



O-

NEW BOBATH CONCEPT APPROACH IN ADOLESCENT WITH TRAUMATIC INTRACEREBRAL HEMORRHAGE (TICH): A CASE STUDY

Husna Mufidati¹, Umi Budi Rahayu², Adhy Kurniawan³

^{1,2,3}Physiotherapy Department, Faculty of Health Science, Universitas Muhammadiyah Surakarta

*Corresponding author: Husna Mufidati, Email: husnamufida@gmail.com

Abstract

Introduction : This case report shows the application of the exercise therapy method with the New Bobath Concept Approach in cases of Traumatic Intracerebral Hemorrhage (TICH) and reports the results of the exercise.

Case presentation: Mr. AR, a 16-year-old student with a clinical diagnosis of Traumatic Intracerebral Hemorrhage (TICH) received an exercise therapy program with a New Bobath Concept Approach consisting of abdominal exercise, facilitate forward & backward pelvic, bridging exercise, sensibility exercise, sitting and sitting balance exercise, mobilization and facilitation of the scapula and arm, core stability exercise, standing exercise, facilitation of walking patterns and walking exercise.

Management and outcome: Exercise was carried out for 12 weeks with a frequency of twice a week and a duration of 60 minutes per training session.

Discussion: After giving exercise therapy with the New Bobath Concept Approach for 12 weeks, the results showed an increase MMT value in muscles shoulder, elbow, wrist, fingers, hip and knee from 0 to 2 and 3. Meanwhile for the Barthel index from a value of 2 (total dependence) to 10 (moderate dependence).

Conclusion: Mr. AR is able to sit, stand independently and walk 100 meters with assistance.

Keywords: Intracerebral Hemorrhage (ICH), Traumatic Intracerebral Hemorrhage (TICH), New Bobath Concept

Introduction

Intracerebral hemorrhage (ICH) is a sub-type of hemorrhagic stroke as a result of the rupture of a blood vessel in the brain and eventually widens into the surrounding tissue (McGurgan et al., 2021). ICH is the most common type of stroke and accounts for 10-20% in all parts of the world (Madangarli et al., 2019). One of the main complications of traumatic brain injury (TBI) is traumatic intracerebral hemorrhage (TICH) which occurs in 13-35% of patients after a traumatic event (Gabriel et al., 2020). Based on data collected at RSUD dr.Hardjono S Ponorogo, it was found that from January to December 2020 the incidence of non-traumatic ICH was 150 events and ICH due to trauma was 16 events.



There are many training methods for training stroke survivors, each method has its own advantages and disadvantages, and will be useful and effective in certain cases. But more importantly how to examine the problems that occur in stroke patients. Problems that occur can vary depending on a. The degree of damage, b. Topical lesions and comorbidities. Problems with stroke patients include cognitive, psychiatric, and sensory aspects (Shafa & Yanti, 2020). One of the modalities that can be given is the Bobath Concept developed by Berta and Karel Bobath. The Bobath concept is based on recovery as opposed to movement compensation (Graham et al., 2015)

Case Presentation

Mr. AR is a 16 year old student with a diagnosis of Hemiplegia Dextra due to Traumatic Intracerebral Hemorrhage (TICH). AR's family complained that the patient's legs and arms could not be moved. Tuan AR is a grade IX junior high school student who lives with his mother, grandmother and younger brother. Mr. AR was unable to move his right limb after having a single accident due to avoiding a potholed road on March 12, 2021. At that time, Mr. AR was riding a motorcycle after Friday prayers, Mr. AR had a single accident because he avoided a hole and hit a tree so he fell and unconscious. Mr. AR was taken to Dr. Hospital. Harjono S Ponorogo and was in a coma for 4 days. Based on the results of the CT scan, it was found that there was ICH in the left thalamus with a size of 3x3,5x4 (Fig. 1).

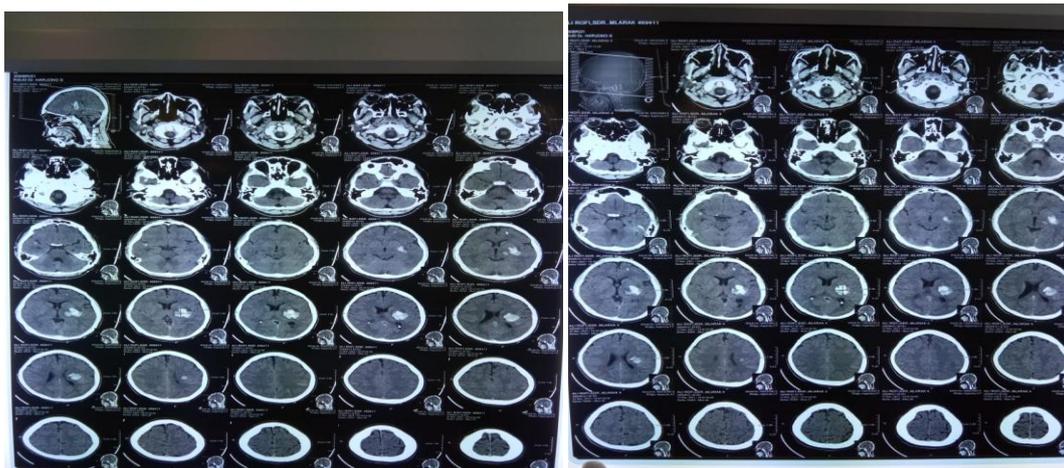


Figure 1. The CT scan of Mr. AR shows that there is bleeding with a size of 3x3,5x4

Mr. AR was transferred from the ICU after one week, when he woke up from his coma. On day 18 Mr AR was referred for physiotherapy. Examinations performed by physiotherapy showed that there was hypotonia in the muscles of the right leg and arm, no patellar and



biceps dextra tendon reflexes were found, the muscle value of the right limb in both legs and arms was 0. Functional examination with the Barthel index showed 2 results, namely total dependence.

Management and Outcome

The exercise therapy used in dealing with the problematic physiotherapy of Mr. AR is the New Bobath Concept where in this exercise therapy model the emphasis is on functional activities and activation of core muscles. The New Bobath Concept is a development of the Bobath Concept. The exercise therapy provided includes abdominal exercise, facilitate forward & backward pelvic, bridging exercise, sensibility exercise, sitting and sitting balance exercise, mobilization and facilitation of the scapula and arm, core stability exercise, standing exercise, facilitation of walking patterns and walking exercise . The exercise was carried out for 12 weeks with a frequency of twice a week and a duration of 60 minutes per training session.

The examination was carried out before and after the AR host was given physiotherapy modalities. The examination includes examination of muscle values with Manual Muscle Testing (MMT), pathological and physiological reflexes, spasticity with the Asworth Scale and the Activity of Daily Living (ADL) index with the Barthel index.

Mr. AR's condition after receiving physiotherapy modalities in the form of the New Bobath Concept for 12 weeks, the results can be seen in the following table:

| Week | MMT | Barthel Index |
|-------|--|--|
| 0 | Upper & Lower Extremity Muscles Dextra: 0 | -Barthel Index: 2 (total dependence) |
| 1 – 4 | Upper & Lower Extremity Muscles Dextra: 1 Except: ^Flexor Knee Dextra: 2 ^Flexor Elbow Dextra: 2 ^Flexor Hip Dextra: 2 | -Able to sit independently -Barthel Index: 10 (moderate dependence) |
| 5 – 8 | Upper & Lower Extremity Muscles Dextra: 1 Except: ^Flexor Extensor Shoulder Dextra: 2 ^Abductor Adductor Shoulder Dextra: 2 ^Flexor & Extensor Elbow Dextra: 2 ^Flexor & Extensor Hip | -Able to sit independently (stable) -Barthel Index: 10 (moderate dependence) |



| | | |
|---------------|---------------------------|--|
| | Dextra: 3 | |
| | ^Abductor Adductor Hip | |
| | Dextra: 3 | |
| | ^Flexor & Extensor Knee | |
| | Dextra: 3 | |
| 9 - 12 | AGA & AGB Dextra: 1 | -Able to sit independently (stable) |
| | Kecuali | -Able to stand independently (stable) |
| | ^Flexor & Extensor | |
| | Shoulder Dextra: 2 | -Able to walk 100 meters with assistance |
| | ^Abductor & Adductor | |
| | Shoulder Dextra: 2 | -Barthel Index: 10 (moderate dependence) |
| | ^Flexor & Extensor Elbow | |
| | Dextra: 3 | |
| | ^Flexor & Extensor Wrist | |
| | Dextra:2 | |
| | ^Flexor Fingers Dextra: 2 | |
| | ^Flexor & Extensor Hip | |
| | Dextra: 3 | |
| | ^Abductor & Adductor Hip | |
| | Dextra: 3 | |
| | ^Flexor & Extensor Knee | |
| | Dextra: 3 | |

Table 1. MMT & Barthel Index Results

Discussion

Traumatic Intracerebral Hemorrhage (TICH) poses a very complex physiotherapy problem, this is due to the appearance of symptoms such as contralateral hemiplegia and hemihypesthesia. Giving the New Bobath Concept after a stroke is appropriate because in a few days after a stroke, neurons whose damage is not permanent slowly begin to carry out their functions again due to an increase in blood supply and restoration of the metabolic system so that fluid absorption in the brain begins to occur. Neuroplasticity begins to occur because neuroplasticity is a process of taking over the function of neurons whose damage has been permanent. Therefore, the best recovery is done in the early post-stroke period. Plasticity starts from the muscles, because the motor units that work in the muscles change when they receive learning a movement (Hortobágyi & Maffiuletti, 2011). Directly, the motor unit that plays a role increases along with motor learning. After that, a significant increase in the frequency of the motor unit due to continuous practice led to the formation of faster and smoother movements. These all will affect the growth and development of Purkinje cells located in the cerebellum (Irfan, 2012). Currently, the Bobath concept is supported by contemporary theories on motor control, neuromuscular plasticity, biomechanics and motor learning which provide a theoretical basis for posture interpretation, analysis of human



functional movements and recovery of central nervous system lesions (Michielsen et al., 2017)

Giving exercise therapy with the New Bobath Concept method can significantly increase the excitability of alpha motor neurons in post-stroke humans, with this increase, the motor learning process can be formed and the process of adaptation and plasticity in the nerves helps restore movement activity in post-stroke humans (Paci, 2014).).

This is possible because in principle the current Bobath method approach is based on the development of normal motion patterns where the study of normal motion patterns is part of the study of motion science. For every facilitation and mobilization as well as the use of training facilities in the Bobath application, the main target given is the formation of normal movement patterns based on motion analysis of each body member. Likewise in this study, Bobath applications were given not only on the lower limbs or legs, but on other body parts such as the thorax, neck and head, shoulders and arms (Chung, 2014). The expected normal movement in the post-stroke human walking pattern can be obtained with support and facilitation from other body parts, because in the concept of locomotion there is a connection between postural and limb movements that are formed automatically as the basis of movement. Posture and other limbs facilitate the formation of movements with normal patterns in the legs when doing walking activities (Graham et al., 2015).

Conclusion

Based on the results of studies that have been carried out, giving exercise with the New Bobath Concept can increase muscle strength and functional ability in adolescents with Traumatic Intracerebral Hemorrhage (TICH).

Acknowledgments

The author would like to thank all those who support this case study.

References

- Alexander, G. Q-O., Durango-E, Y., Padilla-Z, H., Rafael, L. M-S., Keni, R., Deora, H., & Agrawal, A. (2020). The puzzle of spontaneous versus traumatic intracranial hemorrhages. *Egyptian Journal of Neurosurgery*. 35:13. <https://doi.org/10.1186/s41984-020-00084-9>



- Chung, B. P. H. (2014). Effect of different combinations of physiotherapy treatment approaches on functional outcomes in stroke patients: Aretrospective analysis. *Hong Kong Physiotherapy Journal*, 32(1), 21–27. <https://doi.org/10.1016/j.hkpj.2013.11.001>
- Graham, J. V., Eustace, C., Brock, K., & Swain, E. (2015). *The Bobath Concept in Contemporary Clinical Practice*. June. <https://doi.org/10.1310/tsr160157>
- Hortobágyi, T., & Maffiuletti, N. A. (2011). Neural adaptations to electrical stimulation strength training. *European Journal of Applied Physiology*, 111(10), 2439–2449. <https://doi.org/10.1007/s00421-011-2012-2>
- Irfan, M. (2012). *APLIKASI TERAPI LATIHAN METODE BOBATH DAN SURFACE ELECTROMYOGRAPHY (SEMG) MEMPERBAIKI POLA JALAN INSAN PASCA STROKE APPLICATION OF EXERCISE THERAPY WITH BOBATH METHOD AND SURFACE ELECTROMYOGRAPHY (SEMG) TO IMPROVE GAIT PATTERN IN STROKE PATIENTS*. 12(April), 1–20.
- Madangarli, N., Bonsack, F., Dasari, R., & Sukumari-Ramesh, S. (2019). Intracerebral hemorrhage: Blood components and neurotoxicity. *Brain Sciences*, 9(11). <https://doi.org/10.3390/brainsci9110316>
- McGurgan, I. J., Ziai, W. C., Werring, D. J., Al-Shahi Salman, R., & Parry-Jones, A. R. (2021). Acute intracerebral haemorrhage: Diagnosis and management. *Practical Neurology*, 21(2), 128–136. <https://doi.org/10.1136/practneurol-2020-002763>
- Michelsen, M., Vaughan-G, J., Holland, A., Magri, A & Suzuki, M. (2017). The Bobath concept- a model to illustrate clinical practice. *Disability and Rehabilitation An International Multidisciplinary Journal*. 1-13. <https://doi.org/10.1080/09638288.2017.1417496>
- Paci, M. (2014). *Physiotherapy based on the Bobath Concept for adults with post-stroke hemiplegia : A review of effectiveness studies REVIEW ARTICLE PHYSIOTHERAPY BASED ON THE BOBATH CONCEPT FOR ADULTS WITH POST-STROKE HEMIPLEGIA : A REVIEW OF EFFECTIVENESS STUDIES*. May. <https://doi.org/10.1080/16501970306106>
- Shafa, S. I., & Yanti, D. (2020). *Journal of Medical Science Efektifitas New Bobath Concept terhadap Peningkatan Fungsional Pasien Stroke Iskemik dengan Outcome Stroke Diukur Menggunakan Fungsional Independent Measurement (FIM) dan Glasgow Outcome Scale (GOS) di Rumah Sakit Umum Daerah dr. Zaenol Abidin*.(1), 14–19.