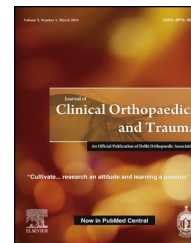


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Original Article

Comparison of treatment of unstable intra articular fractures of distal radius with locking plate versus non-locking plate fixation



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ABSTRACT

Introduction: Unstable intra articular fractures of distal radius are frequently being managed with open reduction and internal fixation. Of late in some biomechanical studies locking plates have been shown to be better in terms of maintenance of radiological parameters in comparison to non-locking plates. We conducted this study to know whether this biomechanical superiority of locking plates is converted in to better clinical outcomes.

Materials and methods: A study was conducted in 60 patients (30 in each group) with unstable intra articular fractures of distal radius who were treated by open reduction and internal fixation with locking plates and non-locking plates. Patients were evaluated for radiological parameters (intra articular step off, radial height, radial tilt, volar tilt) and functional parameters (flexion, extension, radial deviation, ulnar deviation, pronation, supination grip strength) at two year follow up. Overall outcome was evaluated by scoring systems of Gartland and Werley and modified Green O' Brien.

Results: The change in radiological parameters from immediate post op to latest at two year in locking plate group was not significant for radial height, radial tilt, volar tilt, but ulnar variance whereas in non-locking plate there was significant change in radial height, volar tilt, ulnar variance but no significant change in radial inclination. In clinical and functional outcome no significant difference was found at two year follow up.

Conclusions: Locking plates maintain the radiological parameters better than non-locking plates but functional outcome are same for both plates at two year after surgery.

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1. Introduction

Fractures of distal end of radius are common.¹ They occur in elderly as a result of weakened osteoporotic bones but in

young they are due to high energy trauma leading to intra articular involvement. Knirk and Jupiter² reported a 65% prevalence of post-traumatic arthrosis after intra-articular fracture of distal end of radius in forty three young adults

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and demonstrated a strong correlation between residual articular incongruity and osteoarthritis. It is also known that extra articular malalignment can lead to decreased grip strength and endurance⁴ as well as limited motion and carpal instability.^{5–8} In high demand young adults to avoid post-traumatic joint arthrosis intra-articular fractures should be anatomically reduced. To achieve anatomical reduction methods of treatment involving open reduction and internal fixation with volar plates are being preferred. Conventional non-locking have been reported to give effective treatment for displaced unstable intra-articular fracture of distal radius.³ Volar locked plating has gained vast popularity for treatment of both extra and intra articular fractures of distal radius due to its favourable functional and radiological outcome.^{9–11} However currently we are unaware of the studies that have focused on comparison of radiological and functional outcome between non-locking and locked plates.

On the basis of biomechanical studies of two types of plating systems it could be predicted that locking plate will have a better outcome in comparison to non-locking.¹² But no reliable clinical data is available to prove or disprove this prediction.¹²

We have conducted this study with the hypothesis that locked plates are better than non-locking plates in maintaining radiographic parameters and functional outcome in intra articular fractures of distal radius.

1.1. Subjects and methods

This study was conducted at a tertiary level orthopaedic surgery centre. All patients of age group 18–65 years with intra-articular fractures of distal end radius were close reduced and casted. All patients who did not achieve acceptable reduction or lost reduction at first follow up visit within one week were advised ORIF and those willing were included in study after taking written consent. Criteria used to determine unacceptable reduction were radial height shortening of >5 mm, radial inclination on postero-anterior film <15°, intra-articular step off >2 mm, dorsal tilt >15° and volar tilt >20°. Patients having open fractures, concomitant upper extremity injury, patients with bilateral wrist fractures, those who were managed surgically more than two weeks after injury and patient with multi-organ or head injury, were excluded from study. All patients were operated within 2 weeks of injury. AO/ASIF classification was used to classify fractures. Consecutive patients were alternately allocated to locking plate group and non-locking plate group. Total 60 patients (30 in each group) were included in study between November 2008 and June 2011. Fracture pattern distribution in locking plate group was B2:2; B3:5; C1:1; C2:6; C3:16 while in non-locking plate group it was B2:3; B3:7; C1:1; C2:5; C3:14. Mean age was 36.1 years. 75% patients were in age group 25–45 years. Females constituted 11.67% of whole study. Overall 66% patients had their dominant extremity involved in this series. Mechanism of injury included bike riding (44 cases) fall (9 cases) sports (5 cases) automobile accident (2 cases) (Figs. 1–3).

1.2. Surgical technique

All operative procedures were performed by same team. Standard volar approach of Henry¹³ was used. Linear incision

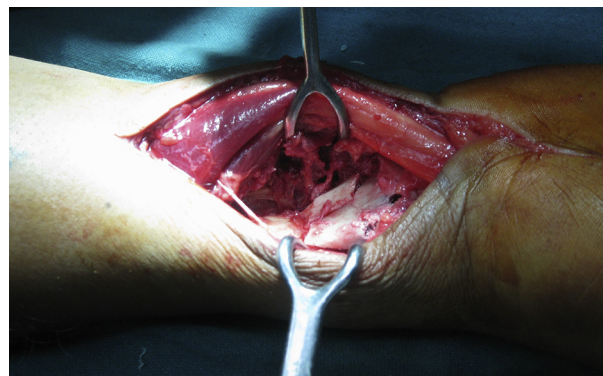


Fig. 1 – a. Volar approach of Henry to distal radius fractures.

lateral to flexor carpi radialis were given by retracting brachioradialis and radial artery laterally and flexor carpi radialis along with median nerve medially. Pronator quadrates was exposed and incised at its radial insertion. Fracture site exposed after retracting pronator quadrates ulnarly.

Articular surface was assessed with c arm, plates were kept on volar side and sliding hole was fixed first and plate was readjusted with respect to articular surface. Distal screws were placed in subchondral bone. No bone grafting was done in any fracture. K wires were used to secure small fragments.

1.3. Follow up examinations

Patients were kept in below elbow slab for one week. Followed by removable volar splint for 3 weeks. Immediate post op X-rays were done. At latest follow up patients were evaluated with X-rays, clinical parameters and overall scoring systems of Gartland and Werley¹⁴ and modified Green O' Brien score¹⁵ Immediate postoperative radiographs were compared to those at final follow up (at twenty four months). An observer who performed all radiographic measurements was blinded to the clinical history and outcome. Range of motion of wrist and grip strength was evaluated by same external observer who made radiographic measurements. Grip strength was measured with Jamar dynamometer and compared with that of contralateral hand.

All patients were evaluated with scoring systems of Gartland and Werley¹⁴ as well as Green O' Brien.¹⁵ Scoring system of Gartland and Werley emphasizes upon clinical and radiographic data whereas Green O' Brien depends upon subjective and objective clinical data.

Results: Out of total 60 patients enrolled for study only 52 completed the follow up at two years. Three from locking plate group and five from non-locking plate group lost follow up.

1.4. Clinical results

The mean of range of motion and grip strength at final follow up (at twenty four months) for two groups are given in Table 1. There was no statistical difference between two groups for active range of motion and grip strength.

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