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Comparative analysis of conservative and surgical interventions in distal end radius fracture management in adults

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Abstract
Distal radius fractures are common injuries, and treatment options include surgical and conservative approaches. Surgical treatment, such as open reduction and internal fixation, offers better anatomical alignment and faster recovery but carries risks like infection and hardware complications. Conservative methods, including casting, are less invasive but may lead to malunion and stiffness. This comparison evaluates outcomes, complications, and functional recovery to determine optimal management for different patient populations.

Keywords: Distal end radius fracture, extra-articular, intra-articular, casting, henry's approach, stiffness, malunion

Introduction
Distal radius fractures are one of the most frequently encountered orthopedic injuries, affecting both younger individuals due to high-energy trauma and older adults, often as a result of low-energy falls. The management of distal radius fractures can be approached through a variety of methods, depending on the type, severity, and the patient's age and activity level.These methods generally fall into two categories:
1. Non-surgical Treatments
2. Surgical Treatments

Objectives
To compares the outcomes of conservative and surgical interventions in treating
distal end radius fractures in adults.

Materials and Methods
The retrospective cohort study was carried out from December 2022 to April 2024, at KVG Medical College & Hospital, Sullia- D.K, Karnataka.A total of 100 patients with distal radius fractures were enrolled and divided equally into two groups:
Conservative Treatment (50 patients)- involving closed reduction, followed by casting or splinting.
Surgical Intervention (50 patients) - surgical treatment using volar locking plate fixation.
All the patients were subjected to clinical and radiographic examination. Anteroposterior (AP) and lateral views of the wrist joints was taken at the time of presentation and at regular follow up intervals.

Inclusion Criteria
1. Patients with radiologicaly confirmed distal end radius fracture (including both intraarticular and extraarticular fractures).
2. Patients aged 18 years and above, presenting within the study period from December 2022 to April 2024.

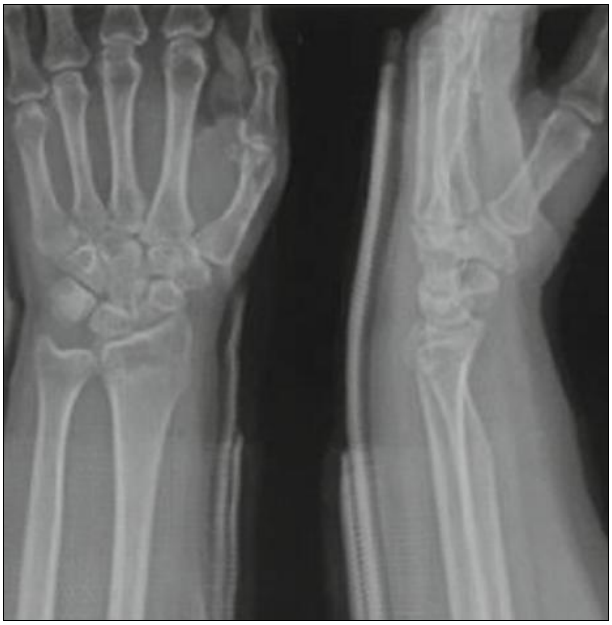
Exclusion Criteria
1. Patients aged below 18 yrs.
2. Individuals with prior wrist surgeries.
3. Patients with associated neurovascular injuries.

Study Design: retrospective cohort study

Sample size
Our study comprised 100 patients suffering from distal radius fractures, equally divided into two
treatment groups. The Conservative Treatment Group included 50 patients (23 males and 27
females) with an average age of 55 years. The Surgical Intervention Group also consisted of 50
patients, with a gender distribution of 38 males and 12 females, and an average age of 45 years**.**

Conservative approach
The conservative treatment for distal end of radius should be considered for:
1. Fractures of the low-demand elderly and infirm patients
2. Undisplaced extra-articular fractures, and
3. Extra-articular fractures with an initial position of <10° of dorsal angulation, minimal comminution, and <2 mm of shortening.

Patients were followed up at regular intervals
Serial x-rays were taken at immediate post reduction,1st week, 2nd week, 1 month, 3 months and 6 months
Initially a below elbow POP slab was put followed by below elbow POP cast once swelling subsided and reduction was maintained



Surgical approach

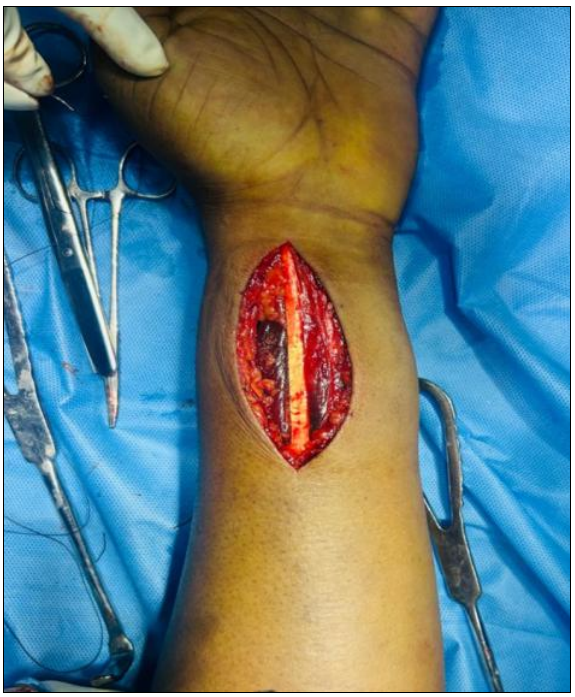
Indications for surgical approach

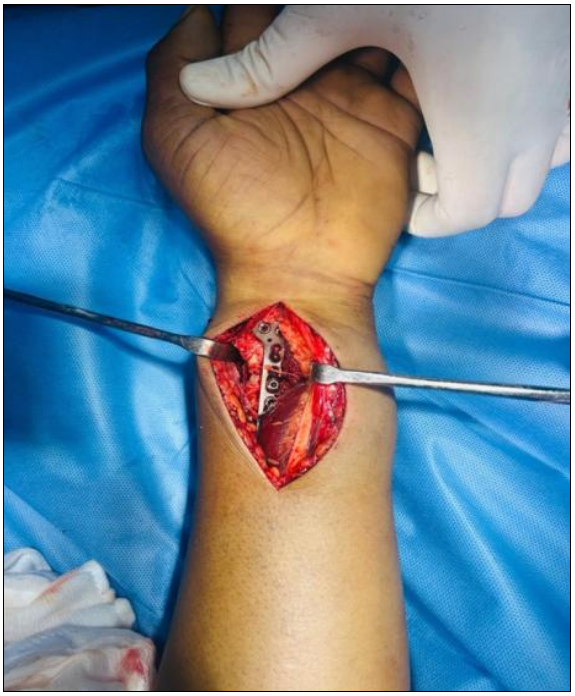
1. High energy injury with instability
2. Comminuted displaced intraarticular fracture
3. Open injury
4. Radial inclination <15
5. Articular step-off, or gap >2mm
6. Dorsal tilt >10
7. DRUJ incongruity
8. Failed closed reduction

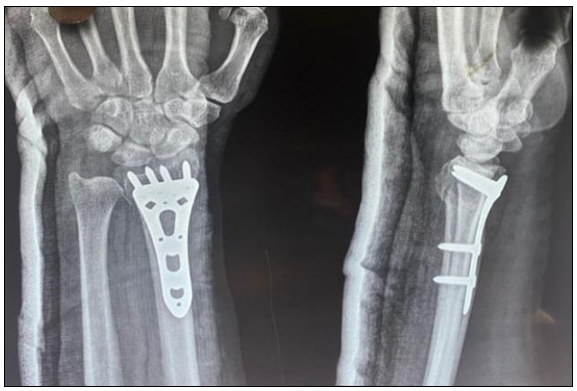
Incision was made over the distal forearm using a modified Henry's approach. The surgical plane was selected between the flexor carpi radialis tendon and the radial artery. The flexor tendons and median nerve were gently retracted medially, while the radial artery was retracted laterally. The pronator quadratus muscle was incised to fully expose the fracture site. A suitable locking plate was then fixed to achieve a stable reduction and fixation of the fracture.

Regular follow up was done at 10th day (for suture removal), 1 month, 3 months and 6 months

X rays (wrist- AP and lateral views) were taken on immediate post op, 1 month, 3 months and 6 months.







Key parameters measured included

1. Time to healing - confirmed through radiographic union.
2. Functional recovery (grip strength, range of motion, wrist flexion, and extension) - evaluated at 6 months post treatment.
3. Pain assessment - using the Visual Analogue Scale (VAS) at 3- and 6-months intervals.
4. Complications - linked to each treatment strategy.
5. Return to work/daily activities,
6. Patient satisfaction - Patient satisfaction levels, quantified on a scale from 1 to 10.
7. Reoperation rates - Reoperation rates observed during the study timeframe.

Results

Table 1: Sample Distribution

Group	Number of Patients	Gender Distribution	Average Age
Conservative Treatment	50	Male :23, Female :27	55 yrs
Surgical Intervention	50	Male :38, Female :12	42 yrs

Table 2: Time for Healing

Treatment Group	Average Time to Healing	Range
Conservative Treatment	10 weeks	8-12 weeks
Surgical Intervention	6 weeks	4-8 weeks

Table 3: Functional Recovery at 6 Months

Outcome	Conservative Treatment	Surgical Intervention
Grip Strength	85%	95%
Range of Motion	80%	98%

Table 4: Pain Assessment (VAS Score)

Time Frame	Conservative Treatment VAS Score	Surgical Intervention VAS Score
3 months	4	3
6 months	2	1

Table 5. Return to work/ daily activity

Treatment group	Average time to return
Conservative treatment	12 weeks
Surgical intervention	8 weeks

Table 6. Patient satisfaction	
Treatment group	Average satisfaction score
Conservative treatment	7
Surgical intervention	9

Table 7: Reoperation Rates	
Treatment Group	Reoperation Rate
Conservative Treatment	2% (for late surgical intervention)
Surgical Intervention	0% (for hardware removal or revision)

Table 8: Complications		
Complication	Conservative Treatment Group	Surgical Intervention Group
Malunion	10%	-
Delayed Union	8%	-
Nonunion	2%	-
Reflex Sympathetic Dystrophy	1%	-
Infection	-	4%
Nerve Damage	-	0%
Hardware Complication	-	2%
Post-operative Hematoma	-	1%

- The Surgical Intervention Group showed a faster average healing time (6 weeks) compared to the Conservative Treatment Group (10 weeks)
- Functional recovery at 6 months was higher in the surgical group across all measured outcomes
- Pain reduction, as assessed by VAS score, was more significant in the surgical group at both 3 and 6 months
- The surgical group also reported higher patient satisfaction
- The conservative group took longer to return to work/daily activities
- Both conservative and surgical group had their own variety of complications. Malunion, delayed union was more common in conservative group and infection rates and hardware related complications were found to be associated with surgical group

Conclusion

- Surgical intervention for distal radius fractures results in faster healing, better functional recovery, and higher patient satisfaction but comes with a higher risk of complications.
- Conservative treatment remains a viable option, especially considering the longer time to return to work and daily activities

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