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ORIGINAL ARTICLE

Outcome of Distal Femoral Fracture Treated with Locking Plate

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ABSTRACT

Objective: The aim of this study is to determine the outcome of distal femoral fracture treated with locking plate.
Study Design: Prospective study
Place and Duration: Conducted at Orthopaedic Unit Ayub Medical Teaching Institute, Abbottabad for one year duration from 1st January 2020 to 31st December 2020.
Methods: Total 90 patients of both genders were presented in this study.Patients were aged between 18-80 years of age. Patients' detailed demographics including age, sex and body mass index were recorded after taking informed written consent. All the patients had distal femoral fracture treated with locking plate. Radiological assessment was done. Mean union time and complications associated to procedure were examined.Functional outcomes were analyzed according to the Flyn's criteria. Follow-up was taken at 6 months postoperatively. Complete data was analyzed by SPSS 24.0 version.
Results: There were 58 (64.4%) patients were males and 32 (35.6%) were females. Mean age of the patients were 42.61±12.88 years with mean BMI 27.65±9.56 kg/m^2. According AO/OTA classification 55 (61.1%) had A1, A2 fracture was among 18 (20%) cases and the rest were 17 (18.9%) had A3. 62 (68.9%) fractures were caused due road traffic accidents, falling from height were among 17 (18.9%) cases and 11 (12.2%) cases were due to sports. Right side fracture was the most common side of fracture among 54 (60%). Mean union time among patients was 5.16±1.27 months.According to Flyn's criteria, 38 (42.2%) cases had excellent results, 32 (35.6%) patients had good, fair results were among 16 (17.8%) cases and poor results were among 4 (4.4%) cases. Complications were delayed union, stiffness, varus deformityand non union observed among all cases.
Conclusion: We concluded in this study that the locking plate for the treatment of distal femoral fractures was effective in terms of good results with fewer complications.
Keywords: Distal femoral fracture, Locking plate, RTA, Complications

INTRODUCTION

According to reports, distal femoral fractures account for less than 1% of all fractures and account for 4%–6% of femoral fractures. [1-3]Both youthful patients involved in high-energy accidents (such as motor vehicle and motorcycle accidents and sports trauma) and older, osteoporotic patients who suffer low-energy fall fractures are at risk for supracondylar femoral fractures. An increase in distal femur periprosthetic fractures in individuals who had had a total knee or hip arthroplasty in the past was also noted by Jahangir [4].

Treatment of supracondylar femoral fractures is usually surgical, unless in exceptional cases [4]. Based on fixed angle devices such as the blade plate, dynamic condylar screw (DCS) [6, 7], and nail (resulting in locked plating), surgical fixation consistently outperforms nonsurgical therapy [5]. As a result of the present trend, submuscularly placed periarticular distal femoral locking plates [8, 9] are being used to preserve blood supply, reduce fracture hematoma, and minimize soft tissue damage [10–13].

Maintenance or restoration of distal femoral alignment is required for definitive treatment of distal femoral fractures in order to maintain the function of the extremity. A distal femoral fracture must also be treated with early knee mobility. When the knee is immobilized, it can become rigid and lose its range of motion (ROM) [15], which can lead to a negative outcome [10]. The treatment of intraarticular supracondylar fractures is very challenging. For conservative treatment or internal fixation procedures [5, 6], nonunion rates ranged from 0 percent to 20 percent. This finding was unrelated to the type of treatment that was used. The incidence of healing problems, infections, and nonunions is further increased in diabetic and obese patients [7]. The implant's substance has been questioned . It has been found that stainless steel plate implants have a considerably higher nonunion rate than titanium plate implants.

For best results, it is crucial to understand the characteristics of distal femoral fractures, as well as the concepts and obstacles of care [14]. So the goal of this study was to examine the clinical results and consequences of locked plating for distal femoral fractures.

MATERIAL AND METHODS

This prospective study was conducted atOrthopaedic Unit Ayub Medical Teaching Institute, Abbottabad for one year duration from 1st January 2020 to 31st December 2020 and comprised of 90 patients. Patient's detailed demographics were recorded after taking informed written consent. Patients with pathological fractures, metabolic bone disease and those did not give written consent were excluded from this study.

Patients were aged between 18-80 years of age. Patients details demographics age, sex and body mass index were recorded after taking informed written consent. All the patients had distal femoral fracture treated with locking plate. Radiological assessment was done. Mean union time and complications associated to procedure were examined.Functional outcomes were analyzed according to the Flyn's criteria. Follow-up was taken at 6 months postoperatively. Complete data was analyzed by SPSS 24.0 version. Categorical variables were assessed by frequencies and percentages.

RESULTS

There were 58 (64.4%) patients were males and 32 (35.6%) were females. Mean age of the patients were 42.61±12.88 years with mean BMI 27.65±9.56 kg/m^2. According AO/OTA classification 55 (61.1%) had A1, A2 fracture was among 18 (20%) cases and the rest were 17 (18.9%) had A3. 62 (68.9%) fractures were caused due road traffic accidents, falling from height were among 17 (18.9%) cases and 11 (12.2%) cases were due to sports. Right side fracture was the most common side of fracture among 54 (60%).(table 1)

Table 1:

Variables	Frequency	%age
Mean age	42.61±12.88	
Mean BMI	27.65±9.56	
Gener		
Male	58	64.4
Female	32	35.6
Types of Fracture (AO/OTA)		
A1	55	61.1
A2	18	20
A3	7	18.9
Side of Fracture		
Left	54	60
Right	36	40
Cause of fracture		
RTA	62	68.9
Fall from height	17	18.9
Sports	11	12.2

Mean union time among patients was 5.16±1.27 months. According to Flyn's criteria, 38 (42.2%) cases had excellent results, 32 (35.6%) patients had good, fair results were among 16 (17.8%) cases and poor results were among 4 (4.4%) cases. (Table 2)

Table 2: Post-operatively functional outcomes among all cases

Variables	Frequency	%age
Mean union time (months)	5.16±1.27	
According to Flyn's Criteria		
Excellent	38	42.2
Good	32	35.6
Fair	16	17.8
Poor	4	4.4

Table 3: Post-operatively complications among cases

Variables	Frequency	%age
Complications		
Delayed union	7	7.8
Stiffness	5	5.6
Varus deformity	4	4.4
Non-union	4	4.4

Complications were delayed union, stiffness, varus deformityand non union observed among all cases. (Table 3)

Among all the 90 cases, 78 (86.7%) patients were satisfied and 12 (13.3%) cases were unsatisfied.(Table4)

Table 4: Post-operatively satisfaction among all cases

Variables	Frequency	% age
Satisfaction		
Yes	78	86.7
No	12	13.3

DISCUSSION

Fractures of the proximal femur remain difficult to treat, despite advances in fixing techniques and plate designs In comparison to angled blade plates or retrograde intramedullary nails, locked plates absorb higher energy before failure, according to certain writers [16]. In spite of the fact that there is no consensus on how to treat complex distal femoral fractures, numerous authors [17,18] have reported positive findings indicating that current locking plates can be used to correct diverse fracture patterns in this region. These include high-energy fractures with extensive bone comminution that may be further aggravated by open injury, fractures in older persons with low bone quality, and periprosthetic fractures, to name a few examples.

In this prospective study 90 patients were presented. Majority 64.4% were males with mean age 42.61±12.88 years. According AO/OTA classification 55 (61.1%) had A1, A2 fracture was among 18 (20%) cases and the rest were 17 (18.9%) had A3. 62 (68.9%) fractures were caused due road traffic accidents, falling from height were among 17 (18.9%) cases and 11 (12.2%) cases were due to sports. Right side fracture was the most common side of fracture among 54 (60%). These demographically details were comparable to the previous some studies.[19,20]Locked plating of distal femoral fractures had a lower nonunion rate than non-locking plating, according to earlier research [21,22], although more recent investigations have revealed nonunion rates as high as 20 percent.[23,24] In current study 4.4% fractures were non union,7.8% were delayed, varus deformity was 4.4%. Interfragmentary mobility and callus development are inhibited by stiffer locking plates [23,25].

In our study mean union time among patients was 5.16±1.27 months.According to Flyn's criteria, 38 (42.2%) cases had excellent results, 32 (35.6%) patients had good, fair results were among 16 (17.8%) cases and poor results were among 4 (4.4%) cases. These results were comparable to the previous researches in which locking plate was effective for distal femoral fractures.[26,27] Satisfaction rate among patients was 86.7% because fewer complications were found in our study.When bridging plates are needed to ensure relative stability, Gautier and his colleagues recommend using locking compression plates. According to researchers, minor fractures should be treated with plates 8–10 times longer than the fracture length, with 0–3 empty holes left in the surrounding space, a spacing of at least 2 millimeters, and with three screws (bicortically) placed into each bone fragment [28].

In a previous study conducted in Asia, failures were found when short locking plates were used. [29] Theoretically, using lengthy plates increases the working length of the plate and, as a result, the number of load cycles it can withstand before failing. [30] In contrast to this some recent studies reported that fractures of the distal femur that are open can be stabilized with lateral locking plates. Proactive identification and management of probable healing issues is recommended to enhance bone regeneration and bone repair.[19-26]

CONCLUSION

We concluded in this study that the locking plate for the treatment of distal femoral fractures was effective in terms of good results with fewer complications.

REFERENCE

1. Court-Brown CM, Caesar B: Epidemiology of adult fractures: a review. Injury. 2006, 37: 691-697. 10.1016/j.injury.2006.04.130.
2. Martinet O, Cordey J, Harder Y, Maier A, Buhler M, Barraud GE: The epidemiology of fractures of the distal femur. Injury. 2000, 31 (Suppl 3): C62-C63.
3. Wahnert D, Hoffmeier K, Frober R, Hofmann GO, Muckley T: Distal femur fractures of the elderly—different treatment options in a biomechanical comparison. Injury. 2011, 42: 655-659. 10.1016/j.injury.2010.09.009.
4. Jahangir AA, Cross WW, Schmidt AH: Current management of distal femoral fractures. Current Orthopaedic Practice. 2010, 21: 193-197. 10.1097/BCO.0b013e3181bd6174.
5. Kregor PJ, Stannard J, Zlowodzki M, Cole PA, Alonso J: Distal femoral fracture fixation utilizing the Less Invasive Stabilization System (L.I.S.S.): the technique and early results. Injury. 2001, 32 (Suppl 3): SC32-SC47.
6. Chan DB, Jeffcoat DM, Lorich DG, Helfet DL: Nonunions around the knee joint. IntOrthop. 2010, 34: 271-281. 10.1007/s00264-009-0924-9.
7. Ricci WM, Loftus T, Cox C, Borrelli J: Locked plates combined with minimally invasive insertion technique for the treatment of periprosthetic supracondylar femur fractures above a total knee arthroplasty. J Orthop Trauma. 2006, 20: 190-196. 10.1097/00005131-200603000-00005.
8. Gaines RJ, Sanders R, Sagi HC, Haidukewych GJ: In OTA. 2008, Denver, Paper no. 55, Titanium versus stainless steel locked plates for distal femur fractures: is there any difference?,Annual Meeting
9. Cain PR, Rubash HE, Wissinger HA, McClain EJ: Periprosthetic femoral fractures following total knee arthroplasty. ClinOrthopRelat Res. 1986, 208: 205-214.
10. Bolhofner BR, Carmen B, Clifford P: The results of open reduction and internal fixation of distal femur fractures using a biologic (indirect) reduction technique. J Orthop Trauma. 1996, 10: 372-377. 10.1097/00005131-199608000-00002.
11. Kristensen O, Nafei A, Kjaersgaard-Andersen P, Hvid I, Jensen J: Long-term results of total condylar knee arthroplasty in rheumatoid arthritis. J Bone Joint Surg Br. 1992, 74: 803-806.
12. Pritchett JW: Supracondylar fractures of the femur. ClinOrthopRelat Res. 1984, 184: 173-177.
13. Marsh JL, Slongo TF, Agel J, Broderick JS, Creevey W, DeCoster TA, Prokuski L, Sirkin MS, Ziran B, Henley B, Audige L: Fracture and dislocation classification compendium - 2007: Orthopaedic Trauma Association classification, database and outcomes committee. J Orthop Trauma. 2007, 21: S1-S133. 10.1097/00005131-200711101-00001.
14. Gwathmey FW, Jones-Quaidoo SM, Kahler D, Hurwitz S, Cui Q: Distal femoral fractures: current concepts. J Am AcadOrthop Surg. 2010, 18: 597-607.
15. Nasr AM, Mc Leod I, Sabboubeh A, Maffulli N: Conservative or surgical management of distal femoral fractures. A retrospective study with a minimum five year follow-up. ActaOrthop Belg. 2000, 66: 477-483.
16. Zlowodzki M, Cole PA, Williamson S. Biomechanical evaluation of the less invasive stabilization system, angled blade plate, and retrograde intramedullary nail for internal fixation of distal femur fractures. J Orthop Trauma. 2004;18:494–502
17. Cole PA, Zlowodzky M, Kregor PJ. Treatment of proximal tibia fractures using the less invasive stabilization system (LISS): surgical experience and early clinical results in 77 fractures. J Orthop Trauma. 2004;18:528–535.
18. Haidukewych G, Sems SA, Huebner D, Horwitz D, Levy B (2007) Results of polyaxial locked-plate fixation of periarticular fractures of the knee. J Bone J Surg 89:614–620
19. Jain, D., Arora, R., Garg, R. et al. Functional outcome of open distal femoral fractures managed with lateral locking plates. International Orthopaedics (SICOT) **44,** 725–733 (2020)
20. Poole WEC, Wilson DGG, Guthrie HC et al (2017) 'Modern' distal femoral locking plates allow safe, early weight-bearing with a high rate of union and low rate of failure. Bone Joint J 99:B:951–B:957
21. Kregor PJ, Stannard J, Zlowodzki M, Cole PA, Alonso J: Distal femoral fracture fixation utilizing the Less Invasive Stabilization System (L.I.S.S.): the technique and early results. Injury. 2001, 32 (Suppl 3): SC32-SC47.
22. Weight M, Collinge C: Early results of the less invasive stabilization system for mechanically unstable fractures of the distal femur (AO/OTA types A2, A3, C2, and C3). J Orthop Trauma. 2004, 18: 503-508.
23. Henderson CE, Kuhl LL, Fitzpatrick DC, Marsh JL: Locking plates for distal femur fractures: is there a problem with fracture healing?. J Orthop Trauma. 2011, 25 (Suppl 1): S8-S14.
24. Markmiller M, Konrad G, Sudkamp N: Femur-LISS and distal femoral nail for fixation of distal femoral fractures: are there differences in outcome and complications?.ClinOrthopRelat Res. 2004, 426: 252-257.
25. Lujan TJ, Henderson CE, Madey SM, Fitzpatrick DC, Marsh JL, Bottlang M: Locked plating of distal femur fractures leads to inconsistent and asymmetric callus formation. J Orthop Trauma. 2010, 24: 156-162. 10.1097/BOT.0b013e3181be6720.
26. Elsoe R, Ceccotti AA, Larsen P (2018) Population-based epidemiology and incidence of distal femur fractures. IntOrthop 42:191–196
27. Kanakaris NK, Obakponovwe O, Krkovic M et al (2018) Fixation of periprosthetic or osteoporotic distal femoral fractures with locking plates: a pilot randomised controlled trial. IntOrthop.
28. Gautier E, Sommer C. Guidelines for the clinical application of the LCP. Injury. 2003 Nov;34(Suppl 2):B63–76.
29. Wong MK, Leung F, Chow SP. Treatment of distal femoral fractures in the elderly using a less-invasive plating technique. Int Orthop.2005;29(2):117-120
30. Hoffmeier KL, Hofmann GO, Mu¨ckley T. Choosing a proper working length can improve the lifespan of locked plates. a biomechanical study.ClinBiomech(Bristol, Avon). 2011;26(4):405-409.