

# PHYSIOTHERAPEUTIC REHABILITATION FOR DISTAL RADIUS FRACTURE WITH POSTTRAUMATIC NEUROPATHY AND SEVERE HAND MOVEMENT LIMITATIONS

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**Abstract:** *This article elucidates the rehabilitation of distal radius fracture with post-traumatic neuropathy and joint stiffness, characterized by severe functional limitations, persistent pain syndrome, and muscle weakness. The rehabilitation process is exemplified through a case study focusing on post-fracture rehabilitation with post-traumatic neuropathy and joint stiffness. Analyses were conducted based on relevant specialized literature, scientific research, and the specifics of the described case. Consequently, conclusions are presented as recommendations to be applied in similar cases.*

**Key words:** *Distal radius fracture, physical therapy, rehabilitation program, manual therapy, passive mobilization.*

## 1. Introduction

Distal radius fractures are among the most common orthopedic injuries encountered in medical practice, and their management is often complex and challenging. Especially when these fractures are associated with post-traumatic neuropathy and joint stiffness, therapeutic approach becomes an additional challenge. Post-traumatic neuropathy can involve a variety of symptoms, including persistent pain, paresthesia, muscle weakness, and difficulties in coordinating movements, while joint stiffness can significantly affect patients' functionality and quality of life.

In this context, physical therapy and manual therapy represent essential

elements of the recovery process in distal radius fractures with post-traumatic neuropathy and joint stiffness. Through joint mobilizations, exercises, and appropriate physical therapy techniques, joint mobility can be improved, muscle strength can be increased, and the reduction of pain and other symptoms associated with post-traumatic neuropathy can be achieved.

In this article, we aim to explore the role and effectiveness of physical therapy in addressing distal radius fractures in the context of post-traumatic neuropathy and joint stiffness. We will examine various aspects of physical therapy, including types of exercises, intervention modalities, and strategies for managing associated complications.

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By understanding and properly addressing physical therapy in distal radius fractures with post-traumatic neuropathy and joint stiffness, we can offer patients a greater chance of functional recovery and improvement in their quality of life.

## **2. The Research**

### **2.1. The purpose of the research**

The aim of the recovery program in distal radius fracture with post-traumatic neuropathy and joint stiffness is to facilitate complete functional recovery of patients, reducing symptoms associated with neuropathy, and restoring mobility and functionality of the affected joint.

### **2.2. Research objectives**

- 1.Reducing pain and associated discomfort
- 2.Restoring joint mobility
- 3.Improving muscle function and coordination of movements
- 4.Neurological re-education
- 5.Enhancing quality of life

### **2.3. Research methods**

The research methods used in the study involve a multifaceted approach that integrates theoretical frameworks, clinical assessments, and patient-reported outcomes. From the physiotherapist's point of view, the goniometric method and muscle balance assessment were utilized, as well as the visual analog scale.

## **3. Results and Discussions**

Distal radius fracture is one of the most common orthopedic injuries encountered in medical practice, characterized by the fracture of the lower end of the radius bone in the forearm.

It is often associated with traumas caused by a fall on an outstretched hand or direct impact on the wrist.

This fracture can affect a wide range of ages and population groups, although it is more common among elderly individuals and postmenopausal women.

The incidence of distal radius fracture has increased in recent decades, partially due to population aging and the increased frequency of osteoporosis.

The treatment of distal radius fracture may vary depending on the severity of the fracture, the age and general condition of the patient, as well as the presence of other associated injuries [4], [7], [11].

Below, I will present a case study conducted at CRM KINETICA, Chişinău, Republic of Moldova. During the consultation, patient N.P. presented with a post-distal radius fracture state, with post-traumatic neuropathy and joint stiffness. He exhibited severe motion limitations on goniometry (Flexion: 0°, Extension: 5°), according to the Visual Analog Scale (VAS) numeric rating scale, 7/10, and muscle strength deficit of f3 (manual muscle test) [2, 3], [Table 1].

Combining techniques and methods of physiotherapy, manual therapy techniques, and efficient and personalized physical effort management has resulted in a significant improvement in the patient's physical and mental condition. The patient reports a decrease in the pain level to 2/10 (VAS), an increase in muscle strength to f4, restoration of joint mobility to F-85°; E-75°. Grip function has improved, significantly easing and enhancing the performance of daily activities. After completing the program, the patient reintegrated into their former workplace. The patient has been recommended to continue exercising the exercise program at home [2], [12].

Comparative table Table 1

Testing at the beginning of the programme	
N.P.	Left hand
Goniometry	F-0°; E-5°
Manual muscle testing	3
VAS	7/10
Testing after finishing the program	
N.P.	Left hand
Goniometry	F-85°; E-75°
Manual muscle testing	4
VAS	2/10

Physical therapy program	
No.of pro- cedures	content of the procedure
1-10	passive joint mobilizations, PNF techniques
10-20	Joint mobilizations, PNF techniques, flexion and extension exercises, pronation, supination, interfigital prehension
20-30	Block exercises, flexion, interphalangeal extension, palmar extension flexion, isolated radiocarpal joint flexion/extension, prehension.

### 3.1. Additional observations

The patient realized the necessity of performing home exercises independently and the importance of involvement in the rehabilitation process. The physiotherapy program included a variety of techniques of passive joint mobilizations as well as specific exercises in hand rehabilitation, tailored to the patient's needs and capabilities. These included:

- ♦ Passive joint mobilizations on the radiocarpal, intercarpal, and carpo-metacarpal joints focused on reducing pain and increasing joint mobility.
- ♦ Proprioceptive Neuromuscular Facilitation (PNF) techniques aimed at promoting mobility, stability, and muscle strength in the hand [1, 2], [8], [15].
- ♦ *Blocking exercises*. Specific exercises designed to induce isolated movement

by blocking a global movement, allowing for increased neuromuscular control and active joint mobility, as well as muscle strength [5], [10], [13], [14].

### 3.2. Progress and results

During the 30 sessions, the patient periodically showed improvements in his functional status:

- Increased joint mobility: Periodic goniometric evaluations demonstrated a gradual increase in joint mobility.
- Increased muscle strength: The patient, through his subjective observations and manual muscle testing, confirmed an increase in muscle strength.
- Decreased pain: During the physiotherapy program, the patient reported a gradual decrease in the pain level.

### 3.3. Perspectives

This patient case study illustrates the effectiveness of a personalized physiotherapy program in addressing the complex issue of rehabilitating distal radius fracture with post-traumatic neuropathy and joint stiffness. The results underscore the importance of a multidisciplinary and individualized approach to managing potential complications. The study indicates that, in this patient's case, physiotherapy significantly contributed to improving quality of life and overall functionality.

### 4. Conclusions

*Holistic Rehabilitation Approach:* Both the article and the case study underscore the importance of adopting a holistic approach to the rehabilitation of distal radius fractures with post-traumatic neuropathy and joint stiffness. By

integrating various therapeutic modalities such as physiotherapy, manual therapy, and individualized exercise programs, healthcare professionals can effectively address the multifaceted needs of patients, leading to improved functional outcomes and enhanced quality of life.

*Patient-Centered Care:* The article and case study emphasize the significance of patient-centered care in orthopedic rehabilitation. Tailoring treatment plans to meet the unique needs and preferences of each patient is essential for promoting adherence to therapy and achieving optimal recovery. By prioritizing patient empowerment and engagement throughout the rehabilitation process, healthcare providers can foster greater patient satisfaction and long-term treatment success.

## References

1. Albu, C. A.: *Kinetoterapie. Metodologia poziţionării şi mobilizării pacientului (Physiotherapy. Methodology of patient positioning and mobilization)*. Iaşi, Polirom, 2012.
2. Balint, T. D.: *Evaluarea aparatului locomotor bilanţ articular bilanţ muscular teste funcţionale (Assessment of the locomotor system joint balance muscle balance functional tests)*. Iaşi, Editura Tehnopress, 2007.
3. Dellon, A.: *The moving two-point discrimination test: clinical evaluation of the quickly adapting fiber/receptor system*. In: *J Hand Surg Am*, 3(5), 1978, p. 474-481.
4. Gornea, F.: *Ortopedie şi Traumatologie*. Chişinău: Centrul Editorial-Poligrafic Medicina 2, 2010.
5. Jaffe, R., Farney-Mokris, S.: *Edema*. In: *Clinical Assessment Recommendations*. Chicago: American Association of Hand Therapists, 1992.
6. Laseter, G.: *Therapist's management of distal radius fractures*. In E. Mackin, A. Callahan, T. Skirven, *Rehabilitation of the hand and upper extremity*. St. Louis: Mosby, 2002.
7. LaStayo, P., Winters, K., Hardy, M.: *Fracture healing: bone healing, fracture management, and current concepts related to the hand*. In: *J Hand Ther*, 16(2), 2003, 81-93.
8. Liu, T-Y., Yang, C-Y.: *Management of Extra-Articular and Intra-Articular Distal Radius Malunion*. In: *Life*, 14(9), 2024, 1177.
9. Noraphaiphaksa, N., Surangkana, K., Waitayawinyu, T., Kanchanomai, C.: *Practical Method to Evaluate the Stiffness of Fractured Radius*. In: *Methods Protoc*, 6(3), 2023, p. 56.
10. Quadlbauer, S., Pezzei, C., Jurkowitsch, J., Rosenauer, R., Kolmayr, B., Keuchel, T., Leixnering, M.: *Rehabilitation after distal radius fractures: is there a need for immobilization and physiotherapy?* In: *Arch Orthop Trauma Surg.*, 140(5), 2020, p. 651-663.
11. Ratajczak, P., Meller, P., Kopciuch, D., Paczkowska, A., Zaprutko, T., Kus, K.: *Assessment of Patients' Quality of Life during Conservative Treatment after Distal Radius Fracture*. In: *Int J Environ Res Public Health*, 10;19(22), 2022, 14758.
12. Skirven, T.: *Clinical examination of the wrist*. In: *J Hand Ther*, 1996, p. 96-107.
13. Stone, J.: *Sensibility. Recommendations, Clinical Assessment*. Chicago: American Association of Hand Therapists, 1992.
14. Stralka, S.W.: *Hand Therapy Treatment*. In: *Hand Clin.*, 32(1), 2016, p. 63-69.
15. Wang, W-T., Chen, C-S.: *Treatment of the Distal Forearm Fracture by Volar Dual Window Approach*. In: *Life (Basel)*, 14(8), 2024, p. 972.