

Review Article

Exercise protocols for improving functional outcomes in hip fractures

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Received: 29 October 2024

Accepted: 15 November 2024

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ABSTRACT

Hip fractures, particularly among the elderly, are a growing public health concern due to their association with significant morbidity, mortality, and long-term disability. Effective rehabilitation is essential for restoring mobility, independence, and quality of life in affected individuals. Exercise-based interventions, focusing on early mobilization, strength training, and balance exercises, have been shown to significantly improve functional outcomes in patients recovering from hip fractures. Early mobilization, initiated within 24 to 48 hours post-surgery, reduces the risk of complications associated with immobility, such as muscle atrophy and deep vein thrombosis. Encouraging weight-bearing activities early in the recovery process accelerates the restoration of mobility and functional independence. Strengthening exercises, particularly those targeting the lower extremities, play a crucial role in rebuilding muscle mass and enhancing stability, which is critical for preventing recurrent falls. Balance exercises complement strengthening efforts by improving postural control and reducing the fear of falling, which is common in elderly patients. Long-term adherence to these exercise protocols is vital for sustaining functional improvements and preventing further decline. The long-term outcomes of these interventions extend beyond physical benefits, contributing to improved psychological well-being by promoting confidence and reducing anxiety associated with functional limitations. Tailoring rehabilitation programs to individual needs, ensuring sustained participation, and addressing barriers to adherence, such as lack of access to resources, are crucial for maximizing recovery. These evidence-based strategies offer a comprehensive approach to improving recovery and reducing the long-term burden of hip fractures on individuals and healthcare systems. The integration of structured, progressive exercise regimens, supported by multidisciplinary teams, is key to optimizing both short- and long-term functional outcomes following hip fractures.

Keywords: Hip fractures, Rehabilitation, Early mobilization, Strength training, Balance exercises

INTRODUCTION

Hip fractures are a significant health concern, particularly among the elderly, as they are associated with high morbidity, mortality, and a substantial decrease in functional independence. These injuries often result from a combination of age-related bone fragility, osteoporosis,

and increased susceptibility to falls, leading to fractures typically in the proximal femur.¹ Globally, hip fractures represent a growing public health challenge, particularly as life expectancy rises, with estimates suggesting that the incidence of hip fractures could double by 2050 due to the aging population.² Such fractures can severely impair an individual's ability to walk, perform daily activities, and

maintain independence, making effective rehabilitation protocols essential.

Exercise plays a pivotal role in the recovery process following hip fractures. The rehabilitation process traditionally involves a combination of physical therapy and exercise aimed at restoring mobility, strength, balance, and overall functional outcomes.³ Early mobilization following surgery is crucial, as prolonged immobility can lead to complications such as muscle wasting, deep vein thrombosis, and further loss of functional capacity. Evidence suggests that structured exercise programs, when implemented early and sustained over time, can significantly enhance recovery and improve outcomes in patients with hip fractures.⁴

Despite the known benefits of exercise in post-hip fracture recovery, the type, timing, and intensity of exercise that yields optimal results remain topics of ongoing research. Traditional rehabilitation often focuses on general physical therapy; however, more recent studies have examined the effectiveness of specific exercise protocols designed to target functional deficits in this population. For example, strength training, balance exercises, and gait training are increasingly being integrated into rehabilitation programs with the goal of improving overall mobility and reducing the risk of subsequent falls.³ This review aims to explore various exercise protocols designed to improve functional outcomes following hip fractures.

REVIEW

The role of exercise in improving functional outcomes following hip fractures is well-established, with various studies demonstrating the effectiveness of tailored rehabilitation protocols. Early mobilization, which encourages weight-bearing exercises shortly after surgery, has been shown to significantly reduce the risk of complications and improve recovery time. A systematic review highlighted that early initiation of weight-bearing activities not only enhances mobility but also reduces hospital stays and improves long-term functional independence.⁵ The implementation of early, intensive rehabilitation protocols, particularly those involving strength and balance training, has proven beneficial in restoring muscle function and preventing subsequent falls, which are a major concern for elderly hip fracture patients. Strength training plays a critical role in rehabilitation, as hip fractures often result in muscle atrophy and weakened lower body strength. Studies indicate that progressive resistance training, combined with balance exercises, significantly improves gait stability and reduces the risk of future fractures.⁶ The integration of these specific exercises into rehabilitation programs ensures a more comprehensive approach to restoring functional independence. However, further research is necessary to determine the optimal frequency, duration, and intensity of exercise protocols that can maximize recovery in diverse patient populations.

Early mobilization and weight-bearing strategies

Early mobilization following a hip fracture is a critical component of rehabilitation and plays a key role in improving functional outcomes. Mobilization protocols that emphasize early weight-bearing have been linked to quicker recovery of ambulation and a reduction in postoperative complications. Delayed mobilization often leads to complications such as muscle atrophy, deep vein thrombosis, and a longer duration of hospitalization, all of which can negatively impact the patient's long-term functional independence.⁷ Encouraging early movement, typically within 24 to 48 hours after surgery, has been shown to improve overall outcomes by restoring mobility and reducing the risk of immobility-associated health issues.

The timing and intensity of early mobilization exercises are crucial for maximizing the benefits of rehabilitation. Studies have demonstrated that early weight-bearing, under appropriate supervision, improves recovery times and fosters greater independence in activities of daily living.⁸ Early mobilization has also been found to enhance balance and stability, key factors in preventing subsequent falls, which are a significant risk following hip fractures in the elderly. Programs that incorporate progressive weight-bearing exercises help restore lower limb strength and promote the recovery of muscle mass lost during the period of immobility.

A key factor in early mobilization is patient compliance, which can be influenced by pain management and the psychological readiness of the patient to engage in physical activity. Effective pain control is essential for encouraging patients to begin walking or weight-bearing as early as possible. Multidisciplinary approaches that combine the expertise of orthopedic surgeons, physiotherapists, and pain management specialists have been recommended to optimize early mobilization strategies.⁹ Additionally, education and psychological support for patients play an important role in ensuring that they are both mentally and physically prepared to engage in rehabilitation.

Despite the benefits of early mobilization, not all patients may be suitable candidates for this approach. Certain factors, such as preexisting comorbidities, frailty, or the complexity of the fracture, can affect a patient's ability to engage in early weight-bearing activities. In these cases, a more gradual progression to mobilization may be required, while still emphasizing the importance of minimizing prolonged bed rest to avoid the complications of immobility. Individualized rehabilitation protocols that consider each patient's unique needs are essential for optimizing recovery outcomes.

Strengthening and balance exercises for hip fracture rehabilitation

Strengthening and balance exercises are essential components of hip fracture rehabilitation, aimed at

restoring muscle function and improving stability. Hip fractures often result in significant muscle atrophy and reduced strength in the lower extremities, which can severely impair a patient's ability to walk and maintain balance. Strengthening exercises target key muscle groups, including the quadriceps, hip abductors, and extensors, which are vital for regaining mobility and functional independence. Resistance training, in particular, has been shown to be effective in rebuilding muscle mass and enhancing strength, even in older populations.¹⁰ Incorporating progressive resistance training into rehabilitation programs allows for the gradual improvement of muscle function, reducing the likelihood of recurrent falls and subsequent fractures.

Balance training complements strengthening exercises by improving the patient's postural control and coordination. Older adults, especially those recovering from hip fractures, often experience a decline in balance, which increases the risk of falling. Studies have demonstrated that balance exercises, such as standing on one leg, tandem walking, and using unstable surfaces, can improve proprioception and stability, leading to better outcomes in functional mobility.¹¹ The combination of strengthening and balance training has been found to significantly reduce fall risk and improve overall mobility, making it a cornerstone of rehabilitation following hip fractures. In addition to its physical benefits, balance training has psychological advantages. Many patients recovering from hip fractures develop a fear of falling, which can lead to a reduction in physical activity and further decline in strength and balance. Engaging in supervised balance exercises can help rebuild confidence in movement and reduce fear of falling, which is crucial for encouraging patients to participate fully in their rehabilitation programs. Research has highlighted that patients who undergo both strengthening and balance exercises show greater improvements in self-efficacy and mobility compared to those who receive only general rehabilitation.¹²

The timing and intensity of strengthening and balance exercises are important considerations in rehabilitation programs. Starting these exercises early in the recovery process, once the patient is medically stable, has been associated with faster improvements in strength and function. However, the intensity of exercises must be carefully monitored to avoid injury or exacerbation of pain. Tailoring the exercise program to the patient's individual capabilities, while progressively increasing the difficulty of exercises, ensures that patients can safely regain their strength and balance while minimizing the risk of complications.

Long-term functional outcomes of exercise-based interventions

The long-term functional outcomes of exercise-based interventions following hip fractures are critical in determining the overall success of rehabilitation. Studies have consistently shown that patients who engage in

structured exercise programs after hip fracture surgery exhibit better functional outcomes compared to those who receive standard care or limited rehabilitation. The benefits of exercise-based interventions extend beyond the acute recovery phase, with evidence suggesting that sustained engagement in physical activity improves long-term mobility, independence, and quality of life.¹² Regular participation in exercises that focus on strength, balance, and endurance is essential for maintaining these gains and preventing further functional decline.

One of the key factors influencing long-term outcomes is the type and duration of the exercise program. Programs that continue beyond the initial rehabilitation period, incorporating both supervised and home-based exercises, have been shown to yield superior functional outcomes. Research indicates that patients who participate in long-term exercise regimens experience sustained improvements in gait speed, balance, and lower limb strength, all of which contribute to better mobility and a lower risk of subsequent falls.¹³ Moreover, long-term exercise programs help mitigate the age-related decline in muscle mass and strength, a phenomenon known as sarcopenia, which can further complicate recovery in elderly patients.

The impact of long-term exercise on functional outcomes also extends to psychological well-being. Hip fractures often lead to a loss of independence and increased reliance on caregivers, which can negatively affect a patient's mental health. Exercise-based interventions not only improve physical function but also enhance psychological outcomes by fostering a sense of autonomy and self-efficacy.¹⁴ Patients who engage in regular physical activity report higher levels of confidence in their ability to perform daily tasks, which reduces the likelihood of depressive symptoms and anxiety associated with functional limitations. Adherence to long-term exercise programs remains a challenge, particularly in older populations who may have preexisting comorbidities or face barriers to regular participation, such as limited access to facilities or lack of social support. However, strategies to improve adherence, such as incorporating social support, setting realistic goals, and providing education on the benefits of exercise, have been effective in promoting sustained participation in rehabilitation programs. Tailoring exercise interventions to the individual's abilities and preferences is also key to maximizing long-term functional outcomes.

CONCLUSION

Exercise-based interventions play a pivotal role in improving both short- and long-term functional outcomes for patients recovering from hip fractures. Early mobilization, strengthening, and balance exercises are essential in promoting mobility, reducing fall risk, and enhancing overall independence. Tailoring rehabilitation programs to individual needs and ensuring long-term adherence are critical for sustaining the benefits of

rehabilitation. Continued research into optimizing these interventions will further enhance recovery outcomes for this vulnerable population.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: Not required

REFERENCES

- Magaziner J, Simonsick EM, Kashner TM, Hebel JR, Kenzora JE. Predictors of functional recovery one year following hospital discharge for hip fracture: a prospective study. *J Gerontol*. 1990;45(3):M101-7.
- Cooper C, Campion G, Melton Lr. Hip fractures in the elderly: a world-wide projection. *Osteoporos Int*. 1992;2:285-9.
- Sherrington C, Michaleff ZA, Fairhall N, Paul SS, Tiedemann A, Whitney J, et al. Exercise to prevent falls in older adults: an updated systematic review and meta-analysis. *Br J Sports Med*. 2017;51(24):1750-8.
- Beaupre LA, Binder EF, Cameron ID, Jones CA, Orwig D, Sherrington C, et al. Maximising functional recovery following hip fracture in frail seniors. *Best Pract Res Clin Rheumatol*. 2013;27(6):771-88.
- Kenyon-Smith T, Nguyen E, Oberai T, Jarsma R. Early mobilization post-hip fracture surgery. *Geriatr Orthop Surg Rehabil*. 2019;10:2151459319826431.
- Ekegren CL, Edwards ER, Page R, Hau R, de Steiger R, Bucknill A, et al. Twelve-month mortality and functional outcomes in hip fracture patients under 65 years of age. *Injury*. 2016;47(10):2182-8.
- Agarwal N, Feng T, MacLulich A, Duckworth A, Clement N. Early mobilisation after hip fracture surgery is associated with improved patient outcomes: A systematic review and meta-analysis. *Musculoskeletal Care*. 2024;22(1):e1863.
- Mammel JA, Haugen JL, Buckley RE. Weight bearing orders after hip fracture surgery: A quality assurance project. *J Orthop Nurs*. 2008;12(3-4):151-8.
- Handoll HH, Sherrington C. Mobilisation strategies after hip fracture surgery in adults. *Cochrane Database Syst Rev*. 2007;(1):CD001704.
- Ivanova N, Aibast H, Gapeyeva H, Kums T, Märtson A, Pääsuke M. Changes in hip muscle strength after proximal femoral fracture in elderly women. *Acta Kinesiologiae Universitatis Tartuensis*. 2011;17:80-8.
- Seidler RD, Martin PE. The effects of short term balance training on the postural control of older adults. *Gait Posture*. 1997;6(3):224-36.
- Ganz DA, Latham NK. Prevention of falls in community-dwelling older adults. *N Engl J Med*. 2020;382(8):734-43.
- Fairhall NJ, Dyer SM, Mak JC, Diong J, Kwok WS, Sherrington C. Interventions for improving mobility after hip fracture surgery in adults. *Cochrane Database Syst Rev*. 2022;9(9):CD001704.
- Gardner MM, Robertson MC, Campbell AJ. Exercise in preventing falls and fall related injuries in older people: a review of randomised controlled trials. *Br J Sports Med*. 2000;34(1):7-17.

Cite this article as: Aborukbah AF, Alfaleh TA, Alenazi HM, Alsulami AK, Alshahrani AA, Aloraifi MA, et al. Exercise protocols for improving functional outcomes in hip fractures. *Int J Community Med Public Health* 2024;11:5002-5.