Outcome of pertrochantric fracture of the femur treated with proximal femoral locking compression plate

PK Chalise, AK Mishra, SB Shah, V Adhikari and RP Singh

Department of Orthopaedics, Nepal Medical College Teaching Hospital, Jorpati, Kathmandu, Nepal

Corresponding author: Dr. Pralhad Kumar Chalise, MS, Department of Orthopaedics, Nepal Medical College Teaching Hospital, Jorpati, Kathmandu, Nepal; e-mail: chalise.pra01@gmail.com

ABSTRACT

Pertrochantric femoral fractures are one of the most common fracture in old patients with variety of complications. However fixing Pertrochantric femoral fractures properly is clinically challenging. We report the outcome of pertrochantric femoral fractures treated with Proximal Femoral Locking Compression Plate (PFLCP) using Minimal Invasive Percutaneous Plate Osteosynthesis (MIPPO) techniques which were evaluated clinically by Harris hip score and radiologically for a union at fracture site and implant related complication. The study included total of 33 patients (20 males and 13 females) with Pertrochantric femoral fractures. The mean ages of the patients were 57 years (23-88 years). Pertrochantric femoral fractures included both Intertrochantric and Subtrochantric femoral fractures. Patients were followed up at 2 weeks, 6weeks, 3months, 6months and 1 year after the operation. Among the 33 patients, the union rate was 95% (31 patients). However there were 1 case of implant breakage and 1 case of non union. According to Harris Hip score the excellent and good results were 87.87% with no mortality during 1 year follow up period. The PFLCP can be feasible alternative to the treatment of Pertrochantric femoral fractures by providing biological healing and mechanical stability with limited occurrence of complications.

Keywords: Minimal invasive percutaneous plate osteosynthesis (MIPPO), Proximal femoral locking compression plate (PFLCP).

INTRODUCTION

Pertrochantric femoral fractures are one of the most common fractures in older population due to low energy trauma along with osteoporosis[1] and in younger patients with high energy trauma.[2] However fixing Pertrochantric femoral fractures are challenging injury that are prone to a variety of complications such as mortality, rotational instability, the presence of varied fracture patterns and complex deforming forces and the frequent association of these factors with communition and osteoporotic bone requires dedicated implants for optimal fracture fixation. The aim of the surgery is to achieve initial stability and early mobilization of the patient to avoid complications such as pulmonary embolism, urinary tract and lung infection, ulcer and thrombophlebitis.[3,4] It can be treated successfully with conventional implants, such as sliding hip screws, cephalomedullary nails and angular blade plates and rarely by a primary hip arthroplasty with good clinical outcomes.[5-9] Proximal Femoral Locking Compression Plate (PFLCP) provides three dimensional fixation and angular stable fixation compared with conventional treatment, even in the case of unstable fracture in osteoporotic bone.[10] The open reduction and rigid fixation requires large incision with deperiostation. The potential complication such as infection, consolidation delay and construct damage due to non union undergo frequently.[11] Minimal Invasive Percutaneous Plate Osteosynthesis (MIPPO) technique is important to preserve bone vascularization to improve consolidation and to decrease infection rate.[12] Here we report the outcome of PFLCP for the treatment of Pertrochantric femoral fractures using MIPPO technique.

MATERIALS AND METHODS

The study included total of 33 patients admitted in Nepal Medical College Teaching Hospital from September 2009 to November 2011 with Pertrochantric femoral fractures who were treated with PFLCP using MIPPO technique. The 20 males and 13 females had a mean age of 57 years (23-88 years). Seventeen patients had right sided fractures and 16 patients had left sided fractures. Pertrochantric femoral fractures includes both Intertrochantric and Subtrochantric fracture (Table-1).

Table1: Distribution and location of fracture

Fracture	Intertrochantric	Subtrochantric
Male	12	8
Female	7	6

Intertrochantric fracture were classified accordoing to kyle's , In which Type I was none, Type II, III and IV was 4,7 and 8 respectively (Table-2).

Table-2:. Distribution on the basis of classification of fracture

Kyle's Classification	Intertrochnatric Fracture
Type I	None
Type II	4
Type III	7
Type IV	8

Whereas subtrochantric fracture were classified according to Seinsheimer's, In which Type I, IIa, IIb was none and Type IIc, IIIa, IIIb, IV and V was 1, 3, 6, 3 and 1 respectively (Table-3).

Table-3: Distribution on the basis of classification of fracture

Seinsheimer's Classification	Subtrochantric Fracture
I	None
IIa	None
IIb	None
IIC	1
IIIa	3
IIIb	6
IV	3
V	1

Patients were followed up at 2weeks, 6weeks, 3months, 6months and 1 year after the operation and evaluated clinically by Harris hip Score and radiologically for a union at fracture site and implant related complication

RESULTS

Among the 33 patients, 95% (n=31) (Fig. 1.) healed satisfactorily and had no complication, except 3 patients who developed superficial wound infection, treated with oral antibiotic therapy. However there was 1 case of implant breakage and 1 case of non union (Both the cases were treated with Hemiarthroplasty later on). There were no intraoperative complication and mortality rates. According to Harris Hip score; the functional recoveries of hip were as follows. Excellent (90 point) in 12 cases; Good (80 – 90 point) in 17cases; Fair (70-79 point) in 4cases (Fig. 2). The excellent and good rate was 87.87%.

DISCUSSION

The goal of treatment for is to achieve the stability and early mobilization. The successful restoration of stability and early mobilization reduce the morbidity and mortality rates associated with prolonged immbolization.[13] The controversy still exists regarding the method of Pertrochantric femoral fractures fixation. The De lee *et al* abolished in modern trauma care has left conservative treatment due to high incidence of delayed union, malunion and nonunion of fractures and increased incidence of mortality and morbidity.[14] Over the past decades, Pertrochantric femoral fractures were predominantly treated by implants such as the Dynamic hip screw, Intramedullary devises like Gamma nail, proximal femoral nail and proximal femoral nail antirotation. Still there is controversy regarding the best treatment for the Pertrochantric femoral fractures. Although the Dynamic Hip Screw (DHS) is one of the standard treatments, high failure rate is reported in unstable fracture.[15-17] Saarenpa *et al* reported that the reoperation rate is 8.2%.[15] Intramedullary devises, such as the gamma nail (GN), Proximal Femoral Nail (PFN) have same theoretical advantage over the DHS, because they do not depend on the screw fixation of a plate to the lateral cortex, which can be worry part in osteoporotic bone along a more medial axis. However gamma nail

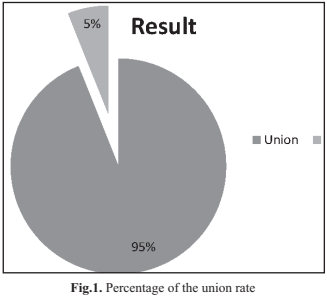


Fig.1. Percentage of the union rate

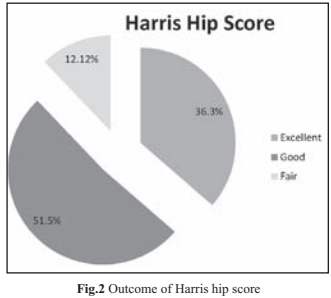


Fig.2 Outcome of Harris hip score

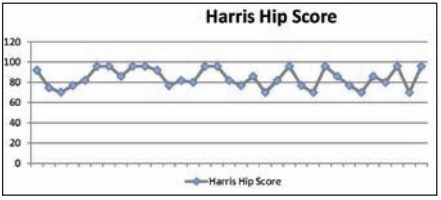


Fig.3. Graphical representation of Harris hip score

(GN) has a failure rate ranging from 12.7% to 15% in various studies.[15,18] As for Proximal Femoral Nail (PFN) Fogagnolo *et al* found that the intraoperative technical or mechanical complication rate is as high as 23.4%.[16]

Wanq –Y *et al* compare the clinical outcomes of Dynamic Hip Screw (DHS), Intramedullary fixation (IF) and Proximal Femoral Locking Compression Plate (PFLCP) in the elderly patients and concluded that Proximal femoral Locking Compression Plate (PFLCP) is the credible method in the elderly patients, especially for severe comminuted fracture and osteoporotic bone.[19]

Guo Chun *et al* reported that treatment with PFLCP can provide good to excellent healing for pertrochantric femoral fracture, with a limited occurrence of complication.[10]

We found that the treatment of Pertrochantric femoral fractures with PFLCP have a union rate of 95%. Breakage of the implant was 3% and reoperation rate was 6% (including 1 case of non union and 1case of implant breakage). There was no case that showed a cut out of the femoral head screw which is the most frequently reported complication leading to implant failure in tradional implant possibly the reason is that PFLCP has Mechanical advantage of three dimensional and angular stable fixation even in unstable fractures and fractures associated with osteoporotic bone.[10]

PFLCP using MIPPO technique has high rate of fracture healing with the advantage of biological fixation, simple and reliable fixation methods, strong anti-rotation, less surgical trauma, without stripping the periosteum and limited occurrence of complication in treatment of Pertrochantric femoral fractures. So it can be a feasible alternative to the treatment of pertrochantric femoral fractures.

Further studies with large number of patients and long term follow up is needed to determine the optimal implant for the internal fixation of Pertrochantric femoral fractures.

REFERENCES

1. Robinson CM, Court-Brown CM, McQueen MM, Christie J. Hip fractures in adults younger than 50 years of age. Epidemiology and results. *Clin Orthop Relat Res* 1995; 312: 238-46.
2. Huuskonen J, Kröger H, Arnala I, Alhava E. Characteristics of male hip fracture patients. *Ann Chir Gynaecol* 1999; 88: 48-53.
3. Haidukewych GJ, Berry DJ. Hip arthroplasty for salvage of failed treatment of intertrochanteric hip fractures. *J Bone Joint Surg Amer* 2003; 85-A: 899-904.
4. Horowitz D. Tecniche per cutanee per la sintesi della sintesi sella frattura pertrocanterica del femore. *Tecniche di Chirurgia Ortopedica* 2002; 2: 14-23.
5. de Vries JS, Kloen P, Borens O, Marti RK, Helfet DL. Treatment of subtrochanteric nonunions. *Injury* 2006; 37: 203-11.
6. Ekström W, Karlsson-Thur C, Larsson S, Ragnarsson B, Alberts KA. Functional outcome in treatment of unstable trochanteric and subtrochanteric fractures with the proximal femoral nail and the Medoff sliding plate. *J Orthop Trauma* 2007; 21: 18-25.

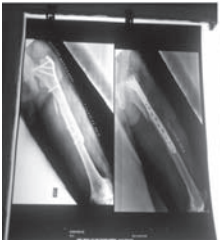
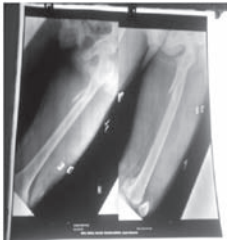


Fig. 4 a. Preoperative X ray

4 b. Immediate Post up X ray



4c. Fracture

7. Oh CW, Kim JJ, Byun YS *et al*. Minimally invasive plate osteosynthesis of subtrochanteric femur fractures with a locking plate: a prospective series of 20 fractures. *Arch Orthop Trauma Surg* 2009; 129: 1659-65.
8. Parker, MJ, Handoll HH. Gamma and other cephalocondylic intramedullary nails versus extramedullary implants for extracapsular hip fractures in adults. Cochrane Database Syst Rev. 2010 Sep 8;(9):CD000093. doi: 10.1002/14651858. CD000093.
9. Robinson CM, Houshian S, Khan LAK. Trochanteric-entry long cephalomedullary nailing of subtrochanteric fractures caused by low-energy trauma. *J Bone Joint Surg Amer* 2005; 87: 2217-26.
10. Guo-Chun Zha. Treatment of pertrochnatric fractures with proximal femur locking compression plate. *Injury* 2011; 42: 1294-9.
11. Bucholz RW, Brumback RJ. Fractures of the Shaft of the Femur, In: Rockwood and Green's Fractures in Adults CA, Rockwood Jr DP, Green RW, Bucholz JD. Heckman (Ed.), 1996: 1827-1910, Lippincott-Raven Publishers, ISBN 978-0397515097, Philadelphia, New York.
12. Paul DS. Minimally Invasive Plate Osteosynthesis (MIPO) in Long Bone Fractures – Biomechanics – Design – Clinical Results, Biomechanics in Applications, Dr Vaclav Klika (Ed.), ISBN: 2011; 978-953-307-969-1, InTech, Available from: http://www.intechopen. com/books/biomechanics-in-applications/minimally-invasive-plate-osteosynthesis-mipoin-long-bone-fractures-biomechanics-design-clinical-res.
13. Simpson AHRW, Varty K, Dodd CAF. Sliding hip screws: modes of failure. *Injury* 1989; 20: 227-31.
14. DeLee JC, Clanton TO, Rockwood CA Jr. Closed treatment of Subtrochanteric fracture of the femur in a modified cast-brace. *J Bone Joint Surg Amer* 1981; 63: 773-9.
15. Saarenpaa I, Heikkinen T, Ristiniemi J. Functional comparison of the dynamic hip screw and the gamma locking nail in trochanteric hip fractures: a matchedpair study of 268 patients. *Int'l Orthop* 2009; 33: 255-60.
16. Fogagnolo F, Kfuri Jr M, Paccola C. Intramedullary fixation of pertrochanteric hip fractures with the short AO-ASIF proximal femoral nail. *Arch Orthop Trauma Surg* 2004; 124: 31.
17. Pajarinen J, Lindahl J, Michelsson O *et al*. Pertrochanteric femoral fractures treated with a dynamic hip screw or a proximal femoral nail. A randomised study comparing post-operative rehabilitation. *J Bone Joint Surg Brit* 2005; 87: 76-81.
18. Sehat K, Baker RP, Pattison G *et al*. The use of the long gamma nail in proximal femoral fractures. *Injury* 2005; 36: 1350-4.
19. Wang Y, Yang YY, Yu ZH, Li CQ, Wu YS, Zheng XX. Comparative study of intertrochanteric fractures treated with proximal femur locking compress plate in aged. *Zhongguo Gu Shang* 2011; 24: 370-3.