

Effectiveness of Physiotherapy Rehabilitation Including Balance Training, Gait Training, and Functional Exercises in Acute Ischemic Stroke: A Case Study

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Abstract

Introduction: The occurrence of acute ischemic stroke is characterized by the development of sudden symptoms related to the disruption in the blood vessels supplying the brain, resulting in a decrease in blood flow and oxygenation to brain tissues.

Some of the common symptoms of this condition are sudden weakness or paralysis, difficulty talking, asymmetry of facial features, and imbalance or loss of coordination. The annual incidence of this disease is found to affect around 100-200 individuals in each 100,000 population. Some of the issues associated with this disease are hemiplegia or hemiparesis, muscle weakness, loss of coordination, difficulty in talking, and inability to function independently. Management of acute ischemic stroke is carried out using medical treatment and rehabilitation with physiotherapy. The latter involves helping patients improve their strength, increase flexibility, move weak muscles, and gain their functionality back. Studies conducted earlier have demonstrated that rehabilitation treatment programs performed on patients with comparable conditions yielded positive results.

Case presentation: The patient is a married woman aged 58 years old. She came up with complaints of experiencing sudden loss of strength in the left part of her body and seemed to be completely fine until a few hours before then experienced the symptoms. From clinical assessment, it became evident that had problems maintaining balance. In addition, there was also demonstrated weakness in the limbs on the left side of the body. There was mild asymmetry in her face, and exhibited difficulty in standing, walking, or moving from one position to another.

Acute ischemic stroke is a neurological disorder that arises due to a blockage of blood flow in a specific region of the brain, resulting in dysfunction in brain cells. It is sudden and may be accompanied by paralysis on one side of the body, as well as speech problems. In one year, a lot of individuals can experience strokes, and this health disorder is known to be among the leading causes of disability among adults.

The complications caused by acute ischemic stroke are characterized by hemiplegia, facial palsy, weakness in muscles, inability to maintain balance and coordination, as well as inability to perform routine activities. Stroke can be treated using physiotherapy, as this discipline is concerned with helping patients regain their strength, improve their coordination and balance, and restore functional capability. This case study discusses the diagnosis and treatment of acute ischemic stroke with left hemiplegia.

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Management and Outcomes: The Physiotherapy management involved positioning, range of motion exercise with passive and active assist, bed mobility, balance exercise, gait training and strengthening exercises to enhance muscle strength, mobility and independence. Moreover, in order to assess the progress of the patient, various assessment methods, including MMT for muscle strength, and MAS for muscle tone assessment, were used which demonstrated gradual improvements after the physiotherapy sessions. After one week, the patient could sit using support, sit to stand with assistance and begin gait with a few assisted steps.

Conclusion: This case study demonstrates that physiotherapy treatment in early stages of acute ischemic stroke could result to improvement in mobility, balance, and functional ability.

Keyword: Recovery of Motor Function, Hemiplegia, Neurorehabilitation, Balance Training, Gait Training, Muscle Strength, Functional Independence, Physiotherapy Rehabilitation, Recovery from Stroke, Activities of Daily Living

BACKGROUND

Acute ischemic stroke is a neurological condition characterized by sudden interruption of the brain's blood supply to a particular region of the brain, mainly as a result of vascular blockage. The lack of adequate oxygen supply leads to brain cell damage, causing an impairment of its physiological functions. Often, patients suffer from conditions such as hemiplegia, difficulty in communication, facial muscle impairment, poor coordination, and lack of balance. They may hinder one's ability to carry out ADLs effectively and efficiently, reducing their functional and independent level of living.

A stroke is known to be one of the most common causes of disabilities among adults, particularly those who suffer from hypertension and have a sedentary lifestyle. Individuals tend to have muscle weakness, poor postural control, and balance problems that may cause other complications, including contracture, bed sores, and dependence in carrying out daily tasks.

Physiotherapy plays a vital role in rehabilitating people who have suffered from strokes. Physiotherapy interventions, including positioning, enable stroke survivors to avoid developing any complications. Range of motion exercises prevent joints from becoming stiff. Muscle strength training helps to improve their muscular activity.

CASE DESCRIPTION AND EVALUATION

A 58-year-old female patient, retired government official, came with complains of sudden weakness affecting right half of body, difficulty walking, impairment in movement of hands, and difficulty in speaking. The patient also had reports of facial asymmetry and difficulty performing self-care activities like dressing, eating, and hygiene.

The patient had a medical history of hypertension and type 2 diabetes mellitus in the last 10 years and the patient was taking irregular treatment for the disease. There were no reports of any traumatic incidents or past neurological problems in his medical history. After gathering patient's history, the patient mentioned that the symptoms appeared suddenly during the early morning. This was indicated by the patient being unable to move right upper and lower limbs and speaking difficulty. And involvement

of territory of left middle cerebral artery. observations, the patient presented with an imbalance posture with lateral trunk displacement towards the unaffected side, forward head posture, and decreased weight-bearing capacity on the affected limb. Weakened left upper and lower limbs and difficulty walking and generalized fatigue and weakness in the performance of activities of daily living

By palpation, increased muscle tone was observed in the left upper and lower limbs, and before this, it used to have flaccidity tone, and after some time, spasticity occurred. During examination, the range of movement was normal on the unaffected side but decreased on the affected side owing to increased muscle tone and stiffness. The manual muscle testing by (MMT) testing showed that muscle strength on the left upper limb was 2/5 and in modified ashworth scale (MAS)tone assessment, there was hypertonia indicating impairment in upper motor neuron function reduced voluntary movement affected side and reduced superficial sensation. Impairment of postural control assessment showed poor balance and coordination in the affected limb, and the patient required assistance for sitting and standing and was unable to stand independently.

Uniqueness of study:

Acute Ischemic Stroke in this particular instance is unique in the fact that the hypertonic phase occurred earlier than expected causing an increase in muscle stiffness and decreased voluntary movements. This resulted in the loss of muscle control and inability to perform basic functional activities.

Upon examination, it was evident that the patient presented symptoms such as hemiparesis, poor control of trunk, **poor** balance and improper movement synergies that greatly affected posture and mobility. Altered breathing pattern and poor core stability were noted as well which made the completion of functional tasks difficult.

In light of the problem at hand, a multifaceted physiotherapy approach was chosen in terms of managing hypertonia, facilitation of proper movements, trunk stabilization exercises and functional activities. It was decided that 6-8 weeks would be ideal to complete the program and ensure gradual improvements according to patient tolerance and recovery.

To assess the efficacy of this intervention, it was decided to use a number of different tests including ROM, MMT, tone test using Modified Ashworth Scale and functional mobility scales.

Intervention:

Positioning: Proper positioning in supine, lateral, and sitting to avoid potential problems, Regular changing of positions to avoid bed sores, Correct positioning of the affected upper extremity to avoid dislocation of the shoulder and pain, Using pillows and supports to maintain correct posture

ROM Exercises: Passive ROM exercises of all joints (shoulder, elbow, wrist, fingers, hip, knee, and ankles), Progress to active and active-assisted ROM exercises, To avoid stiffness in the joints and maintain flexibility

Bridging Exercises: Performing bridging exercises in supine lying position, Aids in gaining pelvic stability and control, Enables bed mobility

Bed Mobility Exercises: Exercises that involve rolling from supine lying to lateral lying, Moving from lying position to sitting position, Aids in gaining independence in mobility exercises

Balance & Coordination Exercises: Sitting balance exercises with or without supports, Standing balance exercises, Coordination training exercises

Functional Mobility Training: Training in sit to stand, Assisted standing, Progress to independent standing

Gait Training: Weight bearing exercises of the affected lower extremity, Gait training with the help of supportive devices, Focus on gait symmetry and coordination

Strengthening Exercises: Strengthening of affected sides muscles, Progress from assisted strengthening to active and resisted strengthening, Upper and lower extremities exercises

Postural Control Training Exercises: Exercises for improving trunk postures and alignment, Helpful in gaining balance

Coordination Exercises: Exercise to improve motor coordination, Specific to particular activities

Hand Function Training: Grip and release exercises, Functional tasks like object handling and manipulation

Functional Task Training: Activities of daily living (ADLs), such as: Reaching, grip objects, Basic self-care activities

Result (After 1 week of Physiotherapy)

After one week, there was mild improvement in movement of the left side of his body, bed mobility, and sitting tolerance with support, as well as standing and sit to stand transfer ability. There were slight improvements in weight-bearing activities and assisted walking. Grasp-and-release and there was slightly improvement in ADL. The patient exhibited an increased level of confidence and engagement in therapy.

Discussion:

The present study was carried out to evaluate the impact of the physiotherapy procedures including electrical stimulation, exercise and training in patients suffering from acute ischemic stroke. The present study is in continuation to the earlier study done in 8 patients with the same complaints to find out whether or not the findings of both studies match each other. The therapy included strengthening the muscles, improvement in the motor coordination and mobility function in the patients. It is evident from the findings that the physiotherapy regimen is very important for recovery.

Conclusion

In this particular patient, this condition represents a case of Acute Ischemic Stroke characterized by the sudden appearance of weakness on the left side, imbalance, and dependence. In such cases, the application of timely medical assistance and physiotherapy plays a crucial role in improving mobility and the slightly improvement in upper and lower limb movement

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