

# Enhancing Functional Recovery in Chronic Lacunar Infarct Stroke: A Physiotherapy Approach

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## **Abstract:**

A stroke is distinguished by a quickly evolving neurological symptom of focal either global impairment of mental aptitude along with repercussions that endure for a day or more or result in death, and which have no apparent vascular origin but rather have no meaningful cause. One of the major blood vessels that feeds the brain, the middle cerebral artery, can become blocked or clogged, leading to a type of stroke known as a middle cerebral artery infarct (MCA). An innovative technique called Proprioceptive neurovascular facilitation approach has mostly been used to treat stroke victims, particularly those with upper limb impairments. This case study is based on a 75-year-old woman who was diagnosed with MCA infarct on the basis of MRI and had complaint of left limb paralysis and speech impairment. In addition to traditional physical treatment, she received proprioceptive neurovascular facilitation technique. The results demonstrated that individuals with stroke can benefit from Proprioceptive neurovascular facilitation approach.

**Keywords:** Stroke, Middle cerebral artery infarct, upper limb impairments, gait, physiotherapy.

## **1. Introduction**

Stroke is one of the most serious illnesses threatening people's neurological health. Due to its high morbidity, mortality, and recurrence rate, it ranks third in terms of causes of death, after cardiovascular disease and cancer [1]. The most crucial element of the external capsule is cortico segmental fibers that arise from the frontal, temporal, anterior parietal, and insular cortexes and move caudally to the midbrain segment via a sub ventricular pathway[2]. In order to manage individuals with chronic lacunar infarcts who have AIS, physiotherapy is quite important. Physical therapy's main goals are to help the patient regain as much of their lost functions as possible and to assist in the restoration of those that have been seriously or irreversibly damaged [3-5]. There are two categories of strokes: ischemic (80-87%) hemorrhage (13-20%) can be caused by embolism, thrombus or generalized hypoperfusion. Parenchymal strokes account for 10% of all types, while subarachnoid strokes account for 33% of all types. Stroke is a global health concern that is the main cause of adult disability [6-8].

A stroke occurs when there is an unexpected stoppage of blood flow (ischemia) or complete cessation of blood flow (infarction) from the MCA, one of the major arteries in the brain. Up to 80% of patients with recurrent middle frontal artery blockage who receive conservative treatment may not survive the illness [9-11]. MCA infarctions can cause symptoms that affect one side of the body, usually the face, arm, or leg, such as numbness or sudden onset paralysis. The symptoms are determined by the depth and location of the injury. Additionally, patients may develop visual issues such hemianopia, or the loss of vision in half of the visual field. Cognitive abilities could be impacted, leading to confusion or disorientation [12]. The risk of stroke in young individuals during pregnancy, especially during the purperium, is significantly higher than the low baseline frequency, not wide standing the rarity of maternity-related hemorrhage [13-15].

## 2. Case presentation

### 2.1 Patient Information

A 75-year-old female experienced fall while working at home then she has been take to hospital by her relatives, after examination the patient was unresponsive. The patient had an history of episode of hypoglycemia 15 days back. Some investigations such as ECG, MRI and CBC were done and were diagnosed as a case of Hypertension and diabetes since 8 -10 years was treated with medications for the same Patient did not have a history of fainting or dizziness. Furthermore, her medical history shows no evidence of a head injury, fever, seizures, or headache she was taken to ward and next day was reffered for physiotherapy. The patient was having complained of weakness on left side of the body and slurring of speech so the physiotherapy session was continued.

### 2.2 Clinical findings

A neurological examination was performed following the patient's consent. On The Glasgow Coma Scale (GCS) score of E4V4M6. The patient was found to have a mesomorphic body type. Patient was vitally stable. The results of the MRI revealed a small vessel ischemic illness and age-related cerebral atrophic alterations in addition to a persistent lacunar infarct in the right cerebellar hemisphere. The patient's upper and lower extremity muscle tone (tone grading system) results and reflexes are displayed in Tables 1 and 2. The right side of the body had normal muscle tone, or +2 (normal tone). She required minimal assistance when sitting, but moderate support was required when standing and walking. With a Berg Balance Score, there is a significant chance of falling

Table 1: Muscle tone of upper and lower extremities of both side

	Right	Left
Upper extremity	+2	+1
Lower extremity	+2	+1

Table 2: Motor examination (reflexes) + diminished reflexes++ Normal reflexes, +++ exaggerated reflexes

Reflexes	Right	Left
Biceps	++	+
Triceps	++	+
Knee	++	+++
Ankle	++	+++
Plantar response	Flexor	Mute

**3. Investigations**

A persistent lacunar infarct in the right cerebellar hemisphere was found during a brain MRI prominence of the sylvian fissures, bilateral sulcogyral gaps, and ventricular system dilatation due to age-related atrophy. Small vessel ischemic illness indicated by periventricular T2/FLAIR hyperintensities. Bilateral ethmoid sinuses and the left maxillary sinuses both showed mucosal thickening. The MRI brain impression also showed age-related cerebral atrophic alterations with small artery ischemic illness, as well as a persistent lacunar infarct in the right cerebellar hemisphere. An MRI of the brain is shown in Figure 1.



Fig 1: - The circles represent the lacunar infarct MRI brain, magnetic resonance imaging

**4. Physiotherapy management**

The treatment protocol is planned for the patient week wise with accordance to the recovery of the patient. Table 3 shows the summery of treatment in week 1 and Table 4 shows treatment in accordance to week 2 physiotherapy management.

Table 3: PT rehabilitation protocol for week 1

Goals	Interventions	Dosage
Improve Functional Mobility	<ul style="list-style-type: none"> <li>- Seated and standing lower extremity strengthening exercises</li> <li>- Dynamic sitting and static standing balance exercises</li> <li>- Therapeutic activities like bed mobility and transfer training</li> <li>- Gait training including over ground and community ambulation</li> </ul>	10 reps x 1 set
Enhance Neurological Function	<ul style="list-style-type: none"> <li>- Neuromuscular re-education exercises</li> <li>- Specific therapeutic activities targeting balance and coordination</li> <li>- Gait training with progression from walker to independent ambulation</li> </ul>	Tailored to patient's tolerance and progress

Increase Independence in Activities of Daily Living (ADLs)	<ul style="list-style-type: none"> <li>- Functional tasks practice to improve ADL performance</li> <li>- Patient education on self-care techniques and strategies</li> </ul>	10 reps x 2 sets
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Table 4: PT rehabilitation protocol for week 2

Goals	Interventions	Dosage
Regain functional mobility and independence with activities of daily living	Seated lower extremity (LE) strengthening - Standing LE strengthening - Nu-Step - Dynamic sitting	60-75 minutes per day for six days a week. Specific exercises to be performed as follows: - Seated LE strengthening: 3 sets of 10 reps - Standing LE strengthening: 3 sets of 10 reps - Nu-Step: 15 minutes - Dynamic sitting balance: 10 minutes - Static standing balance: 10 minutes - Bed
	balance - Static standing balance - Bed mobility - Transfer training - Gait training	mobility: 5 minutes - Transfer training: 10 minutes - Gait training: 20 minutes

Fig 2: Dynamic Quads PNF approach technique Gait training



**5. Follow up and outcome measures**

Three weeks following release, the patient made a follow-up appointment for therapy at the neuro rehabilitation unit. The evaluation was repeated at the conclusion of his care. The patient reported increased strength on his left side of the body, better walking and standing balance, a lower chance of falling, and an improvement in speech and swallowing abilities. Reflexes were normal, and the left side of the body's tone showed improvement. The Berg Balance Scale indicated a medium fall risk for the patient, the Functional Independence Measure (FIM) indicated just minimal help was required for him to do the tasks, and the GCS revealed slight brain injury following treatment. Table 4 lists the pre- and post-treatment results.

Outcome measures	Pre- treatment	Post- treatment
GCS	E4V1M6	E4V3M6
Berg balance scale	5/56	40/56
FIM	50	82

### 5.1 Discussion

In the instance above, we saw the patient's physiotherapy recovery after experiencing chronic lacunar Infarct stroke in right cerebral hemisphere. After five weeks of treatment, our patient-tailored physiotherapy protocol demonstrated notable improvement. The literary analysis in chronic lacunar infarct is minimal. This study represents the case of a 75 year old female who was receiving physiotherapy for persistent lacunar infarct she is being admitted in the hospital for the same and her protocol was gait training, PNF and mobilization exercises to improve gait, strength and mobility of the patient. A strong correlation appears to exist between high levels of patient satisfaction, motivation, and involvement and a successful rehabilitation outcome. For stroke victims, rehabilitation is crucial to their recovery [16]. The purpose of rehabilitation is to help patients regain their ability to live freely and to carry out activities of daily living. Individuals may require varied rehabilitation goals.

Most studies have found that consistent motor practice and practical motor training aid in the motor recovery of stroke victims [17]. The major objectives of stroke rehabilitation are to increase the patient's ability to function safely in a dynamic environment by enhancing postural control, motor function, the patient's self-perception, and their understanding of the risk of falls [18]. Rehabilitation is required in order to achieve safety, independence, and efficient movement for the patient. Effective therapy approaches improve patient outcomes and lessen difficulties [19]. Early mobility assessment allows for the identification of each client's capabilities and needs, as well as the implementation of efficient solutions and education for clients and their families. During therapy, proprioceptive facilitation approaches for the upper limb have shown efficacy. These procedures comprise executing joint approximation ten times with a 30-second hold [20].

The patient in this case had a persistent lacunar infarct on their right side, which caused generalized weakness. Their balance and gait were affected as a result. A thorough neurological examination was conducted, and GCS, BBS, and FIM were utilized as pre- and post-outcome measures. The physiotherapy protocol was designed based on the impairments, and it included strengthening, bed mobility, balance exercises, fine and gross motor training, and gait training. Treatment lasted for two weeks, with weekly assessments and a follow-up at the sixth week, which markedly improved results. The patient's symptoms cleared up quickly, and their increased muscle strength, stride, and balancing abilities allowed them to become independent with ADLs. For a patient to recuperate, physiotherapy is essential. Early rehabilitation aids in the restoration of early functioning, as the current study found.

### 6. Conclusion

The effectiveness of a thorough physical therapy intervention in treating a 75-year-old patient's persistent lacunar infarct that resolves on its own is demonstrated in this case study. During the planned two-week rehabilitation program, there was a significant improvement in muscle strength, balance, and gait performance, leading to an increase in functional independence in daily living activities. The patient's progress was quantitatively assessed by outcome measures such as the FIM, BBS, and GCS. This case highlights the critical role that early and targeted physical therapy plays in assisting stroke victims in regaining optimal motor function and neurological recovery, both of which enhance overall health and quality of life.

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