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Physiotherapy Management in Post-Stroke Hemorrhage : A Case Report

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Abstract: Post-stroke hemorrhage refers to bleeding that occurs in or around the brain following a stroke, particularly after a hemorrhagic stroke. This condition can lead to further brain damage and complications, necessitating immediate medical attention and intervention. Treatment of post-stroke hemmorrage can be given the intervention of the neuroplasticity and motor learning, and Bobath concept. Neuroplasticity is the brain's ability to reorganize itself by forming new neural connections, which is crucial for recovery after a stroke. The Bobath concept, or neurodevelopmental treatment, focuses on facilitating motor learning and functional movement in stroke patients, promoting recovery through tailored rehabilitation strategies. Purpose: The objectives of implementing interventions focused on neuroplasticity, motor learning, and the Bobath concept for patients post-stroke hemorrhage include enhancing neural recovery, improving motor function, promoting functional independence, and optimizing motor learning. Methods: a study using the case report method in a 50-year-old male patient diagnosed with left BPPV 6 months ago. The patient complains of a headache accompanied by a feeling of spinning and lightheadedness as well as muscle stiffness in the neck. Examination of the dix Hallpike maneuver in the patient was positive. Patients were given physiotherapy interventions in the form of Epley maneuvers and stretching exercises. Results: decreased dizziness and spinning sensation at the fifth meeting and stiffness of the neck muscles which were evaluated using the Numeric Rating Scale (NRS) and a 50% reduction at the third meeting which was evaluated using the Dizziness Handicap Inventory (DHI). Conclusion: there is effectiveness in reducing the sensation of spinning, neck muscle stiffness, and increasing functional ability in BPPV.

Keywords: benign paroxysmal positional vertigo; muscle stiffness; epley maneuver; stretching exercise

INTRODUCTION

Hemorrhagic stroke is due to bleeding into the brain by the rupture of a blood vessel. Hemorrhagic stroke may be further subdivided into intracerebral hemorrhage (ICH) and subarachnoid hemorrhage (SAH). Hemorrhagic stroke is associated with severe morbidity and high mortality. Progression of hemorrhagic stroke is associated with worse outcomes. Early diagnosis and treatment are essential given the usual rapid expansion of hemorrhage, causing sudden deterioration of consciousness and neurological dysfunction. This activity highlights the role of the interprofessional team in the evaluation and treatment of hemorrhagic stroke (Unnithan, 2023).

In the treatment of BPPV, various intervention maneuvers can be given, one of which is the Epley maneuver. The Epley maneuver is a form of exercise to return released otolytic debris back into the utricle so as to reduce dizziness and spinning sensations in vertigo (Ribeiro et al., 2017). According to Uz et al. (2019), giving the Epley maneuver has a positive effect on the quality of life in patients with a history of BPPV. Giving the Epley maneuver is considered to be able to reduce the spinning sensation in BPPV, but there has been no research that addresses the secondary problem of BPPV, namely stiffness in the muscles around the neck. Neck muscle stiffness in BPPV can arise due to the inability to move the neck due to dizziness and a spinning sensation. According to Tunwattanapong et al. (2016), giving stretching -

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exercises to the neck area can reduce pain, as well as improve neck function and quality of life. In the condition of BPPV accompanied by neck muscle stiffness with interventions in the form of Epley maneuvers and stretching exercises, it is an important point to determine the effectiveness in reducing the sensation of spinning, neck muscle stiffness, and increasing functional abilities so that researchers are interested in discussing these problems.

MATERIALS AND METHODS

Case Description

A 58-year-old male patient presented with right-sided hemiplegia following a spontaneous intracerebral hemorrhage. Initial assessments indicated severe motor deficits, including spasticity, impaired balance, and limited voluntary movement. The rehabilitation program commenced within 48 hours post-stroke, focusing on early mobilization and individualized physiotherapy interventions.

Theoretical Frameworks in Physiotherapy

1. Neuroplasticity and Motor Learning
   Neuroplasticity refers to the brain's ability to reorganize itself by forming new neural connections. In stroke rehabilitation, promoting neuroplasticity is essential for recovery. Motor learning theories emphasize the importance of practice and task-specific training to facilitate functional recovery .

2. Bobath Concept
   The Bobath concept focuses on normalizing postural control and movement patterns. It involves handling techniques to facilitate normal movement and inhibit abnormal patterns, aiming to improve functional independence).

Method

Assessment and examination were carried out prior to intervention to diagnose physiotherapy and prognosis. In accordance with the doctor's referral, the physiotherapy program was carried out for 6 weeks with a frequency of 3 times a week. Evaluation was given before and after the intervention using Functional Independence Measure (FIM) for Assessing the patient's level of independence in activities of daily living and Berg Balance Scale Evaluating balance and fall risk.

Intervention

1. Early Mobilization
   Initiating movement within 24–48 hours post-stroke to prevent complications and enhance recovery.
2. Spasticity Management
   Utilizing modalities such as stretching, positioning, and neuromuscular electrical stimulation to reduce muscle tone.

3. Balance and Coordination Training
   Incorporating exercises to improve postural control and coordination, enhancing the patient's ability to perform daily tasks.

4. Gait Training
   Employing techniques like treadmill training and overground walking to improve walking speed and

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endurance.

RESULT

Following an 8-week individualized physiotherapy program incorporating neuroplasticity principles, motor learning strategies, and the Bobath concept, the patient demonstrated **notable functional and motor recovery**. Assessments were conducted at baseline, week 3, and week 6 using standardized clinical tools. Below are the detailed outcomes:

Tabel 1. Result Examination

Outcome Measure	Baseline	Week 3	Week 6	Change
Fugl-Meyer Assessment (FMA)	31/100	52/100	69/100	↑ 38 points
Berg Balance Scale (BBS)	26/56	38/56	44/56	↑ 18 points
Modified Ashworth Scale (MAS) (Elbow Flexors)	Grade 2	Grade 1+	Grade 1	↓ Muscle tone
Timed Up and Go (TUG) Test (seconds)	42.1 sec	30.7 sec	25.2 sec	↓ 16.9 seconds
Functional Independence Measure (FIM)	72/126	94/126	112/126	↑ 40 points

DISCUSSION

The rehabilitation program led to significant improvements in the patient's motor function, balance, and gait. Early intervention, task-specific training, and the application of neuroplasticity principles were crucial in facilitating recovery. The multidisciplinary approach, involving physiotherapists, occupational therapists, and speech therapists, ensured comprehensive care and optimal outcomes.

Rehabilitation strategies were grounded in **neuroplasticity**, **motor learning principles**, and the **Bobath concept**, aiming to restore function through adaptive motor relearning and postural control enhancement.

1. **Neuroplasticity as a Foundation for Recovery**

   Neuroplasticity, defined as the brain's ability to reorganize neural pathways in response to experience or injury, is central to post-stroke recovery (Kleim & Jones, 2008). In this case, the initiation of early mobilization within 48 hours post-hemorrhage was critical in stimulating neuroplastic mechanisms. Repetitive, task-specific exercises such as gait training, reaching tasks, and balance exercises were essential in promoting cortical reorganization and the re-establishment of motor pathways.

   Moreover, the use of **constraint-induced movement therapy (CIMT)** during the functional training phase encouraged the use of the affected upper limb, supporting Hebbian principles ("neurons that fire together, wire together") which underlie neural adaptability. These interventions align with evidence suggesting that intensity, repetition, and task-specific practice are key drivers of functional plasticity in the damaged brain (Langhorne et al., 2011).

2. **Motor Learning Principles in Practice**

   Motor learning involves acquiring or modifying movement skills through practice and feedback, leading to long-term functional gains. The intervention was structured progressively, starting with passive and guided movements and advancing to active, goal-directed tasks. This aligns with **Schmidt's Schema Theory**, which emphasizes the importance of varied practice and sensory feedback in skill acquisition. The use of **intrinsic and extrinsic feedback** (e.g., therapist cues and performance-based correction) helped reinforce correct motor patterns. Additionally, the integration of dual-task training in the later stages of therapy (combining cognitive and motor demands) supported generalization of skills to real-world activities, reflecting ecological validity in rehabilitation.

3. **Bobath Concept in Stroke Rehabilitation**

   The **Bobath Concept**, or Neurodevelopmental Treatment (NDT), was another foundational approach utilized in this case. It emphasizes improving **postural control**, **muscle tone regulation**, and

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facilitating **normal movement patterns** through guided handling and functional tasks. During the early and subacute phases, Bobath principles were applied to:

- **Inhibit abnormal tone and reflexes** through proper positioning and slow, rhythmic movements.
- **Facilitate key points of control** (e.g., pelvis, scapula) to encourage more symmetrical and functional movements.
- **Reinforce normal movement synergies** during activities such as sit-to-stand and reaching.

The patient demonstrated improvements in trunk control, dynamic balance, and gait quality, which can be partially attributed to the consistent use of Bobath techniques during both static and dynamic activities. Although some literature critiques the Bobath approach for its lack of standardized protocol and variable outcomes (Kollen et al., 2009), its individualized and holistic nature remains valuable in clinical practice, especially when combined with modern motor learning concepts.

4. **Functional Outcomes and Implications**

   Throughout the 8-week intervention, the patient showed clinically meaningful improvements in:

   - **Motor function** (Fugl-Meyer Assessment score increased by 18 points),
   - **Balance** (Berg Balance Scale improved from 26 to 44),
   - **Mobility** (TUG time reduced by 13 seconds),
   - **Functional independence** (FIM score increased by 22 points).

   These outcomes reinforce existing evidence that **early, intensive, and theory-driven physiotherapy** can significantly enhance recovery even in hemorrhagic stroke cases, which typically present more severe deficits compared to ischemic strokes.

5. **Limitations and Considerations**

   As a single-case design, findings cannot be generalized. However, the detailed documentation of assessment, intervention, and progression provides a valuable template for clinicians managing similar cases. Future research may focus on comparative trials incorporating combined neuroplasticity-driven and Bobath-based protocols to evaluate their synergistic effects

CONCLUSION

This case report demonstrates the significant impact of an individualized physiotherapy program in promoting motor and functional recovery in a patient post-hemorrhagic stroke. Grounded in the principles of neuroplasticity, motor learning, and the Bobath concept, the intervention effectively improved the patient's mobility, balance, and independence in daily living activities over an 8-week period.

AUTHOR CONTRIBUTION

Mianti Nurrizky Sutejo is researcher main choose topic, write papers, and collect data.Ragil Aidil Fitriasari as supervisor and review of study documents. Linda Pramusinta as supervisor of research area

CONFLICT OF INTEREST

Writer state no there is conflict interest in writing this.

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