

Comparative Assessment of Two Different Techniques in the Management of Unstable Senile Intertrochanteric Fractures

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Abstract

Aim: To comparative study of PFNA antirotation vs bipolar hemi arthroplasty in unstable senile intertrochanteric fractures. **Methods:** The present Prospective study was conducted in the Department of Orthopaedic, Katihar Medical College and Hospital, Katihar, Bihar, India for 1 year. 50 patients each were included in PFNA group and hemi arthroplasty group. Patients with age > 70 years, unstable intertrochanteric fractures Patient mobile before the fracture and medically fit for surgery. **Results:** In hemi arthroplasty group 38 patients underwent cemented bipolar replacement, 12 patients underwent uncemented bipolar replacement. PFNA group scored significantly better with respect to intraoperative blood loss, surgical time, hospital stay compared to hemi arthroplasty group. ($P < 0.05$) There were less intraoperative complications in PFNA group as compared to hemi arthroplasty. ($P = 0.041$). In hemi arthroplasty group three patients had hypotension with bradycardia following cementing. Two patients had symptomatic fat embolism with hypotension, desaturation and tachypnea. All patients were immediately resuscitated and shifted to ICU for further management. In PFNA group none of the patients had intraoperative complications. Hemi arthroplasty group definitely had better functional outcome using Harris hip score till first three months ($P < 0.05$) as compared to PFNA group. But both groups had similar score at 6 month and 1 year ($P > 0.05$). There was significant difference in the incidence of wound complications in both groups (0% vs 26%, $P = 0.045$). In PFNA group none of the patients had wound infection or post operative wound drainage following DVT Prophylaxis. In Hemi arthroplasty group 6 patients have superficial wound infection. Wound debridement and through lavage done in both cases and antibiotics was given as per culture and sensitivity for 6 weeks. **Conclusion:** The PFNA definitely provide advantage for senile intertrochanteric fracture being less invasive, quick surgery, and less disruptive to normal physiology. It allows early weight bearing similar to Hemi arthroplasty which has more risk of cementation, hypotension, wound related complications.

Keywords: PFNA, Intertrochanteric, Hemi arthroplasty.

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Introduction

Intertrochanteric fracture is a common injury in the elderly. The primary treatment

for intertrochanteric fracture is internal fixation. However, senile intertrochanteric

fractures treated with internal fixations are often associated with complications due to poor bone quality, such as metal failure, nonunion and femoral head perforation. Hip arthroplasty is always used as a salvage procedure for internal fixation failure[1,2]. 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]. In order to prevent the reoperation due to internal fixation failure, some surgeons recommended hemiarthroplasty as the preferred choice for treating the unstable senile intertrochanteric fractures with osteoporosis[5,6]. Nevertheless recent studies indicated that proximal femoral nail antirotation (PFNA) currently was an optimal implant for the treatment of different type of intertrochanteric fractures[7,8]. PFNA is an intramedullary fixation system which allows early weight bearing postoperatively. The device permits impaction of the metaphyseal fracture through the sliding helically shaped collum-blade, which can accelerate the fracture union and reduce the incidence of femoral head penetration. Meta-analysis showed that PFNA had the benefits of less blood loss, minimal rate of fixation failure and shorter hospital stay compared with patients treated with Gamma nails, and dynamic hip screws[9]. So far, however, there was no prospective randomized study comparing PFNA with hemiarthroplasty for senile intertrochanteric fractures in the literature. Which method is better for treating these fractures in elderly patients remains controversial due to the insufficient clinical evidences.

Material and methods

The present Prospective study was conducted in the Department of Orthopaedic, Katihar Medical College and Hospital, Katihar, Bihar, India for 1 year, after taking the approval of the protocol review committee and institutional ethics

committee. 50 patients each were included in PFNA group and hemiarthroplasty group.

Inclusion and exclusion criteria

Patients with age > 70 years, unstable intertrochanteric fractures Patient mobile before the fracture and medically fit for surgery.

Patients with age < 70 years, bedridden patient before fracture, pathological fractures and were excluded from this study.

Methodology

All the patients were admitted in emergency department of our hospital. Thomas splint was put for initial immobilisation and to reduce pain. Preoperative blood test was sent to pathology laboratory. Physician opinion taken regarding fitness for surgery. A written, informed consent taken explaining details of surgery, risk factors, postoperative rehabilitation, medical and surgical complications. Pre anaesthetic check up was done a day prior to surgery. ASA grading recorded.

Methods for PFNA

After induction of anaesthesia patient put on lateral decubitus position on radiolucent table. Other leg maximally flexed and pillow kept in between the legs. Fracture reduction confirmed under image intensifier in AP view and lateral view (20-degree oblique to avoid overlap with other hip). After closed reduction, an about 5 cm longitudinal incision was made approaching the greater trochanter. Entry taken with awl through tip of GT. Guide pin passed through the tip into the medullary canal. Nail passed over the guide pin without reaming. Helical blade put centrally/inferiorly in anteroposterior view and centrally in lateral view. Distal static bolt put.

Methods for bipolar hemiarthroplasty

After induction of anaesthesia patient put on lateral decubitus position. Moore's

approach for the entire cases. 10 cm curved incision centering over GT. Short external rotators ligated and cut. Removal of head in intertrochanteric fracture is difficult. Head extractor is put, and capsule is released all around. Other option is to cut it sub capitally with saw as in neck femur fracture and then remove remaining neck with piecemeal. Fracture pattern is assessed. Usually, LT is reconstructed first to get an anatomical landmark using SS wire. Then Canal is reamed and serially broached. Trial stem put. Final stem is put with/without cement. Final head put after trial reduction. Greater trochanter then fixed with k wires /encirclage/tension band wiring depending on fracture pattern.

Post operatively abduction pillow kept for hemiarthroplasty patient. Haemoglobin checked next morning and accordingly blood transfused if required. Most of hemiarthroplasty patients started full weight bearing walking with walker support from post op day one.

PFNA patients also started full weight bearing walking with walker from post op day one. All patients were given DVT prophylaxis like factor Xa inhibitor/ direct thrombin inhibitor/ clopidogrel/aspirin etc. till 3 weeks. Patient called for follow up at 1 month, 3-month, 6-month, 1 year. X-rays taken at each follow up and Harris hip score calculated.

Patients of PFNA group were gradually mobilised from walker support to stick support to walking without support. Hemiarthroplasty group mobilised with walker for one week and then to stick support /without support depending upon general condition of patient.

Statistical analysis

Data statistically analysed using fisher's exact test for categorical variables and student's T test for continuous variables. Two tailed P value of less than considered to be significant.

Results

In both groups 50 patients were included and their data analysed. Baseline characteristics like age, sex, side, type of fracture, ASA grading, comorbid conditions were recorded. There was no significant difference in above characteristics ($P>0.05$) (Table 1)

In hemiarthroplasty group 38 patients underwent cemented bipolar replacement, 12 patients underwent uncemented bipolar replacement. PFNA group scored significantly better with respect to intraoperative blood loss, surgical time, hospital stay compared to hemiarthroplasty group. ($P<0.05$) (Table 2)

There were less intraoperative complications in PFNA group as compared to hemiarthroplasty. ($P=0.041$). (Table 2). In hemiarthroplasty group three patients had hypotension with bradycardia following cementing. Two patients had symptomatic fat embolism with hypotension, desaturation and tachypnea. All patients were immediately resuscitated and shifted to ICU for further management. In PFNA group none of the patients had intraoperative complications. Hemiarthroplasty group definitely had better functional outcome using Harris hip score till first three months ($P<0.05$) as compared to PFNA group. But both groups had similar score at 6 month and 1 year ($P>0.05$) (Table 3).

There was significant difference in the incidence of wound complications in both groups (0% vs 26%, $P= 0.045$) (Table 4). In PFNA group none of the patients had wound infection or post operative wound drainage following DVT Prophylaxis. In Hemiarthroplasty group 6 patients have superficial wound infection. Wound debridement and through lavage done in both cases and antibiotics was given as per culture and sensitivity for 6 weeks. all patients recovered following the treatment. 5 patients had postoperative wound drainage following oral anticoagulants. Regular dressing was done, and anticoagulants were stopped. There was no

significant difference in implant related orthopaedic complications (12% vs 16%, $P > 0.91$) in both the groups. IN PFNA group 3 patient had screw cut out superiorly and varus collapse for which he was advised reoperation, but patient was not willing for second surgery. Another patient had periprosthetic fracture (Vancouver type B1) following history of fall from bed. they were operated again and ORIF with DCP and screws done. In hemiarthroplasty group 4 patient had dislocation with breakage of tension band wire over GT. This patient was re-operated with open reduction and revision of TBW. 1 patient had breakage of

tension band wiring over GT following history of fall. She was managed conservatively and advised non weight bearing walking with walker till GT union. 1 patient had migration of k wire medially noticed in one year follow up x-ray. As this patient didn't have any complaints she was counselled and monitored. There was no significant difference in reoperation rate in both groups ($P = 0.58$). Patient treated with Hemiarthroplasty had a trend of higher medical complications as compared to PFNA group. However, results are not significant (6% vs 22% $P = 0.37$) (Table 4).

Table 1: Demographic profile of the patients

Characteristics	PFN antirotation	Hemiarthroplasty	P value
Age in years	80.7 + 4.3	78.6+3.9	0.27
Sex (Male/Female)	25/25	23/27	0.88
Side (Right/Left)	11/9	6/14	0.17
Boyd and griffin classification			
type II	36(72%)	29(58%)	0.69
type III	6(12%)	6(12%)	
type IV	8(16%)	15(30%)	
ASA Grade			
I	4(8%)	4(8%)	0.584
II	25(50%)	11(22%)	
III	19(38%)	33(66%)	
IV	2(4%)	2(4%)	
Comorbidities			
DM	20(40%)	15(30%)	0.69
Hypertension	15(30%)	25(50%)	0.53
Cardiac illness	10(20%)	15(30%)	0.68
Asthma/COPD	8(16%)	9(18%)	0.88

Table 2: Demographic profile of the patients

Variable	PFN antirotation	Hemiarthroplasty	P values
Surgical time (mins)	39 ± 5.09	54 ± 8.50	<0.001
intraoperative blood loss(ml)	119 ± 28.4	299 ± 48.4	<0.001
Intraoperative complications	0 (0%)	13(26%)	0.041
ICU requirement post op	8(16%)	21(42%)	0.155
Hospital stays (days)	4.5±1.21	6.5±2.54	<0.001
Time to complete weight bearing	Immediate	Immediate	

Table 3: Harris hip score

Variable	PFN antirotation	Hemiarthroplasty	P value
Harris hip score at 1 month	51.1±2.15	60.4±3.65	<0.001
Harris hip score at 3 months	63.05±2.51	69.10±2.25	<0.001
Harris hip score at 6 months	78.55±1.7	78.75±1.62	0.52
Harris hip score at 1 year	83.35±2.68	84.9±2.41	0.057

Table 4: Complication of patients

Variables	PFN antirotation	Hemiarthroplasty	P value
Minor orthopaedic complications (wound infection/excessive bleeding)	0(0%)	13(26%)	0.045
Major orthopaedic complications (implant failure, dislocations, periprosthetic fracture)	6(12%)	8(16%)	>0.91
Medical complications	3(6%)	11(22%)	0.37
Reoperation rate	3(6%)	4(16%)	0.58

Discussion

Treating a senile intertrochanteric fracture poses a great challenge to orthopaedic surgeon especially when multiple options are available from conservative to internal fixation to replacement surgeries. Internal fixation with PFN has advantage of small incision, less invasive, less tissue handling, less hospital stays, less operative time[10-12]. Our study well supported the above advantages where PFNA group showed significant less blood loss (119 ml vs 299 ml, $P<0.001$), less operative time (39 mins vs 54 mins $P<0.001$), less hospital time (4.5 days vs 6.5 days, $P<0.001$). Hemiarthroplasty group had more wound complications (26%) including wound complications secondary to DVT prophylaxis as compared to PFNA group (0%). These results are comparable with study by Görmeli et al.[13] Anticoagulants need to be stopped in those patients till wound heals which lead to cardiac risk in elderly patients. Studies showed that internal fixation have disadvantage of screw cut out, periprosthetic fracture, head fracture, higher reoperation rate[14,15] but our study contradicts and showed no significant difference in implant related and major orthopaedic complications ($P>0.91$). Possible explanation can be:

- 1) Helical blade results in increased surface contact between devices and femoral head cancellous bone, compressing rather than removing the limited amount of bone.
- 2) The tip of PFNA nail is especially designed to reduce the concentration of stress[16].

In another study by R.K. simmermacker et al[17,15] concluded PFNA to be effective method in treating unstable senile intertrochanteric fracture with low rate of internal fixation failure and related reoperation. E. soucanye et al[18] showed similar results. Although there are many studies which showed lesser orthopaedic complications with hemiarthroplasty as compared to PFN[19-22] but the complications associated with replacement like dislocations, cement related complications; fat embolism mainly depends on skill and experience of operating surgeon. Hemiarthroplasty in senile comminuted intertrochanteric fracture is far more difficult compared to hemiarthroplasty in neck femur fracture which require longer learning curve and surgeons' expertise to identify and reconstruct anatomical landmark correctly[23]. In our study even after taking all the precautions 16% of patient had cement related complication like hypotension, bradycardia and immediate

intervention was required to resuscitate the patients. This complication can easily be avoided with PFN. In hemiarthroplasty broaching and reaming of medullary canal is necessary irrespective of cementation with leads to fat embolism in many patients as seen in 12% of our patients in hemiarthroplasty group. As unreamed PFNA was done in all of our cases, no incidence of fat embolism was noticed in PFNA group.

One unbiased advantage of hemiarthroplasty is early mobilisation which reduces the chances of medical complications like pulmonary complications, bed sores, DVT.²⁴ In our study we mobilised PFNA patients on post operative day 1 or 2 because of 1) added advantage associated with PFNA helical blade as described earlier 2) PFNA is minimal invasive surgery with minimal tissue handling, minimal blood loss which lead to less disturbance to normal physiology of body and early recovery to normal physiology 3) Operating surgeon took additional precaution to put helical blade centrally or inferiorly in AP view and centrally in lateral view. We documented less medical complications in PFNA group although insignificant ($P=0.37$).

R. Siwach et al[25] N. Ozkayn et al[26] showed better functional outcome of hemiarthroplasty group as compared to PFN group. Though our study showed hemiarthroplasty patients outscoring PFNA patients significantly in first 3 months Harris hip scores ($P<0.001$) but both groups showed similar Harris hip score at 6 month and 1 year ($P > 0.05$). As the fracture unites in PFNA group, pain reduces and activity level increases which usually takes 4-5 months. PFNA preserve the natural hip, patients have no restriction in activities especially in Indian population where squatting and sitting cross leg is required for daily living and for religious activities.

Conclusion

The present study concluded that the PFNA definitely provide advantage for senile

intertrochanteric fracture being less invasive, quick surgery, and less disruptive to normal physiology. It allows early weight bearing similar to hemiarthroplasty which has more risk of cementation, hypotension, wound related complications. PFNA being osteosynthesis procedure provide normal hip with no restriction of activities and similar functional outcome at the end of 1 year.

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