



Management of Intra Articular Fractures of Distal Radius with Volar Locking Compression Plate – Midterm Outcome Analysis

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Abstract

Introduction: *Intra articular fractures of distal radius remains one of the most challenging fractures treated by orthopaedic surgeons. The aim of this study is to analyse the radiological as well as functional outcome in intra articular fractures of distal radius treated with volar locked compression plate.*

Aim of the Study: *The aim of this study is to analyse the radiological as well as functional outcome in intra articular fractures of distal radius treated with volar locked compression plate.*

Materials and Methods: *From May 2016 to Dec 2017, consecutive patients with intra articular fractures of the distal radius were included in our study. All subjects were recruited, operated, and assessed at Department of Orthopaedic Surgery, RMMCH, Annamalai University, Chidambaram, Tamilnadu. The patients were followed for a minimum period of 6 months. The results were evaluated using DASH scoring system Sarmiento's modification of Lindstorm's criteria for radiological outcome for wrist.*

Results: *Of the twenty five wrists operated, according to DASH scoring system, 19 cases were males and 6 cases were females of which 15 cases were right and 10 cases were left wrists, the most commonest mode of trauma being RTA accounting for 80% of cases, the average time for surgery was 5 days from the date of admission, a below elbow slab was applied on the day of admission till surgery. Excellent to Good results were obtained in 24 wrists i.e. 96%. Fair results were obtained in one (4%). None of the patient results. The one patient showing fair result had wrist stiffness mainly attributable to his non compliance to Physiotherapy. No major complication was noted in our study.*

Conclusion: *Volar locking compression plate is the implant of choice in Comminuted Intraarticular distal radius Fractures. Use of locked volar plate predictably yields better patient reported outcome as per DASH scoring system and Sarmiento's modification of Lidstorm's criteria for radiological outcome and allows earlier range of wrist motion which yields accelerated return of function necessary for our Indian population.*

Keywords: *Volar locking compression plate, volar plate, wrist and fracture fixation.*

Introduction

The fractures of the distal radius are very common injuries accounting for about 8 to 17% of fractures seen the emergency room. The purpose of this study was to evaluate functional and radiological outcome of patients with intra articular distal radius fractures treated with a volar locking compression plate. As with an increase in life expectancy there is an increase in the incidence of these fractures as well. There appears to be a bimodal distribution among these fractures where the younger group falling prey due to high velocity injuries like road traffic accidents and the older group due to a trivial fall mainly due to senile osteoporosis. In terms of management

especially for the unstable intra articular fractures has evolved over the past two decades from the century old cast immobilization through K wire and to the open reduction and internal fixation with plate osteosynthesis. The goals would be to maintain joint line congruity, joint stability, to achieve a near normal anatomical reduction and give a good functional range of movement to the patient post operatively.

Common Classifications

1. Gartland & Werley
2. Frykman (radiocarpal & radioulnar)
3. **AO Classification**
4. Melone (impaction of lunate)
5. Fernandez (mechanism)



Materials and Methods

From May 2016 to Dec 2017, consecutive patients with intra articular fractures of the distal radius were included our the study. All subjects were recruited, operated, and assessed at Department of Orthopedic Surgery, RMMCH, Annamalai

University, Chidambaram, Tamilnadu. The patients were followed up for a minimum 6 months period and the results were assessed using the DASH scoring system and Sarmiento's modification of Lidstrom's criteria for wrist.

Inclusion Criteria

1. All clinically and radiologically diagnosed intra articular distal radius using the AO classification of fractures of distal radius.

Exclusion Criteria

- Age more than 75 years
- Age less than 18 years
- Compound fractures
- Fractures with vascular insult

Results

Of the twenty five wrists operated, in accordance to the DASH scoring system

- Excellent to good results were obtained in 24 wrists i.e. 96 %.
- Fair results were obtained in 1 wrist (4%)
- No patient showed poor results
- One patient who had fair result had wrist stiffness mainly attributable to his non compliance to Physiotherapy.
- No major complication was noted in our study

Please rate your ability to do the following activities in the last week.

1. Open a tight or new jar	<input type="radio"/> No difficulty	<input type="radio"/> Mild difficulty	<input type="radio"/> Moderate difficulty	<input type="radio"/> Severe difficulty	<input type="radio"/> Unable
2. Write	<input type="radio"/> No difficulty	<input type="radio"/> Mild difficulty	<input type="radio"/> Moderate difficulty	<input type="radio"/> Severe difficulty	<input type="radio"/> Unable
3. Turn a key	<input type="radio"/> No difficulty	<input type="radio"/> Mild difficulty	<input type="radio"/> Moderate difficulty	<input type="radio"/> Severe difficulty	<input type="radio"/> Unable
4. Prepare a meal	<input type="radio"/> No difficulty	<input type="radio"/> Mild difficulty	<input type="radio"/> Moderate difficulty	<input type="radio"/> Severe difficulty	<input type="radio"/> Unable
5. Push open a heavy door	<input type="radio"/> No difficulty	<input type="radio"/> Mild difficulty	<input type="radio"/> Moderate difficulty	<input type="radio"/> Severe difficulty	<input type="radio"/> Unable
6. Place an object on a shelf above your head	<input type="radio"/> No difficulty	<input type="radio"/> Mild difficulty	<input type="radio"/> Moderate difficulty	<input type="radio"/> Severe difficulty	<input type="radio"/> Unable
7. Do heavy household chores (eg wash walls, wash floors)	<input type="radio"/> No difficulty	<input type="radio"/> Mild difficulty	<input type="radio"/> Moderate difficulty	<input type="radio"/> Severe difficulty	<input type="radio"/> Unable
8. Garden or do yard work	<input type="radio"/> No difficulty	<input type="radio"/> Mild difficulty	<input type="radio"/> Moderate difficulty	<input type="radio"/> Severe difficulty	<input type="radio"/> Unable
9. Make a bed	<input type="radio"/> No difficulty	<input type="radio"/> Mild difficulty	<input type="radio"/> Moderate difficulty	<input type="radio"/> Severe difficulty	<input type="radio"/> Unable
10. Carry a shopping bag or briefcase	<input type="radio"/> No difficulty	<input type="radio"/> Mild difficulty	<input type="radio"/> Moderate difficulty	<input type="radio"/> Severe difficulty	<input type="radio"/> Unable
11. Carry a heavy object (over 10 lbs)	<input type="radio"/> No difficulty	<input type="radio"/> Mild difficulty	<input type="radio"/> Moderate difficulty	<input type="radio"/> Severe difficulty	<input type="radio"/> Unable
12. Change a lightbulb overhead	<input type="radio"/> No difficulty	<input type="radio"/> Mild difficulty	<input type="radio"/> Moderate difficulty	<input type="radio"/> Severe difficulty	<input type="radio"/> Unable
13. Wash or blow dry your hair	<input type="radio"/> No difficulty	<input type="radio"/> Mild difficulty	<input type="radio"/> Moderate difficulty	<input type="radio"/> Severe difficulty	<input type="radio"/> Unable
14. Wash your back	<input type="radio"/> No difficulty	<input type="radio"/> Mild difficulty	<input type="radio"/> Moderate difficulty	<input type="radio"/> Severe difficulty	<input type="radio"/> Unable
15. Put on a pullover sweater	<input type="radio"/> No difficulty	<input type="radio"/> Mild difficulty	<input type="radio"/> Moderate difficulty	<input type="radio"/> Severe difficulty	<input type="radio"/> Unable
16. Use a knife to cut food	<input type="radio"/> No difficulty	<input type="radio"/> Mild difficulty	<input type="radio"/> Moderate difficulty	<input type="radio"/> Severe difficulty	<input type="radio"/> Unable
17. Recreational activities which require little effort (eg cardplaying, knitting, etc)	<input type="radio"/> No difficulty	<input type="radio"/> Mild difficulty	<input type="radio"/> Moderate difficulty	<input type="radio"/> Severe difficulty	<input type="radio"/> Unable

18. Recreational activities in which you take some force or impact through your arm, shoulder or hand (eg golf, hammering, tennis, etc)	<input type="radio"/> No difficulty	<input type="radio"/> Mild difficulty	<input type="radio"/> Moderate difficulty	<input type="radio"/> Severe difficulty	<input type="radio"/> Unable
19. Recreational activities in which you move your arm freely (eg playing frisbee, badminton, etc)	<input type="radio"/> No difficulty	<input type="radio"/> Mild difficulty	<input type="radio"/> Moderate difficulty	<input type="radio"/> Severe difficulty	<input type="radio"/> Unable
20. Manage transportation needs (getting from one place to another)	<input type="radio"/> No difficulty	<input type="radio"/> Mild difficulty	<input type="radio"/> Moderate difficulty	<input type="radio"/> Severe difficulty	<input type="radio"/> Unable
21. Sexual activities	<input type="radio"/> No difficulty	<input type="radio"/> Mild difficulty	<input type="radio"/> Moderate difficulty	<input type="radio"/> Severe difficulty	<input type="radio"/> Unable
22. During the past week, to what extent has your arm, shoulder or hand problem interfered with your normal social activities with family, friends, neighbours or groups?	<input type="radio"/> Not at all	<input type="radio"/> Slightly	<input type="radio"/> Moderately	<input type="radio"/> Quite a bit	<input type="radio"/> Extremely
23. During the past week, were you limited in your work or other regular daily activities as a result of your arm, shoulder or hand problem?	<input type="radio"/> Not limited at all	<input type="radio"/> Slightly limited	<input type="radio"/> Moderately limited	<input type="radio"/> Very limited	<input type="radio"/> Unable
Please rate the severity of the following symptoms in the last week					
24. Arm, shoulder or hand pain	<input type="radio"/> None	<input type="radio"/> Mild	<input type="radio"/> Moderate	<input type="radio"/> Severe	<input type="radio"/> Extreme
25. Arm, shoulder or hand pain when you performed any specific activity	<input type="radio"/> None	<input type="radio"/> Mild	<input type="radio"/> Moderate	<input type="radio"/> Severe	<input type="radio"/> Extreme
26. Tingling (pins and needles) in your arm, shoulder or hand	<input type="radio"/> None	<input type="radio"/> Mild	<input type="radio"/> Moderate	<input type="radio"/> Severe	<input type="radio"/> Extreme
27. Weakness in your arm, shoulder or hand	<input type="radio"/> None	<input type="radio"/> Mild	<input type="radio"/> Moderate	<input type="radio"/> Severe	<input type="radio"/> Extreme
28. Stiffness in your arm, shoulder or hand	<input type="radio"/> None	<input type="radio"/> Mild	<input type="radio"/> Moderate	<input type="radio"/> Severe	<input type="radio"/> Extreme
29. During the past week, how much difficulty have you had sleeping because of the pain in your arm, shoulder or hand?	<input type="radio"/> No difficulty	<input type="radio"/> Mild difficulty	<input type="radio"/> Moderate difficulty	<input type="radio"/> Severe difficulty	<input type="radio"/> So much I can't sleep
30. I feel less capable, less confident or less useful because of my arm, shoulder or hand problem	<input type="radio"/> Strongly disagree	<input type="radio"/> Disagree	<input type="radio"/> Neither agree nor disagree	<input type="radio"/> Agree	<input type="radio"/> Strongly agree

Thank you very much for completing all the questions in this questionnaire.

X - Ray and Clinical Pictures

Pre-Op



Post op



Intra Op



Intra op



Immediate post op saline stand limb elevation



One year follow-up

Clinical Pictures





Discussion

The distal radius fractures account about 8 to 17% of fractures seen by the orthopaedic surgeons in the Emergency Department. Over the last 2 decade there has been a shift towards the operative managements of distal radius with respect to maintaining the joint congruity, intra-articular step to achieve a radiological and in terms a good functional outcome for the patients. Since the introduction of volar locked plates in 2001. There has been an increase in popularity towards open reduction and internal fixation with plate osteosynthesis according to Osudo et al. In the present study we has evaluated the functional outcome with respect to the DASH scoring system of and the radiological outcome with respect to the Sarmiento's modification of Lindstrom's criteria.

The volar plates work by the biomechanical principle of external fixator requiring no friction between the plates the bone, providing a pre contoured anatomical fit, the locking screws offers

either a fixed or a variable trajectory screw fixation to support the articular surface, maintain the joint congruity to obtain good fixation in special conditions like osteoporotic bones.

Recently with introduction of variable angled locking plates there is a decreased in the use of additional methods of fixation, intra articular penetration of screws as well according to Stanbery et al. The evaluation of our results using the DASH and Sarmiento modification of lindstrom criteria 92% had excellent result and 8% fair result. The patients who had fair results were mainly attributed to the noncompliance to physiotherapy. The minimum duration of follow-up in our study was six month comparable to study by Mac Dermid et al., patients with fracture of the distal radius had achieved the majority of grip strength and functional range of movement about six month. Similarly in a study by Kanaber et al., the parameters of grip strength and range of movement were restored in 94% of patients after Volar plating in 3 months.



Implants

Conclusion

Committed intra articular distal radius fractures often pose a great challenge to the treating orthopedic surgeon. Fixed and variable angled locking compression plates are the implants of choice in such fracture patterns. The use of variable angle locking plates has an upper edge according to the recent studies in maintaining the joint biomechanism and yield a better patient reported outcome which is necessary for our population. The use of volar plates also offer the luxury for early rehabilitation without the fear of decrease in radiographics indices and hence functional results. We would like to conclude by stating that though this is a study with a small sample size, the volar locked plates are a useful modality in unstable intra-articular fractures of distal radius and the present series should provide a future prospective study for the evolving plate osteosynthesis for distal radius fractures.

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