



OPEN REDUCTION AND INTERNAL FIXATION OF INTRAARTICULAR AND EXTRA ARTICULAR DISTAL END RADIUS FRACTURE WITH VOLAR PLATE FIXATION

Orthopaedics

Sunil S Chodavadiya

3rd year resident , dept. of orthopaedics , SMT NHL Municipal medical college , ellisebridge ,Ahmedabad.

Maulik M Patel*

Assistant professor svp hospital , Ellise bridge , Ahmedabad. *Corresponding Author

Mitul D Patel

consultant ,VS hospital , Ellise bridge , Ahmedabad.

ABSTRACT

Fracture of distal end radius is the most common fracture of upper extremity. It is more common in women aged 60-70 years because of osteoporosis. Various modalities have been used for managing intra and extra articular distal end radius fractures. Here we are showing results and outcomes of open reduction and internal fixation of intra and extra articular distal end radius fracture with volar plate fixation.

KEYWORDS

distal end radius fractures , intra articular , extra articular , volar plate , buttress plate

INTRODUCTION

Fracture of distal end radius accounts for approximately one sixth of all fractures seen in emergency room. It is the most common fracture of upper extremity with average incidence of 17% of fractures per year. It is more common in women aged 60-70 years because of osteoporosis.¹

The ultimate goal is to provide the patients with the most functional and comfortable wrist and restoring anatomical articular congruity of the distal radius and return back to origin occupation. Treatment of displaced extra as well as intra – articular fractures of distal radius by open reduction & internal fixation has previously been shown to produce acceptable results.

Internal fixation with the metaphyseal bending plating has become very popular due to (1) directly control and maintain physiological palmer tilt (2) avoid collapse of fracture and (3) avoid bridging of radiocarpal joint. Palmer plating is preferred as plate directly buttress against the loss of palmer tilt. Open reduction and internal fixation using a volar locking plate system is a valid treatment of displaced extra-articular and intra-articular distal radius fractures in adults.^{2,3,4,5}

This study is taken up to analyse the outcomes of the open reduction and internal fixation of fractures using volar plating internal fixation devices.

MATERIAL AND METHODOLOGY

Cases satisfying the inclusion criteria admitted in our tertiary care hospital during the study period of January 2013 to September 2014 has been included. 20 cases were taken under this study.

Inclusion Criteria

- 1) Patients who are skeletally mature and age >18 years
- 2) Patients who are medically fit for surgery
- 3) Radiological findings confirming extra as well as intra articular fracture of distal end radius
- 4) Frykman classification I, II, III, IV, V, VI, VII & VIII.

Exclusion Criteria

- 1) Patients below 18 years
- 2) Open fractures
- 3) Pathological fractures
- 4) Patients with existing disorders having a relevant effect on the healing process, such as multiple sclerosis or paraplegia.
- 5) Cases in which bone grafts were needed.

Operative Technique:

We have operated upon patients under brachial block or general anaesthesia. Volar approach (Henry's Approach)⁶ is used. Reduction is achieved with reduction clamps and bone holding clamps and then provisional fixation achieved by K- wires fixation. Position of volar buttress plate is confirmed under image intensifier and fixation is secured with screws.

Post Operative Protocol :

Post operative x ray is taken at the night of surgery. Dressing was done

at second post operative day. Usually Stitch removal is done on 12th day with removal of slab and mobilization is done.

Rehabilitation Protocol

During fracture immobilization ,

Immediate exercises of uninvolved joint of ipsilateral limb to prevent stiffness in the same.

- Resistive exercises to avoid atrophy of muscles
- Reduction of post operative oedema by elevation and anti-inflammatory drugs.
- Wound care by regular dressing
- Ablation of pain to prevent sudeck's dystrophy by pain killers.
- Prophylactic antibiotics to prevent infection.

Following the removal of stitches : Joint mobilization, Active exercises in limits of tolerance., Adequate splintage if required, Strengthening exercises under supervision of occupational therapist.

- For functional and radiological evaluation of outcome of volar plating in distal end radius fracture we have used two standard accepted scoring systems.
- DEMERIT POINT SYSTEM OF GARTLAND & WERLEY WITH SARMIENTO et al MODIFICATION.

OBSERVATION AND RESULT

As far as frequency is concerned maximum number of cases were above 50 years of Age with an average of 47.6 years.

In present study there were 75% male and 25% female patient, right and left sides were equally involved, 11 patients had injury due to fall and 9 cases due to road traffic accident, maximum number of cases are of Frykman type 3 ie. 6 cases followed by type 5 and 2. Most of the cases are treated on 1st day of admission. We mostly used buttress non locking plate.

The longest follow up is of 1 year and average follow up is of 7.8 months , 13 cases got 1-2 mm of shortening in radial length, there was articular step off in 7 cases of around 1-2 mm which had not created any restriction of movement.

we had excellent result in 80% of cases, with good result in 15% of cases and 5% fair and no poor result as far as palmer flexion is concerned with average of 79 degree of dorsiflexion. we could achieve 85% of excellent and 15% of good result as far as dorsiflexion is concerned with average of 70 degree of dorsi flexion.

In present study we could achieve 35% of excellent 45% of good and 20% of fair result as far as radial deviation is concerned with average of 16.5 degree of radial Deviation.

In present study we could achieve 45% of excellent result 20% of good result and 30% of Fair result as far as ulnar deviation is concerned with average of 23.6 degree of RD. we could achieve 50% of Excellent 25% of good and 20% of Fair result with an average of 79.25 degree of

supination, we could achieve 55 % of Excellent and 35% of good result with average of 66.6 degree of pronation.

In present study we could achieve 55 % of Excellent result 35% of good result and 10% of fair result with Gartland and werley's score with an average of 4.4 score.

DISCUSSION

The present study was under taken to assess the functional outcome of operative management of distal radial fractures using a volar plate.

We evaluated our results and compared them with those obtained by various other studies utilizing different modalities of treatment. Our analysis is as follows.

Age Distribution :

In our study, distal radial fracture was more common after 5th decade with a mean of 47.6 years. Most of the intra articular, comminuted and unstable fractures requiring operative management occurred in young individuals are due to high energy trauma such as road traffic accident and fall from tree. Fractures occurring in old individuals are due to trivial fall and usually will be extra articular and unstable. The average age in our study is comparable to the studies of Ayhan Kilic et al (2009)⁷, Kevin C. Chung et al., (2006)⁸ and R.E. Anakwe et al (2010)⁹ who had an average age of 45 years, 48.9 years and 48 years respectively. 104 Arora Rohit et al (2007)⁹ had an average age of 57 years in their series.

Mode Of Injury :

In our study 45% of the patients had road traffic accident and 55% had a fall on the out stretched hand.

Kevin C. Chung et al (2006)⁷ and Arora Rohit et al (2007)⁶ reported fall on the outstretched hand as the most common mode of injury.

We reported road the same.

Type Of Fracture

N Keerthi, R Marappa, A Macleod⁹ et al showed that commonest type is type 2 and then type 5. In our study commonest type of fracture is type 3(30%) and then type 5(25%) and then type 2(20%).

Complications:

We encountered a complication rate of 10%, out of which 1 (5%) was due to superficial infection which was cure with antibiotics, 1 (5%) developed arthritis of wrist joint secondary to improper reduction and articular step.

Ayhan Kilic et al., (2009)⁸ reported a complication rate of 11.1%, Kevin C. Chung et al., (2006)⁽⁸⁴⁾ reported a complication rate of 9.1%, R.E. Anakwe et al., (2010)⁽⁸⁶⁾ reported a complication rate of 4.8% and Arora Rohit et al., (2007)⁽⁵⁵⁾ reported a complication rate of 57%.

RESULTS:

In our series, we had 55% excellent, 35% good, 10%, fair and 0% poor result.

Patients, who obtained excellent results, had no residual deformities or pain. Range of motion was within the normal functional range. They had no arthritic changes or other complications.

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.

Our series is comparable to that of Ayhan Kilic et al., (2009)⁷ who had 44.4% excellent, 44.4% good, 11.2% fair.

Kevin C. Chung et al., (2006)⁷ outcome measures included radiographic parameters grip strength, lateral pinch strength, the Jubsen Taylor test, wrist range of motion and Michigan hand questionnaire compared to normal side. In his series decrease in mean grip strength, mean pinch strength and mean flexion of the wrist was 86% of normal side.

R.E. Anakwe et al., (2010)⁷ 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.

Rohit Arora et al., (2007)⁸ used modified Green and Obrein score he had 31 excellent, 54 good, 23 fair and 6 poor results.

CONCLUSION

Use of buttress or 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.

REFERENCES

- 1) COLLES A. On the fracture of the carpal extremity of the radius. *Edinb MedSurg J*, 1814, 10: 182-186.
- 2) Fernandez DL, Geissler WB (1991). Treatment of displaced articular fractures of the radius. *Journal of Hand Surgery*, 16A:375-384. Fitoussi F, Ip WY, Chow SP (1997). Treatment of intra-articular fractures of the distal end of the radius with plates. *Journal of Bone and Joint Surgery*, 79A:1303-1312
- 3) Shukuki Koh, Randal P. Morris, Rita M. Patterson, J. Patrick Kearney, William L. Buford Jr, Steven F. Viegas: Volar Fixation for Distally Angulated Extra-articular Fractures of the Distal Radius: A Biomechanical Study. *J Hand Surg* 2006; 31A:771-779
- 4) Hanae Minegishi, 1 Osamu Dohi, 1 Soukan An, 2 and Hidetsugu Sato *Ups J Med Sci*. Nov 2011; 116(4): 280-284. Published online Oct 29, 2011. doi: 10.3109/03009734.2011.594183
- 5) Barton JR. Views and treatment of an important injury of the wrist. *Medical Examiner* 1838;1:365-8.
- 6) Roy Cardoso, Robert M. Sazbo ;Wrist anatomy and surgical approaches *Orthop Clin N Am* 38 (2007) 127-148
- 7) Ayhan KILIC, Yavuz KABUKCUOGLU, Ufuk OZKAYA, Murat GUL, Sami SOKUCU, Umit OZDOGAN. Volar locking plate fixation of unstable distal radius fractures. *Acta Orthop Traumatol Turc* 2009;43(4):303-308
- 8) Chung, Kevin C, Watt, Andrews, Kotsis, Sandra VMPH, Margaliot, ZVI, Hase, Steven, Kim H. Myra. Treatment of unstable distal radius fractures with volar locking compression plate. *The J Bone & Joint Surg* 2006 Dec; 88-A(12):2687-2694.
- 9) 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.