



Functional outcome of primary hemiarthroplasty using bipolar prosthesis for unstable comminuted intertrochanteric fractures of hip in elderly

KEYWORDS

Unstable comminuted Intertrochanteric fractures, primary hemiarthroplasty, bipolar prosthesis, Harris Hip Score

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ABSTRACT

INTRODUCTION: Intertrochanteric fractures with severe comminution and displacement are common in elderly patients, and these are highly unstable and difficult to treat. These patients have a poor bone quality and the fractures are usually associated with complications such as non-union, implant failure. The primary treatment goal is stable fixation and an immediate full-weight-bearing mobilization. To allow an early post-operative weight-bearing and rehabilitation and to avoid excessive collapse at the fracture site, some surgeons have recommended prosthetic replacements in elderly patients.

AIM: To assess the Functional outcome of primary hemiarthroplasty using bipolar prosthesis for unstable comminuted intertrochanteric fractures of hip in elderly.

MATERIALS AND METHODS: 20 elderly patients above 70 years who underwent bipolar hemiarthroplasties for unstable comminuted intertrochanteric fractures in Department of Orthopaedics, Govt. Medical College, Kozhikode, were followed and studied.

RESULTS: A majority of the patients had a pain free mobile hip with a full range of flexion, abduction and adequate amount of rotations and adduction. In this study, there was no incidence of loosening of the prosthesis or an acetabular erosion radiologically on follow up. In this study, the final functional results were fair to good according to the Harris hip scoring system, with a mean score of 77.6%.

Conclusion: In elderly patients with severe osteoporosis unstable comminuted intertrochanteric fractures of hip, cemented hemiarthroplasty using bipolar prosthesis is an alternative treatment option with less complication rate, hospital stay, early post-operative mobilization and increased functional outcome.

INTRODUCTION

Intertrochanteric fractures with severe comminution and displacement are common in elderly patients, and these are highly unstable and difficult to treat. These patients have a poor bone quality and the fractures are usually associated with complications such as non union, implant failure^{1,2}. The primary treatment goal is stable fixation and an immediate full-weight-bearing mobilization³.

In patients older than 70 years of age, the management of fractures requires considerations of several aspects of ageing which limit the choice of treatment⁷. The prime consideration is to select the appropriate treatment option consistent with each patient's physical and mental ability to co operate in the treatment programme. Another factor is to avoid any therapeutic procedures which will cause more stress than the patient's compromised cardiovascular, gastrointestinal and genitourinary system can tolerate. To allow an early Post-operative weight-bearing and rehabilitation and to avoid excessive collapse at the fracture site, some surgeons have recommended prosthetic replacements for the treatment of unstable intertrochanteric fractures in elderly patients^{4,5,6}.

AIMS AND OBJECTIVES

To evaluate the functional outcome of primary hemiarthroplasty using cemented bipolar prosthesis in unstable comminuted intertrochanteric fractures of hip in patients above 70 years of age.

MATERIALS AND METHODS

It was a prospective study. Between January 2015 and October 2016, a series of 20 patients who underwent bipolar hemiarthroplasties for unstable intertrochanteric fractures in Department of Orthopaedics, Govt. Medical College, Kozhikode, were followed up prospectively. These patients were all above 70 years of age and they had been independently mobile before they had sustained the fractures. Patients with compound intertrochanteric fractures, polytrauma patients and pathological fractures except osteoporosis were

excluded from the study. This study was approved by the institutional ethics committee. All the patients provided written informed consents. All surgical procedures were performed by the same surgical team as soon as the conditions of the patients were stabilized, usually within four days after their admissions. Pre-operative templating of radiographs of the fractured side and contralateral side was performed to determine the approximate size and position of the stem and the approximate femoral neck offset.

Procedure

The operation was performed by Moore's approach, with the patients in the lateral decubitus position. The femoral head and neck was removed. The femoral medullary canal was then reamed to the appropriate stem size and diameter. Careful restoration of neck length, offset and version to maximize stability of the hip joint, was also performed during trial. The definitive femoral stem was cemented into the femoral canal with the use of so called second-generation techniques (medullary lavage, use of an intramedullary cement plug, hand-mixing of cement, use of a cement gun to deliver the cement in a doughy state in a retrograde fashion and to insert antibiotic-impregnated cement in all patients). The greater trochanter was reduced and stabilized by using the tension band wiring technique after hip reduction or it was just sutured near the prosthesis. The gluteus medius muscle and vastus lateralis muscle were sutured to their anatomical locations by using anchor sutures, if necessary. Fascia lata was tightly closed over a suction drain.



Figure 1 - Case 1 Per-op surgical Photos, Pre-op & Post-op X-ray

Post-operative radiographs were obtained .The sutures were removed on day 10 and the patients were discharged, with printed instruction sheets of dos and don'ts. Patients were ambulated full weight bearing on the second postoperative day. They were followed up at 6 weeks, 3 months, 6 months and 12 months. Clinical evaluation was done according to Harris Hip score. Anteroposterior radiographs of the hip were analyzed at each follow up to note any evidence of loosening.



Figure 2 – Case 2 Post-op X-ray & clinical Photo



Figure 3 - Case 3 Post-op X-ray & clinical Photo

RESULTS

1. Age distribution

Twenty patients were enrolled in this study. The average age at surgery was 72.4 years (range, 71-89).

Table 1 - Age distribution

	Frequency	Percentage
70-79	9	45.0
80-89	11	55.0
90 and above	0	0
Total	20	100.0

2. Gender distribution

There were 6 men and 14 women. The female to male ratio was 2.3:1(70%-30%).

Table 2 - Gender distribution

	Frequency	Percentage
MALE	6	30.0
FEMALE	14	70.0
Total	20	100.0

3.Delay in surgery

The mean delay in surgery was 3.5 days from admission (range, 2 days to 7 days).

4. Type of fracture

16 patients had type 31-A 2.2 fractures, and 4 had type 31-A 2.3 fractures (AO/OTA classification).

Table 3 - Type of fracture

	Frequency	Percentage
31-A 2.2	16	80.0
31_A 2.3	4	20.0
Total	20	100.0

P value;0.022

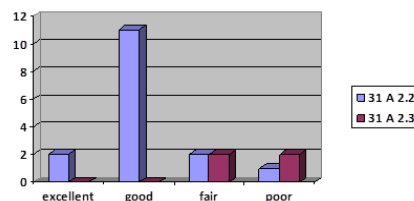


Figure 4 - Type of fracture & functional outcome

5. Greater trochanter reconstruction

Greater trochanter was reconstructed using tension band technique in 11 cases (55%).

Table 4 - Greater trochanter reconstruction

	Frequency	Percentage
TENSION BAND WIRING	11	55.0
OTHERS	9	45.0
Total	20	100.0

p value; 0.04

6. Complications

There was one case of a superficial infection and one case of a deep infection, and one case of dislocation.

Table 5 - Complications

	Frequency	Percentage
NIL	17	85.0
DEEP INFECTION	1	5.0
SUPERFICIAL INFECTION	1	5.0
DISLOCATION	1	5.0
Total	20	100.0

7. Functional outcome

Excellent to fair results were obtained at the final follow-up in 17 (85%) cases, and in 3 (15%) cases results were poor.

Post-operatively, 11 patients (55%) had a shortening of less than 1cm and 1 patient (5%), had a shortening of 1.5 cm. 4 patients had a lengthening of less than 5mm (20%). Three patients (15%) had fixed external rotations of the operated limbs, of less than 20 degrees. Two patients (10%) had flexion deformities of less than 20 degrees.

Patients were followed up at 6 weeks, 3 months, 6 months and 12 months. The mean Harris hip score was 77.6 points at final follow up, at the end of 12 months. Majority of the patients had a pain free mobile hip with a full range of flexion, abduction and adequate amount of rotations and adduction. In this study, there was no incidence of loosening of the prosthesis or an acetabular erosion radiologically on follow up. There was one incidence of revision surgery for dislocation of prosthesis. In this study, the final functional results were fair to good according to the Harris hip scoring system, with a mean score of 77.6%.

DISCUSSION

Haentjens et al⁷, reported a prospective series comparing 37 consecutive patients older than 75 year of age who were managed by either bipolar arthroplasty or internal fixation. They concluded that arthroplasty group had an easier and faster rehabilitation, with a lower incidence of pressure sores, pulmonary infection and atelectasis, which they attributed to earliest return to their weight bearing. Although literature describes about hemiarthroplasty in intertrochanteric fractures, a prospective randomized study comparing hemiarthroplasty with DHS is very few.

Shin-Yoon Kim et al⁸, reported a of cementless calcar replacement hemiarthroplasty compared with intramedullary fixation of

unstable intertrochanteric fracture in 2005. In this study he used 58 patients with an AO/OTA type 31A2 inter trochanteric fracture and he concluded that a proximal femoral nail provides superior clinical outcomes but no advantage with regard to functional outcome when compared with a long stem cementless calcar replacement arthroplasty. In his study he used a Mallory – Head calcar replacement system as endoprosthesis.

C Kayali et al⁹ conducted a study in unstable intertrochanteric fracture patients during a period between 2001 and 2004. He compared internal fixation with cone hemi arthroplasty and he concluded that it is an alternate treatment for unstable intertrochanteric fracture in elderly patients so as to achieve earlier mobilization.

In another study by A. Kiral et al¹⁰, published in 2002 obtained an excellent and good result in about 80% of cases using the Harris Hip scoring system. He studied about 54 elderly patients with unstable intertrochanteric fracture and in his study he used bipolar prosthesis.

According to Kiran Kumar GN et al¹¹, these fractures are better treated with cemented hemi-arthroplasty than with internal fixation. It has advantage of an early ambulation and less hospital stay. Cemented hemi-arthroplasty also provides stable and mobile hips and revision surgeries is hardly needed in elderly patients.

In 2012, a study by Lihong Fan et al¹², on unstable intertrochanteric fractures in elderly osteoporotic patients, bipolar hemiarthroplasty seems to be a better or more reasonable choice compared with Total hip arthroplasty for the reason of less blood loss, shorter operation time, lower cost and no dislocation.

Study by Bong Ju park et al¹³, in 2012 suggest, in treatment of unstable intertrochanteric fractures bipolar hemiarthroplasty may be chosen in case of severe bone pulverization and poor bone quality, patients with a higher risk for early failure, as well as for those with short remaining lifetimes, and patients who require early ambulation, as high risks of complications are expected due to long term bed rest.

In Khaldoun Sinno et al¹⁴ series, patients who underwent bipolar arthroplasty (group 1) had less postoperative complications than those having internal fixation (group 2); pressure sores (6.3% in group I and 20.4% in group II), pulmonary complications (12.5% in group I and 29.6% in group II), cardiac complications (4.2% in group I and 13.0% in group II), superficial wound infection (0% in group I and 7.4% in group II). No significant difference was noted between the 2 groups as regards the occurrence of urinary tract infection and deep vein thrombosis

Harwin et al¹⁵, 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.

Broos et al¹⁶, 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 hemiarthroplasty than in groups treated with Ender nailing, an angled blade-plate, or a dynamic hip screw.

Rodop et al¹⁷, 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 80% of

the patients. There were no dislocations or cases of stem loosening.

Comparison of Harris Hip Score in different studies

Table 6 - Comparison of HHS

STUDY	CASES	FOLLOW-UP (months)	HHS
Choy et al.	40	40.5	80.6
Sancheti et al.	37	24.5	84.5 ± 9.72
Yi et al.,	39	14	82.1
Elmorsy et al.	41	13.68	78.19
Kumar K et al.	20	9	75
Singh S et al.,	25	12	78.86±8.13
Our study	20	12	77.6

Comparison of functional outcome in different studies

Table 7 - Comparison of functional outcome

STUDY	Excellent outcome	Good	Fair	Poor
Hassankhani et al	13 (32.5%)	21 (52.5%)	6 (15%)	0
Won cik Choy et al	8 (20%)	19 (47.5%)	9 (22.5)	4 (10%)
Our study	2 (10%)	11 (55%)	4 (20%)	3 (15%)

Advantages of hemiarthroplasty

1. Early mobilization
2. Reducing the period of recumbancy and thereby eliminating the complication.
3. Eliminating the complication of non-union, mal union etc.
4. No need of second operation to remove the implant.
5. Better functional outcome in unstable intertrochanteric fractures.
6. No need of C-arm usage.

Disadvantages

1. When there is mechanical failure or infection second procedure become complicated.
2. The operation for inserting prosthesis is generally considered to be more extensive than that required for an uncomplicated internal fixation procedure.
3. Chance of dislocation present.
4. Anaphylactic reaction can occur while putting bone cement.

CONCLUSION

Osteosynthesis with dynamic hip screw fixations or intramedullary fixations are the most commonly performed operations for intertrochanteric fractures of hip. In elderly patients with severe osteoporosis and comminuted unstable fractures (AO type 31 A-2 and 31 A-3) cemented hemiarthroplasty using bipolar prosthesis is an alternative treatment option with less complication rate and hospital stay. It allows early post-operative mobilization and increased functional outcome. Cemented hemi-arthroplasty also provides stable and mobile hips and revision surgery is hardly needed in elderly patients. Greater trochanter reconstruction and early weight bearing mobilisation improves the functional outcome in these patients.

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