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# Accelerated Recovery: A Case Report and Clinical Recommendations for Conservative Management Rehabilitation of Distal Radius Fracture

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**Abstract:** ***Background: Distal radius fractures are among the most prevalent upper extremity fractures, accounting for one-sixth of all fractures treated in emergency departments. They are commonly caused by falls onto an outstretched arm. These fractures represent 1.5% to 2.5% of all emergency orthopedic cases and over 18% of fractures in adults. The condition predominantly affects the elderly population. Objective: To evaluate the effectiveness of a structured rehabilitation protocol in improving pain, range of motion (ROM), strength, and hand function in a 60-year-old female patient with post-immobilization stiffness following a left distal radius fracture (DERF). Methods: A 60-year-old female diagnosed with post-fracture immobilization stiffness of the left wrist underwent physiotherapy intervention for three weeks. The rehabilitation program was formulated using the clinical practice guidelines (CPG), which focused on pain and edema management, sensory-motor training, and functional recovery. The Outcomes were measured using a numerical pain rating scale, wrist joint goniometry, resisted isometrics, and a patient-rated wrist evaluation. Results: By the end of the rehabilitation program, significant improvements in pain, edema, wrist and hand ROM, and strength were observed. The patient also exhibited enhanced hand function and could perform daily activities without discomfort. Outcome measures showed consistent improvement from baseline to discharge. Conclusion: The results of this case report suggest that a comprehensive rehabilitation protocol with specific goals and treatment plans will help to promote early recovery. It is suggested to assess the patient using outcome measures and plan a tailored made rehabilitation program to achieve the SMART goals.***

**Keywords:** Post-immobilization stiffness, Distal radius fracture (DRF), Rehabilitation protocol**,** Strengthening exercises**,** Hand function**,** Sensorimotor training.

## 1. Introduction

Wrist injuries in adults are commonly defined as trauma or damage to the wrist joint, which includes the distal radius, ulna, and carpal bones, as well as associated ligaments and tendons. These injuries can result from acute trauma, such as falls or sports-related impacts, or from repetitive strain and overuse.[1] Epidemiological data from Sweden report that 75% of these fractures result from simple falls, highlighting the relevance of studying distal radius fractures.[2] Further, a prospective study in Imphal, India, showed that these fractures are more common in older women and are closely related to postmenopausal osteoporosis.[3] Another survey detailed that low-energy trauma occurring at home is a primary cause, with complete articular fractures being the most common pattern.[4] This additional epidemiological context underscores the significance of managing and preventing distal radius fractures effectively for public health. A distal end of the radius fracture (DERF) is defined as a fracture at the site where the radius interfaces with the lunate and scaphoid bone of the wrist, which is three cm proximal to the radiocarpal joint. The most common cause of a distal radius fracture is falling onto an outstretched arm. Most DERFs are closed-type fractures.[5] The radius bone is the most often fractured bone in the arm, and distal radius fractures account for about 1.5% to 2.5% of all orthopedic emergency cases and more than 18% of all fractures in adults.[6] These fractures are among the most typical upper extremity fractures in adults, comprising one in six fractures treated in emergency departments, primarily affecting the elderly population. Symptoms of a distal radius fracture include pain, swelling in the forearm, tenderness, loss of function, numbness and tingling, discoloration, and abnormality in the wrist or forearm.[7] These fractures are often described by features such as dorsal misalignment, dorsal tilt, dorsal fragmentation, and radial shortening. Wrist injuries can weaken grip strength, limit wrist movement, and make tasks like writing, typing, or lifting hard to do. These problems often continue even after treatment, affecting both daily life and work. People may struggle with basic activities such as dressing, cooking, and personal hygiene. Tasks that need precise hand movements, like buttoning clothes or using utensils, can be especially challenging.[8, 9] Treatment for distal radius fractures can be either non-operative or operative, based on the severity of the fracture. Conservative treatment is typically preferred for less severe fractures and for patients not at high risk for surgery.[10] Non-surgical or conservative treatment involves realigning displaced fracture fragments (reduction), followed by the application of a splint or cast for six to eight weeks. If distal radius fractures are not treated properly, they can lead to limited daily functioning and irreversible impairments.1[1] Physiotherapy management for distal radius fractures includes both post-surgical and post-immobilization treatments. The kind of therapy is determined by the type of fracture, as evaluated through radiographs following temporary reduction. The approach to treatment is also influenced by the type of fracture, the age of the patient, and the necessity of exercise therapy. Most fractures are initially managed with an early protective stabilization phase, followed by a wrist movement phase. During the early fracture-treatment protection phase, the wrist is completely immobilized using either a cast or a splint, with any wrist

range of motion (ROM) being prohibited. Patient education emphasizes self-guided active or passive ROM exercises for the fingers of the affected hand, as well as for other nearby joints such as the elbow, forearm, and shoulder. The wrist mobilization phase begins, permitting exercise loading to be safely applied to the fractured area. For distal radius fractures, individuals managed conservatively begin the early mobilization phase immediately after a 4-6-week period of cast immobilization. The primary goal of the wrist mobilization phase is to control pain and swelling while enhancing both active and passive range of motion (ROM) in the wrist, hand, elbow, and shoulder. Hand rehabilitation is an exercise protocol specifically designed to treat injuries of the hand and wrist.[10] It includes patient education, pain management, exercise therapy, and a tailor-made home exercise program. There is also an emphasis on developing wrist and hand sensitivity, along with sensory-motor integration through improved cognitive proprioception. Submaximal static exercises can enhance pain relief, joint dynamic stability, and motor control across all joints. This therapy option typically requires physician clearance for insurance coverage, and effective communication and coordination between the therapist and orthopedic surgeon are crucial for successful rehabilitation and optimal outcomes. The Patient-Reported Wrist Evaluation (PRWE), a tool designed in Canada, is used to assess recovery. This 15-item questionnaire evaluates both pain and function, including six specific tasks and four questions about daily life activities. The scoring is determined out of 100, with 0 indicating the absence of pain and impairment. The PRWE provides a comprehensive measure to monitor patient progress and refine treatment strategies for optimal recovery.[12]

## 2. Case Description

A 60-year-old woman presented to the physiotherapy outpatient department with complaints of left wrist pain, difficulty moving her wrist and fingers, and trouble performing daily tasks, including grooming and household chores. By occupation, she is a housewife maintaining good health. Before the injury, there was no previous history of falls, no history of co-morbidities with no significant medical conditions, or prior history of fractures. On September 18, 2024, the patient slipped and fell in her bathroom. She did not experience any loss of consciousness or head injury. However, she reported severe pain, swelling, and limited mobility in the left wrist and fingers following the fall. An X-ray revealed an undisplaced fracture of the left distal radius. Although she was initially advised to pursue conservative treatment, the patient sought care at a local bone-setting center, where a POP (plaster of Paris) cast was applied, and she was instructed to immobilize the wrist for three months. After one month of immobilization, the patient returned to the bone-setting center with complaints of itching and discomfort. The cast was replaced, and she was instructed to continue immobilizing the wrist for an additional two months. On December 4, 2024, an X-ray indicated good healing of the fracture, and the patient was prescribed medication for pain relief. The orthopedic specialist recommended physiotherapy to address the ongoing pain and limited wrist and finger movements. The patient visited the outpatient physiotherapy department on December 5, 2024. Upon evaluation, she reported experiencing dull, aching pain in the left wrist, especially during wrist and finger movements. She rated the pain as 5/10 on the Numerical Pain Rating Scale (NPRS). Observations revealed mild, diffuse swelling around the wrist and fingers, with no signs of muscle wasting. The left wrist was held in a neutral position, supported by the right hand. Pitting edema was noted on the dorsum of the left hand, and the skin was warmer compared to the right hand. Tenderness was localized to the distal radius area.

### Clinical Findings

**Table 1:** On Examination of Range of Motion

| Wrist Movement | Rt AROM | Rt PROM | Lt AROM | Lt PROM | END FEEL |
|---|---|---|---|---|---|
| Flexion | (0-80°) | (0-85°) | (0-45°) | (0-55°) | Tissue Stretch |
| Extension | (0-50°) | (0-55°) | (0-30°) | (0-45°) | Bony |
| Ulnar Deviation | (0-50°) | (0-55°) | (0-5°) | (0-20°) | Bony |
| Radial Deviation | (0-25°) | (0-30°) | (0-10°) | (0-20°) | Bony |
| Supination | (0-60°) | (0-65°) | (0-30°) | (0-35°) | Tissue Stretch |
| Pronation | (0-80°) | (0-90°) | (0-30°) | (0-35°) | Tissue Stretch |

**Table 2:** Resisted Isometrics

| Wrist Movement | Rt wrist | Lt wrist |
|---|---|---|
| Flexion | Strong and pain-free. | Weak and painful. |
| Extension | | |
| Ulnar Deviation | | |
| Radial Deviation | | |
| Supination | | |
| Pronation | | |

Functional assessment was done using a patient-rated wrist evaluation questionnaire (PRWE). The score was 50.

**Fig 1:** Investigations
X-ray – Left wrist AP / Lateral view:

AT THE TIME OF THE FRACTURE AND AFTER REMOVING THE POP CAST.

**Special Tests**
Ligament integrity tests were performed to rule out ligament laxity.

**Intervention:** The Physiotherapy treatment was formulated based on the clinical practice guidelines 2024[12].

**Table 3**

| DAY WISE | GOALS | REHABILITATION EXERCISES |
|---|---|---|
| DAY 1 – 6 | Patient education.<br>Pain management.<br>To improve left wrist AROM, grip strength, and functional capacity.<br>Oedema management. | Hot/cold packs (B)<br>AROM exercises for left hand, wrist, and shoulder (A) [10×3 reps]<br>Submaximal progressive strengthening and light load gripping exercises (B) [10 sec hold with 10×3 reps]<br>Mobilization with movement, oscillations, [10 reps] sustained stretching (B) [10 sec hold with 10×3 reps]<br>Oedema control techniques-elevation and home exercises instruction (C) |
| DAY 7 – 12 | To improve forearm and wrist strength.<br>To address the scapula and glenohumeral musculature.<br>To improve Hand function. | Wrist and forearm loading exercises. (2kg db) (B) [10 sec hold with 10×3 reps]<br>Progressive bilateral resistance exercises (B) [10 sec hold with 10×3 reps]<br>Tendon gliding exercise (B) [10 reps] |
| DAY 13 – 18 | To improve functional capacity. | Sensorimotor training-Graded motor imagery (A)<br>Proprioceptive exercises for wrist and hand (C) |
| DAY 19-20 | To teach a home exercise programme | Tailor-made home exercise programme |

The patient had follow-up for 19 days (excluding Sundays)

**Results based on follow-up and outcomes.**

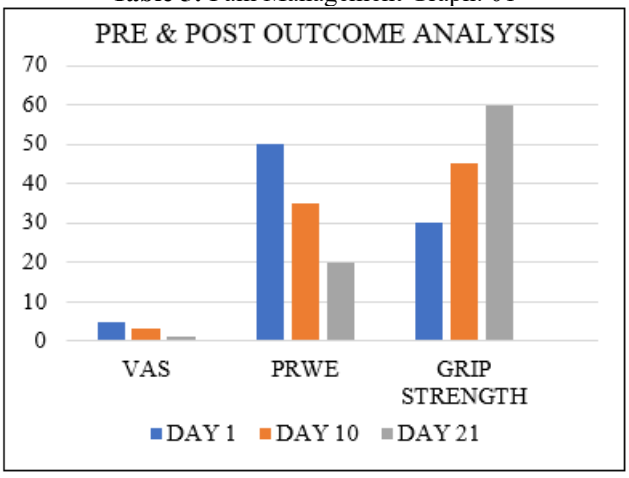
**Table 4:** Time to healing

| | Average time of healing | Range |
|---|---|---|
| Conservative | 10 weeks | 8-12 weeks |

Time to Healing: Although the immobilization was done at a bone-setting center, sufficient time was given for the fracture to heal. The patient kept the plaster cast on for almost 2.5 months.

Patient Satisfaction: The patient was highly satisfied with the recovery.

**Table 5:** Pain Management Graph: 01




| OUTCOME | DAY-1 | DAY-10 | DAY-21 |
|---|---|---|---|
| NPRS | 5/10 | 3/10 | 1/10 |

**Table 6**

| GRIP STRENGTH USING S PHYGMOMANOMETER | DAY 1 | DAY 10 | DAY 21 |
|---|---|---|---|
| | 30 mmHg | 45 mmHg | 60 mmHg |

**Table 7:** PRWE: Patient-rated wrist evaluation questionnaire

| PRWE | DAY 1 | DAY 10 | DAY 21 |
|---|---|---|---|
| | 50 | 35 | 20 |

**Functional recovery**

**Table 8:** Active Range of Motion of Left Wrist and Forearm

| Movement | DAY-1 | | DAY-10 | | DAY-21 | |
|---|---|---|---|---|---|---|
| | Lt | Rt | Lt | Rt | Lt | Rt |
| Flexion | (0-45°) | (0-80°) | (0-60°) | (0-80°) | (0-70°) | (0-80°) |
| Extension | (0-30°) | (0-50°) | (0-50°) | (0-50°) | (0-60°) | (0-50°) |
| Ulnar Deviation | (0-5°) | (0-50°) | (0-40°) | (0-50°) | (0-50°) | (0-50°) |
| Radial Deviation | (0-10°) | (0-25°) | (0-25°) | (0-25°) | (0-25°) | (0-25°) |
| Supination | (0-30°) | (0-60°) | (0-40°) | (0-60°) | (0-60°) | (0-60°) |
| Pronation | (0-30°) | (0-80°) | (0-35°) | (0-80°) | (0-80°) | (0-80°) |

**Table 9:** Muscle Strength of Left Wrist and Forearm

| WRIST MOVEMENT | DAY 1 | DAY 10 | DAY 21 |
|---|---|---|---|
| Flexion | Weak and painful | Strong and moderate pain. | Good contraction and pain-free. |
| Extension | | | |
| Ulnar Deviation | | | |
| Radial Deviation | | | |
| Supination | | | |
| Pronation | | | |

## 3. Discussion

This study adhered to the clinical practice guidelines for distal radius fractures (2024), which significantly contributed to effective rehabilitation management. The structured approach, integrating evidence-based pain management techniques and a tailored rehabilitation protocol, resulted in a notable reduction in post-immobilization pain levels and functional recovery for the patient.

The findings of previous studies underscored the importance of individualized rehabilitation strategies in reducing pain and enhancing functional recovery in distal radius fractures.[13] Similarly, a study emphasized that adherence to clinical guidelines with levels of evidence A, B, and C resulted in faster recovery rates and improved patient-reported outcomes. The observations in the previous study highlighted the necessity of the timely initiation of rehabilitation to minimize complications and improve outcomes.[14] While the case demonstrated successful adherence to guidelines, it also highlights the critical role of the patient's motivation and compliance in achieving positive outcomes. The previous study suggests that delayed rehabilitation—especially post-immobilization periods exceeding two months—can lead to a reduced range of motion and higher incidences of residual discomfort. This case echoes the necessity of the timely initiation of rehabilitation to minimize complications.[15]

## 4. Conclusion

This case highlights the effectiveness of a three-week intervention designed in accordance with the clinical practice guidelines (CPG) for managing distal radius fractures. The rehabilitation program's focus on pain and edema management, sensory-motor training, and functional recovery led to significant improvements in the patient's condition. Outcomes were systematically measured using the numerical pain rating scale, wrist joint goniometry, and resisted isometric exercises, reflecting intense progress in the patient's wrist function and reduction of symptoms.

The take-away message from this study focuses on the need for active patient engagement and education throughout the recovery process. Understanding the critical role of evidence-based guidelines in shaping physiotherapy interventions and the importance of patient compliance in achieving optimal recovery. The patient's adherence to the rehabilitation protocol, coupled with structured physiotherapy, facilitated faster recovery and a return to daily activities**.** Overall, this case exemplifies the effective application of clinical guidelines in achieving optimal outcomes for distal radius fractures. However, it also highlights areas for improvement, such as earlier engagement in physiotherapy and greater patient education to ensure adherence to evidence-based treatment protocols. future recommendation should explore the application of CPGs across a larger and more diverse population, starting from the early stages of immobilization. Incorporating additional outcome measures, such as grip strength and patient-reported assessments, could further validate the guidelines and enhance the evidence base for distal radius fracture rehabilitation.

**Figure 2:** Wrist Exercises

**Figure 3:** Hand Gripping Exercises and Tendon Gliding Exercises

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