

## Original Research Article

# A comparative study on functional outcome of unstable intertrochanteric fractures in elderly treated with bipolar hemiarthroplasty and dynamic hip screw fixation: a short term perspective analysis

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### ABSTRACT

**Background:** Trochanteric hip fractures in elderly patients have benefited from advances in internal fixation. Early failure of internal fixation occurs however in a number of cases. The failure after internal fixation had been due to initial fracture pattern, communication, sub-optimal fracture fixation and poor bone quality. The aim of this prospective comparative study is to analyze the short term follow up results of unstable Intertrochanteric fractures in elderly treated with bipolar hemiarthroplasty and dynamic hip screw (DHS) fixation.

**Methods:** This is a study conducted in the Department of Orthopaedics, Government Tiruvarur Medical College, Tiruvarur. 42 elderly osteoporotic patients with unstable intertrochanteric fractures who were divided into two groups with group A-bipolar prosthesis (21 cases) and group B-DHS (21 cases).

**Results:** 42 elderly osteoporotic patients with unstable intertrochanteric fractures who were divided into two groups with group A-bipolar prosthesis (21 cases) and group B-DHS (21 cases). Patients were evaluated clinically using the Harris hip score during their follow up period. In both groups, the most common Singh's index was grade III, 61.90% in both group A and group B.

**Conclusions:** From our results, we are of the opinion that bipolar hemiarthroplasty may be an efficient option in elderly osteoporotic intertrochanteric fractures. It reduces the potential complications of prolonged immobilization such as pressure sores, pulmonary complications by early mobilization.

**Keywords:** Comparative study, Functional outcome, Unstable intertrochanteric fractures, Elderly treated with bipolar hemiarthroplasty, Dynamic hip screw

### INTRODUCTION

Proximal femoral fractures in elderly individuals have a tremendous impact on both the health care system and society and it occurs in moderate or minimal trauma. During an impact, the large amount of energy that is released is absorbed by the skin, fat, and muscles that surround the hip.<sup>1</sup> There is an increased incidence of hip fractures with aging due to a decrease in muscle mass

around the hip and osteoporosis and is becoming more common as the proportion of elderly people in the population increases.<sup>2</sup> Trochanteric hip fractures in elderly patients have benefited from advances in internal fixation. Early failure of internal fixation occurs however in a number of cases. The failure after internal fixation had been due to initial fracture pattern, communication, sub-optimal fracture fixation, and poor bone quality.<sup>3</sup> The problems associated with fixation of these fractures are

loss of fixation, varus collapse and cut out of the lag screw, as a result, there is profound functional disability and pain.<sup>4</sup> In these patients treated with primary bipolar hemiarthroplasty decreases the post-operative complications due to prolonged immobilization or implant failure and also quickly return the patients to their preinjury activity level.<sup>5</sup>

**METHODS**

This is a study conducted in the Department of Orthopaedics, Government Tiruvarur Medical College, Tiruvarur. From April 2019 to November 2019. On 42 elderly osteoporotic patients with unstable intertrochanteric fractures were divided into two groups with group A-bipolar prosthesis (21 cases) and group B-dynamic hip screw (DHS) (21 cases).

**Inclusion criteria**

Age more than 60 years, unstable intertrochanteric fractures and (AO-ATO and EVANS classification) osteoporotic fractures were included.

**Exclusion criteria**

Age less than 60 years, patients with stable intertrochanteric fractures (AO-ATO and EVANS classification) patients with pathological fractures, patients with stable lesser trochanter and patients with associated fractures of lower limbs were excluded.

*Pre-operative evaluation:* The general condition of the patient is assessed at the time of admission and associated comorbidities are noted. Skeletal traction was applied for patients who had a delay in getting anesthetic fitness. *Radiographic evaluation:* Both anteroposterior and lateral radiographs were taken and studied.

*Functional analysis:* The functional outcome was evaluated using the Harris hip score during follow up. Ethical committee approval was given by institution

**Statistical analysis**

Data are reported as a mean and a significant difference between the two groups of data was studied using Two-sample Wilcoxon rank-sum (Mann-Whitney) test.

**RESULTS**

Table 1 shows in our study, of the total 42 participated, most of them were in the age group of 60 to 69 (50%). Females outnumbered males in both the groups, 57% in group A and 52% in group B.

**Table 1: Age and sex distribution.**

Age (in years)	Group A		Group B		Total
	M	F	M	F	
60-69	04	5	7	5	21
70-79	3	5	2	5	15
80-89	1	2	1	1	5
90-99	1	-	-	-	1
<b>Total</b>	9	12	10	11	42

M: male; F: female.

**Table 2: Side involved.**

Side	No. of patients
<b>Group A</b>	
Right	11
Left	10
<b>Group B</b>	
Right	12
Left	9

Table 2 of the 21 patients in group A, 11 patients had a fracture on the right side and 10 patients on the left side. Of the 21 patients in group B, 12 had a fracture on the right side and 9 patients on the left side.

**Table 3: Type of fracture.**

Classification Types	AO			Total	EVANS		Total
	A2.1	A2.2	A2.3		IV	V	
Group A	-	12	09	21	12	09	21
Group B	03	12	06	21	14	07	21

**Table 4: Mode of injury.**

Mode of injury	Male		Female		Total
	Group A	Group B	Group A	Group B	
RTA	03	02	02	03	10
Trivial trauma	01	03	03	02	9
Accidental fall and others	06	06	06	05	23
<b>Total</b>	10	11	11	10	42

Table 3 shows in group A, according to AO classification type A 2.2 was more common in 12 patients (57.14%) and type A 2.3 in 9 patients (42.85%). In Evans classification type IV was more common in 12 patients (57.14%) and type V in 9 patients (42.85%). In group B, according to AO classification type A2.2 was more common in 12 patients (57.14%), type A2.3 in 6 patients (28.57%) and type A2.1 in 3 patients (14.28%). In Evans classification type IV was more common in 14 patients (66.66%) and type V in 7 patients (33.33%).

In group A, 12 patients had accidental fall of which there were six male and six female patients, 5 patients had road traffic accident of which there were three male and two female patients, 4 patients had trivial trauma of which there were one male and three female patients. In group B, 11 patients had accidental fall of which there were six male and five female patients, 5 patients had road traffic accident of which there were two male and three female patients, 5 patients had trivial trauma of which there were three male and two female patients (Table 4).

**Table 5: Time interval from admission to surgery.**

Time interval from admission to surgery (days)	No. of patients	
	Group A	Group B
0-6	05	04
7-12	11	13
13-18	04	03
19-24	01	01

Table 5 shows intravenous antibiotic prophylaxis was given routinely to all patients. Intraoperatively and are continued for 5 days and then switched on to oral antibiotics till suture removal. The drain was removed after 48 hours. Patients in group A were ambulated with tolerated weight bearing on the second postoperative day with the help of a physiotherapist. Patients in group B were ambulated non-weight bearing on the second postoperative day and gradually progressed to partial then full weight bearing depending on the quality of bone fixation. Suture removal was done on the 11<sup>th</sup> or 12<sup>th</sup> day. Patients were followed up monthly for 6 months and later every 6 months. During every follow-up, the patient was assessed clinically using the Harris hip score.

**Table 6: Harris hip score in A and B group.**

Follow up (months)	Harris hip score		P value
	Group A	Group B	
3	70.90	62.09	0.00001
6	76.73	67.05	0.00001
12	83.40	73.71	0.002
20	89.66	77.66	0.046

In Table 6, during every follow-up, the functional outcome of the patient was analyzed. In group A, the Harris hip score at three, six, twelve and twenty months are 70.9, 76.7, 83.4 and 89.6 respectively.

Similarly, in group B, the Harris hip score at three, six, twelve and twenty months are 62.09, 67.03, 73.71 and 77.66 respectively.

## DISCUSSION

Intertrochanteric fractures in elderly patients are associated with notable morbidity and mortality. Although the mortality rate is somewhat decreased with internal fixation, the complication rate still ranges from 4 to 50 percent.<sup>6</sup> Primary hemiarthroplasty in these patients provides adequate fixation and early mobilization, alleviates pain and improves function. It also prevents postoperative complications such as pneumonia, atelectasis, and pressure sores.<sup>7</sup> In a study by Hernigou Pet bipolar Bateman-Leinbach prosthesis implanted in fifty-eight elderly osteoporotic patients, who had comminuted intertrochanteric fractures, were followed for an average duration of twenty-eight months. The average age of the patient in this study was seventy-eight years. There were no stem loosening, dislocations or deep infections. Ninety-one percent of patients walked before discharge.<sup>8</sup> In the study by I'm et al, bipolar Vandeputte prosthesis was implanted in ninety-four elderly patients. Results were better with bipolar hemiarthroplasty group with respect to shorter average operating time, lower mortality rate and better functional results.<sup>9</sup> In a study by Lafosse et al, bipolar Leinbach-hemiprosthesis was implanted in fifty-four elderly patients. There were no cases of stem loosening or dislocations. Harris's hip scoring showed good to excellent results in eighty percent of the patients. In our study, there was female preponderance in both the groups accounting for 57% in group A and 52% in group B. This is due to postmenopausal osteoporosis and lower peak bone mass.<sup>10</sup> The results in group A were better than group B with respect to blood loss, operative time, perioperative blood transfusion this compares favorably with Sancheti et al where one hundred and two patients participated in the study.<sup>11</sup> Bipolar hemiarthroplasty was done in 48 patients and 54 patients were treated with dynamic hip screw fixation.<sup>11</sup> The mean operative time is less in group A (116 minutes) than that in group B, with a p value of 0.0004, which coincides with the study by Kyle et al where it is 112 minutes and p value of 0.0001 in hemiarthroplasty group.<sup>12</sup> The amount of blood loss (mean) is lower in group A (153.5 ml) than in group B (167.5) with p value of 0.03, which is similar to the study by Levy et al where it is 192 ml in hemiarthroplasty group with p value of 0.005. The mean blood transfusions (units) is higher in group B (1.3) than in group A (1.1) with p value of 0.02, similar to that study where the mean blood transfusions were greater in internal fixation group (1.9) than in hemiarthroplasty group (1.37), with P value of 0.01. Early mobilization with full weight-bearing in group A compared to non-weight bearing or partial in group B shows a reduction in pulmonary complications (4.7%) and pressure sores (4.7%).<sup>13</sup> This incomparable to the study by Liang et al, where they studied 39 patients treated with bipolar arthroplasty. It allowed early weight-

bearing and a low rate of complications. There was one case of deep infection and one superficial infection in group A, which comes around 9.5%, whereas in group B 3 patients had an infection (14.2%).<sup>14</sup> There were no cases of dislocation reported in our study. Two patients (9.5%) had to shorten postoperatively with 1.5 cm and 2 cm this is better than Singh et al (11%).<sup>15</sup> The Harris hip score was better in group A than in group B. The Harris hip score at 20 months follow up is significant with P value of 0.04 and were regarded as good in Hemiarthroplasty group and fair in internal fixation group, which goes favorably with the study by Rodopi et al where at 24 months follow up the score was significant in hemiarthroplasty group with p value of 0.0001.<sup>16</sup>

## CONCLUSION

From our results, we are of the opinion that bipolar hemiarthroplasty may be an efficient option in elderly osteoporotic intertrochanteric fractures. It reduces the potential complications of prolonged immobilization such as pressure sores, pulmonary complications, etc. by early mobilization. As there is improved function and decreased hospitalization it seems to be cost-effective. Though the results are encouraging in the short term, a larger prospective study comparing internal fixation and hemiarthroplasty is needed in the long term.

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