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Functional evaluation of cemented hemiorthoplasties as a treatment option for unstable intertrochanteric fractures in the elderly: A prospectively case series study

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Abstract

Background: The Management of unstable osteoporotic intertrochanteric fractures in elderly is challenging because of difficult anatomical reduction, with a high risk of morbidity and mortality, The aim of study is to do functional evaluation of primary cemented hemiarthroplasties as a treatment option in elderly patient.

Material and Methods: We prospectively analyzed 27 cases of primary hemiorthoplasty performed for unstable intertrochanteric fractures. The functional outcomes were assessed based on Harris hip score.

Result: The functional outcome is better with less time to full weight bearing and less postoperative complications.

Conclusion: Hemiorthoplasty for unstable intertrochanteric fractures in elderly results in early ambulation with acceptable complications and good functional results.

Keywords: Unstable intertrochanteric fractures, primary bipolar hemiarthroplasty, osteoporosis, Harris hip score

1. Introduction

The management of unstable Intertrochanteric fractures is challenging in elderly patient with poor bone quality [1, 2], and high risk of morbidity and mortality. Osteoporosis and instability are two of most important factors leading to unsatisfactory results of treatment [3-5]. Conservative management with traction prolonged immobilization lands up with many complications. Reverse obliquity pattern is inherently unstable because of the tendency for medial displacement of the femoral shaft. Stable Intertrochanteric fractures can be easily treated by osteosynthesis with predictable good results [6, 7]. With sliding hip screw complications such as screw cut out, excessive sliding leading to shortening, plate pullout, and plate breakage continued to be a problem especially with the unstable type of fracture. To allow early post-operative weight-bearing and rapid rehabilitation, few surgeons recommended hemiorthoplasty for treatment of unstable intertrochanteric fractures [8-10]. The purpose of study is to evaluate the functional and clinical outcomes of cemented bipolar hemiarthroplasty as a treatment option for unstable intertrochanteric fracture in elderly [11, 12].

2. Materials and methods

Between June 2014 and November 2015 a series of 27 patients who underwent cemented bipolar hemiarthroplasty for unstable intertrochanteric fractures (AO/OTA type 31-A2.2 and 31-A2.3 and Evans type III or IV fractures) were followed up prospectively. These patients were all above 65 years of age and they had been independently mobile before they had sustained the fractures. Exclusion criteria were patients with compound intertrochanteric fractures, polytrauma patients, patients who were < 65yrs of age and patients who were unfit for surgery.

Preoperative data included: Age, sex, side, fracture type and mode of injury. Post-operative data included time to full weight bearing, average hospital stay and complications.

This study was approved by the institutional ethics committee of B.R.D. medical college Gorakhpur. 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 seven days after their admissions. Preoperative 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.

The operation was performed by using Moore's approach, with the patients in the lateral decubitus position. The femoral head and neck was removed, calcar graft taken from neck in some cases for calcar grafting. Meticulous care was taken to preserve the integrity of the greater trochanter and abductor muscles. The femoral medullary canal was then reamed to the appropriate stem size and diameter. Trial reductions were performed to determine the exact length that would provide the

desired tension and tissue balancing of the abductor muscles and an equal leg length. 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 cement gun 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 lesser trochanter was not removed. Any protrusion of cement between reduced bone fragments was cleaned out. 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, capsule repair done by Ranawat suturing technique. Fascia lata was tightly closed over a suction drain. Post-operative radiographs were obtained [Table/Fig-1 and 2].



[Mr. Dosh Mohd 72 yr /male]



[Table/Fig-1]



[Table/Fig-2]

Patients were ambulated full weight bearing on the second post-operative 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.

3. Results

Twenty seven patients were enrolled in this study of them 25 sustained fractures after fall from a standing height, while 2 patients sustained road traffic accidents. The average age at surgery was 72.85 year (range 65-85 years). There were 8 men and 19 women. 24 patients had type III fractures, and 3 had a type IV fracture (Boyd and Griffin's classification). Singh's index (grades of osteoporosis) was grade III in 21 patients and it was grade II in 6 patients. The average operative time was 82.29 minutes. Greater trochanter was reconstructed in 21 cases. Calcar grafting done in 6 cases. There were two cases of superficial infection which healed with further two week of antibiotics.

Patients were discharged from the hospital at a mean of the 6.0th post-operative day. Patients were followed up at 6 weeks, 3 months, 6 months and 12 months. The mean Harris Hip score was 87.20 point at final follow up at 12 months. A majority of the patients had a pain free mobile hip with a near full range of flexion, abduction and adequate amount of rotations and adduction.

4. Discussion

Hip fractures are associated with notable morbidity and

mortality in elderly patients. Internal fixation has drastically reduced the mortality associated with intertrochanteric fractures [13]. Often because of poor bone quality that is age related osteoporosis there is a high failure rate of internal fixation methods [14], and early mobilisation is difficult. Incidence of general complications such as pulmonary embolism, DVT and pneumonia ranges from 22% to 50% when internal fixation was adopted because of delayed mobilisation [15, 16]. Although there are some fixation methods such as fixed nail plate, sliding hip screw and intramedullary interlocking devices, no one guarantees absolute fracture stability and complete bone union in elderly patients [17-19]. Geiger *et al.* studied Clinical records including X-ray of all patients with trochanteric femoral fractures, except pathologic fractures and a minimum age of 60 years, which were treated between 1992 and 2005. Of these 283 patients, 132 were treated by primary arthroplasty, 109 with a dynamic hip screw and 42 with a proximal femoral nail. Survival after 1-year and complications, which had to be treated within this period were main outcome measurement. Influencing cofactors such as age, gender and comorbidities were reduced by multivariate logistic regression analysis. Primary hip arthroplasty did not bear a higher 1-year mortality risk than osteosynthesis [20].

Hip arthroplasty is an effective salvage procedure after failed treatment of an intertrochanteric fracture in an older patient. Most patients had good pain relief and functional improvement [21]. Use of Leinbach bipolar prosthesis a calcar replacing prosthesis in elderly debilitating patients in an attempt to get the patient up and walk rapidly is an effective way of treating comminuted and unstable intertrochanteric fractures in the

elderly [22]. In elderly patients with intertrochanteric fractures and related complications, treatment with endoprosthesis is thought to be helpful in decreasing these complications and allows early mobilization of the patient [23].

In our study twenty seven elderly patients with unstable intertrochanteric fracture were treated with primary cemented bipolar hemiarthroplasty were followed up to an one years. The mean age of the patients was 72.85 years (65-85 years) which is comparable to the age distribution in similar studies in the literature like by Haentjens *et al.*, [24] was 80 years, by Chan *et al.*, [25] was 84.2 years, by Haidukewych *et al.*, [14] was 78 years. The mean day of full weight bearing was on the 5th day which is comparable to similar study.

By Green *et al.*, [20] in a series of 20 cases, performed bipolar hemiarthroplasty for elderly patients with unstable intertrochanteric fractures with a mean time to ambulation of 5.5 days. The most common associated medical problem was hypertension in 14 cases (51.9%), followed by anaemia and

diabetes in 10 cases (37%), they were all treated accordingly. A total of sixteen patients were transfused with a unit of blood, which were uneventful. There were no complications like pneumonia, DVT, pulmonary embolism in the post-operative period.

Liang *et al.* [26] in their study of unstable intertrochanteric fractures concluded hemiprosthesis arthroplasty is an effective method to treat the unstable intertrochanteric fractures in elderly

We graded the functional results according to Harris Hip Scoring System, where in, a score of more than 90 indicates excellent result, a score in between 80 and 90 indicates good results, a score in between 70 and 80 indicates fair results and a score below 70 is rated as poor. In our study the mean HHS at 6 months was 84.24 and at 12 months were 87.50 respectively as shown in [Table 3]. Functional results of our study are comparable to similar studies in literature as mentioned in the [Table 4].

Table 3: HHS of the patients in the study at 6 and 12 months

	Hhs At 6 Months	Hhs At 12 Months
Excellent	5	8
Good	17	18
Fair	3	1
Poor	2	0
Failed	0	0
Mean HHS	84.24	87.5

Table 4: Comparison to other Studies

Study by	number of cases	Excellent	Good	Fair	Poor	Death
Chan <i>et al.</i> ,	55	19	8	0	0	12
Haentj <i>et al.</i>	37	7	11	7	5	3
K H Sancheti,	37	8	16	6	3	0
Our study	27	8	18	1	0	0

Chan *et al.*, in his series of 55 patients with intertrochanteric fractures, with a mean age of 84.2 years, were treated using cemented bipolar hemiarthroplasty. They reported excellent results in 19 cases good results in 8 cases, and death of 12 cases in the series. They concluded that, cemented bipolar hemiarthroplasties for intertrochanteric fractures have the advantage because the patients can bear full weight immediately after the surgery and there was no risk of excessive collapse, compromising walking function and so is a reasonable alternative to a sliding screw device for the treatment of unstable intertrochanteric, fractures [22].

Haentjens *et al.*, in a series of 37 cases, with a mean age of 82 years who sustained unstable intertrochanteric fractures were treated with immediate bipolar hemiarthroplasty. Amongst the 37 cases, who were rated according to criteria of Merle d'Aubigne, 7 patients had excellent results, 11 patients had good results, 7 patients had fair results, 5 patients had poor results and reported death of 3 cases. They concluded that immediate bipolar hemiarthroplasty for independently mobile patients older than 70 years having a unstable intertrochanteric fractures, allowed early walking with full weight bearing and helped the patients to return to prefracture level of activity rapidly, preventing complications such as pressure sores, pneumonia, atelectasis, pseudoarthrosis [21].

At 12 months follow-up of the 27 patients in our study group, we had excellent results in eight patients, good results in eighteen patients, fair results in one patients and poor result in none patients according to the Harris Hip Scoring System. The poor result was secondary to medical co-morbidities in a patient with chronic renal failure, diabetes and anaemia who

developed deep infection for whom implant removal and excision arthroplasty was done. Overall the procedure offered excellent pain free mobile and stable hip with early rehabilitation and rapid return to functional level. We agree that the study with an average follow-up of 1 years and sample size of 27 is small to comment anything on the results in an arthroplasty series. But with the kind of results we are seeing in this interim follow-up, we advise careful restoration of neck length offset and version making use of the intraoperative techniques mentioned to achieve good results.

Delay in surgery is an important predictor for mortality in patients with proximal femur fracture and also of the postoperative morbidity [27, 28]. We in our study no mortality was found.

5. Conclusion

Thus in conclusion, primary hemiarthroplasty does provide a stable, pain-free, and mobile joint with acceptable complication rate as seen in our study; however a larger prospective randomised study comparing the use of intramedullary devices against primary hemiarthroplasty for unstable osteoporotic fractures will be needed.

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