

American Journal of
Medicine and
Medical Sciences

American Journal of Medicine and Medical Sciences 2024, 14(12): 3451-3453
DOI: 10.5923/j.ajmms.20241412.80

Association Between Magnetic Resonance Imaging of the Brain and Cognitive Indicators in Post–Traumatic Encephalopathy

Nodir Khaydarov[1], Muborak Abdullaeva[2], Saodat Sobirova[2], Shakhzoda Khikmatova[3]

[1]Doctor of Medical Sciences, Professor, Tashkent State Dental Institute, Tashkent, Uzbekistan
[2]Associate Professor, Tashkent State Dental Institute, Tashkent, Uzbekistan
[3]PhD Student, Tashkent State Dental Institute, Tashkent, Uzbekistan

Abstract Post–traumatic encephalopathy (PTE) is a disease that occurs after traumatic brain injury and is accompanied by diffuse changes in the brain. After a traumatic brain injury, scarring, atrophic, and dystrophic changes develop in the tissues of the skull for one year, which lead to post–traumatic encephalopathy (PTE). The patients with post–traumatic encephalopathy (PTE) have general cerebral complaints, neurological and intellectual–mnestic changes and neuropsychiatric disorders in the brain. In this scientific work, special attention is paid to the relationship between cognitive changes and the results of magnetic resonance imaging (MRI) of the brain in patients with post–traumatic encephalopathy (PTE).

Keywords MRI, Brain, Cognitive function, Post-traumatic encephalopathy (PTE), Traumatic brain injury, Neurological changes, Intellectual-mnestic changes, MMSE

1. Introduction

Post–traumatic encephalopathy (PTE) is a disease that results from a traumatic brain injury, resulting in neurological disorders and, in some cases, mental changes as a result of atrophic, dystrophic, and degenerative changes in the layers of the brain that develop over one or more years. Symptoms and degree of damage of PTE depend on the age of the patient, the degree of brain injury, the effect of medical treatments, changes in the cerebral vessels. Brain injuries are one of the most common diseases in neurotraumatology and are currently one of the urgent problems of medicine. Complications arising after various brain injuries worsen the quality of life of patients and make it difficult for them to adapt socially. The fact that brain injuries are more common, especially in young people, causes many social problems. Therefore, improving the treatment and treatment tactics of such patients has become an urgent task.

Among diagnostic tests, magnetic resonance imaging (MRI) is the most informative. MRI is a radiological diagnostic method based on a magnetic field and radio waves to obtain layered and volumetric images of organs and tissues. Unlike other radio wave methods, MRI uses radio waves with a frequency much lower than that required to ionize atoms. MRI does not have an ionizing (harmful) effect on biological tissues and is currently considered almost harmless.

There are several neuropsychological tests to assess the cognitive functioning of patients. The most commonly used is the Mini-Mental State Examination (MMSE). The MMSE is a simple questionnaire that assesses the cognitive status of patients and the degree of dementia.

The aim of scientific research: To determine the relationship between brain MRI parameters and signs of cognitive impairment in patients with posttraumatic encephalopathy.

2. Materials and Methods of Scientific Research

The study was conducted on 60 patients (40 (66.6%) men, 20 (33.3%) women) treated at the Tashkent Regional Specialized Somatic Hospital (Figure 1).

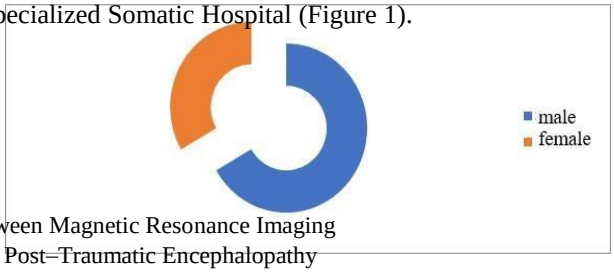


Figure 1. Gender analysis of patients

All patients underwent clinical–neurological and neuropsychological examinations. The MMSE scale was used to assess the intellectual–mnestic state of the patients.

Received: Dec. 8, 2024; Accepted: Dec. 28, 2024; Published: Dec. 31, 2024
Published online at http://journal.sapub.org/ajmms

Examinations conducted on the basis of this scale allowed to determine the cognitive state and the degree of dementia in the patients.

Magnetic resonance imaging (MRI) was used to better study changes in brain tissue in patients with post–traumatic encephalopathy.

Clinical diagnosis and diagnostic criteria of the disease were applied according to the International Classification of Diseases (ICD–10).

3. Research Results

According to the results of MRI of the brain, various signs of atrophy were revealed in these patients (Figure 2).

In 30 patients, the MRI examination revealed signs of cortical atrophy in some parts of the brain, and they were noted more in the forehead and temporal parts. In the neurological examination, no focal pathological signs were found in these patients.

In 12 patients, MRI showed signs of diffuse atrophy, that is, atrophy in several parts of the brain. In the neurological examination, signs of scattered organic symptoms were noted (Figure 3).

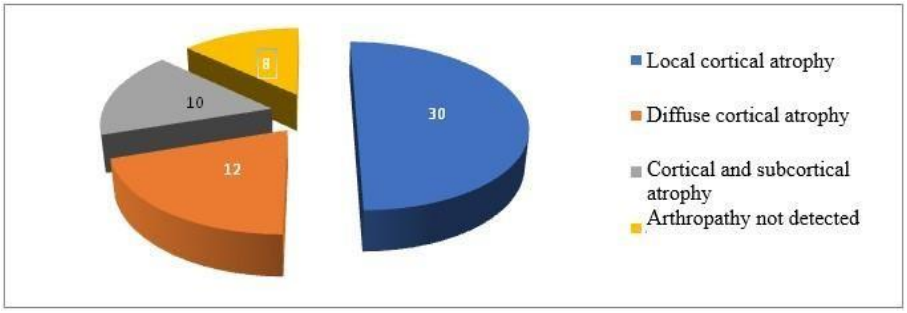


Figure 2. Cerebral MRI features detected in patients

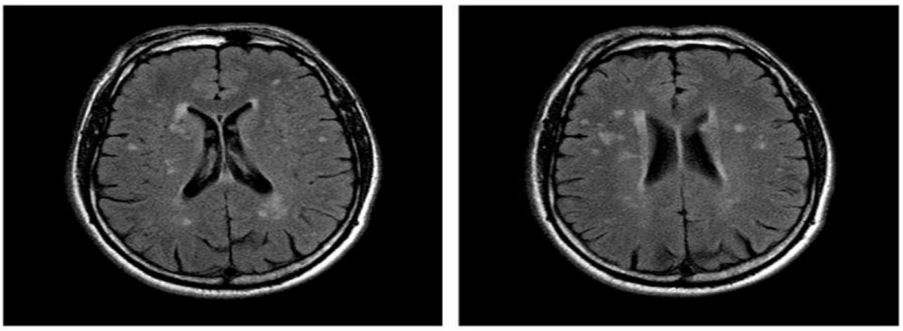


Figure 3. MRI image of patients with post–traumatic encephalopathy

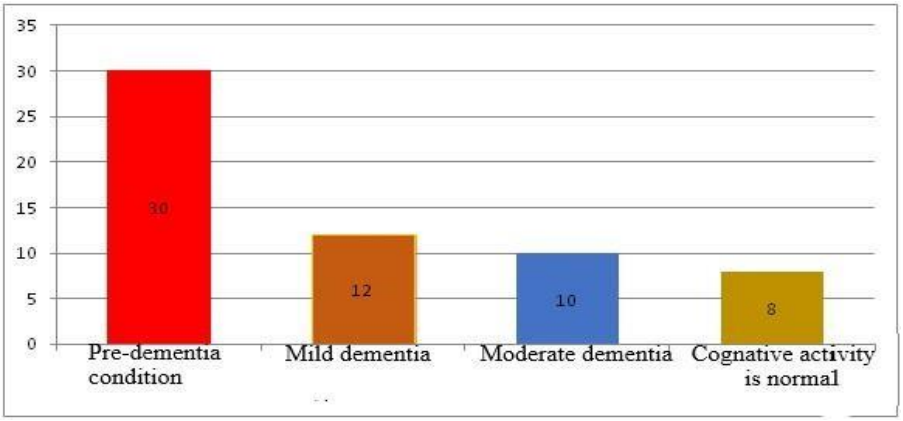


Figure 4. The changes in cognitive function in posttraumatic patients

Table 1. Correlation between brain MRI findings and cognitive function in patients

Brain MRI features	Local bark atrophy	Diffuse cortical atrophy	Cortical and subcortical atrophy	Atrophy was not detected
MMSE result (score)	27,2	22,6	18,5	28,9
Cognitive changes	Pre–dementia state	Mild dementia	Moderate dementia	Cognitive activity is normal

In 10 patients, signs of cerebral atrophy were noted in almost all parts of the cerebral cortex, and small ischemic lesions were detected in the subcortical areas. Neurological examination revealed organic lesions with lesions.

In 8 patients, no pathological changes were detected in the MRI brain examination, but in the neurological examination, small plane organic signs were found.

When we examined cognitive function in all patients using the MMSE test, various intellectual and mental changes were detected in the patients (Figure 4).

The 30 patients scored an average of 27.2 points on the MMSE scale. This indicator indicates that cognitive functioning is in a pre–dementia state. The average score of 12 patients was 22.6, which means that patients in this group have mild dementia. An average of 18.5 points was recorded in 10 patients, which is a sign of moderate dementia, which is a strong weakening of intellectual–mnestic changes. 8 patients scored 28.9 points on the MMSE scale and showed moderate cognitive functioning.

4. Conclusions

In patients with posttraumatic encephalopathy, a correlation was found between cognitive changes, neurological indicators, and MRI findings (Table 1). Signs of atrophy in the brain tissue indicate involutional processes in the brain tissue. These processes are a complication of brain injury, which leads to a slowdown in intellectual processes in everyday life in patients and the development of pathological neurological symptoms.

REFERENCES

[1] Neurological Bulletin. (2020). *Volume LII(2), 67–71*. Facts, doubts, and unresolved issues. *CNS Drugs*, *28*(3), [2] The Chest X–Ray: A Survival Guide (1st ed.). 185–193.

[3] Felson, B. (2020). *Felson's Principles of Chest Roentgenology: A Programmed Text* (5th ed.).

[4] The Unofficial Guide to Radiology: 100 Practice Chest 11–25. X–Rays.

[8] Gusev, E. I., Konovalov, A. N., & Gecht, A. B. (Eds.). (2008). *Neurology and Neurosurgery: Clinical Recommendations*. Moscow: GEOTAR–Media.

[9] Putilina, M. V., & Radishevsky, M. V. (2005). Optimization of rehabilitation programs for patients with craniocerebral trauma. *Russian Medical Journal*, (13), 22.

[10] Chikina, E. S., & Levin, V. V. (2005). Craniocerebral trauma: Use of modern nootropic drugs in the acute period and in the treatment of post-traumatic encephalopathy. *Russian Doctor*, (11).

[11] Saver, D. L. (2012). Citicoline: New data on a promising and widely available neuroprotection and neurorepair agent. *Consilium Medicum Ukraina*, *6*(8), 29–33.

[12] Alvarez-Sabin, J., & Roman, G. S. (2011). Citicoline in vascular cognitive impairment and vascular dementia after stroke. *Stroke*, *42*, 40–43.

[13] Bramlett, H. M., & Dalton, D. W. (2006). Pathophysiology of ischemic and traumatic brain injury: Similarities and differences. *Emergency Medicine*, *4*(5), 22–34.

[14] Conant, R., & Schauss, A. G. (2004). Therapeutic applications of citicoline for stroke and cognitive dysfunction in the elderly: A review of the literature. *Alternative Medicine Review*, *9*(1), 17–31.

[15] Krupinski, J., Abudawood, M., Matou-Nasri, S., et al. (2012). Citicoline induces angiogenesis improving survival of vascular/human brain microvessel endothelial cells through pathways involving ERK1/2 and insulin receptor substrate-1. *Vascular Cell*, *4*(20). https://doi.org/10.1186/2045-824X-4-20.

[16] Davalos, A., & Secades, J. (2011). Citicoline preclinical and clinical update 2009–2010. *Stroke*, *42*, 36–39.

[17] Fioravanti, M., & Yanagi, M. (2004). Cytidinediphosphocholine (CDP choline) for cognitive and behavioral disturbances associated with chronic cerebral disorders in the elderly. *Cochrane Database of Systematic Reviews*, (2).

[18] Grieb, P. (2014). Neuroprotective properties of citicoline: Facts, doubts, and unresolved issues. *CNS Drugs*, *28*(3),

[19] Qureshi, I., & Endres, J. R. (2010). Citicoline: A novel therapeutic agent with neuroprotective, neuromodulatory, and neuroregenerative properties. *Natural Medicine Journal*, *2*(6),

[5] Vizilo, T. L., & Vlasova, I. V. (2006). Clinical and neurological characteristics of patients with traumatic encephalopathy. *Review of Neurological Diseases*, *5*(4), 167–177. *Polytrauma*, 68–72.

[6] Krylov, V. V. (Ed.). (2010). *Lectures on craniocerebral* rehabilitation: Review of the literature. *Review of Neurology, trauma: A study guide*. Moscow. *54*(3), 173–179.

[7] Makarov, A. Y. (2001). Consequences of craniocerebral trauma and their classification. *Neurological Journal*, (2).

[20] Saver, J. L. (2008). Citicoline: Update on a promising and widely available agent for neuroprotection and neurorepair.

[21] Secades, J. J. (2012). Probable role of citicoline in stroke

[22] Zweifler, R. M. (2002). Membrane stabilizer: Citicoline. *Current Medical Research and Opinions*, *18* (suppl. 2), 14–17.

Copyright © 2024 The Author(s). Published by Scientific & Academic Publishing
This work is licensed under the Creative Commons Attribution International License (CC BY). http://creativecommons.org/licenses/by/4.0/