

Clinical Study to Evaluate the Functional Outcome of Fracture of Femoral Neck with Bipolar Prosthesis

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Abstract:

Introduction: Intertrochanteric fractures are rising due to longer life expectancies, especially in Asia. Lag screws and intramedullary (IM) nailing have shown promising outcomes. New design improvements have overcome prior challenges. Surgeon expertise and local criteria determine implant choice. The research found statistically significant regional differences in Medicare enrollees' "intramedullary (IM)" nail use.

Aim and Objectives: This study examines intramedullary nail fixing for intertrochanteric femur fractures.

Method: 53 patients with intertrochanteric fracture from four high-volume clinics were included. Participants must be 60 or older and healthy enough to stroll around their areas. The procedure used an InterTAN nail and was on schedule. Lag screws supplied anatomical alignment and compression after fluoroscopically assisted reduction. After surgery, antibiotics and heparin helped with weight bearing. Non-institutional orthopedists judged bony union as a callus crossing two cortices.

Result: Table 1 shows preoperative findings: mean age 76.7 years (SD 8.9), 20 men, 33 women. BMD hip T-score -2.6 (SD 1.0), spine T-score -2.8 (SD 1.3). In Table 2, the surgery lasted 76.8 min (SD 29.9), blood loss was 184.5 ml (SD 97.9), and 1.3 blood units were transfused. Good 74, acceptable 17, bad 9. TAD 14.9 mm (SD 2.9), bone union 17.9 weeks (SD 7.9). Table 3 shows surgical complications, emphasising caution.

Conclusion: In conclusion, treatment with IM nails and lag screws for Asian patients with intertrochanteric fractures is effective. Correctly selecting patients and putting in screws is essential. Further investigation is recommended.

Keywords: Intertrochanteric Fractures, "intramedullary (IM)", Fewer Blood Transfusions.

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Introduction

Femoral neck fractures, one of the most common injuries in the elderly, have always presented great challenges to orthopaedic surgeons. The prevalence of these fractures has increased with improvement in life expectancy, increased incidence of osteoporosis, poor vision, neuro-muscular in-coordination and changes in lifestyle leading to sedentary habits. The incidences of these fractures are expected to double in the next twenty years and triple by the year 2050 [1]. Hip fractures are common and comprises about 20% of the operative workload of an orthopaedic trauma unit. Intracapsular femoral neck fracture account for about 50% of all hip fractures. The lifetime risk of sustaining a hip fracture is high and lies within the range of 40% to 50% in women and 13% to 22% in men. The prevalence of the fracture also doubles for each decade of life after the fifth decade. [2] Femur neck fractures frequently occur in elderly patients, more commonly in women than in men and are usually due to simple low-energy trauma. A considerable reduction in bone strength and tendency to fall are the two most common risk

factors for femur neck fractures in the elderly. [3] The goal of treatment of femoral neck fractures is restoration of pre-fracture function without associated morbidity. [4] However, treatment of displaced femoral neck fractures in elderly has been controversial. Treatment options include reduction and fixation, unipolar arthroplasty, bipolar hemiarthroplasty, and total hip arthroplasty. Recent surveys of practice indicate widespread variation in the use of this options. As a generalization these trials have suggested that for majority of patients with a displaced fracture an arthroplasty is the best choice and that a modern design of arthroplasty is better than older design unipolar hemiarthroplasty. [2] The introduction of a single piece unipolar metal prosthesis by Thomson in 1954 and Austin Moore in 1957, to replace the femoral head used in the era of hemiarthroplasty of the hip as a treatment for these fractures. Experience of the last four decades has shown that hip arthroplasty is the best treatment for intracapsular fracture neck of femur in elderly in terms of both short-term and long-term results. [5]

The problems encountered with unipolar prostheses (Austin Moore's Prosthesis and Thomson's Prosthesis) were acetabular erosion and loosening of stem giving rise to pain. Bateman in 1974 introduced the bipolar prosthesis (initially popular as the Bateman's prosthesis) which had mobile head element and had additional head surface to allow movement within the acetabulum.

This led to reduced wear of acetabular surface and hence reduced incidence of pain and acetabular protrusion because motion is present between the metal head and the polyethylene socket (inner bearing) as well as between the metallic head and acetabulum (outer bearing). [6] Unipolar hemiarthroplasty with an Austin Moore prosthesis or Thompson prosthesis is no longer employed in the developed countries though it is very commonly used in developing countries like India. It should ideally be reserved for very limited or non-ambulatory patients. [7] Bipolar prosthesis is slowly replacing the conventional unipolar prosthesis in the ever-increasing segment of 'active elderly' because of its superior benefits and its attractive pricing. [8] Its advantages over unipolar endoprosthesis are higher percentage of satisfactory results, less post-operative pain, greater range of movements, more rapid return to unassisted activity and reduced incidence of acetabular erosion. [9] Total hip arthroplasty is still not popular as a treatment modality for fracture neck of femur in our country because majority of the patients do well with hemiarthroplasty and also due to the high costs involved. It also has a higher incidence of dislocations and higher morbidity associated with the procedure. [10]

Objectives

To study the end results of bipolar prosthesis with respect to pain, mobility and stability. To study the complications of bipolar hemiarthroplasty



Figure 1: Bipolar Prosthesis

After induction of either spinal or epidural anaesthesia the patient is placed on the lateral

Material and Methods

This study proposed to include patients with fracture neck of femur requiring surgical interventions, after taking their consent, analysed clinically and radiologically. Required investigations were done to get the fitness for surgery. Cases satisfying the inclusion criteria admitted in BMIMS Pawapuri. A total of 23 cases studied without any sampling procedure.

Inclusion Criteria

1. Displaced fractures of the intracapsular part of the femoral neck
2. Age of the patient >50 years
3. Failed internal fixation
4. Avascular necrosis of femoral head secondary to fracture neck of femur

Exclusion Criteria

1. Skeletally Immature.
2. Patient medically unfit for surgery
3. Patient not willing for surgery
4. Age of the patient <50 years

Patients were admitted through outpatient and from casualty. Diagnosis confirmed by radiograph. Adequate medical management of associated comorbid conditions like Diabetes Mellitus, Systemic Hypertension, Chronic Obstructive Pulmonary Disease and Heart Diseases were initialized to optimize patient's fitness for anaesthesia. An informed written consent for the procedure as per the guidelines of the institution and consent for inclusion of the patient for the present study was taken.

All patients were put on high tibial skeletal traction. The involved lower limb was prepared from nipple to ankle on the day before surgery. The per-operative antibiotic used was Ceftriaxone given 1 g intra-venous at the induction of anaesthesia and continued for 7 days postoperatively.

position on the operative table with the affected side facing up. A curved incision is taken from 8 cm

distal to the posterior superior iliac spine, extended distally and laterally, parallel with fibres of gluteus maximus muscle to the posterior margin of the greater trochanter. The appropriate sized prosthesis is inserted into the canal taking care to place it in 10-15° of anteversion immediately after all the

cement is packed. The final seating of the prosthesis is by gentle blows with the help of a mallet and the impactor. Adequate seating of the prosthesis on the calcar is visualized directly. The prosthesis held in this position till the cement sets completely.



Figure 2: Broaching of the Insertion of Medullary Canal Bipolar Prosthesis

Results: Data was collected based on detailed patient evaluation with respect to history, clinical examination and radiological examination. The postoperative evaluation was done both clinically and radiologically. Out of the 23 cases, all patients were available for follow up till one year which was taken as a basic pre-requisite for inclusion in the study.

Table 1: Age distribution

Age	Frequency	Percent %
50-60	15	65.22%
61-70	2	8.70%
>70	6	26.08%

Table-1 shows the age distribution pattern of the patients. The average age was noted to be 59 years. The youngest patient in the study was 51 years and the oldest was 78 Years.

Table 2: Sex distribution

Sex	Frequency	Percent %
Male	11	47.83%
Female	12	52.17%

Table-2 shows the sex distribution pattern of the study patients. Female patients were found to be slightly higher than Male patients.

Table 3: Type of fracture

Type of Fractures	Frequency	Percent %
Transcervical (TC)	19	83%
Subcapital (SC)	4	17%
Basicervical (BC)	0	0

Table – 3 shows that the majority of study patients (83%) had a trans-cervical type of fracture with only four patients (17%) having sub-capital fractures.

Table 4: Size of prosthesis

Bipolar Head Size	Frequency	Percent %
39mm	1	4.35%
41mm	3	13.04%
43mm	5	21.75%
45mm	7	30.43%

47mm	4	17.39%
49mm	3	13.04%

Table -4 depicts that the most commonly used prosthesis size was 45mm followed by 43mm. The mean prosthesis size was 45 mm.

Table 5: Type of prosthesis

Type of Prosthesis	No
Uncemented	21
Cemented	2

Table 5 shows that most common prosthesis used in the study was uncemented bipolar prosthesis, in 21 patients uncemented prosthesis was used and in 2 patients cemented prosthesis was used.

Table 6: Per operative complications

	Frequency	Percent%
Hypotension	3	13.04%
Peri Prosthetic Fracture	1	4.35%
Normal	19	82.61%

Table 6 depicts that the most commonly encountered peri-operative problem was hypotension. This was managed by blood transfusion, administration of intravenous Dopamine in 1 case along with colloids and crystalloids. There was one case of peri-prosthetic fracture.

The average Harris Hip Score at 6 weeks after surgery was 53.74 with the highest score being 70 and the lowest being 40. The average Harris Hip Score at the second follow-up of 3 months was 63.35 with the maximum score being 80 and the minimum 50. At the third follow-up at 6 months the average Harris Hip Score was 71.48 with the highest being 88 and the lowest being 60. At nine months the

average Harris Hip Score rose to 77.17 the maximum score being 92 and the minimum being 67. At the final one year follow-up the average Harris Hip Score was 83.3 with a maximum score of 96 and a minimum score of 67.

The final Harris Hip Score as evaluated at one year follow-up averaged 83.3 with the maximum score being 96 and the minimum score being 67. Overall, 4 patients (17.39%) achieved Excellent result, 13 patients (56.52%) achieved Good result, 4 patients (17.39%) achieved fair result and 2 patients (8.7%) achieved poor result. 73.91% of the patients achieved an excellent or good result.



Figure 3: Pre Op and Post Op

Discussion

The mean age of the patients in the present study was 59 years. The aim of assessing age is to estimate the patient’s mean survival time and their ability to comply with rehabilitation protocol. Some authors have advocated hemiarthroplasty in patients over 70 years of age [11], The average age of patients in our series is lower to those reported in Western literature viz. - 77.2 years, 81 years [12], but nearly same as other Indian series viz. 65.7

years [13], and This can be explained on the basis of a lower life expectancy amongst the Indian population as compared with the Western population with hip fractures. These patients have an increased mortality rate during the first year after fracture but after one year the mortality rate is comparable to that of the general population. In present study females (52.17%) were slightly higher than males (47.83%). In other standard studies, [14], also had a higher number of females. This is due to the lower peak bone mass and postmenopausal bone loss in women.

Women have a skeleton that adapts less well to ageing by periosteal apposition. More women have bone size and volumetric BMD reduced to below a critical level at which the loads on the bone are near to, or greater than, the bone's structural ability to tolerate them. The left side (65.22%) was more commonly affected than the right. There is less subject of discussion in very few studies. Boyd and Salvatore had 55% patients with left side fractures in their series. The left side was involved in 55.4% patients in the series by D'Arcy and Devas. The cause for left side preponderance is not known. In 9 cases, the blood loss was less than 500ml for the whole procedure and in 10 others it was between 500ml to 750 ml. Only 4 cases % had blood loss of >750 ml leading to hypotension requiring blood transfusion. It has been reported in literature that the average blood loss with hip hemiarthroplasty is less in the anterior approach as compared to the posterior approach. [15] Most of the surgeries were completed between 60-120 minutes of starting the procedure. Similar duration of the procedure has been reported by Haidukewych, et al and Emery et al [16], Figved et al, Parker et al (2010) and Fraser Taylor et al (2012) found increased surgery duration and blood loss in the cemented groups but none of the findings were statistically significant. Neither the intra-operative blood loss nor the duration of the procedure had any effect on final function. All patients were followed up regularly at 6 weeks, 3 months, 6 months, and one year. Only the patients who completed a minimum one-year follow-up were included in the final analysis. The Harris Hip Scores were recorded at each follow-up visit. In our study, the final Harris Hip Score as evaluated at one year follow-up averaged 83.3 with the maximum score being 96 and the minimum score being 67. Overall, 4 patients (17.39%) achieved Excellent result, 13 patients (56.52%) achieved Good result, 4 patients (17.39%) achieved fair result and 2 patients (8.7%) achieved poor result. 73.91% of the patients achieved an excellent or good result.

All study patients were also evaluated with their level of satisfaction with the procedure and their ability to return to pre-fracture level of activity. 8 patients (34.78%) were =very satisfied', 10 (43.47%) were =fairly satisfied' and 5 (21.73%) were =not satisfied'. The level of satisfaction being a subjective assessment did not correlate well with the Harris Hip Score which was an objective assessment. There was one patient (4.5%) with peri prosthetic fracture. There were no errors in selecting prosthesis of the correct head size. These results are less compared to those of Weinrauch P. where the author had studied intra-operative errors during Austin Moore hemiarthroplasty (uncemented) in 147 patients. In that study, there was inadequate length of neck remnant in 27% cases, inadequate calcar seating in 22% cases and intra operative periprosthetic fracture in 14% cases. [17]

Conclusion

The bipolar prosthesis has allowed freedom from pain, early weight bearing, early rehabilitation. It also allowed squatting and greater range of movements. As compared to other standard studies of AMP hemiarthroplasty, our study with Bipolar being better in functional aspect and showed lower incidence of complication and can be used for comparatively younger age group considering longer life span of Bipolar prosthesis.

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