Case Study

Physical Therapy in a Patient with Viral -encephalitis Hemi-Paresis: A Case Report

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Abstract

The purpose of the rehabilitation program is to improve motor skills, coordination, sensory system, mobilization and other existing disorders to achieve activity of daily living (ADL). For a span of five months, beginning two months ago, the patient had been incapable of independent mobilization. Throughout this duration, he was confined to a bed and wheelchair, necessitating assistance from family members for movement, who would lift or carry him as necessary. Physical therapy as part of the multidisciplinary approach can provide core stability exercises, muscular facilitation and stimulation of motion of the upper and lower extremities, balance exercises and mobility exercises, as well as strengthening exercises with PNF facilitation and active stimulation techniques and using the patient's body weight as a training burden. Bobath approach and facilitation exercise can reduce spasticity by strengthening the antagonist muscles. This case report concludes that although physiotherapy is done late with strengthening exercise and core stability strengthening techniques, prone strengthening exercise, it can improve motor skills, coordination, which in turn will increase the patient's independence in carrying out functional activities and ADLs.

Keywords- ADL, MMT, PNF MOTOR SKILL, COORDINATION, MOTOR & SENSORY, SENSORY INTEGRATION,

Introduction

Young people are more prone to developing viral encephalitis than the elderly. About 70% of diagnosed cases are viral, but the cause of many cases remains unknown despite extensive research. This condition affects 3.5 to 7.5 people per 100,000 and is most common among young and elderly people. It remains a major cause of acute neurological disability and long-term disability, particularly in children.[1]

The respiratory system falls prey to the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), wreaking havoc globally. Recent statistics from the World Health Organization reveal staggering figures: more than 550 million individuals infected and over 6 million fatalities worldwide. Amid this devastation, it's crucial to recognize the indirect neurological impacts of the virus, ranging from long COVID symptoms to neurological

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complications like strokes and encephalitis. As the pandemic persists, understanding and addressing these neurological implications becomes increasingly imperative, highlighting the interconnectedness of respiratory and neurological health and the necessity for comprehensive approaches to combatting the multifaceted challenges posed by SARS-CoV-2. As the COVID-19 pandemic is still going strong, and there's increasing evidence that the virus can potentially have neurotropic and neuro-invasive effects on the central nervous system.

In addition to gastrointestinal, respiratory, and systemic symptoms, neurological manifestations of COVID-19, such as headache, taste dysfunction, smell dysfunction, and seizures, are becoming more widely recognized in these patients. According to published data, encephalitis is one of the neurologic manifestations of COVID-19 that kills the most people, including adults and children.[2]

An inflammation of the brain parenchyma known as encephalitis can have major neurological malfunction, which is primarily brought on by viruses and is marked by symptoms like confusion, altered or decreased consciousness, fever, headaches, and seizures, as well as mobility disorders.[2]

While neurological complications of SARS-CoV-2 infection are relatively uncommon, their potential long-term impact is significant given the widespread infection rates. COVID-19 is now recognized in the differential diagnosis of several neurological syndromes, necessitating thorough understanding of their underlying pathophysiology for timely management.[3]

Although evidence supports neuro virulence, the virus's neuro invasive and neurotropic capacities appear limited, with immune and vascular mechanisms predominantly implicated in complications. Long COVID, including neuropsychiatric symptoms, presents in a notable proportion of patients, yet its mechanisms remain elusive. Long-term consequences, especially neurodegeneration, will only become apparent through sustained follow-up and research.[3]

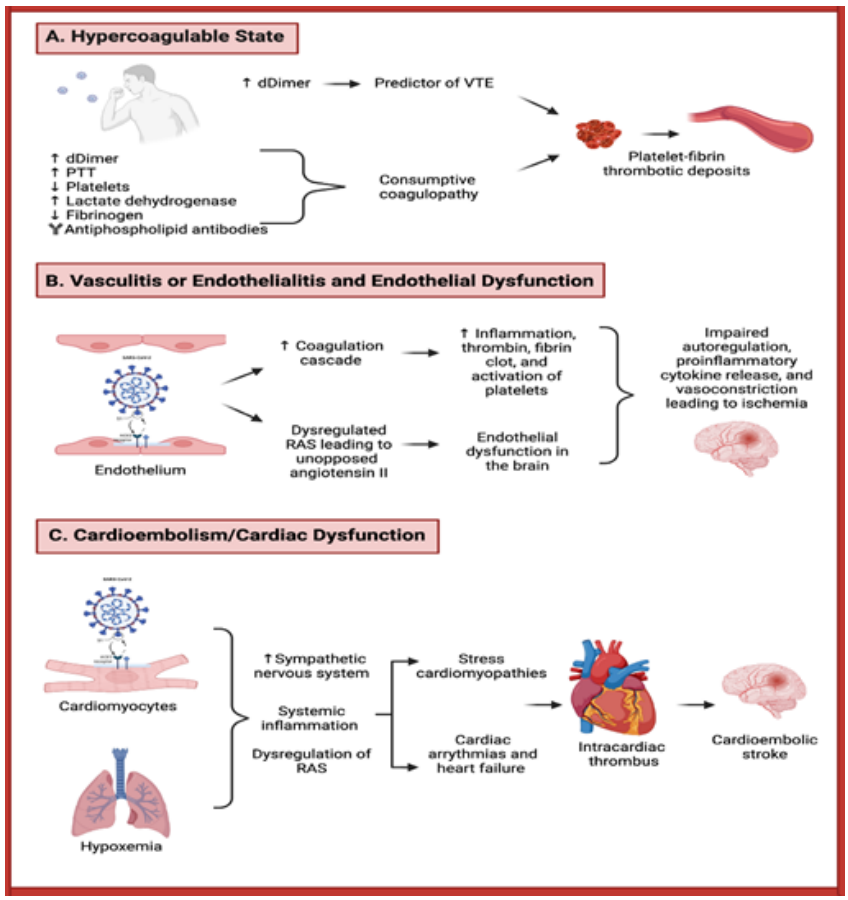

Figure 1: 'Underlying pathophysiology of various neurological syndromes.
Source- Rachel L Brown, et. al[3]

Case Report

A 28-year-old male patient was diagnosed with viral encephalitis five months ago. When he developed a cold, cough, and fever due to COVID-19, he experienced a lower respiratory rate, underwent ventilation, was incubated at home, catheterized, and underwent tracheostomy at the hospital. He also experienced weakness throughout his body, fever of 105°C, and a pressure sore in the sacral area after being treated at the hospital for one month. After treatment, the patient did not routinely undergo physical therapy due to his psychological instability and tendency to experience sadness and pain in the gluteal area following the debridement surgery. Due to the need for continued dressing and cleaning of the pressure sore, the patient lay down more frequently.

Figure 2: Pressure sores in the sacral area, also known as sacral pressure ulcers, result from Pressure sores in the sacral area. Pressure on the skin and underlying tissues in the lower back region.

Till two months ago, the patient was unable to mobilize independently for a period of five months. During this time, his activities were confined to a bed and wheelchair, and he relied on family assistance to move, being lifted or carried as needed. Both lower limbs were too weak for the patient to stand and walk, and spasticity and tremors were common, especially when changing positions from supine to side lying or bending the knees. The patient's left arm could move actively, while the right arm was slightly weak, and the fingers of the right hand were difficult to move actively, although they could still be moved with the help of others.

Figure 3: Active range of motion exercise sessions are conducted with support and rehabilitation to enhance muscle strength and joint flexibility.

The patient's consciousness was compos mentis, blood pressure was 100/70 mmHg, pulse rate was 86x/minute, respiratory rate was 25x/minute. MMT right upper extremity 1/5, left upper extremity 4/5, right lower extremity 1/5, and left lower extremity 3/5. Ashworth scale right upper extremity 3/4, right lower extremity 3/4, left lower extremity 1/4 left upper extremity 1/4. Clonus occurs mainly in the lower right extremity both upper and lower extremity VAS scale 10/10

Initiating movement facilitation and adjusting the patient's position initially. Trunk impairment scale 5/23 and Barthel index 20/100. Scores of 0-20 indicate "total" dependency. Mini Mental Status Examination, rating 0-17 this is an inadequate way of testing whether the MMSE can provide a meaningful measure of change when used longitudinally in a therapeutic setting.

Anthropometric examination showed differences in the circumference of lower extremities, namely

the right patella circumference 20 cm-22 cm left, right upper leg 20 cm-left 25 cm, and left lower leg 20 cm-22 cm. Sensory examination showed complete sensory loss, sensory system and ascending pathways aids comprehension of clinical conditions. Listed conditions relate to sensory system for better understanding.[8]

Material and Methodology

All parameters were recorded in the pre, post intervention program. (Table-1)

Table 1: Assesment Result

Assessment type	Pre intervention	Post intervention
MMT	right upper extremity 1/5 left upper extremity 4/5, right lower extremity 1/5 left lower extremity 3/5	right upper extremity 3/5 left upper extremity 4/5, right lower extremity 4/5 left lower extremity 3/5
Functional abilities	Sitting balanced±10- 15 min	Standing with support on the pelvis and knees ± 5 min
TIS	06/23	13/23
Ashworth scale	right upper extremity ¾ right lower extremity ¾ left lower extremity 3/4 left upper extremity 3/4	right upper extremity 1/4 right lower extremity 2/4 left lower extremity 2/4 left lower extremity 2/4
FIM	50/100	67/100
Barthal index	20/100	52/10

The physical therapy rehabilitation provided consists of a series of exercises starting from relaxation and muscle facilitation in the lower leg area with the Bobath method to reduce spasticity and stimulate movement of the lower and upper extremities it improve motor performance.[12] Stretching of both upper and lower extremity. Stimulation of trunk muscles to improve core stabilization by activating trunk muscles, sit up and posture correction sitting and standing, proprioceptiveneuromuscular facilitation improve (rhythmic initiation, D1 flexion, extension) coordination. In addition to facilitation and sensory integration, these approaches significantly enhance social skills, adaptive behaviour, and sensory processing function.[10]offering promising avenues for holistic intervention in diverse neurodevelopmental disorders, gradual mobilization exercises are also carried out from both right and left rotation, sleeping to sitting, sitting to standing and standing independently.

Until now, a routine physiotherapy program has been carried out for 6 months with a frequency of 6day/week and a duration of 45-60 minutes of home exercise/training session. In addition, the patient family member is given a home education program to sit without leaning for a minimum of four hours per day, and wear a hand splint for the right wrist also use donut pillow to prevent bed sore.

Finding

After six months, informed consent was taken from the patient and evaluation was carried out with changes in the assessment results as follows (Table 2): blood pressure 110/70 mmHg, pulse frequency 76x/minute, respiratory rate 20x/ minute. MMT right upper extremity 3/5, left upper extremity 4/5, right lower extremity 2/5, and left lower extremity 3/5... Ashworth scale right upper extremity 1/4, right lower extremity 2/4, and left lower extremity 1/4. Clonus is reduced, the patient can stand with maximum support without clonus for 10 minutes. Trunk impairment scale 12/23 and Barthel index 65/100. Anthropometric examination showed differences in the circumference of the lower extremities mobilize the patient to a sitting position with minimal assistance.

Table 2: Physical therapy program.

Variables	DURATION 16 weeks of training sessions
Intensity	45-90 minutes per session
TYPE	Spasticity treatment: Stretching, it stimulates actin and myosin and muscle belly and strengthening agonist muscle Strengthening exercises: Lower extremity and upper extremity with passive range of motion, assisted Gradual mobilization exercises: Rolling right and left, prone exercise, lying down to sit exercise, balanced sitting exercise, sitting to standing exercise, balanced standing exercise Core muscle strengthening: Sit ups, push ups Use of hand splint. Sensory integration, proprioceptive neuromuscular facilitation, Gait training, standing with or without support.
	Use of hand splint

Figure 4: Patient achieve improved comfort and prevention of bedsores in the sitting position with the Donut pillow.

Figure 5: The patient can walk with assistance but has not achieved independent walking yet.

Figure 6: Patient is able to engage in walking activities with support but has not yet attained the ability to walk without assistance.

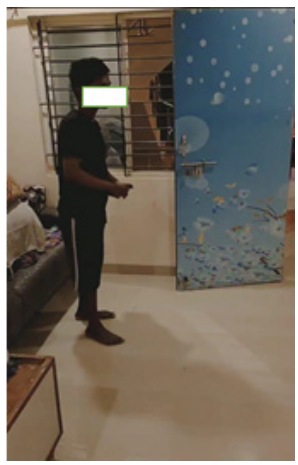

Figure 7: Patient has achieved the ability to walk and participate in activities independently, without the need for any assistance or support.

Figure 8: Significant milestone is achieved a comprehensive rehabilitation program, patient isable to walk independently without requiring any support or assistance.

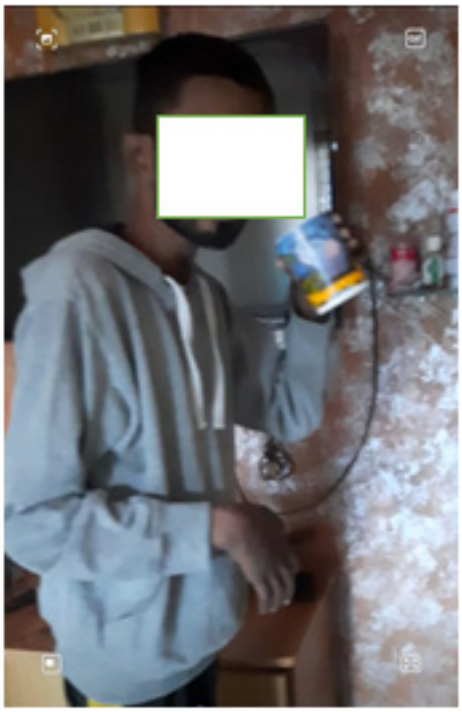

Figure 9: Undergoing physiotherapeutic neuro-rehabilitation, patient is able to regain the ability to walk independently without requiring any support or assistance.

Examination

Before commencing the examination, the informed consent was obtained, following which a thorough examination was conducted. During the examination, he was hemodynamically stable. Physically, the patient presented an ectomorphic physique. On auscultation, the chest was bilaterally symmetrical along with an abdomino-thoracic breathing pattern. There was no murmur or crepitus audible during auscultation, and bilateral air entry was also equal. The patient's current anthropometric measurements are 155 cm in height, 45 kg in weight, with a BMI of 12.78 kg/m2. The chest circumference was 55 cm and the head circumference was 33 cm.1 Patient caregiver education.

Discussion

Adult rehabilitation for viral encephalitis with covid19 infection right side hemiparesis is a complex and challenging endeavor that requires a multidisciplinary approach. Viral encephalitis, particularly in adult, can lead to significant neurological deficits and impairments in motor function, cognition, and behavior loss of sensory and motor function. The study provides valuable physiotherapy rehabilitation of a adult patient with viral encephalitis. The comprehensive approach to rehabilitation, focusing on caregiver and family education, addressing weakness and reduced strength, coordination motor deficit, improving mobility and gait, and enhancing functional activities, highlights the importance of early and multidisciplinary intervention in such cases. The utilization of proprioceptive neuromuscular facilitation (PNF) techniques, strengthening exercises, and task-oriented activities demonstrates a tailored approach to address specific impairments associated with viral encephalitis, such as weakness, loss of strength and balance and mobility limitations. The activities like climbing, walking, and walking with support, sitting to standing not only targets physical function but also promotes engagement and participation in meaningful activities for the adult. When multiple impairments with anatomical variations such as a hemiplegicrightupper and lower, the rehabilitation process becomes even more oriented. This study underscores the importance of

clinical conditions, highlighting their relation to the sensory system, facilitates precise diagnosis and treatment strategies and rehabilitation interventions designed to address the specific clinical impairments and deficits of each individual patient. In the case of viral encephalitis, early rehabilitation efforts focus on mitigating the acute effects of the infection, such as managing seizures, reducing inflammation, prevent pressure sore and providing supportive care to prevent further neurological damage and improve Quality of life.[10,,11]

Conclusion

This study highlights the importance of physiotherapy rehabilitation in adult patients with viral encephalitis. Early initiation of physiotherapy interventions can significantly improve functional abilities, improve motor control coordination, muscle strength, and range of motion, thus overall recovery and quality of life of the patient. The comprehensive approach of neurological physiotherapy acknowledges the complex medical, behavioural, social, emotional, and cognitive issues associated with encephalitis, ensuring a holistic rehabilitation process. It is crucial for healthcare providers to recognize the significance of neurological physiotherapy in managing the consequence of viral encephalitis and to integrate it into the multidisciplinary care of affected patients.

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