

Enhancing Recovery and Alleviating Pain in Radial Capitellum Fractures: The Role of Low-Impact Aerobic Exercise in Conservative Treatment

Mejora de la recuperación y alivio del dolor en fracturas del capitellum radial: el papel del ejercicio aeróbico de bajo impacto en el tratamiento conservador

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ABSTRACT

Introduction: Radial head fractures, common in orthopedics, present unique challenges in conservative management, particularly in terms of pain modulation. The use of low-impact aerobic activities in this treatment phase is still underexplored and could offer significant benefits.

Objective: To describe the case of a 41-year-old male podiatrist presented with a MASON 2 radial capitellum fracture following a fall.

Case report: A 41-year-old male podiatrist presented with a MASON 2 radial capitellum fracture following a fall, experiencing notable pain (NPRS 6/7) and functional impairment (DASH 45/100, PRTEE 43/100). The inclusion of aerobic activities during the immobilization period led to a significant decrease in pain, with the NPRS score reaching 2 after 4 weeks.

Conclusions: This case underscores the potential of low-impact aerobic activities in managing pain and facilitating functional recovery in radial

capitellum fractures, warranting further exploration of their role in clinical practice.

Keywords: aerobic activity; radial capitellum fracture; pain management; physical rehabilitation; non-pharmacological interventions.

RESUMEN

Introducción: Las fracturas de la cabeza del radio, frecuentes en ortopedia, presentan desafíos particulares en el manejo conservador, especialmente en lo que respecta a la modulación del dolor. El uso de actividades aeróbicas de bajo impacto durante esta fase del tratamiento aún está poco explorado y podría ofrecer beneficios significativos.

Objetivo: Describir el caso de un podólogo de 41 años que presentó una fractura del capítulo radial tipo MASON 2 tras una caída.

Presentación del caso: Un podólogo de 41 años sufrió una fractura del capítulo radial tipo MASON 2 tras una caída, con dolor notable (NPRS 6/7) y deterioro funcional (DASH 45/100, PRTEE 43/100). La inclusión de actividades aeróbicas durante el período de inmovilización condujo a una disminución significativa del dolor, con una puntuación NPRS de 2 después de cuatro semanas.

Conclusiones: Este caso subraya el potencial de las actividades aeróbicas de bajo impacto en el manejo del dolor y la facilitación de la recuperación funcional en fracturas del capítulo radial, lo que justifica una mayor exploración de su papel en la práctica clínica.

Palabras clave: actividad aeróbica; fractura del capítulo radial; manejo del dolor; rehabilitación física; intervenciones no farmacológicas.

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Introduction

Effectively managing acute pain following traumatic bone fractures is a critical aspect of clinical care, impacting not just the immediate quality of life of patients but also significantly influencing the success and timing of their rehabilitation.⁽¹⁾ Radial head fractures, as common and notable injuries of the elbow joint, exemplify this challenge.⁽²⁾ These injuries are often associated with both acute and chronic pain, lead to functional limitations,⁽³⁾ and increase the risk of developing long-term complications, such as osteoarthritis.⁽²⁾

In this case report, our objective is to highlight the often-overlooked but crucial role of low-frequency aerobic activity in the pain management of radial head fractures. While much of the existing literature concentrates on the anatomical and surgical interventions for these fractures, the supplemental role of aerobic exercises in post-fracture pain management is frequently underemphasized.^(4,5,6)

Low-frequency aerobic activity promotes increased blood flow to the injured area, aiding in the reduction of inflammation and the facilitation of healing processes.^(7,8) Additionally, aerobic activities can release endorphins, the body's natural painkillers, which help in alleviating pain perception.⁽⁹⁾ Engaging in such exercises also helps in maintaining joint mobility and preventing stiffness, crucial for functional recovery.⁽⁴⁾ This approach, combined with traditional medical interventions, offers a more rounded strategy for managing pain and expediting recovery in patients with radial head fractures.

This report aims to bridge this gap, demonstrating how integrating low-frequency aerobic activities can considerably mitigate pain and improve the overall recovery outcome.⁽⁴⁾ Our discussion offers a more holistic view on managing radial head fractures, underscoring the significance of including physical activities, specifically low-frequency aerobic exercises. Such an approach not only aids in pain reduction but also contributes to a more

comprehensive and patient-focused care strategy in managing orthopedic injuries.

Case report

A 41-year-old male, following an accidental fall from a ladder, presented to the emergency department with pain and immobility in his left elbow. He was alert, cooperative, and reported no pain elsewhere. Physical examination revealed severe tension in the elbow, rated as 6/7 on the Numeric Pain Rating Scale (NPRS),⁽¹⁰⁾ without visible bruising. Both active and passive elbow mobility were limited in all directions, although joint stability was maintained. Radiographic examinations, including an X-ray confirmed a lateral MASON 2⁽²⁾ radial capitellum fracture (fig.1).



Fig. 1 - X-ray.

Considering the patient's profession in physiotherapy, a CT scan was performed, revealing a closed fracture of the radius capitulum (fig. 2).



Fig. 2 - TC.

Post-CT scan follow-up showed limited flexion-extension ($25-110^{\circ}$) with NPRS 6 pain during movement, but pain-free prone-supination and stable elbow condition were noted. The patient was fitted with a thermoplastic elbow brace for one week, removable only for hygiene, and advised to mobilize his shoulder and wrist regularly. A follow-up X-ray one month later confirmed the fracture's stability (fig. 3).



Fig. 3 - X-ray after 1 month.

The elbow's range of motion improved (prone-supination and flexion-extension of 16-130°), but pain remained at NPRS 6/7. The patient's condition was further assessed using the DASH⁽¹¹⁾ score (45/100) and the PRTEE⁽¹²⁾ questionnaire (43/100), with an initial NPRS score of 7/10. Active ROM measurements included flexion of 130°, extension of 16°, pronation of 175°, and supination of 180°. Rotator cuff tests (Moving valgus stress test and Tinel Test)^(13,14) were negative, and muscle strength, as assessed by the MRC scale, showed moderate reduction in the biceps brachii and triceps brachii (4/5), as well as in the pronator and supinator muscles.

During the month-long rest period, the patient engaged in low-impact aerobic activities, such as brisk walking and jogging, to manage pain and maintain functional mobility. This approach led to a significant reduction in pain (NPRS 2) at the one-month follow-up, despite the other assessment scores remaining unchanged.

At the three-month follow-up visit, the patient showed remarkable progress. The Numeric Pain Rating Scale (NPRS) score improved to 0, indicating no pain. Muscle strength, as assessed by the Medical Research Council (MRC) scale, recovered fully, achieving a score of 5/5 for the biceps brachii, triceps brachii, and the pronator and supinator muscles. This indicates a return to normal muscle strength.

This case study adheres to the SCARE⁽¹⁵⁾ (Surgical Case Report) guidelines for reporting surgical case studies. The SCARE guidelines aim to enhance the transparency and completeness of reporting surgical cases, providing a structured framework that facilitates accurate communication and assessment of surgical experiences.

Clinical findings

- History of trauma: The patient, a 41-year-old male, presented following a fall from a ladder, resulting in direct trauma to the left elbow.

- Pain and mobility: The patient reported severe pain in the elbow, rated 6/7 on the Numeric Pain Rating Scale (NPRS), with limited active and passive mobility in all directions. Stability of the elbow joint was maintained.
- Physical examination: No visible bruising on the elbow was observed. Severe tension was noted upon examination, indicating significant discomfort and pain.
- Radiographic confirmation: X-ray examinations confirmed a lateral fracture of the MASON 2 radial capitellum. A subsequent CT scan revealed a closed fracture of the radius capitulum.
- Initial management: The patient was fitted with a thermoplastic elbow brace for immobilization and was advised to mobilize the shoulder and wrist regularly and take pain medication as necessary.
- Follow-up findings: After one month, follow-up X-rays confirmed the stability of the fracture. The elbow's range of motion improved to prone-supination and flexed-extension of 16-130°, with a reduction in pain to NPRS 4.
- Functional scores: The patient's function was assessed using the DASH score, which was 45/100, and the Patient-Rated Tennis Elbow Evaluation (PRTEE) score, which was 43/100.
- Range of Motion (ROM): Active ROM measurements included flexion of 130°, extension of 16°, pronation of 175°, and supination of 180°.
- Strength assessment: Muscle strength was evaluated using the Medical Research Council (MRC) scale. The biceps brachii and triceps brachii scored 4/5, indicating moderate strength reduction. Pronator and supinator muscles also demonstrated a strength of 4/5.
- Negative rotator cuff tests: The Moving Valgus Stress Test and Tinel Test were negative, indicating no associated rotator cuff injuries.

- Low-impact aerobic activities: During the one-month rest period, the patient engaged in low-impact aerobic activities such as brisk walking and jogging, resulting in further pain reduction to NPRS 2 and maintaining functional mobility.

Timeline

- 2023-08-23: Initial event and immobilization
- 2023-08-24 to 2023-09-21: Low-impact aerobic activity (walking, jogging)
- 2023-09-22: One-month follow-up check
- 2024-01-27: Three-month follow-up check

Diagnostic assessment

Physical examination

The patient presented with acute pain and immobility in the left elbow following a fall.

Physical findings included severe tension in the elbow, rated 6/7 on the NPRS, with limited active and passive mobility.

No visible bruising was observed, and elbow stability was maintained.

Radiological imaging

- Initial X-ray: Confirmed a lateral fracture of the MASON 2 radial capitellum.
- Follow-up CT scan: Performed to better assess the fracture and revealed a closed fracture of the radius capitulum.
- One-month follow-up X-ray: Confirmed the stability of the fracture with improved elbow mobility.

Diagnostic reasoning

Differential diagnoses for elbow pain and immobility could include elbow dislocation, ligamentous injury, or other types of elbow fractures.

The choice of radiological imaging over more invasive diagnostic methods was guided by the need for a precise assessment of the fracture type and extent, crucial for determining the treatment plan.

Prognostic characteristics

The prognosis in such cases depends on the exact nature and severity of the fracture.

The MASON 2 classification of the radial head fracture suggested a more favorable prognosis, with proper management.

Therapeutic intervention

1. Initial Phase - Walking:

- Duration: 30-60 minutes daily.
- Intensity: A steady pace of 6.5 km/h.
- Objective: Introduce the patient to a consistent aerobic routine, promoting blood circulation, enhancing endorphin release, and gradually improving cardiovascular fitness without stressing the injured area.

2. Advanced Phase - Running:

- Duration: 30-45 minutes daily.
- Intensity: A faster pace of 12 km/h.
- Objective: As pain levels decreased and functional capacity improved, the intensity of aerobic activity was increased to further promote cardiovascular health and endorphin release.

Benefits of the comprehensive intervention

- Pain reduction: The aerobic exercises interventions effectively reduced pain levels by stimulating the release of endorphins and improving joint mobility.
- Improved cardiovascular health: Regular aerobic activity, from walking to running, strengthened the heart and lungs.
- Mental well-being: Aerobic exercises, combined with the sense of achievement from regaining strength and mobility, contributed to improved mental health.
- Reduced reliance on medications: Effective pain modulation through reduced the need for pain medications, minimizing potential side effects.

Follow-up and outcomes

- Radiological outcome: One-month follow-up X-ray showed stability of the radial head fracture without displacement.
- Functional improvement: Significant pain reduction (NPRS score decreased from 6/7 to 2/10).
- Strength assessment: Moderate improvement in muscle strength noted in the elbow region.
- At the three-month follow-up: the patient showed remarkable progress. The Numeric Pain Rating Scale (NPRS) score improved to 0, indicating no pain. Muscle strength, as assessed by the Medical Research Council (MRC) scale, recovered fully, achieving a score of 5/5 for the biceps brachii, triceps brachii, and the pronator and supinator muscles.
- Patient feedback: The patient reported decreased pain and improved daily functionality, expressing satisfaction with the treatment and pain management, which included low-impact aerobic activities.

Discussion

In this case report, we discuss the management of a radial head fracture, emphasizing the efficacy of conservative treatment combined with low-impact aerobic activities.⁽⁴⁾ Typically, radial head fractures are managed with rest and immobilization, but this case demonstrates the effectiveness of incorporating controlled physical activity into the recovery process.⁽³⁾ The patient's treatment included the use of a thermoplastic elbow brace for stabilization, aligned with best practices for non-displaced fractures.⁽¹⁶⁾

A novel aspect of this case was the inclusion of low-impact aerobic activities, such as brisk walking and jogging. This approach contributed significantly to pain management and functional recovery, marking a departure from traditional methods that primarily focus on rest. The substantial reduction in pain, as reflected in the NPRS score, highlights the potential of aerobic exercises in enhancing pain relief and reducing the reliance on pharmacological interventions. The tailored treatment plan, considering the patient's profession as a podiatrist, exemplifies the importance of a patient-centric approach in clinical care.^(17,18) Such personalized strategies can lead to improved adherence to the treatment plan and better overall outcomes.

This case suggests that integrating low-impact aerobic activities into the treatment of radial head fractures could be beneficial, potentially signaling a shift towards more dynamic strategies.⁽¹⁹⁾ It challenges conventional post-fracture care paradigms and opens avenues for further research into the role of physical activity in the management of such injuries. However, it's crucial to recognize the limitations of this approach, as it may not be universally applicable to all patients, particularly those with more severe fractures or different health profiles. Despite these considerations, the case adds valuable insight into the management of radial head fractures and advocates for a more dynamic, patient-centered approach to orthopedic injury management.

The patient expressed significant satisfaction with the treatment and its outcomes. He noted a marked improvement in both the recovery process and the reduction of pain associated with the radial head fracture. The inclusion of

low-impact aerobic activities, such as brisk walking and jogging, in his rehabilitation regimen was particularly appreciated, as it not only contributed to his physical recovery but also positively impacted his overall well-being.

The patient reported feeling more engaged and active in his recovery process, a factor that he believed played a crucial role in his rapid improvement. The decrease in pain, as evidenced by the lowered NPRS score, was a significant relief to him, allowing for a more comfortable and faster return to his daily activities and professional duties as a podiatrist.

Overall, the patient's experience with this treatment approach was highly positive, reaffirming the value of patient-centered care and the importance of incorporating individual preferences and lifestyles into the treatment plan.

Conclusions

This case underscores the potential of low-impact aerobic activities in managing pain and facilitating functional recovery in radial capitellum fractures, warranting further exploration of their role in clinical practice.

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Conflict of interest

The authors stated that there was no conflict of interest.