Original Article

Journal of Orthopaedic Education
Volume 3 Number 2, July - December 2017
DOI: http://dx.doi.org/10.21088/joe.2454.7956.3217.12

Comparative Study of the Functional Outcomes between Proximal Femoral Nailing and Cemented Hemiarthroplasty in Management of Intertrochanteric Fractures in Elderly Patients

Sameer Wooly[1], Somesh Manjunath[2], Mohmad Irfan[1], Venkatesh Reddy[3]

Author Affiliation: [1]Assistant Professor [2]Post Graduate [3]Professor, Department of Orthopedics, P.E.S. Institute of Medical Sciences and Research, Kuppam, Andhra Pradesh 517425, India.

Corresponding Author: Mohmad Irfan, Assistant Professor, Department of Orthopedics, P.E.S. Institute of Medical Sciences and Research, Kuppam, Andhra Pradesh 517425, India.
E-mail: pesimsrresearch@gmail.com
Received: 19 September 2017, **Accepted on:** 03 October 2017

Abstract

Introduction: Intertrochanteric fractures like femoral neck fractures, are commonly encountered in the practice of orthopaedic surgery. Intertrochanteric fractures usually occur in patients over 60 years of age commonly and are three times more frequent in women than men because women tend to be less active and develop postmenopausal osteoporosis. *Methodology:* 40 elderly patients who were admitted and operated between July 2014 to July 2016 and had fulfilled the inclusion criteria, were enrolled for this study. Patients operated with PFN were allocated to Group A and operated with Bipolar prosthesis were allocated to Group B.20 patients each were allocated into 2 groups A and B according to randomized tables. *Results:* Majority of patients in study were between 60-85 years with a mean age of 70 years. Sixty percent of patients were female. Trivial fall was most common mode of injury.T3 fractures constitute 55% and T4 fractures constitute 45%. PFN required shorter incisions and less blood loss and operative time. *Conclusion:* Both modalities, PFN and Bipolar Hemiarthroplasty have shown good functional outcome.

Keywords: Proximal Femoral Nailing; Cemented Hemiarthroplasty; Intertrochanteric Fractures.

Introduction

Intertrochanteric fractures are a major cause of morbidity and mortality in elderly population. The incidence of all hip fractures is approximately 80 per 1,00,000 persons.Intertrochanteric fracture make up 45% of all hip fractures [1]. Unstable intertrochanteric fractures in elderly patients are associated with high rates of morbidity and mortality [2] although the results have improved with the use of internal fixation.In these patients however, comminution, osteoporosis, and instability often preclude the early resumption of full weight bearing [3].

Trochanteric fractures almost invariably occur as a result of fall,at involving both direct and indirect forces. Koval [4] and Zukerman postulated that Intertrochanteric fractures constitute almost half of all fractures of the proximal femur.Direct forces act along the axis of the femur or directly over greater trochanter to result in Intertrochanteric fractures. Indirect forces include pull of the Iliopsoas muscle on the lesser trochanter and pull of the abductor muscle on the greater Trochanter region.

Intertrochanteric fractures like femoral neck fractures, are commonly encountered in the practice of orthopaedic surgery.Intertrochanteric fractures usually occur in patients over 60 years of age commonly and are three times more frequent in women than men because women tend to be less active and develop postmenopausal osteoporosis. severe osteoporosis in these age group is responsible for high incidence of trochanteric fractures with minimal to moderate trauma.

Norton and Riska described patients with Intertrochanteric fractures to be 10 to 12 years older than patients with intracapsular femoral neck fractures, the average age reported in these patients in 60 to 75 years [5].

Intertrochanteric fractures frequently occur through bone affected by osteoporosis, the degree of osteoporosis can be determined by singh'sindex, this index classifies the severity of osteoporosis by the radiographic evaluation of trabecular pattern [6] of the proximal femur.

Before the introduction of suitable fixation devices, treatment for intertrochanteric fractures was of necessity nonoperative, consisting of prolonged bed rest in traction until fracture healing occurred (usually 10 to 12 weeks), followed by a lengthy program of ambulation training. In elderly patients, this approach was associated with high complication rates. Typical problems include decubiti, urinary tract infection, jointcontractures, pneumonia, and thromboembolic complications, resulting in a high mortality rate. Inaddition, fracture healing was generally accompanied by varus deformity and shortening because of the inability of traction to effectively counteract the deforming muscular forces.

Surgery in intertrochanteric fractures is important in elderly patients for prevention of complications associated with conservative treatment like pressure sores, pulmonaryinfection, atelectasis, malunionetc, and aimed at early rehabilitation and mobilization.

Methodology

Comparative study between PFN and Bipolar prosthesis in IT fracture femur-A prospective comparative study was conducted in the period from July 2014 to October 2016

Study Population

All male/female patients aged 60 or more admitted in the hospital.

Study Sample Size

40 elderly patients who were admitted and operated between July 2014 to July 2016 and had fulfilled the inclusion criteria, were enrolled for this study. Patients operated with PFN were allocated to Group A and operated with Bipolar prosthesis were allocated to Group B.20 patients each were allocated into 2 groups A and B according to randomized tables.

Study Type

Prospective study

Study Design

Randomisedcomparision with two groups.

Study Title

Comparative study between PFN and Bipolar prosthesis in IT fracture femur.

Inclusion Criteria

1. Elderly patients with intertrochanteric fractures unstable, comminuted.
2. Patients more than 60 years.
3. All patients medically fit for surgery even with hypertension and diabetes mellitus.
4. Type3 and type 4 under Boyd and Griffith classification are considered.
5. Closed fracture.
6. Fracture within 3 weeks.

Exclusion Criteria

1. Intertrochanteric fractures less than 60 years of age.
2. Seriously ill patients and patients not fit for surgery.
3. Fracture due to tumour or any other pathological cause.
4. Compound fractures and polytrauma.
5. Patients with intertrochanteric fractures treated by internal fixation which has gone for failure.
6. Neurovascular injuries.

Preoperative Management

Patients were admitted to the ward.Detailed history was taken with particular emphasize on mode of injury and associated medical illness. Indepth, clinical assessment was carried out in each case.

Results

- Majority of patients in study were between 60-85 years with a mean age of 70 years.
- Sixty percent of patients were female.
- Trivial fall was most common mode of injury.
- T3 fractures constitute 55% and T4 fractures constitute 45%.

- PFN required shorter incisions and less blood loss and operative time.
- Bipolar was found to be implant of choice in unstable comminuted intertrochanteric fractures, there was less shortening and early postop mobility and no use of fluoroscopy in Bipolar cases.
- Post operative complications in both groups included 6 wound infections in bipolar and PFN, two screw backout in PFN.
- 16 out of 20 patients treated with PFN and 18 of the 20 patients treated with Bipolar regained their pre injury walking ability at the fourth month followup.
- Patients treated with PFN had a significantly lower pain score at 6th month followup.
- For unstable fractures Bipolar showed significantly better outcomes with all patients having good results.

Table 1: Age distribution

Age (Years)	PFN	Bipolar	Total
60-65 years	10(50%)	10(50%)	20(50%)
66-70	4(20%)	5(25%)	9(45%)
71-75	2(10%)	1(5%)	3(15%0
76-80	3(15%0	1(5%)	4(20%)
81-85	1(5%)	3(15%)	4(20%)
Total	20(100%)	20(100%)	40(100%)

Table 2: Sex distribution

Sex	PFN	Bipolar	Total
Male	11(55%)	8(40%)	19(45%)
Female	9(45%)	12(60%)	21(55%)
Total	20(100%)	20(100%)	40(100%)

Table 3: Type of fracture with method of fixation

Type	PFN	Bipolar	Total
T3	10(50%)	12(60%)	22(55%)
T4	10(50%)	8(40%)	18(45%)
Total	20(100%)	20(100%)	40(100%)

Table 4: Post-operative complications

Post Operative Complications	PFN	Bipolar	Total
Wound Infection	2	4	6
Screw Back out	2	0	2

Table 5: Functional outcome VS type of fracture: PFN

Outcome	Type of Fracture		Total
	T3	T4	
Excellent	3	1	4
Good	4	3	8
Fair	4	4	8
Total	10	10	20

Table 6: Functional outcome VS method of fixation: bipolar

Results	Type of Fracture		
	T3	T4	
Excellent	4	2	6(30%)
Good	6	2	8(40%)
Fair	2	4	6(30%)
Total	12	8	20(100%)

Discussion

The age of the patient ranged from 60 to 85 years with an average of 70years. In case of Bipolar fixation it was 71years and in cases of proximal femoral nailing it was 69 years.

All the fractures that occurred in patients were either due to a trivial fall or a road traffic accident. This supports the view that bone stock plays an important role in the causation of fractures in the elderly, which occur after a trivial fall. Degree of osteoporosis is measured by singh's index, although it involves great degree of inter-observer variation and has a few drawbacks, but still it was effective in the present study.

The accuracy of the singh index has been questioned by authors such as Kootel al [7].

White and colleagues [8] did a study of rate of mortality for elderly patients after fracture of the hip in the 1980's and they concluded that the average age for trochanteric fractures is 75.4years

The overall functional outcome of bipolar is better compared to PFN and it is statistically significant ($p=0.0001<0.05$).

When we compared individual T3 and T4 fractures in PFN group functional outcome of T3 fractures is better ($p=0.001$)compared to T4 Even in Bipolar T3 group have better outcome when compared to T4 fractures ($p=0.004$)

T3 fractures have better results when treated with Bipolar and T4 fractures have better results when treated with PFN. There is some amount of shortening in the Bipolar group which can be explained as due to significantly greater impaction of the fracture in Bipolar group.

The smaller incisions, shorter operative time, relatively less blood loss and less postoperative pain with PFN indicate that the PFN has an advantage over the Bipolar. However in unstable intertrochanteric fracture the bipolar has a definite advantage over the PFN in terms of limb length shortening, earlier restoration of pre-injury walking ability and overall functional outcome.

Harriship Score

Series	Year	Bipolar%
Carl johanHedbeck	2010	79.3
Cadler	1996	72
Nottage	1990	85
Meyer	1981	77
Drinker and Murray	1979	77.5

All cases in our series were assessed according to harris hip score and graded accordingly as excellent, good, fair, poor and failure. We got 70% excellent and good results with bipolar group and 60% with PFN group. The mean HHS score was 84.5 in Bipolar group and 82.5 in PFN group.

Yamagata et al, in their classical study of reviewed 1001 cases of hip hemiarthroplasty, there were 682 unipolar and 319 bipolar cases. Patients undergoing Bipolar exhibited higher hip score and lower acetabular erosion rates compared to unipolar prosthesis [9].

Bochner et al reported their experience with Bipolar arthroplasties in a consecutive series of 120 hemiarthroplasties. In this group, 90 patients were followed for atleast 2 years, with 91% being pain free and 92% demonstrating satisfactory power and motion [10].

Lestrange reviewed 496 patients with Bipolar replacements for displaced femoral neck fractures and compared them with patients having fixed head prosthesis.He found that the Bipolar prosthesis offered advantages over one-piece designs interms of stability, decreasedacetabular erosion and improved function [11]. In 1988, cornell et al, reported no difference in the functional outcome in a small study including 48 patients with a six month follow up [12].

Calder et al published the results of a study including 250 patients, all aged 80 years or more,with a 1.5-2 year follow-up. A higher proportion of patients returning to their preinjury was found in the unipolar HA group, but no other differences were found [13].

According to OngBC, there was no significant differences were found between the unipolar and bipolar groups [14].

Finally, in 2003, Raia et al, reported the results of a study including 115 patients randomized to a more modern cemented unipolar HA or Bipolar HA with identical stems. At the one-year assessment there were no significant differences between the groups in terms of surgical complications, functional outcome.

Conclusion

Thus in our study, primary hemiarthroplasty provides, stable pain free, and mobile joint with acceptable complication rate as seen in our study; however larger prospective randomized study comparing the use of PFN against primary

hemiarthroplasty for unstable intertrochanteric fractures is needed.

References

1. JosephD. Zuckerman, M.D Hip fracture N Engl J Med 1996;334:1519-1525.
2. Jenson, Js: Trochanteric fractures. An epidemiological, clinical and biomechanical study, Actaorthop. Scandinavica. supplimentum 188,1981
3. Bergman, G D; Winquist, R.A; Mayo, K.A. and Henson, S., JR:subtrochanteric fracture J.A.A.O.S, 194;2:150-156.
4. Kovali K.J and Zuckerman J.D: hipfractures, evaluation and treatment of intertrochanteric fractures, J.A.A.O.S, 1994;2:150-156.
5. Norton. P.L: Intertrochantericfractures. Clinortho 1969;66:77-81.
6. Singh M. Mainj. P.S: Changes in trabecular apttern of the upper end of femur as an index to osteoporosis JBJS 1976;52A:457-467.
7. Koot VCM, Kesselaer SMMJ, Clevers GJ, Hooge P, Weits TW, Evaluation of singh index for measuring osteoporosis. JBJS 1996;78B:831-834.
8. White BL, Fisher WD, Laurin CA. Rate of mortality for elderly patients after fracture of the hip in the 1980's. JBJS 1987;69A:1335-40.
9. Yamagata M, Chao EY, Ilstruo DM, etal, Fixed head and Bipolar head endoprosthesis.A Retrospective clinical and roentgenographic study J. Arthroplasty, 1987;2:327-41.
10. Bochner RM, Pellicci PM, Lyden JP. Bipolarhemiarthroplasty for fracture of the femoral neck.Clinical review with special emphasis on prosthetic motion. JBJS Am 1988;70:1001-10.
11. Lestrange NR. Bipolararthroplasty for 496 hip fractures. ClinOrthop 1990;251:7-19.
12. Cornell CN, Levine D, O' Doherty J, LydenJ. Unipolar versus Bipolar hemiarthroplasty for the treatment of femoral neck fractures in the elderly. Clin Orthop Relat Res 1998;348:67-71.
13. Calder SJ, Anderson GH, Jagger C, Harper WM, Gregg PJ. Unipolar or bipolar prosthesis for displaced intracapsular hip fracture in Octogenarians: a randomized prospective study JBone joint surg Br 1996;78:391-394.
14. Ong BC, Maurer SG, Aharonoff GB, Zukerman JD, Koval KJ. Unipolar versus Bipolar hemiarthroplasty: functional outcome after femoral neck fracture at a minimum of thirty-six months of follow up. JOrthop Trauma. 2002;16(5):317-322.