Proximal femur nail vs cemented bipolar prosthesis in unstable intertrochanteric femur fractures in elderly: A prospective study

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Abstract

Background: Surgical stabilization of Intertrochanteric fracture femur is one of the most commonly performed orthopaedic procedures. Present study was done to analyse the outcome of various treatment modalities for unstable Intertrochanteric fracture femur in elderly.

Methods: The present clinical study was carried out at our tertiary care hospital. Study duration was from Jan 2015 to June 2016. 70 patients over the age of 60 years with unstable Intertrochanteric fracture were selected. Outcome of management of unstable Intertrochanteric fracture femur was analysed using Harris Hip Score in Proximal femoral nail (PFN) and Cemented Bipolar prosthesis (CBP).

Results: Most of the patients were between 60-70 years of age. The average age of study group was 68.9 years. 35 patients treated with PFN and 35 patients treated with CBP. Superficial infection was seen in 4 patients and was the most common complication found in cemented bipolar prosthesis. External rotation deformity was second most common complication seen in 5 patients. Out of them, 2 patients were of CBP and 3 patients of PFN. Deep wound infection occurred in 1 case of CBP. Average blood loss in patients operated with PFN and CBP were 205 ml and 311ml in CBP. It was noted that shorter time was required for P.F.N (55 min) and then for CBP (84min). Average Harris score for PFN and CBP at 3 months, at 1 year and at 2 years were 70.1:74.9, 86.4:78.2 and 84.4:76.6.

Conclusion: Considering the amount of blood loss, duration of the surgery and Harris Hip Score, PFN is better for unstable inter trochanteric fracture femur than CBP. The only advantage of Hemiarthroplasty was early weight bearing. But at the end of 1 year and 2 years, the outcome of PFN was better than Cemented Bipolar prostheses.

Statistical method: Data were reported as mean, median (range) or number. t-test was used to assess significant difference among all numerical parameters of the study within the two surgical groups. P-values < 0.05 were considered statistically significant.

Keywords: Harris hip score, Proximal femoral nail, Bipolar prosthesis.

1. Introduction

Elderly patients with hip fractures constitute the Largest Group of Emergency Orthopaedics Admissions [1]. With an expected incidence of 6.26 million by the year 2050, an increase in these fractures is on the rise due to the increased life expectancy of the people and osteoporosis [1-4].

It is universally agreed that the treatment of Intertrochanteric fractures is stable fixation as early as possible. Stable fixation is the cornerstone of successful union of trochanteric fractures. Surgical stabilization of Intertrochanteric fracture femur is one of the most commonly performed orthopaedic procedures.

Four major categories of operative treatment can be distinguished, including nail plates and blade plates with a fixed angle, sliding screws and plate devices, rigid intra medullary devices, flexible intra medullary devices and arthroplasty. Each method has recognized advantages and disadvantages. Some studies reported that hip arthroplasty could shorten the weight bearing time, reduce the incidence of implant-related complications and improve the hip function when compared with internal fixations by Gamma nails, dynamic hip screws, and proximal femoral nails (PFN) [3, 4]. Contrarily recent studies indicated that proximal femoral nail (PFN) currently
is an optimal implant for the treatment of different type of intertrochanteric fractures [5-8]. So far, however, there is only one prospective randomized study comparing PFN with hemiarthroplasty for senile intertrochanteric fractures in the literature [4]. Present study is done to analyse the outcome of PFN (proximal femur nail) with CBP (Cemented Bipolar) for treating unstable Intertrochanteric fracture femur in elderly.

2. Material and methods

The prospective study was conducted in a tertiary institute by collecting data of 92 cases of unstable and complex intertrochanteric fracture who have undergone proximal femur nail and cemented hemiarthroplasty, selected through prior randomization based on a computer based random number sequence by a person uninvolved in the surgical procedure from Jan 2015 to Feb 2016 with 2 years follow up. Surgically fit post-traumatic patients more than 60 years of age who has been diagnosed as having complex/unstable intertrochanteric fractures which include postero medial large separate fragmentation, basivcerial patterns, reverse obliquity, displaced greater trochanteric fractures and failure to reduce fracture before fixation or with sub trochanteric extension were included in study. Patients with following conditions were excluded, patients who had less than 6 months of follow-up, bilateral fractures, pathological or compound fractures, fractures associated with polytrauma, pre-existing femoral deformity preventing hip screw osteosynthesis or intra-medullary nailing and subtrochanteric fractures, fractures extending 5 cm distal to the inferior border of the lesser trochanter.

Clinical Outcome of management of unstable Intertrochanteric fracture femur by using Proximal femoral nail (PFN) and Cemented Bipolar prosthesis (CBP) was analysed with Harris hip score[9]. Partial weight bearing was allowed within a week onwards with the assistance of a walker. Mean follow up period was 22.5 months (18-31 months).

Statistical analysis: The continuous variables were declared as mean ± standard deviation (SD). Depending on the distribution, mean values were compared using student t test. Statistical significance was determined with P <.05.

ERB (ethical review Board approval has been taken)

Conflicts of interest: none.

3. Results

Most of the patients were between 60-70 years of age. The average age of study group was 68.9 years. 52 patients treated with PFN and 40 patients treated with CBP. Average blood loss in patients operated with PFN and CBP were 185 ml and 311 ml in CBP. It was noted that shorter time was required for P.F.N (55 min) and then for CBP (84min) shown in table no.1. Superficial infection was seen in 5 patients with a ratio 3:2 in CBP: PFN respectively. Deep wound infection occurred in 2 cases of CBP and 1 case in PFN group (table no.2).

Table 1: Demographic and Intraoperative data

| S.no | Complication | CBP gp(40) | PFN gp(52) | P value |
|------|--------------|-----------|------------|---------|
| 1    | Mortality rate within 2 years | 4 | 1 | <0.05 |
| 2    | Dislocation | 2 | 0 | - |
| 3    | Limb Length Alteration | 3 | 4 | >0.99 |
| 4    | Deep Vein Thrombosis | 1 | 1 | >0.99 |
| 5    | Pulmonary infection | 4 | 1 | < 0.05 |
| 6    | Prosthetic/implant related | 2 | 1 | 0.79 |
| 7    | Superficial Infection | 3 | 2 | 0.067 |
| 8    | Deep infection | 2 | 1 | 0.81 |
| 9    | Average hospital stay | 14 | 10 | <0.05 |
| 10   | Av. Partial weight bearing | 5th day | 9th day | <0.05 |
| 11   | Revision surgery | 2 | 1 | >0.99 |

Table 2: Postoperative outcomes in CBP and PFN Group

| (n=52) | CBP Group (n=40) | PFN Group | P value |
|--------|------------------|-----------|---------|
| Follow-Up Period in months (range) | 23 (18-29) | 25 (19-32) | - |
| Mean Time to full weight bearing (weeks) | 3 weeks | 8.2 weeks | p<0.001 |
| Harris Hip Score (100) | 74.9 | 67.1 | p<0.001 |
| 3 months | 79.2 | 84.2 | p< 0.05 |
| 12 months | 76.6 | 83.8 | p<0.01 |
| Radiological union (mean duration) | - | 5.5 months | - |

4. Discussion

Hemiarthroplasty is always one of the choice in unstable intertrochanteric femoral fractures [9]. Some studies reported that hip arthroplasty in treating these fractures had more advantages than internal fixations [4, 10-13]. However, the findings of the present study did not support hemiarthroplasty as a preferred choice when compared with PFN. Although hemiarthroplasty is a preferable alternative, intramedullary
fixation techniques, which need less surgical cut, have been
developed to protect patient’s bone structure. Proximal
femoral nail is the internal fixation technique that causes
minimum bone loss in femoral head and femoral neck [6].
Tang et al. reported that at 3 years follow-up, there was no
significant difference in Harris Hip Score between PFNA and
hemiarthroplasty group (83.0 ± 12.2 for the PFNA group and
80.2 ± 10.9 for the hemiarthroplasty group, P = 0.09) [14].
Ozkayın N et al. conducted a prospective randomized study
comparing PFN with hemiarthroplasty for intertrochanteric
fractures in the elderly, and found that at 3 months, Harris Hip
Score average was 45.24 in PFN group and 63.38 in
hemiarthroplasty group respectively, with significant
difference; while at 12 months, Harris Hip Score average
was 75.95 in PFN group and 68.44 in hemiarthroplasty group
respectively, with significant difference [4]. In the present
study, at 1 and 2 year follow-up, there is statistically
difference between the two groups regarding to the Harris Hip
Score. Our results also strengthened by Shen J et al.
categorically stated after studying 124 patients above 70 years
of age, that Internal fixation is preferred as it leads to a higher
Harris scores, lesser pain, and better walking ability than
those treated with hemiarthroplasty provided there is good
and stable reduction, even when severe osteoporosis is present
[15]. Tang P et al. after retrospectively studying 303 patients
concluded that PFNA was superior to hemiarthroplasty
according to the operative statistics, especially the
anaesthesia, operation lasting time, blood loss, blood
transfusion and the drainage and our study found similar
results [14].
As Pho RW et al. and Siwach R et al. reported that only 75–
88% of patients treated with hemiarthroplasty could
successfully ambulate and our study found similar results
probably because of more postoperative complications in
cemented bipolar group [16, 17].

Although many studies indicated that hemiarthroplasty in
treating these fractures had very low incidence of
postoperative complications but the issues of
hemiarthroplasty, such as prosthetic dislocation, prosthesis
loosen and cement reaction, cannot be completely avoided,
which are mainly depended on the skill level of the operating
surgeon [3, 10, 11, 18, 19]. Tang et al. showed no difference in the
functional results but the incidence of complications was
higher in hemiarthroplasty group than in PFN group (14.1% vs.
PFN 8.96%), with no statistics difference [14]. In our study,
we had two cases of postoperative hip dislocation and two
cases of intraoperative cement reaction in CBP group.
Superficial and deep infections were statistically similar in
both the groups.
The procedures of hemiarthroplasty in treating
intertrochanteric fracture are much more complicated than in
treating femoral neck fracture, especially in case of
comminuted intertrochanteric fractures. PFN had been
approved to be an effective method in treating unstable senile
intertrochanteric fractures with low rates of internal fixation
failure and related reoperation [20, 21]. Present study, we found
a trend of higher 2 year mortality for patients who underwent
primary hemiarthroplasty compared with those underwent
PFN (10% vs. 2%) strengthening the previous results obtained
by Tang et al. [14]. One potential reason of leading to higher
mortality in patients treated with hemiarthroplasty was the
relative greater surgical trauma that hemiarthroplasty brought
to the aging patients along with higher pulmonary infection
rate postoperatively.
The treatment of unstable IT fractures needs meticulous
preoperative planning, good intra-operative reduction and use
of intra-medullary implants. The surgeon is free to use any
design amongst the many intra-medullary implants as per the
training and experience of the surgeon. There is as yet no
consensus in literature regarding whether to use short or long
IM nails. Hemiarthroplasty may still find favour in cases with
fracture comminution in elderly with severe osteoporosis or in
cases with failed fixation of intertrochanteric fracture [11]. As
far as possible fixation of IT fractures is to be attempted
rather than a hemiarthroplasty. It seems that intertrochanteric
fractures treated with PFN may achieve better functional
results than treated with hemiarthroplasty in the short and
middle term, however longer follow-up studies are needed to
confirm it.

Limitations: limitations include small group and mid term
follow up. The implant-related complications occur usually
in the first year after operation in patients treated with PFNA,
while increase with time in patients treated with hemiarthroplasty.
To compare the implant-related complications of the two methods and functional assessment
long term follow-up studies are needed.

5. Conclusion
In conclusion, our results shows that both PFN and cemented,
bipolar hemiarthroplasty are beneficial techniques in
Treatment of intertrochanteric femoral fractures. Internal
fixation may be more appropriate for elderly patients with
poor general conditions due to shorter duration of operation,
lesser surgical trauma and lower risk of reoperation with
progressive improvement in Harris hip score. Postoperative
medical complications are more in CBP group whereas
postoperative orthopaedic complications are almost similar.

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7. Reference
1. Colais P, Pinnarelli L, Fusco D, et al. The impact of a
pay-for-performance system on timing to hip fracture
surgery: experience from the Lazio Region (Italy). BMC
Health Services Research. 2013; 13:39.
2. Kannus P, Parkkari J, Sievonen H, Heinonen A, Vuori I, Jorvinen M. Epidemiology of hip fractures. Bone; 1996; 18:575-635.

3. Koval KJ, Zuckerman JD. Hip fractures are an increasingly important public health problem. Clin Orthop Relat Res. 1998; 348:2.

4. Ozkayn N, Okçu G, Akтуğlu K. Intertrochanteric femur fractures in the elderly treated with either proximal femur nailing or hemiarthroplasty: a prospective randomised clinical study. Injury. 2015; 46(2):53-8.

5. Liu Y, Tao R, Liu F, Wang Y, Zhou Z. Mid-term outcomes after intramedullary fixation of peritrochanteric femoral fractures using the new proximal femoral nail antitrotation (PFNA) Injury. 2010; 41:810-817.

6. Sadic S, Custovic S, Jasarevic M, Fazlic M, Smajic N, Hrustic A. Proximal femoral nail in treatment of fractures of proximal femur. Med. Arch. 2014; 68:173-177.

7. Li M, Wu L, Liu Y, Wang C. Clinical evaluation of the Asian proximal femur intramedullary nail antitrotation system (PFNA-II) for treatment of intertrochanteric fractures. J. Orthop. Surg. Res. 2014; 13:1-8.

8. Gardenbroek TJ, Segers MJ, Simmermacher RK, Hammadcher ER. The proximal femur nail : an identifiable improvement in the treatment of unstable pertrochanteric fractures. J. Trauma. 2011; 71:169-174.

9. Harris WH. Traumatic arthritis of the hip after dislocation and acetabular fractures: treatment by mold arthroplasty. An end result study using a new method of result evaluation ; JBJS American. 1969; 51(4):737-55.

10. Sinno K, Sakr M, Girard J, Khatib H. The effectiveness of primary bipolar arthroplasty in treatment of unstable intertrochanteric fractures in elderly patients. N. Am. J. Med. Sci. 2010; 2:561-568.

11. Sancheti KhSancheti P, Shyam A, Patil S, Dharival Q, Joshi R. Primary hemiarthroplasty for unstable osteoporotic intertrochanteric fractures in the elderly: a retrospective case series. Indian J. Orthop. 2010; 44:428-434.

12. Liang YT, Tang PF, Guo YZ, Tao S, Zhang Q, Liang XD. Clinical research of hemiprosthesis arthroplasty for the treatment of unstable intertrochanteric fractures in elderly patients. Zhonghua Yi Xue Za Zhi. 2005; 85:3260-3262.

13. Singh S, Shrivastava C, Kumar S. Hemi replacement arthroplasty for unstable inter-Trochanteric fractures of femur. J. Clin. Diagn. Res. 2014; 8(10):LC01-LC04.

14. Tang P, Hu F, Shen J, Zhang L, Zhang L. Proximal femoral nail antitrotation versus hemiarthroplasty: a study for the treatment of intertrochanteric fractures. Injury. 2012; 43:876-881.

15. Shen J, Wang DL, Chen GX, Yang HL, Li L, Wei MX et al. Bipolar hemiarthroplasty compared with internal fixation for unstable intertrochanteric fractures in elderly patients. J Orthop Sci. 2012; 17:722-729.

16. Pho RW, Nather A, Tong GO, Korkcu CT. Endoprosthetic replacement of unstable, comminuted intertrochanteric fracture of the femur in the elderly, osteoporotic patient. J. Trauma. 1981; 21:792-797.

17. Siwach R, Jain H, Singh R, Sangwa K. Role of hemiarthroplasty in intertrochanteric fractures in elderly osteoporotic patients: a case series. Eur. J. Orthop. Surg. Traumatol. 2012; 22:467-472.

18. Chu X, Liu F, Huang J, Chen L, Li J, Tong P. Good short-term outcome of arthroplasty with Wagner SL implants for unstable intertrochanteric osteoporotic fractures. J. Arthroplasty. 2014; 29:605-608.

19. Choy WS, Ahn JH, Ko JH, Kam BS, Lee DH. Cementless bipolar hemiarthroplasty for unstable intertrochanteric fractures in elderly patients. Clin. Orthop. Surg. 2010; 2:221-226.

20. Simmermacher RK, Ljungqvist J, Bail H, Hockertz T, Vochteloo AJ, Ochs U et al. The new proximal femoral nail antitrotation (PFNA) in daily practice: results of a multicentre clinical study. Injury. 2008; 39:932-939.

21. Soucany de Landevoisin E, Bertani A, Candoni P, Charpail C, Demortiere E. Proximal femoral nail antitrotation (PFN-ATM) fixation of extra-capsular proximal femoral fractures in the elderly: retrospective study in 102 patients. Orthop. Traumatol. Surg. Res. 2012; 98:288-295.