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Original Research Article

A Study to Evaluate the Clinical and Functional Outcomes of Cemented Bipolar Prosthesis in Unstable Intertrochanteric Fractures in the Elderly

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Abstract

Aim: The aim of the present study was to evaluate the clinical and functional outcomes of cemented bipolar prosthesis in unstable intertrochanteric fractures in the elderly.

Methods: We conducted a prospective study in which we included 50 patients who presented to Orthopedic Outpatient Department and Emergency of Santosh Medical College Hospital, Ghaziabad, Uttar Pradesh, India with inter-trochanteric femoral fractures.

Results: Mean age of the patients was 77 years (range: 65–85 years). Out of 50 patients, 40 (80%) were female and 10 (20%). Left-side (68%) involvement was more than right-side involvement (32%). Most cases required 1 U of postoperative blood transfusion, and four cases required 2 U. Mean duration of surgery was 84 min, ranging from 55 to 105 min. The mean blood loss was 272 ml and ranged between 200 and 400 ml. The dislocation rate in our study was zero. The mean Harris hip score improved progressively with time of follow-up. The mean score was 46.34 on the third day, which increased to 57.63 at 2 weeks, whereas at 3 and 6 months the scores were 76.14 and 79.81, respectively. The final average Harris hip score at last follow-up was 82.92. 30% excellent, 32% good, 26% fair results obtained in our study according to Harris Hip Score.

Conclusion: Intertrochanteric fractures of femur are very common among old age patients; females being more commonly affected. According to our results, we believe that Cemented Bipolar Hemiarthroplasty is of choice in freely mobile elderly patients above sixty years of age with an intertrochanteric femoral fracture. In elderly patients with intertrochanteric fractures of the femur treated with hemiarthroplasty gave early mobilization, early return to pre injury level, superior the quality of life and gave a long-term solution. Postoperative early full weight bearing after Hemiarthroplasty avoids long-term immobilization, rehabilitation, deformities and need for revision surgeries.

Keywords: cemented bipolar prosthesis, elderly, harris hip score, internal fixation, unstable intertrochanteric fracture

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Introduction

Incidence of intertrochanteric fractures has been on rise due to increased longevity of life and osteoporosis. [1,2] It can be classified in many ways and most important being whether fracture is stable or unstable. Unstable fractures are those with fracture extension below lesser trochanter, reverse oblique extension. Treatment of stable fractures is simple with good results. Treatment of unstable fractures is challenging with more complications. Initially most fractures were treated with extramedullary devices like dynamic hip screw (DHS) with much success. Other disadvantage with this implant is immobilisation as early weight bearing leads to fixation failure and prolonged bed rest leads to complications like atelectasis and pneumonia, bed sores, UTI and DVT. [3] Hence nowadays trend has been shifted towards intramedullary devices like trochanteric fixation nails for unstable fractures which offers advantages of early partial weight bearing. [4]

Unstability, osteoporosis and severe medical comorbidities in senile patient treatment are perilous. The spectra of treatment modalities starting from conservative to surgical intervention such as, advanced internal fixation have been employed

since ages. But the problems remains an enigma unsolved till today. Before 1960 IT fractures treated conservatively, which resulted in conservative methods resulted in advanced mortality rates and complications like decubitus ulcer, urinary tract infections, pneumonia, thromboembolic complications. Intertrochanteric fractures with severe displacement and communition are common in elderly patients. These patients have a poor bone quality and the fractures are often associated with complications such as nonunion, metal failure and femoral head perforation. [5,6] The primary treatment goal is a stable fixation, early mobilization and immediate full-weight- bearing. [7]

Osteosynthesis gives good results in stable intertrochanteric fractures where as in unstable intertrochanteric fracture is challenging, with predictable good results, whereas the management of unstable intertrochanteric fractures is challenging, due to poor bone quality. The comminuted intertrochanteric fractures being in cancellous area, fixation of all fragments is difficult. The posteromedial void is generally present which makes the fracture very unstable. [8] Recent modality of fixation of these fractures is by 4th generation of intramedullary nails like the proximal femoral nails [9] immobilisation is required even in this implants. Management of such cases with primary hemiarthroplasty permits early mobilization, thus avoiding most complications such patient are mobilised early. [10]

The aim of the present study was to evaluate the clinical and functional outcomes of cemented bipolar prosthesis in unstable intertrochanteric fractures in the elderly.

Materials and Methods

We conducted a prospective study in which we included 50 patients who presented to Orthopedic Outpatient Department and Emergency of Santosh Medical College Hospital, Ghaziabad , Uttar Pradesh, India for one year with inter-trochanteric femoral fractures.

Inclusion Criteria

1. Patient with age group >60 years of either sexes who are able to walk before injury
2. Intertrochanteric fracture classified as unstable fracture according to Boyd and Griffin classification (type II, III, IV).

Exclusion Criteria

1. Polytrauma patients.
2. Patient <60 years of age.
3. Compound intertrochantric fractures.
4. Patients medically unfit for surgery.
5. Patients with immunocompromised status.

Operative Technique

Patient positioning: Position the patient with the affected hip upward in lateral position. Prepare the skin over the hip and square off the lateral aspect of the hip from the iliac crest to the proximal thigh with towels and drapes. All patients were operated by the same surgeon. We used the posterior approach in lateral position.

Subcutaneous tissue is divided along with a skin incision in a single plane down to fascia lata and fascia covering gluteus maximus superiorly. Fascia is divided in line with the skin wound over the center of the greater trochanter; gluteus maximus is bluntly split proximally in the direction of its fibers. Short external rotators and posterior edge of the gluteus medius were exposed. Fracture fragments were exposed and proper assessment was done without cutting short external rotators. Femoral head is dislocated posteriorly and removed after taking high cut in the neck. When the lesser trochanter is found as a separate fragment with neck, both of them are tied to the shaft using steel wires. In cases of greater trochanter fracture en masse, it is attached to the main shaft using steel wires. In cases in which the greater trochanter is coronally split, a tension band wiring is used. In cases in which the greater trochanter is severely comminuted, Ethibond sutures are used to suture together the inter-trochanteric pieces and the soft tissues to make a stable construct. After proper neck cut, the femoral canal is broached with adequate anteversion. After trial reduction, we inserted a cemented bipolar prosthesis by using first generation cementing technique.

Rehabilitation protocol: The patients were allowed to sit up on the bed hanging legs by the side on the second day. Quadriceps strengthening exercises, knee flexion, and extension exercises were started from the second day and patients were allowed full weight-bearing walk with a walking aid after the third day and/or as the pain and discomfort were tolerated. Adduction and abduction exercises of the hip started after 1 week, after which the patient was allowed to roll by the sides. Squatting and sitting cross-legged was totally restricted and patients were encouraged to leave their walking aids as soon as possible. Postoperative hip function was evaluated using the Harris hip-scoring system. Mean follow-up period was 3.5 years (2–5 years).

Results

Table 1: Patient characteristics

Parameters	*n*(%)
Age group(years)	
65–70	11 (22)
71–75	25 (50)
76–80	5 (10)
81–85	9 (18)
Sex distribution	
Male	10 (20)
Female	40 (80)
Side	
Side	
Left	34 (68)
Right	16 (32)

Mean age of the patients was 77 years (range: 65–85 years). Out of 50 patients, 40 (80%) were female and 10 (20%). Left-side (68%) involvement was more than right-side involvement (32%).

Table 2: Other parameters

Parameters	**N %**
Blood transfusion required (Number of units)	
One	40 (80)
Two	10 (20)
Mean duration of surgery(min)	84(55–105)
Mean blood loss(ml)	272(200–400)
Limb length discrepancy	7(29)
Average shortening(cm)	1.2(0.5–1.8)
Post operative dislocation	None
Superficial infection	5 (10)
Harris hip scores at follow-up (mean score) Time of follow-up	
Third day	46.34
Second week	57.63
3months	76.14
6months	79.81
12 months	82.92

Most cases required 1 U of postoperative blood transfusion, and four cases required 2 U. Mean duration of surgery was 84 min, ranging from 55 to 105 min. The mean blood loss was 272 ml and ranged between 200 and 400 ml. The dislocation rate in our study was zero. The mean Harris hip score improved progressively with time of follow-up. The mean score was 46.34 on the third day, which increased to 57.63 at 2 weeks, whereas at 3 and 6 months the scores were 76.14 and 79.81, respectively. The final average Harris hip score at last follow-up was 82.92.

Table 3: Functional results according to Harris hip score

Functional outcome	**No. of Patients**	**%**
Excellent	15	30
Fair	13	26
Good	16	32
Poor	4	8
Death	2	4
Total	50	100

30% excellent, 32% good, 26% fair results obtained in our study according to Harris Hip Score.

Discussion

Intertrochanteric fractures comprise approximately 45%–50% of all hip fractures in older persons [11] and 50%–60% of them are classified as unstable. [12] Unstable intertrochanteric fractures are of major cause of concern in older patients because of the associated high morbidity and mortality. [13] Intramedullary nailing is the treatment of choice for stable hip fractures. Intramedullary nailing techniques require only a small incision and protect patients' bone structure. Intramedullary nailing reduces surgical complications, blood loss, and infection. [14] Thus, the minimally invasive procedure of intramedullary nailing is considered the most appropriate for geriatric patients.

Management of unstable intertrochanteric fractures is challenging in older patients because of their poor bone quality and high risk of morbidity and mortality. [15] Osteoporosis and instability are two of the most important factors leading to unsatisfactory treatment outcomes. [16,17]

Unstable intertrochanteric fractures in elderly patients are characterized by osteoporosis, severe comminution, and displacement. In patients with osteoporotic and/or comminuted fractures, maintenance of reduction can be a major problem during the healing period. To reduce the healing time, dynamic devices are replaced with the static ones. Biomechanical studies show that dynamic implants have more weight-bearing capacity than static implants. [17-20] It has been recommended that position of the screw in the femoral head should be in the center [21], which yields a cut-out rate of about 13%.Mean age of the patients was 77 years (range: 65–85 years). Mean age of the patients was 77 years (range: 65–85 years). Out of 50 patients, 40 (80%) were female and 10 (20%). Left-side (68%) involvement was more than right-side involvement (32%). Hemiarthroplasty has been used for unstable intertrochanteric fractures since 1971 [22] however less frequently as compared to femoral neck fractures. [23] Its initial use was as a salvage procedure for failed pinning or other complications. [24] Tronzo claimed to be the first to use long, straight-stemmed prosthesis for the primary treatment of intertrochanteric fractures. [25] Rosenfeld, Schwartz, and Alter reported good results with the use of the Leinbach prosthesis. [26] Since then there are multiple studies showing good results using this technique.

Most cases required 1 U of postoperative blood transfusion, and four cases required 2 U. Mean duration of surgery was 84 min, ranging from 55 to 105 min. The mean blood loss was 272 ml and ranged between 200 and 400 ml. The dislocation rate in our study was zero. The mean Harris hip score improved progressively with time of follow-up. The mean score was 46.34 on the third day, which increased to 57.63 at 2 weeks, whereas at 3 and 6 months the scores were 76.14 and 79.81, respectively. The final average Harris hip score at last follow-up was 82.92. 30% excellent, 32% good, 26% fair results obtained in our study according to Harris Hip Score. Because of high failure rates, complications associated with internal fixation, use of hemiarthroplasty, and total hip arthroplasty as primary treatment of these fractures have emerged. Tronzo [27] pioneered the use of prostheses for the primary treatment of comminuted intertrochanteric fractures. Stern and Goldstein [28] used the Leinbach prosthesis for the primary management of 22 intertrochanteric fractures and concluded that early mobilization and early recovery to preinjury status are definite advantages. Rodop et al [29] in a study of primary bipolar arthroplasty for unstable intertrochanteric fractures in 37 elderly patients obtained 17 (45%) excellent and 14 (37%) good results after 12 months according to the Harris hip-scoring system. Haentjens et al [30] compared the outcomes of internal fixation and hemiarthroplasty and reported a significantly reduced incidence of pneumonia and pressure sores in the hemiarthroplasty group. Bipolar Hemiarthroplasty having less complications than in unipolar implants like- loosening, dislocation, protrusion, and acetabular wear. Due to dual bearing surfaces in prosthesis good advantages such as sharing of the motion at the two surfaces and hence, it reduces the net wear at either surface, thus reducing erosion at the acetabular joint interface. In addition, the total range of motions at the joint is increased. In wide femoral canal Cemented fixation gives the implant good stability. an 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 and pseudoarthrosis".

Conclusion

Intertrochanteric fractures of femur are very common among old age patients, females being more commonly affected. According to our results, we believe that Cemented Bipolar Hemiarthroplasty is of choice in freely mobile elderly patients above sixty years of age with an intertrochanteric femoral fracture. In elderly patients with intertrochanteric fractures of the femur treated with hemiarthroplasty gave early mobilization, early return to pre injury level, superior the quality of life and gave a long term solution. Postoperative early full weight bearing after Hemiarthroplasty avoids long-term immobilization, rehabilitation, deformities and need for revision surgeries.

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