



International Journal of Orthopaedics Sciences

ISSN: 2395-1958
IJOS 2017; 3(2): 678-681
© 2017 IJOS
www.orthopaper.com
Received: 10-02-2017
Accepted: 11-03-2017

Chaudhary P
Department of Orthopaedics,
B.P. Koirala Institute of Health
Sciences, Dharan, Nepal

Shrestha BP
Department of Orthopaedics,
B.P. Koirala Institute of Health
Sciences, Dharan, Nepal

Khanal GK
Department of Orthopaedics,
B.P. Koirala Institute of Health
Sciences, Dharan, Nepal

Baral P
Department of Orthopaedics,
B.P. Koirala Institute of Health
Sciences, Dharan, Nepal

Shah AB
Department of Orthopaedics,
B.P. Koirala Institute of Health
Sciences, Dharan, Nepal

Das J
Department of Orthopaedics,
B.P. Koirala Institute of Health
Sciences, Dharan, Nepal

RCT comparing closed reduction and percutaneous versus open reduction and volar locking plate in treatment of distal radius fractures in adults

Chaudhary P, Shrestha BP, Khanal GK, Baral P, Shah AB and Das J

DOI: <http://dx.doi.org/10.22271/ortho.2017.v3.i2g.70>

Abstract

Introduction: Displaced distal radius fractures are very common injuries and present regularly to all orthopaedic surgeons. Several documented treatment modalities for these fractures have been described with a recent trend for internal fixation with volar plating. However, the literature suggests that there is still no consensus as to the best treatment of these injuries. Distal radius fractures are among the most common bone fractures all over the world. Close reduction and fixation by percutaneous pinning is a less invasive method comparing with other open surgeries. There is still a dearth of prospective randomized trials in this area. Before the advent of volar locking plates the randomized trials for surgical interventions for distal radius fractures show some evidence to support the use of external fixation or percutaneous pinning however their precise role and methods are not established and whether this will produce consistently better long-term outcome is also not clear.

Aim & Objective: To compare percutaneous pinning versus volar locking plate in treatment of distal radius fractures in adults in term of: fracture union, post operative pain, functional outcome, post operative complication (stiffness, CRPS). **Materials and Methods:** It is Randomised Controlled Trial Study. All Adults Patients aged 16 and above with displaced distal radius fractures presented to the Emergency department and out Patient Department of Orthopaedics at BPKIHS from August 2010 to September 2012 were included in the study.

Results: 60 patients with fracture distal end of radius who met the inclusion criteria were included in the study, out of which 30 were randomized into group A, treated by closed reduction and percutaneous fixation supplemented by cast and 30 in group B, treated by volar locking plate. The study showed mean age of incidence to be 39.22± 14.49 years in age group ranging from 16-65 years. In our study we found that the injuries were result of high energy trauma with RTA constituting the commonest mode of injury (75%) followed by fall from height (15%) and play ground injuries (10%). Males constituted the majority of the study population (67%). Age, sex, mode of injury, type of fracture, interval to surgery duration and associated co-morbidities were equally distributed between the two groups showing success of randomization. There was a highly significant difference in the operative time and blood loss between two groups, illustrating that percutaneous fixation is much shorter procedure with mean operative time of 30 mins compared to 60mins of ORIF with volar locking plate and has less blood loss being 5-10ml to 145ml of ORIF with volar plating.

Conclusion: ORIF with volar locking plating provide better radiological outcomes with more stable fixation thus lesser degree of loss of reduction in comparison to percutaneous pinning. It also had better ROM at wrist initially however this difference is not significant in later months. Volar locking plate is more expensive with more operative time and blood loss as compared to pinning.

Keywords: Hip fracture, Bone turnover markers, CTX, PINP, Vitamin D

Introduction

Displaced distal radius fractures are very common injuries and present regularly to all orthopaedic surgeons. Several documented treatment modalities for these fractures have been described with a recent trend for internal fixation with volar plating. However, the literature suggests that there is still no consensus as to the best treatment of these injuries. Distal radius fractures are among the most common bone fractures all over the world. Close reduction and fixation by percutaneous pinning is a less invasive method comparing with other open surgeries.

Correspondence
Dr. Pashupati Chaudhary
Additional Professor,
Department of Orthopaedics,
BPKIHS, Dharan, Nepal

There is still a dearth of prospective randomized trials in this area. Before the advent of volar locking plates the randomized trials for surgical interventions for distal radius fractures show some evidence to support the use of external fixation or percutaneous pinning however their precise role and methods are not established and whether this will produce consistently better long-term outcome is also not clear.

The advent of volar locking plates have extended the indications to older population as failure rates are low.

They provide better hold even in osteoporotic bone. In younger population it allows early mobilization and return to work. A comparative outcome study using volar locking plating system for distal radius fractures showed that it is successful in managing distal radius fractures in older patients with comparable outcomes to younger patients.

There is no consensus in the literature regarding treatment of displaced distal fracture in adults, so we want to compare percutaneous pinning versus volar locking plate in treatment of distal radius fracture in terms of functional outcome, fracture union, stiffness, deformity and fracture union.

Objective

To compare percutaneous pinning versus volar locking plate in treatment of distal radius fractures in adults in term of

- Fracture union
- Post operative pain
- Functional outcome
- Post operative complication (stiffness, CRPS)

Materials and Methods

Study Design: Randomised Controlled Trial Study

Sample Unit: Adults Patients aged 16 and above with displaced distal radius fractures

Study sample/ Sample size: 30 in each group

Sampling technique: Consecutive adult patients who aged 16 years and above with displaced distal radius fractures presented to the Emergency department and out Patient Department of Orthopaedics at BPKIHS

Place/institution: Dept. of Orthopaedics, BPKIHS

Period of study: August 2010 to September 2012

Inclusion Criteria

- Open fractures Gustilo grade II and above
- Mal-united fractures
- Fracture avulsion dislocation
- Pathological fractures
- Associated wrist joint disease / carpal bone disease
- Patients not fit for anaesthesia
- Patients not giving informed consent

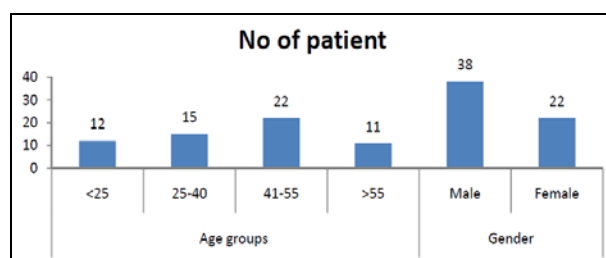
The patients were randomized into two groups, each of size 30:

- Group A (K-wire group)
- Group B (Plate group)
- During procedure patients were evaluated for *blood loss*, procedure time or any complications.
- Immediate post operative complications were taken into account and post operative radiological parameters measured.
- Patients were reviewed after 2 weeks (for pin tract infection, early complications)
- At 6 weeks, 12 weeks and 24 weeks, the patient was evaluated for pain, range of motion, evidence of union, complications, subjective improvement using Quick DASH questionnaire and radiological parameters

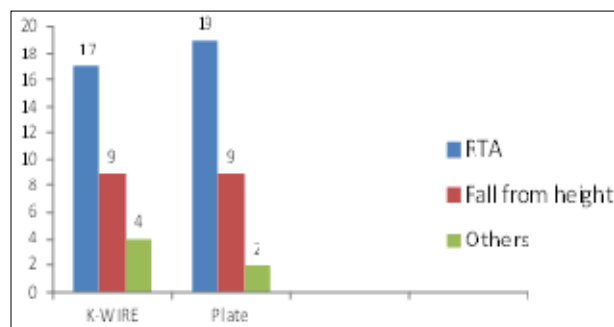
Results

60 patients with fracture distal end of radius who met the inclusion criteria were included in the study, out of which 30 were randomized into group A, treated by closed reduction and percutaneous fixation supplemented by cast and 30 in group B, treated by volar locking plate. The study showed mean age of incidence to be 39.22± 14.49 years in age group ranging from 16-65 years. In our study we found that the injuries were result of high energy trauma with RTA constituting the commonest mode of injury (75%) followed by fall from height (15%) and play ground injuries (10%). Males constituted the majority of the study population (67%). Age, sex, mode of injury, type of fracture, interval to surgery duration and associated co-morbidities were equally distributed between the two groups showing success of randomization.

There was a highly significant difference in the operative time and blood loss between two groups, illustrating that percutaneous fixation is much shorter procedure with mean operative time of 30 mins compared to 60mins of ORIF with volar locking plate and has less blood loss being 5-10ml to 145ml of ORIF with volar plating.



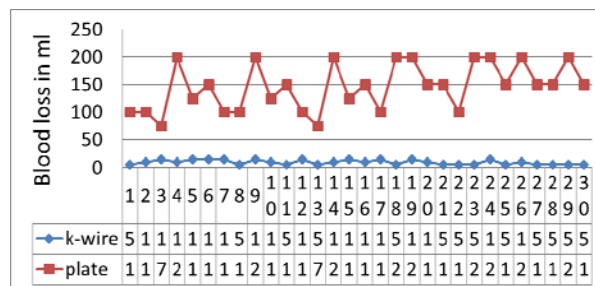
Age distribution of patients in the study

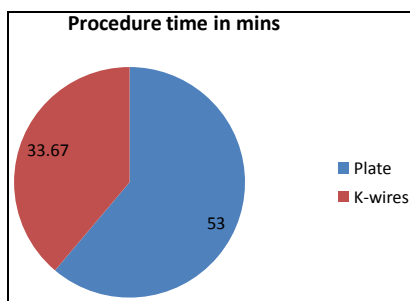


Mode of injury

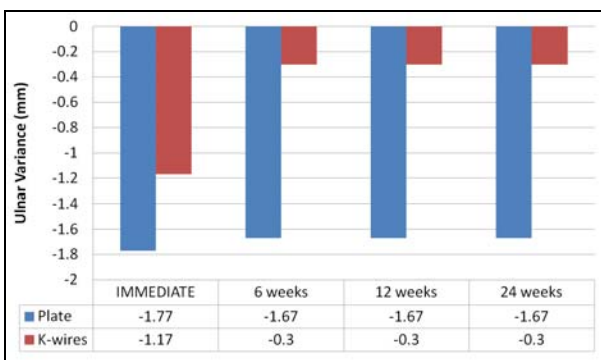
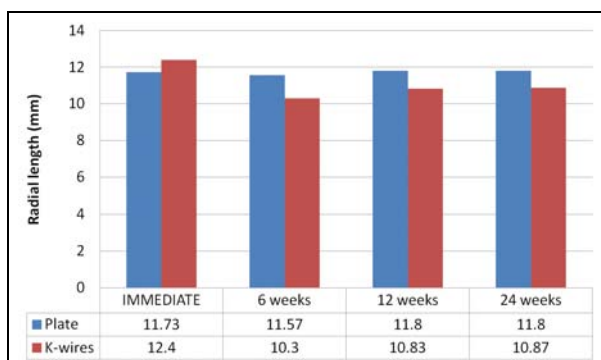
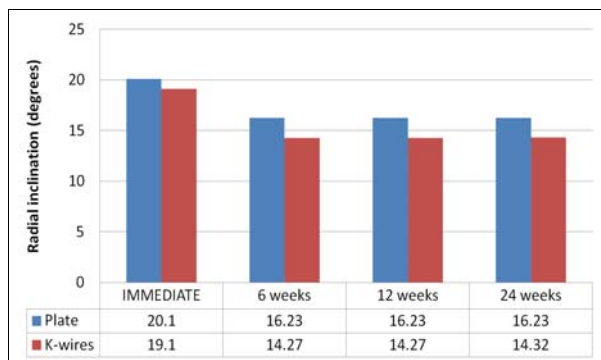
Blood loss in the study

Mean blood loss (in ml) ± SD	K-wires	ORIF*	P-Value
	5.33 ± 11.366	145.83 ± 42.59	<0.001

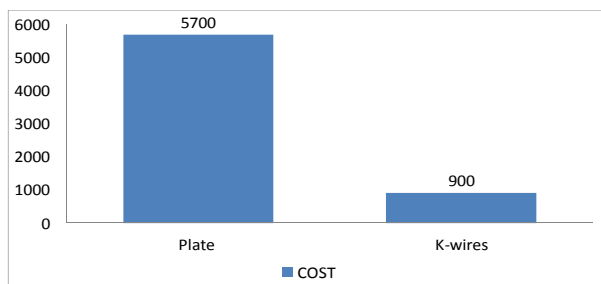




Radiological Outcomes



Cost of Treatment



Discussion

Fractures of the distal radius account for 15–25% of all fractures [1-4]. The peak of age of distal radial fracture incidence is approximately 30 years in men, secondary to high-energy injuries; and postmenopause in women, secondary to low-energy injuries [3]. The lifetime risk of sustaining a distal radius fracture is 15% for women and 2% for men [36]. In our review, in which some studies analysed individuals of all ages while others considered only the elderly, we found an overall 1:3.1 ratio between men and women.

Over the last two decades, the management of distal radius fractures changed from a conservative to a surgical approach. However, as reported by a Cochrane Collaboration summary, there still is lack of evidence regarding the best surgical treatment. Kirschner wire and locking-plate fixation were found as the two types of surgery most frequently adopted [20]. The percutaneous approach is usually accomplished using two or three pins or Kirschner wires placed across the fracture site, generally from the radial styloid, directed proximally and from the dorsoulnar side of the distal radial fragment directed proximally.

The main theoretical advantages of plating internal fixation for distal radius fractures could be the early functional recovery, the possibility of obtaining an optimal restoration of the wrist anatomy, the direct visualization of the fracture and the maintenance of the achieved reduction.

The results of the present study confirmed some strengths of VLP. We found better outcomes for patients undergoing open reduction and plate fixation in terms of DASH score, quantitatively calculated from the data of the studies. ROM assessment showed no statistically significant difference between the two groups except for flexion. Finally, radiographic parameters such as ulnar variance and radial shortening were better restored after the treatment with plate in about half of the studies analysed.

However, Kirschner wire fixation also provides excellent results, comparable to plating at the final follow-up. The quantitative analysis of the grip strength did not show any statistically significant difference. Furthermore, in some studies, the better results in DASH score for the VLP group were detected only in the interim evaluations. Therefore, VLP was sometimes associated with a faster recovery, but the results were comparable in the middle/long term.

The overall rate of complications was lower with the VLP but the difference was not significant. The analysis of the specific complications showed a statistically significant difference between the two groups for infections and complex regional pain syndromes, with lower rates for VLP group. On the other hand, tendonitis and tenosynovitis and carpal tunnel syndrome were more common in patients managed with plating. Malunion and reoperation rates were lower after plating, but such of patients have often to face surgery to remove plates after some months.

Given the current drive to cost reduction, it is also important to consider whether it is worthwhile to use expensive equipment that requires more anaesthesia, longer times of surgery and eventually produce similar results. In our systematic review, two studies reported detailed information about the costs of surgical management, and they show how, despite similar results between the two treatments, costs are higher using VLP.

The present study suggests a trend in favour of the hypothesis that volar locking-plate fixation results in less loss of function and a better ROM in the early post-operative period, with best

questionnaire scores, best restoration of ROM flexion and radiographic ulnar variance and lower overall complication rates. However, these differences in functional benefit between VLP and Kirschner wiring decrease starting from 6 to 12 weeks after surgery, and seem to be of little or no clinical relevance by the end of follow-up. Besides, considering that patients with this kind of fracture are above all people of advanced age, minimum radiographic differences do not often translate into a clinical deficiency.

To our knowledge, the present study is the only comparing volar plate fixation with Kirschner wire fixation techniques. We focussed on the comparison between these two kinds of treatments, the two most common surgical options, especially in the last few years. It must be clarified that no clear difference between classical plates and locking plates has yet been established. However, virtually all recent trial compared locked plates to percutaneous fixation.

ORIF with volar plating was seen to provide better radiological outcomes with more stable fixation as seen by lesser degree of loss of reduction, in comparison to percutaneous K-wires. It also had better ROM at wrist initially; however this difference is not significant in later months. Patients treated by Plating had a statistically significant improvement of radial length (mean 1 mm), radial inclination (mean 2 degree) and ulnar variance (1.3 mm) at 6 months. However, there was no significant difference in functional outcome but superior in plating group in terms of range of movement, activities of daily living and the Quick DASH score but pain is more as compared the percutaneous K-wires group

Conclusion

Open reduction and internal fixation with a volar locking plate and closed reduction with percutaneous pin/Kirschner wire fixation provide comparable excellent clinical and radiographic results in patients with distal radial fractures. At 12 weeks from the procedure, clinical results seem to favour patients treated with plating, but there were no significant differences between the two types of treatment at long term follow-up. The overall results of this review do not demonstrate a clear superiority of either fixation method for the surgical management of distal radius fractures.

ORIF with volar locking plating provide better radiological outcomes with more stable fixation thus lesser degree of loss of reduction in comparison to percutaneous pinning. It also had better ROM at wrist initially however this difference is not significant in later months. Volar locking plate is more expensive with more operative time and blood loss as compared to pinning.

References

1. Leung F, Tu YK, Chew WY, Chow SP. Comparison of external and percutaneous pin fixation with plate fixation for intra-articular distal radial fractures. A randomized study. *J Bone Joint Surg Am* 2008; 90 (1):16-22.
2. Moroni A, Vannini F, Faldini C, Pegreff F, Giannini S. Cast vs external fixation: a comparative study in elderly osteoporotic distal radial fracture patients. *Scand J Surg* 2004; 93 (1):64-7.
3. Singer BR, McLauchlan GJ, Robinson CM *et al*. Epidemiology of fractures in 15,000 adults: the influence of age and gender [J]. *J Bone Joint Surg Br* 1998; 80 (2):243-8.
4. Gartland JJ, Werley CW. Evaluation of healed Colles' fractures. *J Bone Joint Surg Am* 1951; 33 (4): 895-907.
5. Bohra AK, Vijayvergiya SC, Malav R, Jhanwar P. A prospective comparative study of operative treatment of distal radius fracture by using locking and non-locking volar T- plate. *JPBMS* 2012;20 (14).
6. Weber SC, Szabo RM. Severely comminuted distal radial fracture as an unsolved problem: complications associated with external fixation and pins and plaster techniques. *J Hand Surg Am*. 1986; 11(2):157-65.
7. Leung KS, Shen WY, Tsang HK, Chiu KH, Leung PC, Hung LK. An effective treatment of comminuted fractures of the distal radius. *J Hand Surg Am*. 1990; 15:11-17.
8. Schmalholz A. External skeletal fixation versus cement fixation in the treatment of redislocated Colles' fracture. *Clin Orthop Relat Res* 1990; 254: 236-241.
9. McQueen MM, Michie M, Court-Brown CM. Hand and wrist function after external fixation of unstable distal radial fractures. *Clin Orthop Relat Res* 1992; 285: 200-204.
10. Clyburn TA. Dynamic external fixation for comminuted intra-articular fractures of the distal end of the radius. *J Bone Joint Surg Am*. 1987; 69: 248-54.
11. Edwards GS Jr. Intra-articular fractures of the distal part of the radius treated with the small AO external fixator. *J Bone Joint Surg Am*. 1991; 73: 1241-50.
12. Jupiter JB. Complex articular fracture of the distal radius classification and management. *J Am Acad Orthop Surg* 1997; 5:119-29.
13. Trumble TE, Culp RW, Hanel DP, Geissler WB, Berger RA. Intra-articular fractures of the distal aspect of the radius. *J Bone Joint Surg Am* 1998; 80:582-600.