International Journal of Research in Orthopaedics
Verma AK et al. Int J Res Orthop. 2022 Sep;8(5):565-570
http://www.ijoro.org

DOI: https://dx.doi.org/10.18203/issn.2455-4510.IntJResOrthop20222187

Original Research Article

General health and functional improvement among patients with unstable extracapsular proximal femoral fractures managed with proximal femoral nail by using SF-36 score

Amit Kumar Verma, Priyanka Dhiman, Vipin Sharma*

Department of Orthopedics, Department of Anatomy, Dr. Rajendra Prasad Government Medical College Kangra at Tanda, Himachal Pradesh, India

Received: 31 May 2022
Revised: 21 June 2022
Accepted: 22 June 2022

***Correspondence:**
Dr. Vipin Sharma,
E-mail: vipinsh_hp@rediffmail.com

ABSTRACT

Background: Proximal femoral nail is emerging as the treatment of choice for unstable extra capsular proximal femoral fractures. This study comprises of functional evaluation of the treated patients by using SF 36 score.
Methods: This was a prospective hospital-based study done on 54 patients with unstable proximal femoral fractures classified according to the AO/ASIF classification system and were treated by using PFN in the department of Orthopaedics DRPGMC, Tanda. Functional outcome was assessed by using SF-36 score on, 14th postoperative day, at three months and six months.
Results: Our study has mean scores of short form-36 subscales as physical function 70.6, role limitation due to physical health 68.1, role limitation due to emotional health 90, energy/fatigue 66, emotional wellbeing 78, social functioning 67.7, pain 75 and general health 73.3.
Conclusions: The results of this study confirm that intramedullary nailing with the use of a PFN in unstable proximal femoral fractures is a safe method. A significant change was seen in quality of life postoperatively as evidenced by various scores used in present study. Weaknesses of this study include a short follow-up period and the inclusion of a small study group.

Keywords: Proximal femoral nail, Short form-36, AO/ASIF

INTRODUCTION

Proximal femoral fractures account for a large proportion of hospitalization among trauma cases.[1] An overwhelming majority of these patients (>90%) are aged more than 50 years.[2] The incidence of these fractures is 2 to 3 times more in females as compared to male population.[2] Extracapsular proximal femoral fractures involve intertrochanteric and subtrochanteric regions of the femur. Intertrochanteric fractures occur in the area between the greater and lesser trochanter and may involve these two structures. These accounts 45% of all hip fractures.[3] The reported mortality rate of these fractures ranges from 4.5% to 22% and geriatric care. Subtrochanteric fractures constitute 10-30% of all hip fractures.[4] These fractures may sometime occur as an extension of intertrochanteric fractures or occur in isolation in the subtrochanteric area; an area extending up to 5 cm distal to lesser trochanter.[5] These are found to occur in a relatively younger population secondary to high velocity trauma. These fractures are notorious for intra-operative difficulty in reduction and post-operative

complications like malunion and rarely nonunion. Thus, improvement in management of these groups of fractures is a matter of urgency and interest to the treating surgeon as this is directly linked to active mobilization of the patient, decreased hospital stay, decreased incidence of morbidity, mortality and reduction in overall expenditure incurred by the patient.

Various treatment modalities are available for management of these fractures. Conservative approach to these fractures is related to various complications like those related to union and prolonged recumbency like bed sores, hypostatic pneumonia, DVT etc. So operative treatment has been accepted as the gold standard for management of these group of fractures.[6,7] Due to the lack of a uniform classification system for these fractures, nomenclature of extracapsular proximal femoral fractures is often confusing. Also, availability of various treatment options for these fractures poses sufficient challenge to treating surgeon.[8] The most widely accepted classification system world-wide for both intertrochanteric and subtrochanteric fractures is that of AO (arbeitsgemeinschaft fur osteosynthesefragen)/ASIF (association of the study of internal fixation) group with good reproducibility.[9] Broadly speaking the implant devices so far used to treat this fracture pattern are either lateral plate or intramedullary devices. Intramedullary devices have an advantage with shorter lever arm thereby providing more load sharing.

Moreover closed reduction of the fracture preserves the fracture hematoma, an essential element in fracture healing, and insertion by a limited exposure also preserves the biology of the fracture site, resulting in less blood loss and reduced rate of infection.[10,11] Gamma nail is the prototype of intramedullary nail devices, but serious complications such as fracture shaft of femur, failure of fixation, complications of distal locking, rotational instability, thigh pain and cut-out of lag screws have been reported in some studies, resulted in increased rate of reoperation.[11-17] To circumvent these complications AO/ASIF group (1997) has designed proximal femoral nail (PFN) with certain design modifications. The Proximal femoral nail has certain design advantages and has been found to be more useful in unstable fracture patterns due to the fact that it is a load sharing device[18-20]and has been shown to be more biomechanically stronger and can withstand higher static and several fold higher cyclical loading than dynamic hip screw, which leads to lesser complication rates. The PFN implant also acts as a buttress in preventing the medialisation of the shaft. The entry portal of the PFN through the trochanter limits the surgical insult to the tendinous hip abductor musculature, unlike those nails which require entry through the pyriformis fossa.[21] It is reported that the use of PFN in the treatment of pertrochanteric fractures may have positive effect on the speed at which walking is restored. Fracture union in optimum time and adequate rehabilitation of a patient following a surgical procedure is the goal a clinician aims for. Various studies have discussed and reported the parameters like time during the operation, blood loss, time to fracture union and active ambulation but limited literature is available assessing the improvement of health from patient perspective. Fulfillment of social role following loss of structural and functional ability due to injury depends not only on surgical procedure but also depends on functional improvement following the surgical intervention. Various methods for assessment for rating the patient health and functional improvement are available but not being frequently reported following the surgical procedure done for fracture fixation. Present study aims to evaluate the improvement in general health assessment of patient post-surgery using SF (short form)-36.

METHODS

Study design

Current study was a prospective, hospital-based study.

Inclusion criteria

All skeletally mature patients with unstable extracapsular proximal femoral fractures presenting to the department of orthopaedics Dr. RPGMCH Tanda, were included after clinco-radiological assessment, if they fulfill the following criteria: closed unstable extracapsular proximal femoral fractures as per AO/ASIF fracture classification system (31A2.2 to 31A3.3) and patients giving written informed consent to participate in the study.

Exclusion criteria

Exclusion criteria for current study were; fracture neck femur and stable extracapsular proximal femoral fractures, ipsilateral hip and shaft fractures, pathological fractures secondary to neoplastic pathology, unresolved medical co-morbidities that preclude surgical treatment, deformed proximal femur making nail insertion impossible, patient with open physis (skeletally immature), narrow intramedullary canal making implant insertion difficult, open fractures and poly trauma patient.

Data collection

The study was carried out in the department of orthopaedics Dr. PGMCH, Tanda. It was a hospital based prospective study over a period of one year from 1st January 2013 to 31 December 2013. Patients fulfilling the inclusion criteria included for the study. The study population comprised of all skeletally mature patients coming with unstable extracapsular proximal femoral fractures. All the patients were carefully evaluated preoperatively which includes detailed history to determine the cause of fracture and other associated diseases. The radiographs of pelvis with both hips and anteroposterior and lateral views of the affected hip with femur were taken. All necessary investigations required

for anesthesia fitness carried out. The fracture was were duly explained regarding various treatment options available and implant cost and once agreed written and informed consent was taken for surgery. Various peroperative and postoperative parameters were noted. classified using AO/ASIF classification system. Patients Proximal femoral nail diameter was determined by measuring diameter of the femur at the level of isthmus on an anteroposterior X-ray, neck shaft angle was measured in unaffected side in anteroposterior X-ray using goniometer.

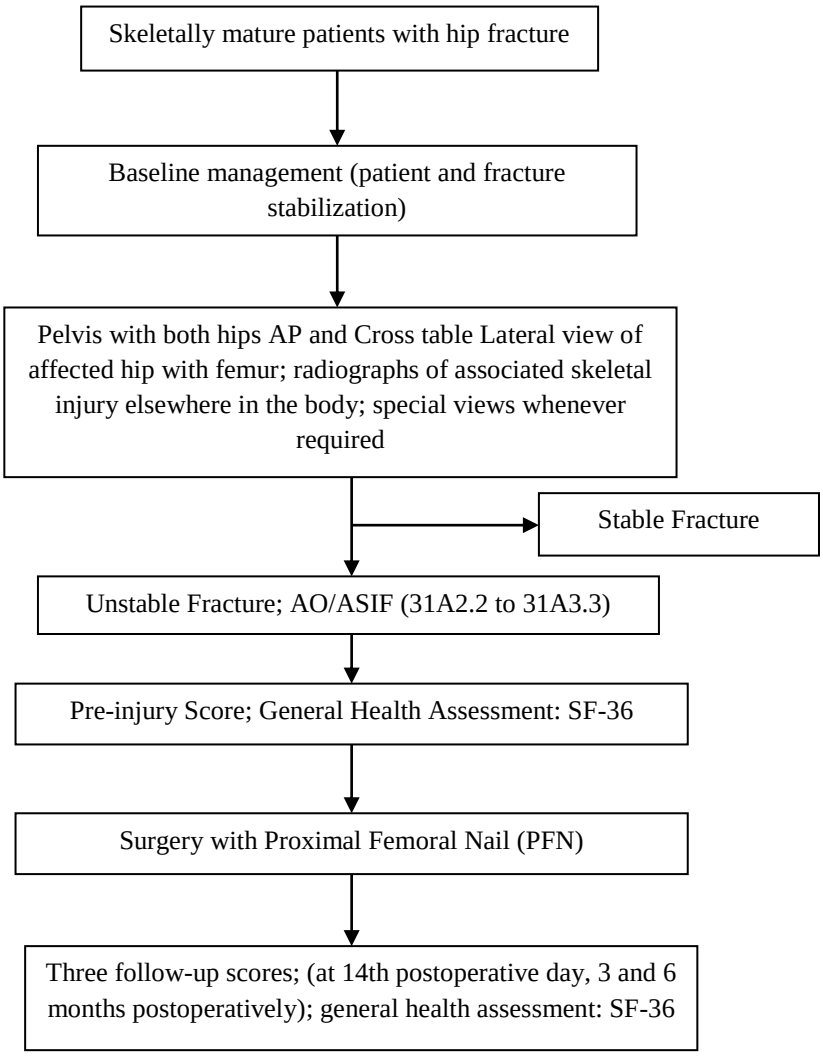

Figure 1: Study procedure.

Standard operative technique for proximal femoral nail (PFN) implant

After suitable anaesthesia patient was taken on standard translucent fracture table. Preoperative antibiotic (preferably 3rd generation cephalosporin) was administered 30 minutes prior to the skin incision. Upper part of the body was abducted by about 10-15º to the contralateral side (or affected leg will be adducted by 10-15º) to allow unimpeded access to proximal femur. Closed reduction was attempted on fracture table and checked under C arm. Reduction was considered to be adequate if the femoral neck angle is <10 degree of varus or <15 degree of valgus when compared with the uninjured, contralateral hip and the displacement was <5 mm on both anteroposterior (AP) and lateral post-operative radiographs. If achieving close reduction was not feasible then open reduction was done after incision. The nail was inserted as per the standard insertion technique. Postoperatively patients were encouraged to do ankle and calf exercises on day one of surgery and toe touch weight bearing with walker/crutches on first postoperative day. Postoperative radiological evaluation was done on first postoperative day to see reduction and alignment of the fracture, position and placement of the implant by using anteroposterior and lateral radiographs of hip and femur of the affected side. The surgical wounds were inspected on the 2nd and 5th postoperative day and stitches got removed on 14th postoperative day. Patients were followed up 14th day then at 3 months and 6 months. On each visit patients were assessed functionally by SF36.

Statistical analysis

The collected data was entered in Microsoft excel spread sheet and analyzed using suitable statistical software.

RESULTS

Fifty-four patients with extracapsular proximal femoral fractures gave informed consent for study enrollment. Various pre-operative and post-operative parameters were noted as per SF 36 scoring system. At six month follow up, our study has mean scores of short form-36 subscales as physical function 70.6, role limitation due to physical health 68.1, role limitation due to emotional health 90, energy/fatigue 66, emotional wellbeing 78, social functioning 67.7, pain 75 and general health 73.3. The scores obtained were compared with their pre-injury SF 36 scores as shown in (Table 1).

Table 1: SF-36 scoring before injury and at 6 month follow up.

Variables	Pre-injury	6 months	P value
Physical function	83.1	70.6	0.001
Role limitation due to physical health	100	68.1	0.001
Role limitation due to emotional health	100	90	0.009
Energy/fatigue	80.7	66	0.001
Emotional well being	76.2	78	0.186
Social functioning	84.6	67.7	0.001
Pain	100	75	0.001

This study has shown a significant difference in physical function, role limitation due to physical health, energy, social functioning and pain at pre injury and at 6 months.

The present study compares with the observations of study of Mendonac et al and Mattsson et al. Physical function and physical health shows more improvement in the present study than others.

Emotional wellbeing in the participants of our study is little higher than the observations done by Mendonca et al and Mattsson et al.

Table 2: Comparison with other studies at 6 month follow up (SF36 scoring).

Variables	Present study	Mendonca et al	Mattsson et al
Physical function	70.6	17.5	28
Role limitation due to physical health	68.1	0	22.8
Role limitation due to emotional health	90	100	52.3
Energy/fatigue	66	60	51.3
Emotional well being	78	66	67
Social functioning	67.7	75	64.2
Pain	75	52	-
General health	73.3	74.5	66.3

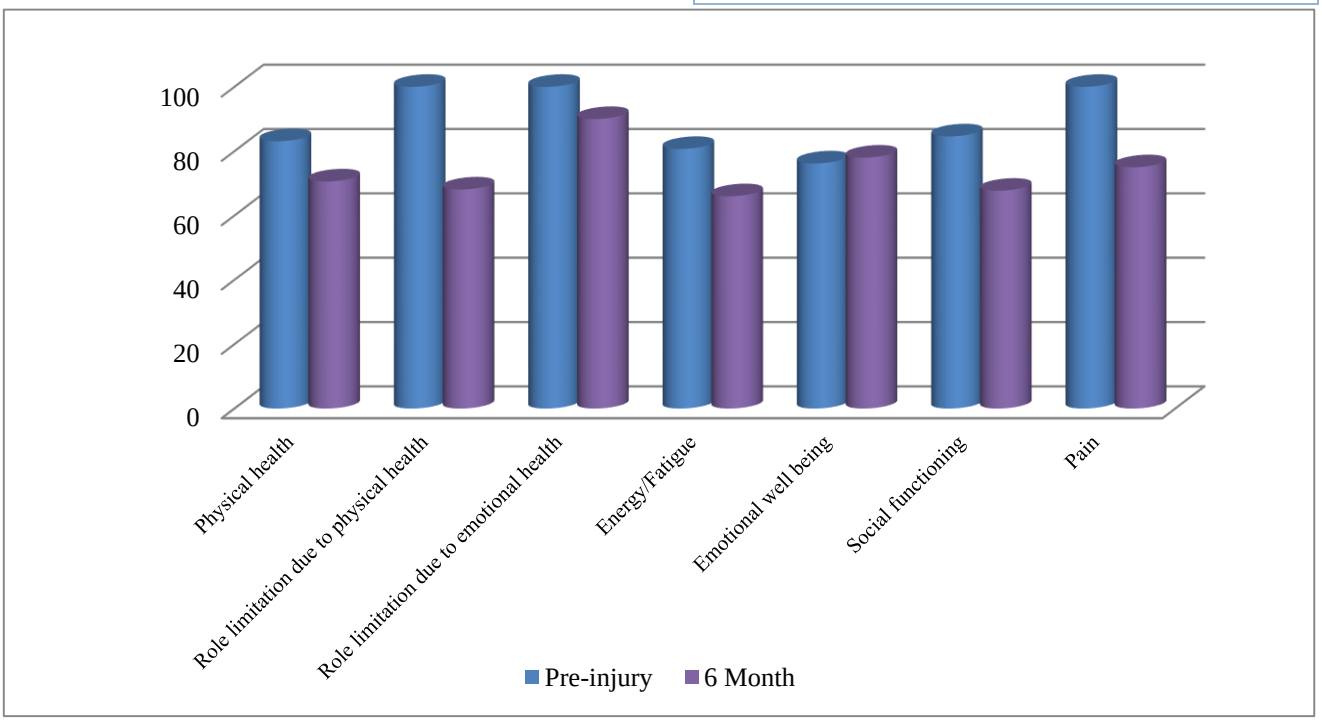

Figure 2: SF-36 scoring before injury and at 6 month follow up.

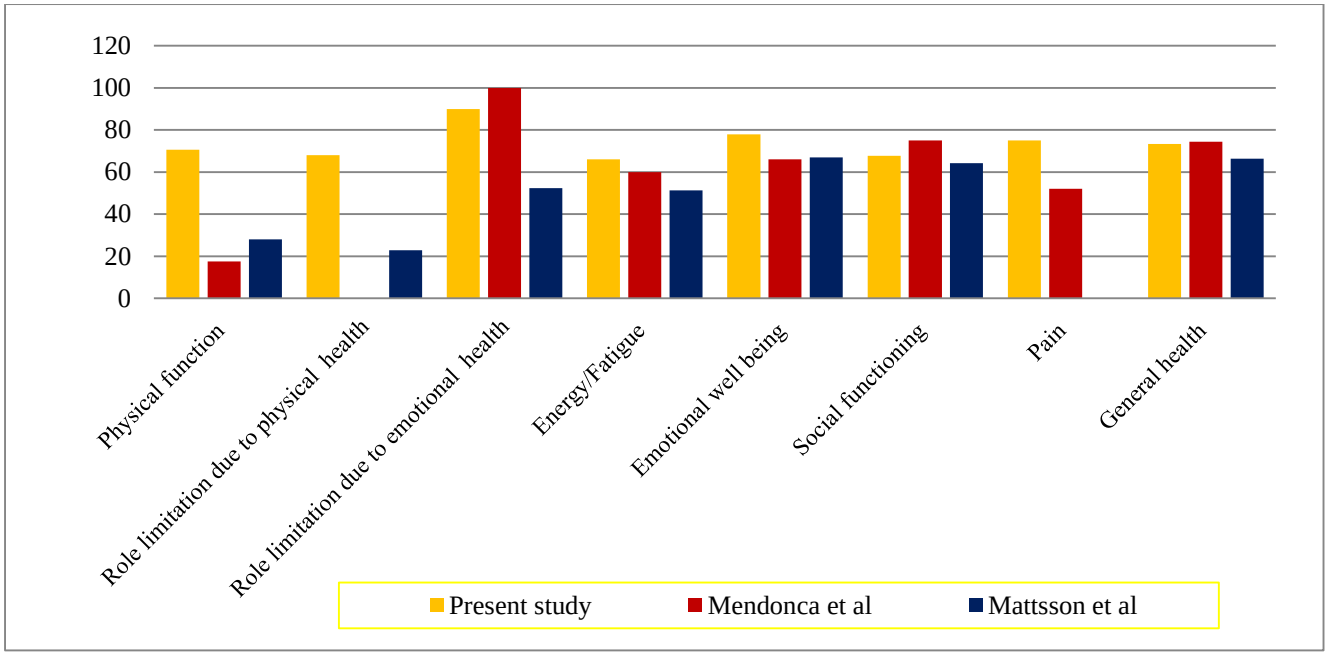

Figure 3: Comparison with other studies at 6 months follow-up (SF36).

DISCUSSION

Fractures of the long bones are a major social and economic problem. Of the long bones extracapsular fractures of the proximal femur have peculiar anatomic and mechanical characteristics which poses problems in their management. Intramedullary devices have a mechanical advantage that effectively addresses these factors.

The benefit of minimal surgical exposure, more efficient load transfer through calcar femorale and decreased tensile strain on the implant because of its shorter lever arm makes proximal femoral nail a good choice of implant for extracapsular proximal femoral fractures. Various studies have considered proximal femoral nail as an acceptable minimally invasive implant for extracapsular proximal femoral fractures. In the present study patients of extracapsular hip fractures were treated by proximal femoral nail and evaluated functionally.

Short Form-36: Our study has mean scores of short form-36 subscales as physical function 70.6, role limitation due to physical health 68.1, role limitation due to emotional health 90, energy/fatigue 66, emotional wellbeing 78, social functioning 67.7, pain 75 and general health 73.3. Our scores are better than scores obtained by Mendonca et al and Mattsson et al in physical function, role limitation due to physical health, energy/fatigue, emotional wellbeing and pain subscales. Scores of social functioning, general health and role limitation due to emotional health are comparable to the scores obtained by Mendonca et al.[22,23] Weaknesses of this study include a short follow-up period and the inclusion of a small study group.

CONCLUSION

Our findings suggest that treatment of unstable extracapsular proximal femoral fractures using proximal femoral nail is the most favourable treatment option in unstable fracture patterns which is shown by better functional health and well-being scores.

ACKNOWLEDGEMENTS

Authors would like to express their sincere gratitude to everyone that has contributed to the accomplishment of this work, especially to Professor Bhanu Awasthi, Dr. S. M. Mehta and Dr. Dinesh Kumar.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the institutional ethics committee

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Cite this article as: Verma AK, Dhiman P, Sharma V. General health and functional improvement among patients with unstable extracapsular proximal femoral fractures managed with proximal femoral nail by using sf 36 score. Int J Res Orthop 2022;8:565-70.