

## Comparison of Outcomes of Unstable Distal Radius Fractures Treated With Internal Fixation or External Fixation in Indian Population – A Series of 40 Cases

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**Abstract:** Distal radius fractures are associated with a lot of morbidity when anatomical reduction and stable fixation are not achieved. The precise relationship between the distal ends of the radius and ulna plays a vital role in all the movements of the wrist and also effects grip strength. As such for a given case, surgeons are often in a dilemma as to which method of fixation would be optimal. Internal fixation with distal radius plates requires careful dissection involving important blood vessels, nerves and tendons. There is limited literature to definitively conclude whether the risks involved in internal fixation are worth the benefits obtained. The main aim of our study is to find out whether one of these methods is clearly better than the other in terms of functional outcomes as assessed by DASH scoring system. Two cohorts of 20 patients each were involved in this study, one cohort being treated with internal fixation with volar plating and the other with a spanning external fixator. Their functional outcome after 1 year was statistically compared.

**Key Words:** distal radius, intra articular fracture, volar plating, external fixator, DASH scoring system.

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### I. Introduction

Controversies and differences of opinion are rampant among orthopaedic surgeons regarding the optimal surgical treatment for unstable distal radius fractures. Each surgical modality has its own merits and demerits. Evidence from rigorous comparative trials is sparse. Data from well designed clinical trials including validated patient reported functional outcomes is insufficient and is yet to demonstrate clinical superiority of any particular surgical option. We wanted to evaluate the functional outcomes obtained by open reduction and internal fixation in one group of patients and closed reduction and bridging external fixator application in the second group. We then compared the outcomes of these two groups to get an idea whether one of these modalities was clearly and consistently better than the other.

### II. Materials And Methods

Patients admitted into the orthopaedics department of Maharajah's Institute of Medical Sciences with unstable distal radius fractures were included in this study. To achieve random sampling, patients whose inpatient identification number was an odd number were allotted to the internal fixation group and patients whose inpatient identification number was an even number were allotted to the bridging external fixator group. In the internal fixation group, the fracture site was exposed through the standard volar approach to the distal radius. Anatomic reduction of the fragments was attempted and stable fixation with plate and screws was done. Skin closure was done with 1-0 silk suture material. In the bridging external fixator group, traction was applied to disimpact the fracture fragments. Two 3.5mm schanz pins were placed in the radius proximal to the fracture site and two 2.5mm schanz pins were placed in the second metacarpal. After attempting reduction with traction-counter traction under fluoroscopic guidance, the construct was completed using connecting rods and clamps. The external fixator was kept for 6 weeks. The fixator was removed after this period after confirming the presence of bridging callus in radiographs. The patients were followed up at the end of one month, two months and six months after completion of the procedure. Further follow-ups were scheduled as required.

### III. Results

Both the cohorts of patients were followed up for an average of 13 months (ranging from 6 months to 26 months). The average DASH score was 4 points for the group treated with internal fixation compared to a DASH score of 18 points in the group treated with a bridging external fixator. The range of movements were consistently better for the internal fixation group.

The significant parameters obtained at the last followup are as tabulated below:

Parameter	Internal Fixation group (20 patients)	Bridging External Fixator group (20 patients)
Average DASH score at the last followup	4 points	18 points
Average wrist flexion	69 degrees	65 degrees
Average wrist extension	72 degrees	61 degrees
Average radial deviation	14 degrees	10 degrees
Average ulnar deviation	32 degrees	21 degrees
Average pronation	85 degrees	63 degrees
Average supination	80 degrees	60 degrees

There were four cases of pin tract infection in the bridging external fixator group which resulted in loosening of at least one pin in the construct. None of the pins were removed prematurely. Infection was successfully eradicated with parenteral antibiotics. There was a single case of superficial surgical site infection in the internal fixation group which was successfully managed with oral third generation cephalosporin therapy. There were no instances of post operative nerve palsies in either of the groups.

**Figure I**

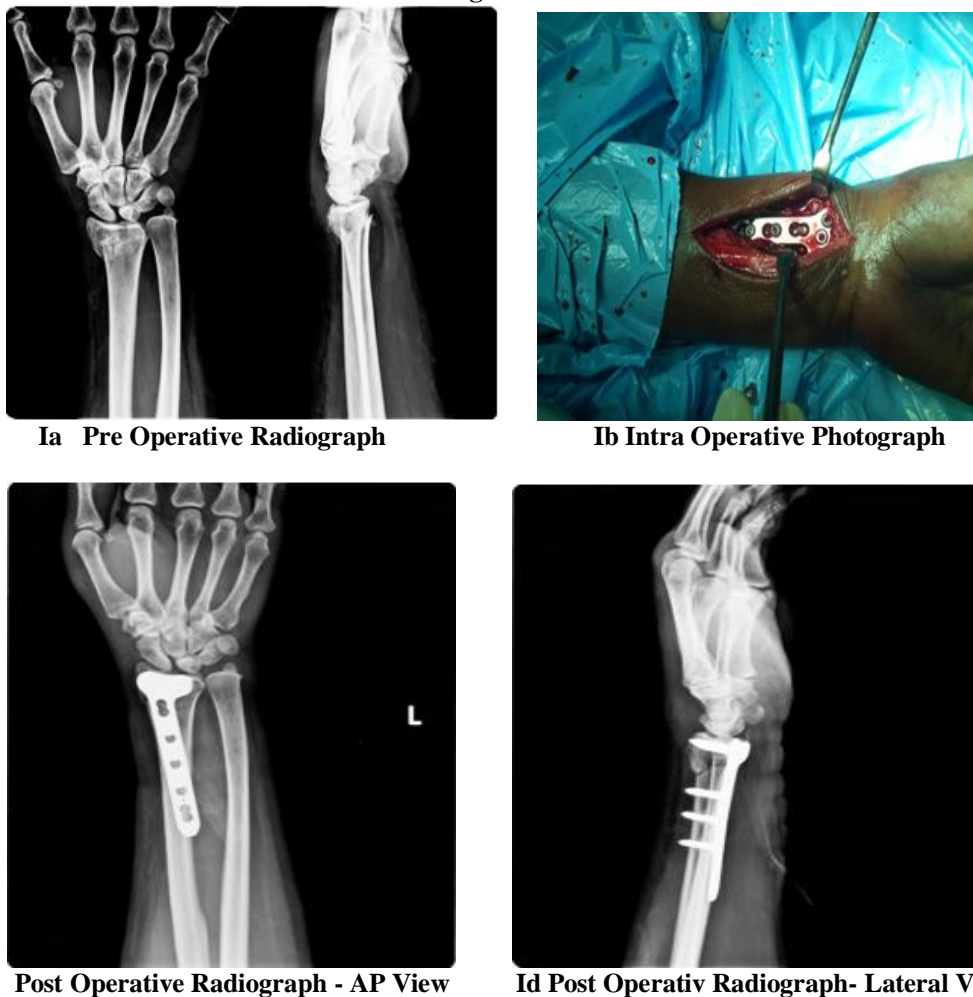
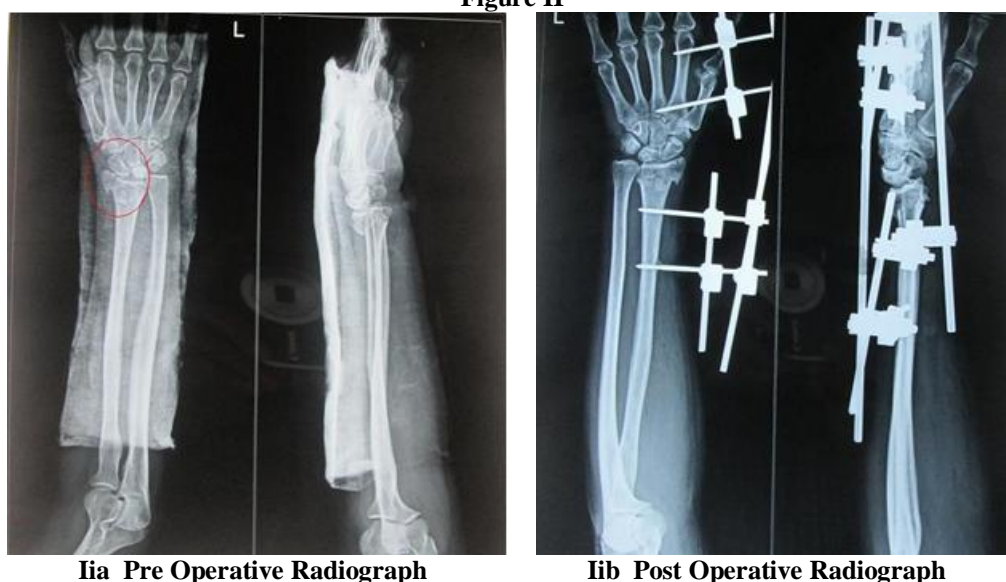


Figure II



#### IV. Discussion

External fixation is a commonly used technique for unstable distal radius fractures, its main benefit being its less invasive nature. The external fixator cannot ensure perfect anatomical reduction in all cases because it has no direct control over the bone fragments and has to rely on indirect reduction through ligamentotaxis. Other notable limitations of the external fixator are pin tract infections, pin loosening, radial shortening, inadequate correction of dorsal displacements, stiffness of the wrist and deconditioning of the muscles controlling wrist movements. Of these pin loosening has been reported as a very common complication in several studies<sup>1, 2, 3</sup>. The holding strength of these Schanz pins in the osteoporotic bone (osteoporosis is highly prevalent among people with distal radius fractures) is another cause for concern. Gelberman et al<sup>4</sup> demonstrated that excessive distraction during external fixation could cause elevated pressures in the carpal tunnel.

The advent of distal radius locking plates has provided several solutions to these problems. Direct visualization and manipulation of the fracture fragments appears to be the greatest advantage of open reduction and external fixation<sup>5</sup>. Some studies have reported good clinical results with distal radius plates of various types including dorsal, volar and fragment specific types<sup>6, 7, 8</sup>. The emerging trend is towards volar locked plates but there is little evidence in the form of trials and studies to support their purported advantages. This study is an endeavor to objectively analyse the functional outcomes of internal fixation with locked volar plates. This study shows that fixation with a locked volar plate is a viable option that produces good subjective and objective outcomes even in unstable distal radius fractures. Due to its excellent stability, the wrist need not be immobilized for prolonged periods (immobilization is a major cause of stiffness related morbidity and has also been suggested as one of the etiological factors for reflex sympathetic dystrophy). The perfect anatomical reduction that is possible with these plates prevents malunions and potential deformities. The plates available today have a very low profile with no disturbance to the surrounding anatomical structures even if they are indefinitely left in situ. In our study the average DASH score for patients treated with locked volar plates was 4 points whereas that for the patients treated with bridging external fixator was 18 points. This clearly illustrates the improved functional outcomes possible with volar plating. Even the range of movements were found to be better in the group treated with volar plating. The results obtained in our study are consistent with those of other such studies.

#### V. Conclusion

This study provides new evidence regarding the management of unstable distal radius fractures. It supports the recent emerging trend towards locked volar plating<sup>9</sup>. Open reduction and internal fixation with a volar plate consistently achieved better anatomic reduction and stable fixation enabling the patient to start early rehabilitation of the wrist leading to better functional outcomes. The use of screws with threaded heads with corresponding threads in the plate holes achieves absolute stability and high strength of fixation. Its use is suitable even in osteoporotic bone. High patient satisfaction becomes a reality with this approach because the problems of malunion, deformity and stiffness can be confidently avoided. The patients with volar plates had a mean DASH score comparable to normative values<sup>10</sup>.

### References

- [1]. Cooney WP, Linscheid RL, Dobyns JH. External pin fixation for unstable Colles' fractures. *J Bone Joint Surg (Am)* 1979;61:840–845.
- [2]. Dienst M, Wozasek GE, Seligson D. Dynamic external fixation for distal radius fractures. *Clin Orthop*.1997;338:160–171.
- [3]. Edwards GE. Intraarticular fractures of the distal part of the radius treated with the small AO external fixator. *J Bone Joint Surg (Am)* 1991;73:1241–1250.
- [4]. Gelberman RH, Szabo RM, Mortensen WW. Carpal tunnel pressures and wrist position in patients with Colles' fractures. *J Trauma*. 1984;24:747–749.
- [5]. Martineau PA, Berry GK, Harvey EJ. Plating for distal radius fractures. *Orthop Clin North Am*.2007;38:193-201
- [6]. Konrath GA, Bahler S. Open reduction and internal fixation of unstable distal radius fractures: results using the TriMed fixation system. *J Orthop Trauma*. 2002;16:578-85.
- [7]. Kamath AF, Zurakowski D, Day CS. Low-profile dorsal plating for dorsally angulated distal radius fractures: an outcomes study. *J Hand Surg [Am]*. 2006;31:1061-7.
- [8]. Rein S, Schikore H, Schneiders W, Amlang M, Zwipp H. Results of dorsal or volar plate fixation of AO type C3 distal radius fractures: a retrospective study. *J Hand Surg [Am]*. 2007;32:954-61.
- [9]. Chen NC, Jupiter JB. Management of distal radial fractures. *J Bone Joint Surg Am*. 2007;89:2051-62.
- [10]. Hunsaker FG, Cioffi DA, Amadio PC, Wright JG, Caughlin B. The American Academy of Orthopaedic Surgeons outcomes instruments: normative values from the general population. *J Bone Joint Surg Am*.2002;84:208- 15.