

Efficacy of Physiotherapy Rehabilitation for Comminuted Olecranon Fracture: A Case Report

Anmol Mall¹, Dr. Reema Rasotra (PT)²

¹MPT Student, Registration No.12309733, Lovely School of Allied Medical Sciences, Department of Physiotherapy, Lovely Professional University, Phagwara.

²Assistant Professor, UID-24404, Lovely School of Allied medical Sciences, Department of Physiotherapy, Lovely Professional University, Phagwara.

Corresponding Author: Anmol Mall

DOI: <https://doi.org/10.52403/ijhsr.20250134>

ABSTRACT

Background: Comminuted olecranon fractures are complex injuries that can result in significant functional impairments if not managed effectively. Surgical intervention combined with physiotherapy rehabilitation is crucial for restoring optimal elbow function.

Case Presentation: A 22-year-old female presented to the physiotherapy outpatient department with difficulty extending her right elbow and performing daily activities for the past month. She had a comminuted right olecranon fracture and underwent open reduction and internal fixation (ORIF) using plates and screws.

Outcome and Follow-up: A comprehensive 8-week rehabilitation protocol was designed with phase-specific goals and criteria for progression. The patient demonstrated significant improvements in range of motion, muscle strength, and functional recovery by the end of 8 weeks. Regular assessments and tailored physiotherapy sessions facilitated her return to normal daily activities and improved quality of life.

Conclusion: A well-structured rehabilitation plan is crucial after ORIF for olecranon fractures. Early mobility, gradual strengthening, and progression of exercises can enhance recovery, minimize complications, and restore elbow function effectively.

Keywords: Elbow, Exercises, Olecranon fractures, Range of motion

INTRODUCTION

Comminuted olecranon fractures are complex injuries that involve multiple fragments of the ulna at the elbow joint, often resulting from high-impact trauma such as falls or direct blows to the elbow. These fractures can lead to significant functional impairments, including loss of mobility, pain, and instability if not managed properly. Surgical intervention is typically required to achieve anatomical reduction and stable fixation of the fracture. Following surgery, a structured rehabilitation program is essential

to restore optimal function and promote recovery.

Physiotherapy plays a critical role in the recovery process by focusing on restoring both mobility and strength while minimizing complications such as stiffness, muscle atrophy, and joint dysfunction. The primary goal of physiotherapy is to enhance the patient's ability to regain functional use of the affected limb and perform daily activities with minimal discomfort. Studies have shown that early and individualized rehabilitation significantly improves outcomes in patients with olecranon fractures

(1, 2). Tailored physiotherapy programs that incorporate both passive and active rehabilitation techniques are essential for optimizing recovery. This case report examines the physiotherapy rehabilitation process following surgical treatment for a comminuted olecranon fracture. By integrating evidence-based techniques and individualized therapy, the aim is to optimize recovery outcomes and ensure the patient's return to functional activities with minimal discomfort.

CASE PRESENTATION

A 22-year-old female patient weighing 52kg with height of 152cm with upper middle class status by occupation PhD student reported to campus OPD of department of Physiotherapy, Lovely Professional University, Phagwara. Her chief complaints were difficulty in extending her right elbow, sleeping as she had habit of sleeping on right side and also difficulty in doing her daily activities like grooming, bathing etc. since one month. Her present history revealed that patient had met with an accident by skid and fall from the bike on tip of the right elbow. She was taken to hospital, where all the investigations were done and her X-RAY report findings confirmed it as comminuted fracture of olecranon(right). She was suggested for surgery by her doctor. She underwent ORIF (open reduction and internal fixation) with plates and screws. Later, when she went for follow up to her doctor after one week, he had advised her for physiotherapy. She came to LPU Physiotherapy OPD after one month after the surgery for further management. Past history revealed that there was no history of recent trauma other than this accident. Medical history of the patient revealed that patient was taking vitamin D3 tablets for bone/fracture healing, NSAIDS for pain and antibiotics for infections. Personal history of the patient reveals that patient is nonsmoker, nonalcoholic, consume vegetarian diet and has active lifestyle. Social history of the patient states that patient belongs to upper middle-class family as her score was 19 out

of 29 according to modified Kuppuswamy scale (3).

On pain evaluation it revealed that site of the pain was over olecranon process covering posterior aspect of the elbow and side of the pain was right. Onset of pain was gradual and dull aching type. Numeric Pain Rating Scale (NPRS), was 6/10 during elbow movements or daily activities and 0/10 during rest. On observation and according to BMI which was calculated using BMI calculator that revealed as (22.5 kg/m²), which explains that she falls under the normal category and built of the patient was mesomorphic. Patient was wearing shoulder sling to support her right elbow when she reported to our OPD. Posture was assessed using plumb line in anterior view which reported right shoulder elevated then left and slightly abducted, right elbow was flexed, supinated and right wrist in neutral position. Patient had flexion contracture of right elbow. On scar inspection it revealed that scar was present over posterior aspect of right elbow and was healthy and in healing stage with no signs of infections.

On palpation the patient had grade (1) tenderness over the olecranon region(4). Swelling and redness were absent over olecranon region. Skin texture near scar revealed as dry, flaky skin. Sensory examination reported that dermatomes were intact which was compared from the normal side. Active and passive range of motion of bilateral shoulder, elbow, and knee was assessed using Goniometer which revealed normal ranges of right shoulder and wrist and also left upper limb with restricted ranges for right elbow which is shown in the table given below. Manual muscle testing for muscle strength of shoulder, elbow and wrist musculature of both the upper limbs was assessed using oxford grading system which reported as grade 3+/5 of right shoulder and wrist, 3-/5(mid-range) in the right elbow and 4+/5 of left shoulder, elbow and wrist (5). Grip strength revealed fair on the right side and good on the left side. Joint play of right elbow that is flexion and extension was limited. Force couple between triceps and

biceps was disturbed. Functional evaluation revealed that patient was partially dependent for combing, dressing. The Quick DASH assessment tool was used to measure disability related to upper extremity musculoskeletal conditions that explains that higher scores indicate greater disability and severity, while lower scores indicate less disability. The scores range from 0 (no disability) to 100 (most severe disability) and patient had scored 65/100 (6).

Differential diagnosis

- Olecranon fracture
- Radial head fracture
- Triceps tendon injury
- Ulnar nerve entrapment

Provisional diagnosis

- Olecranon fracture

S. No	Elbow (AROM)	Right	Left
1.	Flexion	50° – 90°	0° – 145°
2.	Extension	90° – 50°	145° – 0°

Table 1: Active range of motion of right and left elbow joint using goniometer.

S. No	Elbow (PROM)	Right	Left
1.	Flexion	45° – 95°	0° – 145°
2.	Extension	95° – 45°	145° – 0°

Table 2: Passive range of motion of right and left elbow joint using goniometer.

S. No	Shoulder group of muscles	Right	Left
1	Flexors	3+/5	4+/5
2	Extensors	3+/5	4+/5
3	Abductors	3+/5	4+/5
4	Internal rotators	3/5	4+/5
5	External rotators	3/5	4+/5

Table 3: Manual muscle testing (MMT) of Shoulder Muscles using Oxford grading system.

S. No	Elbow group of muscles	Right	Left
1	Flexors (mid-range)	3-/5	4+/5
2	Extensors (mid-range)	3-/5	4+/5
3	Pronators	3-/5	4+/5
4	Supinator	3-/5	4+/5

Table 4: Manual muscle testing (MMT) of Elbow Muscles using Oxford grading system.

S. No	Wrist group of muscles	Right	Left
1	Flexors	3+/5	4+/5
2	extensors	3+/5	4+/5

Table 5: Manual muscle testing (MMT) of Wrist Muscles using Oxford grading system.



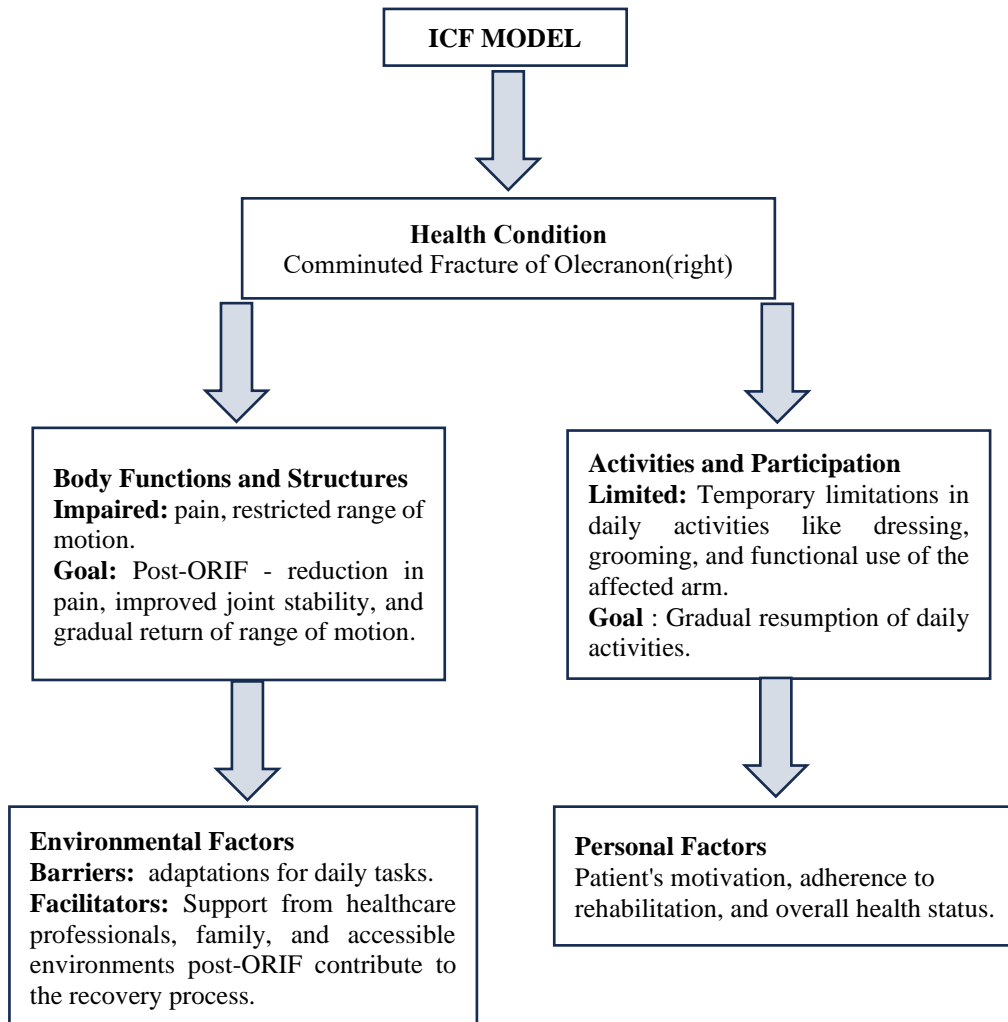
Figure 1: X ray showing displaced olecranon fracture on the right side.



Figure 2: X ray showing fracture was treated with open reduction and internal fixation (ORIF).



Figure 3: Postoperative image showing the lateral aspect of the right elbow, displaying healing incisions and scabbing following surgical intervention (ORIF).



Physiotherapy Intervention

Short term goals:

- To reduce pain over the olecranon region
- To increase range of motion of right elbow

- To correct the deformity and stiffness of right elbow
- Scar management
- Patient education.

Long term goals:

- To improve muscle strength and power of right shoulder, elbow and wrist muscles
- To master functions in daily activities and work.

- Protect healing site (over olecranon region) for 4-6 weeks
- To decrease pain/inflammation over olecranon region
- To decrease muscular atrophy of muscles of elbow
- To promote tissue healing
- Patient education

Management:

➤ **Immediate Post-Op Phase: Weeks 0-4**

➤ **Goals:**

Post-Operative Week 1	Post-Operative Week 2
<p>Brace: Posterior splint at 90 degrees elbow flexion for 10 days</p> <p>Range of Motion: wrist extension /flexion AROM immediately postoperative</p> <p>Exercises: gripping exercises, Shoulder isometrics exercises</p> <p>Cryotherapy: to elbow joint as needed</p> <p>Scar management: - scar massage using Vaseline jelly and performing gentle circular strokes, transverse strokes, scar lifting and rolling.</p> <p>Patient Education as needed: Advice not to lift heavy weights</p> <ul style="list-style-type: none"> • Taking precautions while using electrical gadgets. 	<p>Brace: Hinged elbow brace locked at 90° flexion when not in therapy</p> <p>Exercises:</p> <ul style="list-style-type: none"> • PROM of elbow in available range • Elbow extension isometrics (sub-painful) • Continue wrist ROM exercises • Wrist ROM exercises, gripping exercises <p>Cryotherapy: to elbow joint as needed</p> <p>Scar management: - scar massage using Vaseline jelly and performing gentle circular strokes, transverse strokes, scar lifting and rolling.</p> <p>Patient Education as needed: Advice not to lift heavy weights</p> <ul style="list-style-type: none"> • Taking precautions while using electrical gadgets.

Post-Operative Week 3	Post-Operative Week 4
<p>Brace to continue as needed</p> <p>Exercises:</p> <ul style="list-style-type: none"> • Active ROM Wrist and Elbow (No resistance) • Continue PROM/AAROM elbow ROM (minimal) progress extension as tolerated. • Shoulder rehab program -Tubing IR/ER • Scapular strengthening exercises. Incorporating bicycle for lower extremity strength & endurance. <p>Scar management: - scar massage using Vaseline jelly and performing gentle circular strokes, transverse strokes, scar lifting and rolling.</p> <p>Patient Education as needed: Advice not to lift heavy weights</p> <ul style="list-style-type: none"> • Taking precautions while using electrical gadgets • Scar massage at home for every 2-3 hours 	<p>Brace to continue as needed</p> <p>Exercises:</p> <ul style="list-style-type: none"> • Light resistance exercises for arm, wrist curls, extensions, pronation, supination and elbow extension progression. • Shoulder program emphasizing rotator cuff and scapular strengthening exercises. • Shoulder strengthening with light dumbbells. <p>Scar management: - scar massage using Vaseline jelly and performing gentle circular strokes, transverse strokes, scar lifting and rolling.</p> <p>Patient Education as needed: Advice not to lift heavy weights</p> <ul style="list-style-type: none"> • Taking precautions while using electrical gadgets • Scar massage at home for every 2-3 hours

➤ **Criteria for next phase:**

- Decreased pain over the olecranon region
- Gradual improvement in range of motion of right elbow
- Enhanced tissue healing

➤ **Intermediate phase (Week 5-8)**

➤ **Goals:**

- Gradual increase in ROM of right elbow
- Regain and improve muscular strength of right shoulder, elbow and wrist muscles
- Functional Training of right upper limb.

Post-Operative Weeks (5-6)	Post-Operative Weeks (7-8)
<p>Exercises:</p> <ul style="list-style-type: none"> Active range of motion of the shoulder, hand and digits Shoulder Strengthening exercises using dumbbells targeting shoulder flexors, abductors, extensors Grip strengthening exercises- with metal spring finger exerciser hand gripper, clay Active Supination and pronation exercises Contract relax and Hold relax techniques- To improve elbow flexion and extension ranges (5-6 reps and hold of 10 seconds and rest in between for 5 seconds) Scar management: scar massage using Vaseline jelly and performing gentle circular strokes, transverse strokes, scar lifting and rolling. 	<p>Elbow mobilizations (scoop mobilization technique for elbow flexion 10 reps with 2-3 seconds of hold), humeroulnar and humeroradial medial and lateral glides 10 reps) with rest for 5 seconds after each repetition.</p> <p>Exercises:</p> <ul style="list-style-type: none"> Active range of motion of the shoulder, hand and digits Shoulder Strengthening exercises using dumbbells targeting shoulder flexors, abductors, extensors Grip strengthening exercises- with metal spring finger exerciser hand gripper, clay Active Supination and pronation exercises <p>PNF patterns of upper limb: (D1 flexion and extension pattern, D2 flexion and extension pattern with first active assisted then actively then resisted)</p> <p>Scar management: scar massage using Vaseline jelly and performing gentle circular strokes, transverse strokes, scar lifting and rolling.</p> <p>Functional training: Slowly teaching the patient to progress integration of involved extremity into functional activities as tolerated according to comfort level.</p>

Outcome measure and Follow-up

The case report's findings suggest that, in the wake of a comminuted olecranon fracture, a systematic physiotherapy rehabilitation program can produce significant improvements in pain management, range of motion, and muscular strength. The patient's functional limitations were effectively addressed by the rehabilitation program,

allowing her to resume her normal activities with greater independence, as indicated by the significant improvement in her Quick DASH score. This case emphasizes the value of tailored rehabilitation plans that are adapted to each patient's unique requirements in order to provide the best possible recovery and return to function.

Outcome measures	Pre-Treatment	Post- Treatment
NPRS	6/10	0/10
AROM of elbow flexion	50° – 90°	0° – 130°
PROM of elbow flexion	45° – 95°	0° – 140°
AROM of elbow extension	90° – 50°	130° – 0°
PROM of elbow extension	95° – 45°	140° – 0°
MMT of shoulder and wrist	4/5	4/5
Quick DASH score	65/100	0/100

Table 6: Pre and Post treatment at baseline and at the end of 8 weeks.

NPRS- numeric pain rating scale, ROM- range of motion, AROM-active range of motion, PROM- passive range of motion, MMT- manual muscle testing.

DISCUSSION

Comminuted olecranon fractures are complex injuries that require careful management and a multidisciplinary approach to ensure optimal recovery. This case report highlights the physiotherapy rehabilitation process following surgical intervention for a comminuted olecranon fracture. The initial phase focused on managing pain followed by the introduction of passive and active range-of-motion

(ROM) exercises to prevent joint stiffness and promote healing.

Several past studies provide valuable insights into the management and rehabilitation of olecranon fractures. Duckworth et al. (2023) emphasize the importance of early physiotherapy to minimize complications and enhance recovery outcomes. Their research supports the role of tailored physiotherapy programs that focus on both mobility and strength restoration, crucial for

achieving functional recovery. Similarly, Baecher & Edwards (2013) highlight the significance of progressive rehabilitation strategies, including the gradual introduction of active exercises, to rebuild strength and restore elbow function.

Moreover, advancements in rehabilitation have introduced innovative techniques such as blood flow restriction therapy (BFRT) to optimize recovery. Ponce-Fuentes et al. (2024) demonstrated that incorporating BFRT accelerates muscle activation and enhances healing, complementing traditional physiotherapy approaches. While BFRT was not utilized in this case, their findings provide valuable insights into innovative rehabilitation methods that could be explored for future cases (7).

The structured physiotherapy program implemented in this case led to significant improvements in both mobility and strength. The patient exhibited reduced joint stiffness and enhanced functional use of the elbow joint, aligning well with the findings of Duckworth et al. and Baecher & Edwards that emphasized the effectiveness of a progressive rehabilitation approach in managing olecranon fractures, focusing on both short-term and long-term functionality.

Learning Points

- Tailored rehabilitation plans aid in faster recovery.
- Multidisciplinary care enhances overall outcomes.

CONCLUSION

The patient's pain levels, elbow range of motion, muscle strength, and general functional ability all significantly improved as a result of the structured rehabilitation program, which placed a strong emphasis on pain management, strength training, and steady progression of range of motion.

The positive results emphasize the need for early and customized physical therapy interventions in the treatment of olecranon fractures, since these can greatly speed up healing and improve quality of life. This case highlights the significance of a

multidisciplinary strategy that integrates psychological support and physical rehabilitation to fulfil the different requirements of patients, especially considering the complications commonly associated with such accidents.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Declaration by Authors

Acknowledgements: The patient's timely cooperation in conducting the study and her adherence to our instructions during treatment sessions are greatly appreciated by the study's authors.

Source of Funding: Nil.

Conflict of Interest: There are no conflicts of interest.

REFERENCES

1. Duckworth AD, Carter TH, Chen MJ, Gardner MJ, Watts AC. Olecranon Fractures. *The Bone & Joint Journal*. 2023;105B(2):112-123. doi: 10.1302/0301-620X.105B2.BJJ-2022-0703.R1.
2. Baecher N, Edwards S. Olecranon fractures. *J Hand Surg Am*. 2013 Mar;38(3):593-604. doi: 10.1016/j.jhssa.2012.12.036. PMID:23428192.
3. Radhakrishnan M, Nagaraja SB. Modified Kuppaswamy socioeconomic scale 2023: stratification and updates. *Int J Community Med Public Health*. 2023 Nov;10(11):4415-4418. doi:10.18203/2394-6040.ijcmph20233487.
4. Chiropractic Resource Organization. Soft Tissue Tenderness Grading Scheme. *Chiro.Org*. Available from: <https://chiro.org/LINKS/grading.shtml>.
5. Kendall FP, McCreary EK, Provance PG, Rodgers MM, Romani WA. A narrative review of manual muscle testing and

- implications for muscle testing research. *Chiropr Man Therap.* 2011; 19:17. Available from: <https://pmc.ncbi.nlm.nih.gov/articles/PMC3259988/>.
6. Hudak PL, Amadio PC, Bombardier C. Development of an upper extremity outcome measure: the DASH (Disabilities of the Arm, Shoulder and Hand). The Upper Extremity Collaborative Group (UECG). *Arch Phys Med Rehabil.* 1996;77(11):1088-1096. doi: 10.1016/s0003-9993(96)90191-8.
 7. Ponce-Fuentes F, Cuyul-Vásquez I, Ó Conaire E. Postoperative rehabilitation exercises with addition of blood flow restriction therapy following olecranon fracture: A case report. *Physiother Theory Pract.* 2024 Sep 15;1-9. doi:10.1080/09593985.2024.2402305. Epub ahead of print. PMID:39277844.
- How to cite this article: Anmol Mall, Reema Rasotra. Efficacy of physiotherapy rehabilitation for comminuted olecranon fracture: a case report. *Int J Health Sci Res.* 2025; 15(1):257-264. DOI: <https://doi.org/10.52403/ijhsr.20250134>
