

A HOSPITAL BASED PROSPECTIVE STUDY TO ANALYZE THE FUNCTIONAL OUTCOME OF LOCKING COMPRESSION PLATE IN DISTAL RADIAL FRACTURES IN POSTMENOPAUSAL WOMEN AT NEWLY ESTABLISHED TERTIARY CARE CENTER

Vijay Kumar Meena¹, Gunvanti Meena², Vishnu Prasad Meena³, Sachin Joshi⁴, Arun Sharma⁵

Received : 09/02/2023
Received in revised form : 27/02/2023
Accepted : 15/03/2023

Keywords:
Distal Radius Fracture, Locking Compression Plate, Volar Henry Approach, Functional Outcome.

Corresponding Author:
Dr. Sachin Joshi,
Email: drjoshisachin@gmail.com

DOI: 10.47009/jamp.2023.5.2.326

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2023; 5 (2); 1556-1559



¹Associate Professor, ³Assistant Professor, ⁴Professor, Department of Orthopedic, Government Medical College, Dungarpur, Rajasthan, India.

²Assistant Professor, Department of Obstetrics & Gynaecology, Government Medical College, Dungarpur, Rajasthan, India.

⁵Associate Professor, Department of Orthopedic, SMS Medical College, Jaipur, Rajasthan, India.

Abstract

Background: Distal radius fractures constitute up to 15% of all extremity fractures. The use of locked volar plates for distal radius fractures is increasingly popular. But fixation in osteoporotic and comminuted fractures is difficult to obtain anatomical reduction and adequate purchase. The aim of this study to analyze the functional outcome of locking compression plate in distal radial fractures in postmenopausal women at newly established tertiary care center. **Materials & Methods:** A hospital based prospective study done on ten postmenopausal women with distal fractures in the department of orthopedic at government medical college, Dungarpur, Rajasthan, India during one year period. Patients admitted with distal radius fractures will be classified under AO and Gartland and Werley classification. Detailed informed consent was obtained from all the persons in the study group. Post operative data will include time to full wrist movements, post operative complications such as median nerve compression symptoms, malunion, failure of fixation, wound infections and complex regional pain syndrome (CRPS). Patients will be allowed to start wrist movements at an average of three weeks post operatively. After the discharge, patient will be followed at regular intervals 6weeks, 6 months and 1year. Subjective and objective functional results were graded using modified mayo scoring system. **Results:** Our study showed that mean age of patients was 58.34 years. The right side (dominant wrist) was more involved (60%) as compared to left side (40%). 30% of the patients had road traffic accident and 70% had a house hold fall. Out of 10 cases, 7 of the fracture were of extra articular type and 3 were intra articular fractures. 60% patients had associated injuries. The assessment of results was made using the modified mayo wrist score based on pain, activity, range of motion (supination & pronation) and hand grip strength. In our series, we had 50% excellent, 40% good, 10% fair and no poor results. **Conclusion:** We concluded that use of locked compression plates in distal radius fractures provide good to excellent results and are effective in the correction and maintenance of distal radius anatomy. Hence locking compression plate is a useful implant in stabilizing in osteoporotic distal radius fractures in postmenopausal women.

INTRODUCTION

Distal radius fractures are common and produce a major orthopaedic injury because of the advancing population age and increase in physical activity. Distal radius fractures constitute up to 15% of all extremity fractures. In females the incidence rises

sharply. In the age of 40 it is approximately 36.8/10,000. It is estimated at the age 70 years to be 115/10,000. Distal radius is the most common osteoporotic fracture in elderly females it has been linked to estrogen withdrawal. These injuries are sustained overwhelmingly from low energy falls in an increasingly osteoporotic population.

Locking compression plate (LCP) is a new generation plate and screw system for internal fixation of fractures.^[1,2] The LCP with combi holes have additional dynamic compression holes providing options for axial compression in addition to locking mechanism. The LCP can be used as a compression plate, a locked internal fixator, or a combination of both, depending on the situation.^[3,4] The use of locked volar plates for distal radius fractures is increasingly popular. Proposed advantages of locked volar plating include improved pull-out strength even in osteoporotic bone and a volar surgical approach that avoids the need for an extensive dorsal dissection. The plate is positioned in a well-padded area beneath pronator quadratus to avoid flexor tendon irritation and it is thought that patients tolerate volar wrist scars better than dorsal ones. Internal fixation has the advantage of allowing early mobilisation but its application is limited by the degree of comminution and osteoporosis. Loss of reduction and fixation is common due to poor purchase of screws on osteoporotic bone with the conventional plates, delay in postoperative mobilization results in stiffness of the joint which is an indicator of poor outcome. Screws used in distal radial fractures (3.5mm cortical screws) can also be used in addition to locking screws. Locking plates have advantages such as a decreased incidence of loss of reduction secondary to screw toggling and there is improved bone healing. A locking plate decreases the screw-plate toggle and motion at bone-screw interface and provides more rigid fixation. Rigid fixation is felt to be one key to the successful treatment of these fractures.^[5,6] But fixation in osteoporotic and comminuted fractures is difficult to obtain anatomical reduction and adequate purchase. So now with the evolution of locking compression plating for osteoporotic and peri-articular fractures especially for the comminuted intra-articular fractures restoring the anatomical congruity and providing stable fixation with resulting increased stability allowing for early mobilization.^[7-9] The aim of this study to analyze the functional outcome of locking compression plate in distal radial fractures in postmenopausal women at newly established tertiary care center.

MATERIALS AND METHODS

A hospital based prospective study done on ten postmenopausal women with distal fractures in the department of orthopedic at government medical college, Dungarpur, Rajasthan, India during one year period.

Inclusion criteria

1. Fracture distal radius in the Postmenopausal women.
2. All the women in the study group was independent to take care of their activities of daily living.

3. Fractures occurring at or within 2cms of distal radius.

Exclusion criteria

1. Women in menstrual age group
2. Un-displaced distal radial fractures
3. Patients not willing for internal fixation.

Methods

Patients admitted with distal radius fractures will be classified under AO and Gartland and Werley classification. Detailed informed consent was obtained from all the persons in the study group.

The procedure performed under supraclavicular block/axillary block. Our standard practice, preoperative prophylactic intravenous cefotaxime and bipolar diathermy for haemostasis.

Operative Procedure

By volar Henry approach: The radial styloid fragment was approached initially using an incision centered longitudinally over the flexor carpi-radialis tendon and then dissected between the flexor carpi radialis tendon and radial artery.

The parona's space underneath the flexor tendons developed and the distal and radial borders of pronator quadratus were lifted and retracted ulnarly. Image intensifier used in theatre to assist the evaluation of fracture reduction and fixation. Patients with unstable fractures, the wrist immobilized in a below elbow splint for 2 weeks.

Post-Operative Protocol

Post-operative data will include time to full wrist movements, post operative complications such as median nerve compression symptoms, malunion, failure of fixation, wound infections and complex regional pain syndrome (CRPS).

Patients will be allowed to start wrist movements at an average of three weeks post operatively. After the discharge, patient will be followed at regular intervals 6weeks, 6 months and 1year.

Subjective and objective functional results were graded using modified mayo scoring system.

RESULTS

Our study showed that mean age of patients was 58.34 years. The right side (dominant wrist) was more involved (60%) as compared to left side (40%). 30% of the patients had road traffic accident and 70% had a house hold fall. Out of 10 cases, 7 of the fracture were of extra articular type and 3 were intra articular fractures. 60% patients had associated injuries (table 1). Surgery was done between 1-5 days in 5 (50%) patients as an elective procedure. Surgery was delayed upto the 14th day in 5 (50%) because those patients had history of ischaemic heart disease, diabetes mellitus, associated head injury and surgery was done after clearance from respective specialities. The present study 8 (80%) patients had union within 2-3 months and 02 (20%) patients had union in 3-4 months. There was no case of delayed union. We encountered a complication rate of 20%, out of which 1 (10%) developed reduced range of movements and

another 1 (10%) developed complex regional pain syndrome (CRPS). The assessment of results was made using the modified mayo wrist score based on pain, activity, range of motion (supination &

pronation) and hand grip strength. In our series, we had 50% excellent, 40% good, 10% fair and no poor results [table 2].

Table 1: Distribution of patients according to fracture characteristics

Characteristics	No of cases (N=10)	Percentage
Side		
Right	6	60%
Left	4	40%
Mode of injury		
Road traffic accident	3	30%
House hold fall	7	70%
Based on AO classification		
A2	5	50%
A3	1	10%
B2	1	10%
B3	1	10%
C1	1	10%
C2	1	10%
Type of Fracture		
Extra-articular	7	70%
Intra-articular	3	30%
Associated injury		
Ipsilateral fracture both bone leg	2	20%
Head injury	1	10%
Ipsilateral distal ulna fractures	3	30%

Table 2: Distribution of patients according to clinical characteristics

Clinical Characteristics	No of cases (N=10)	Percentage
Duration of surgery waiting period		
1-5 days	5	50%
6-15 days	5	50%
Time of Union		
2-3 months	8	80%
3-4 months	2	20%
Functional outcome		
Excellent	5	50%
Good	4	40%
Fair	1	10%
Complications		
Complex Regional pain Syndrome (CRPS)	1	10%
Reduced ROM	1	10%

DISCUSSION

A combination of an improved understanding of distal radial anatomy, patient demands and the new fixation devices have changed the management of distal radial fractures. Locking plates are preferred in osteoporotic and in multiple complex fractures. During the recent years, volar approach has become more popular. In our study the right side (dominant wrist) was involved in 6 of the cases and left side involvement was 4. In Arora Rohit et al. (2007)^[10] right side involvement was 70 and left was 44, Ayhan Kilic et al. (2009)^[11] right side involvement 14 and left side was 13, R.E. Anakwe et al. (2010)^[12] right side involvement was 15 and left side was 6, Sanjay Agarwala et al (2012)^[13] right side involvement was 11 and left side was 14. 30% of the patients had road traffic accident and 70% had a house hold fall in our study, which was compatible with Arora Rohit et al. (2007)^[10], Ayhan Kilic et al. (2009)^[11], R.E. Anakwe et al. (2010)^[12] and Sanjay Agarwala et al (2012).^[13]

We encountered two complications (20%) in our study. One being developed reduced range of movements and another developed CRPS. Arora Rohit et al., (2007)^[10] reported a complication rate of 57%. Ayhan Kilic et al., (2009)^[11] reported a complication rate of 11.1%. Another study done by R.E. Anakwe et al., (2010)^[12] reported a complication rate of 4.8% and Sanjay Agarwala (2012)^[13] reported a complication rate of 4%.

In our series, we had 50% excellent, 40% good, 10%, fair and no poor results. Patients, who obtained excellent results, had normal regular activities or no pain. Range of motion was within the normal functional range. Radial length, volar tilt and articular step-off were within acceptable limits. They underwent earlier physiotherapy. Patients with good results had minimal residual deformities, pain and slight limitation.

Patients with fair results, along with residual deformity, pain and limitation also had pain in the distal radio-ulnar joint and minimal complications. Few of their movements were less than that required for normal function.

Rohit Arora et al., (2007)^[10] had 31 excellent, 54 good, 23 fair and 6 poor results based on functional outcome.

R.E. Anakwe et al., (2010)^[12] system outcome was assessed using clinical examination grip strength measures, radiographs and PRWE (patient related wrist evaluation) scoring. In his series 95% patient very high level of satisfaction, good functional outcome and increased grip strength.

Sanjay Agarwala (2012)^[13] used mayo modified wrist score for interpreting results, which showed 100% of excellent results after one year follow-up. Our series is comparable to that of Ayhan Kilic et al., (2009)^[11] who had 44.4% excellent, 44.4% good, 11.2% fair.

CONCLUSION

We concluded that use of locked compression plates in distal radius fractures provide good to excellent results and are effective in the correction and maintenance of distal radius anatomy. By using these plates, joint motions and daily functioning is recovered in a shorter time. Hence locking compression plate is a useful implant in stabilizing in osteoporotic distal radius fractures in postmenopausal women.

REFERENCES

1. Bagby GW. Compression bone-plating: historical considerations. *J Bone Joint surg Am.*1977;59:625-31.
2. Helfet DL, Haas NP, Schatzker J, et al. AO philosophy and principles of fracture management-its evolution and evaluation. *J Bone Joint surg Am.* 2003;85:1156-60.
3. Frigg, R.: Development of the Locking Compression Plate. *Injury.*2003;34(2):B6-10.
4. Perren, S. M.: Backgrounds of the technology of internal fixators. *Injury.*2003;34(2): B1-3.
5. Egol KA, Kubiak EN, Fulkerson E, et al. Biomechanics of locked plates and screws. *J Orthop Trauma.* 2004;488-93.
6. Haidukewych GJ. Innovations in locking plate technology. *J Am Acad Orthop Surg.* 2004;12:205-212.
7. Chan KW, Kwok TK, Mak KH. Early experience with locking compression plate in the treatment of distal radius fracture. *Hong Kong J Orthop Surg.* 2003;7:88-93.
8. Leung F, Zhu L, Ho H, Lu WW, Chow SP. Palmar plate fixation of AO type C2 fracture of distal radius using a locking compression plate: a biomechanical study in a cadaveric model. *J Hand Surg.* 2003;28B:263-6.
9. Orbay JL, Fernandez DL. Volar fixed-angle plate fixation for unstable distal radius fractures in the elderly patient. *J Hand Surg.* 2004;29A:96-102.
10. Arora R, Lutz M, Hennerbichler A, Krappinger D, Espen D, Gabl M. Complications following internal fixation of unstable distal radius fracture with a palmar locking-plate. *J Orthop Trauma.* 2007 May;21(5):316-22.
11. Ayhan Kiliç, Yavuz Kabukçuoğlu, Ufuk Ozkaya, Murat Gül, Sami Sökücü, Umit Özdoğan. Volar locking plate fixation of unstable distal radius fractures. *Acta Orthop Traumatol Turc.* 2009 Aug-Oct;43(4):303-8.
12. RE Anakwe, LAK Khan, RE Cook, and JE McEachan Locked volar plating for complex distal radius fractures: Patient reported outcomes and satisfaction *J Orthop Surg Res.* 2010; 5: 51.
13. Sanjay Agarwala, Ganesh S Mohrir, Shreyans D. Functional Outcome in Distal Radius Fractures Treated with Locking Compression Plate. *Gadiya Bombay Hospital Journal.*2012;54(2):209-219.