325-31.
14. Choi IS, Roh SI, Kim DY et al. Comparision of bipolar hemiarthroplasty and compression Hip screw on Treatment of elderly unstable intertrochanteric Fractures
J Korean Fracture Soc 2000; 13(1):56-63
15. Genat HK, Steiger P et.al. Quantative computed tomography for the assessment of osteoporosis. CT of the body with MRI, 2nd edi, Philadelphia: WB 523-549, 1992.
16. Suh YS, Kim ST, Yim SJ et al. Primary Bipolar Hemiarthroplasty for the treatment of Unstable Intertrochanteric Fractures in elderly Patients. J Korean Fracture Soc 2000; 13(20):222-29.
17. Singh M, Nagrath AR, Maini PS. Changes in trabecular pattern of the upper end of femur as an index to osteoporosis. J Bone Joint Surg Am. 1970; 52(3): 457-67.
18. 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 Am. 1969; 51(4):737-55.
19. Evans EM. The Treatment of trochanteric fractures of the femur. J Bone Joint Surg 1949; 31(2): 190-203.
20. Haentjens P, Lamraski G. End prosthetic replacement of unstable, comminuted intertrochanteric fracture of the femur in the elderly, osteoporotic patient: a review. Disabil Rehabil. 2005; 27(18-19): 1167-80.
21. Kayali C, Agus H, Ozluk S,Sanli C. Treatement for unstable intertrochanteric fractures in elderly patients: internal fixation versus hemiarthroplasty. Journal of Orthop Surg (Honkong) 2006; 14(3) 240-44.
22. Gilberty RP. Bipolar endoprothesis minimizes protrusion acetabuli, loose stems. Ortho review 1985; 14: 27.
23. Langan P, The Giliberty Bipolar Prosthesis: A clinical and radiographical review. Clin Orthop Relat Res 1979; 141; 169-75.
24. Philps T W. The Bateman bipolar femoral head replacement. A fluoroscopic study of movement over a four-year period. J Bone Joint Surg 1987; 69(5): 761-4.
25. Chan KC, Gill GS. Cemented hemiarthroplasties for elderly patients with inter trochanteric fractures. Clin Orthop Relat Res. 2000; 371: 206-15.

DOI: 10.18410/jebmh/2015/757

26. Rodop O, Kiral A, Kaplan H, Akmaz I. Primary bipolar hemiprosthesis for unstable intertrochanteric fractures. Int Orthop. 2002; 26: 233–7.
27. Long JW, Knight W. Bateman and UPF prosthesis in fracture of the proximal femur. Clin Orthop Relat Res. 1980; 152; 198-201.
28. Lestrange NR. Bipolar arthroplasty for 496 hip fractures. Clin Orthop Relat Res. 1990; 251: 7-19.
29. Maricevic A, Erceq M, Gekic K. Perioperative mortality and dislocation rates in bipolar hemiarthroplasty. Lijec Vjesn.1998; 120(5); 121-4.
30. Rosenfeld RT, Schwartz DR, Alter AH. Prosthetic replacement for trochanteric fractures of the femur. J Bone Joint Surg Am 1973; 55: 420.
31. Nottage WM, Mc Master WC. Infection rate in bipolar hemiarthroplasty for proximal femoral fractures. Clin Orthop Relat Res 1990; 251: 38-43.
32. Kho DH, Kim Kh, Shin JY et al. Bipolar hemiarthroplasty in selected cases for unstable intertrochanteric fractures in elderly patients. J Korean Fracture Soc 2003; 16(1): 22-28.

AUTHORS:

1. Maheshwar Lakkireddy
2. Radhakrishna Rapaka
3. Naveen Gouru
4. Shivaprasad Rapur

PARTICULARS OF CONTRIBUTORS:

1. Assistant Professor, Department of Orthopedics, Nizam's Institute of Medical Sciences, Punjagutta, Hyderabad.
2. Assistant Professor, Department of Orthopedics, Gandhi Medical College & Hospital, Hyderabad.
3. Consultant Orthopedic Surgeon, Department of Orthopedics, G. V. Hospital, Miryalaguda, Telangana.
4. Professor & HOD, Department of Orthopedics, Mediciti Institute of Medical Sciences, Ghanpur, Medchal, Hyderabad.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Maheshwar Lakkireddy,
Flat No. A03-505,
Sadbhavana Towship,
APRSCL, Rajiv Swagruha,
Pocharam (Village),
Ghatkesar (Mandal)-500088,
Rangareddy, Telangana
E-mail: maheshwar.ortho@gmail.com

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