



Favorable clinical evolution and neurorehabilitation outcome of Frontal Lobe Syndrome after traumatic brain injury due to a motorcycle accident: A Case Report

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Methodology

This paper presents a case report of neuromuscular rehabilitation in a young patient with psychocognitive status and tetraplegia following a severe TBI (traumatic brain injury) that occurred in a road traffic accident. The patient was a motorcyclist and was not wearing protective equipment. The patient, G.V., aged 19 years old, was first admitted in 17.10.2025 to our clinic, for motor deficit characterized by tetraparesis, psychocognitive status (mixed aphasia), dysphagic, severe locomotor and self care dysfunction, to initiate the rehabilitation program. Her educational history is insignificant, and the personal pathological history is also unremarkable. The patient is a former casual smoker, with the family denying any alcohol consumption. They currently live in an urban environment and are not exposed to any notable adverse lifestyle or working conditions.

The patient sustained on 02.08.2025 polytrauma following a road traffic accident (motorcyclist without protective equipment) and is brought to the ER of TEHB for severe TBI, in comatose state (Glasgow score of 3 points), intubated and mechanically ventilated, presenting anisocoria (OS<OD) and multiple soft tissue lesions for which he was hospitalized in the Neurosurgery Department until 17.10.2025. During hospitalization, a PEG tube and tracheostomy were performed, and on 28.08.2025 the patient underwent neurosurgical intervention with surgical evacuation of a right frontal chronic subdural hematoma. On 22.09.2025 the tracheostomy was removed. At discharge, he remains in Minimally conscious state (MCS) and tetraparetic. On 17.10.2025, he was admitted into our clinic for initiation of the rehabilitation program.

On objective examination upon admission, the patient presented in a mediotone general state and was underweight, **adequate**. Facial asymmetry was noted as a sign of a midline frontal bone fracture. The patient was partially edematous and had an expressive appearance. The integuments and mucosae were pale but normally turgid, with a post-tracheostomy scar observed in the anterior cervical region. The superficial lymphatic system was not palpable. Respiratory examination revealed bilaterally present vesicular breath sounds without rales, with an oxygen saturation (SaO₂) of 97% on room air. Cardiovascular assessment showed rhythmic heart sounds without audible murmurs, blood pressure of 185/100 mmHg, and a ventricular rate of 91 bpm per minute, regular. The abdomen was distended, with slow intestinal transit, the lower edge of the liver was palpable at the costal margin, and the spleen was not palpable. Uro-genital examination showed bilateral testicular atrophy (Glasgow type), with urinary incontinence.

On NM&K examination, orientation in time and space could not be assessed as the patient was in a minimally conscious state. Mixed aphasia and dysphagia were present, with suspected visual impairment. The patient exhibited psychomotor agitation while in bed and responded to painful stimuli. No signs of meningeal irritation were observed. Regarding muscle strength, spontaneous movements were present in both the right upper and right lower limbs; however, muscle strength could not be formally tested. Coordination could not be assessed. Functionally, the patient was not able to perform grasping and prehension and was independent in bed mobility. The patient was positioned in bed on an anti-pressure mattress, and transfer to a standing position was not performed.

Periodical evaluation showed that laboratory investigations were within normal limits, and the vitæ culture was negative. The patient was clinically and functionally assessed using standardized protocols implemented in our clinic, including the following evaluation scales: Ashworth Scale, Medical Research Council (MRC) Scale, Activities of Daily Living (ADL), Disability Rating Scale (DRS), Extended Glasgow Outcome Scale (GOS-E), Barthel Index, Modified Rankin Scale, and Functional Ambulation Classification (FAC).

Based on the anamnesis, clinical and paraclinical data, the positive diagnosis can be formulated as follows: **Cognitive-Psychological Status:** Mixed aphasia and tetraplegia following severe Traumatic Brain Injury (TBI) with Initial Presentation (ER); Glasgow Coma Scale (GCS) (= 3 points). Acute subdural hematoma (Right Frontal), surgically evacuated on August 22, 2025. Resolved subarachnoid hemorrhage (SAH), Resolved intracerebral hemorrhage (IVH), Resolved right parietal cerebral contusion. Resolved cerebellar tonsillar herniation. Resolved C1-C2 Posterior lumbosacral Hemorrhage.

Treatment: 1. **Hypoglycemic regimen:** a low-glyc, low-carb, low-fat diet is recommended. Avoid smoking, alcohol consumption, ensure proper hydration with at least 2 L of fluid daily, and sleep on an anti-bedsores mattress. 2. **Medication:** During hospitalization, the patient received medication treatment with: antiepileptics, antiepileptic therapy, neuroprotective and metabolic therapy, antidepressants, antipsychotics, anxiolytics, dietary supplements, gastric prokinetics, analgesics.

3. **A complex rehabilitation program** was implemented for the patient. The **main objectives** included maximizing physical abilities, stable general status, therapy of associated conditions, mental status improvement, enhancement of QoL and familiar and social inclusion. **Regarding the kinesiotherapy targets**, we focused on prevention of pressure sores and deep vein thrombosis, prevention of vicious posture maintaining joint mobility, restoration of motor control in the limbs, improving active functions and functional deficits, including Activities of Daily Living (ADL) mobility, transfers, sitting posture, balance, wheelchair maneuvering dexterity, personal care/dressing, eating, bathing hygiene.

Rehabilitation in bed: The patient underwent the following bedside interventions: Passive mobilizations to prevent joint ankylosis, avoid deformities, and ensure good circulation, positioning to prevent contraindications and harmful postures, active mobilizations progressing from passive to active-assisted and active exercises with progressive resistance, strengthening of muscles to prepare for lifting, transfers, and walking, adaptation to virtualization.

Rehabilitation of sitting position: The patient followed the step-by-step translation from the lying position to the sitting position, at the beginning with the lower leg extended - sitting elevated, then to the short sitting position - lower legs at the edge of the bed.

Rehabilitation for standing and walking: In the active, walking reduction progressed gradually, starting from basic functional positions. The main stages included: assisted transition to the orthostatic position, initial help from the physiotherapist, maintaining balance in upright position, with speed assistance;

Complications could include the following: Posttraumatic seizures (frequently occur after moderate or severe TBI), Hydrocephalus, Deep vein thrombosis (incidence as high as 54%), Hemorrhagic complication (incidence of 11.76%, with a 10-20% incidence of clinically significant hemorrhagic complication), Spasticity, Gastrointestinal and genitourinary complications (among the most common issue in patients with TBI, Gait abnormalities, Autonomic after TBI, Chronic traumatic encephalopathy (CTE).

Long-term physical, cognitive, and behavioral impairments are the factors that most commonly limit a patient's participation into the community and his return to employment. They include the following: amnesia,agnosia, decline, posttraumatic headache (Tension-type headaches are the most common form, but exacerbations of migraine-like headaches are also frequent), posttraumatic depression (depression after TBI is further associated with cognitive decline,anxiety disorders, substance abuse, dysregulation of emotional expression, and aggressive outbursts).

The patient presented episodes of sudden psychomotor agitation and aggressive language which required long-term psychiatric treatment. The patient also received prophylactic antiepileptic treatment due to the severity of the brain injury.



Abstract

Introduction. Traumatic Brain Injury (TBI) particularly in moderate-to-severe cases, remains a leading cause of long-term disability worldwide, affecting over 64 million people annually. Its multifactorial nature demands a comprehensive, multidisciplinary rehabilitation approach to address the diverse physical, cognitive, behavioral, and psychosocial impairment that follow injury.

Material and method. This paper presents a case report of neuromuscular rehabilitation in a young patient with neurocognitive status and tetraplegia following a severe TBI (traumatic brain injury) that occurred in a road traffic accident on 02.08.2025. The patient was a motorcyclist and was not wearing protective equipment. During hospitalization, a PEG tube and tracheostomy were performed, and on 28.08.2025 the patient underwent neurosurgical intervention with surgical evacuation of a right frontal chronic subdural hematoma. On 22.09.2025 the tracheostomy was removed. At discharge, he remains in minimally conscious state (MCS) and tetraparetic. On 17.10.2025, he was admitted into our clinic for initiation of the rehabilitation program. His progress was evaluated using various scales, including the Barthel Index and Modified Rankin Scale, focusing on motor function and quality of life improvements.

Results and discussions. Following appropriate treatment and a comprehensive rehabilitation program, the patient showed significant progress in muscle strength and also in mental status. He regained the ability to feed independently (following the removal of PEG tube) and can be mobilized to a wheelchair with assistance. Additionally, functionality assessment scales indicated marked improvement, highlighting the effectiveness of the interventions and the overall favorable evolution of his condition.

Conclusions. Neuromuscular rehabilitation plays a pivotal role in the recovery of patients with neurocognitive disorders and tetraplegia. This case highlights remarkable recovery despite the history of traumatic brain injury in a young patient with no prior health issues.

Introduction

Traumatic brain injury (TBI) is defined as "an alteration in brain function, or other evidence of brain pathology, caused by an external force. These types of injuries result from a jolt or blow to the head or from an object penetrating the skull and injuring the brain. Sources of TBI include motor vehicle accidents (MVA), falls, assaults, and gunshot wounds. It is important to differentiate TBI from other types of acquired brain injuries, such as those caused by tumors or strokes, due to significant differences in mechanisms, treatments, and outcomes between traumatic and nontraumatic injuries. TBI should also be distinguished from the term head injury, which refers to a blow to the head or laceration that may occur without causing injury to the brain. A TBI can be classified as either open or closed. As open or penetrating, TBI occurs when an object breaks the skull and enters the brain. A closed TBI occurs when the brain is injured but the skull remains intact. Understanding brain injury severity helps with both prognosis of functional recovery and anticipating patient's rehabilitation needs (Fig. 1).

Table 1 Classification of Traumatic Brain Injuries					
	GCS (Post 24h)	Coma duration	Consciousness	Imaging	PTS
Mild	13-15	<30 min	Normal	Normal	<3 d
Moderate	9-12	>30 min to <24 h	Normal or Mild	Normal or Mild	>3 d and <7 d
Severe	3-8	>24 h	Normal or Mild	Normal or Mild	>7 d

Fig. 1

Most patients with significant TBI experience initial loss of consciousness, with some persisting as a disorder of consciousness (DOC). A large review of TBI model systems data collected over three decades found that 74% of more than 17,000 patients demonstrated some degree of decreased arousal, with 12% of that group remaining in a DOC until transition to a rehabilitation setting, where 82% regained consciousness.

Four primary disorders of consciousness are recognized: (1) coma, (2) unresponsive wakefulness syndrome (UWS, or vegetative state), (3) minimally conscious state (MCS) –+, and (4) posttraumatic confusional state (Fig. 2).

Posttraumatic seizures (PTS) are a significant complication arising from TBI. PTS commonly has been defined as occurring in the immediate period (<24 hours after injury), early period (24 hours to 7 days after injury), or late period (>7 days after injury) [51]. Posttraumatic epilepsy (PTE) is late PTS and can also be defined as a single seizure occurring more than 7 days after an injury.

Rehabilitative care focuses on containing the injury process and preventing complications. Comprehensive transdisciplinary rehabilitation programs are necessary for individuals with TBI to prevent further injury and return to an optimal level of function within the limits imposed by their injury.

Results

Evolution: The patient presents a slow but favorable evolution due to the intensive rehabilitation program. His outcome is affected by the profound neurological sequelae, which make the interactions with the medical staff difficult. At discharge the patient was able to maintain seated position in wheelchair for moderate periods of time and make a few steps with support from kinesiotherapy.

Prognosis: The long-term prognosis remains reserved due to the low compliance to the rehabilitation program and the severe possible complications. The functional prognosis is considered moderate since the patient not compliant to the rehabilitation program and reportedly refuses any treatment. But given the patient's young age and the good family support, the chance of a positive prognosis in the future is higher.

The particularity of the case consists in the young age of the patient and the marked severity of the lesions, which left profound sequelae. During the prolonged hospitalization the patient went from a state of minimal consciousness, to being partially cooperative and being able to move independently at the bed's place. At the first admission in our clinic, the patient was fed through PEG tube. In present, he is able to eat independently. Also, in the beginning he presented urinary catheter, which was later removed, now the patient presenting physiological voiding in adult doses. The patient remains with a severe dysfunction in locomotion and self-care capacity, requiring permanent care from another person.

Conclusion

Traumatic brain injury (TBI) is projected to remain among the top three contributors to disability and injury-related death until 2030.1 Current estimates suggest that TBI affects approximately 50 to 60 million individuals globally each year, with a prevalence rate of 70 per 100,000 persons in the United States.2 However, these figures may not fully capture the true incidence and prevalence of TBI, underestimating its impact. A prevalent misconception among many healthcare providers is that disturbance in consciousness that persists across the intensive care unit (ICU) stay invariably leads to poor outcome. This false belief can negatively influence early decision making leading to overestimation of poor prognosis.

Traumatic brain injury (TBI) can have lifelong and dynamic effects on health and wellbeing. Research on the long-term consequences emphasizes that, for many patients, TBI should be conceptualized as a chronic health condition. Evidence suggests that functional outcomes after TBI can show improvement or deterioration up to two decades after injury, and rates of all-cause mortality remain elevated for many years. Furthermore, TBI represents a risk factor for a variety of neurological illnesses, including epilepsy, stroke, and neurodegenerative disease. With respect to neuroendocrinology after TBI, post-traumatic stress disorder (PTSD) is a common long-term neuropsychological injury after injury have identified complex persisting and evolving abnormalities, but described as polypathology, which includes chronic traumatic encephalopathy.

Comprehensive rehabilitation programmes appear to be effective in terms of a reduction in psychosocial problems, a higher level of community integration and a higher return to employment.

It must be remembered that prevention of TBI is vital as there remains no cure for the sequelae of moderate-to-severe TBI.

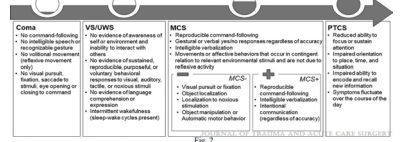


Fig. 2

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