

# Clinical-imagistic and rehabilitation features in a young patient traumatized by road accident- with vegetative state and evolution towards a state of minimum consciousness at 6 months after the accident

STOICA Simona-Isabelle <sup>1,2</sup>, CHIPĂRUȘ Carmen Elena <sup>2</sup>, LAPĂDAT Magdalena Vasilica <sup>2</sup>, NOHAI Iulia-Maria <sup>2</sup>, DUMITRAȘCU Andreea <sup>2</sup>, ANDONE Ioana <sup>1,2</sup>, POPESCU Cristina <sup>2</sup>, ONOSE Gelu <sup>1,2</sup>

Corresponding author: Popescu Cristina, E-mail: [cristina.popescu\\_recuperare@yahoo.com](mailto:cristina.popescu_recuperare@yahoo.com)

<sup>1</sup> University of Medicine and Pharmacy "Carol Davila", Bucharest, Romania

<sup>2</sup> Teaching Emergency Hospital „Bagdasar-Arseni” (TEHBA), Bucharest Romania

## Abstract

**Introduction:** The frequency of road accidents is increasing due to the continuous enhancement of cars and unpredictable elements such as state of the roads and individual factors; their individual consequences can be very severe. Materials and Methods: With the permission of the THEBA Ethics Committee (no 3159/ 30.01.2019), we present an interesting case of a young patient who suffered a severe head injury after a road accident. We will talk about the evolution of clinical, paraclinical and functional parameters. We will also highlight the diagnostic and therapeutic features encountered in this case. Results: Despite the unfavorable clinical and functional prognosis and the multiple post-traumatic complications that occurred, the patient survived and evolved to better psycho-cognitive and functional status. Discussion and conclusions: Road accidents represent a real social problem through individual, family and professional consequences. In this context, primary and secondary preventive education of the population, as well as the promotion of neuro-muscular – and, if necessary cognitive and or communication - rehabilitation programs are essential.

**Keywords:** traumatic brain injury, neuro-muscular and cognitive rehabilitation, post-traumatic complication,

## Introduction

Road accidents are a major cause of premature death and disability worldwide, with 20-50 million people injured each year. Mortality from road accidents is around 1.3 million people yearly. Road accidents are one of the leading causes of death among young people and adolescents and cause at least 120,000 deaths and 2.4 million injuries annually in Europe (1).

As can be seen in the graph below, the number of seriously injured is proportional to the number of severe road accidents.

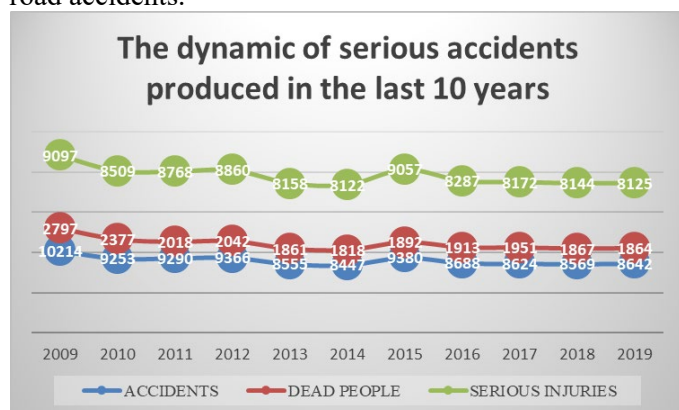


Figure 1. The dynamic of serious accidents produced in the last 10 years (Adapted after 2)

One of the serious consequences of road accidents is the traumatic brain injury that can lead to varying degrees of disability (3).

Traumatic brain injury can affect all the structures of the cephalic extremity and functionally can disturb the state of consciousness in different degrees: coma, vegetative state, state of minimal consciousness, confusional syndrome (4). Coma is the lack of any response of the patient (either spontaneously or to stimuli); vegetative

state is a condition in which the patient does not have psychic contact with the world around him, but presents moments of awaking state with his/her eyes open; the state of minimal consciousness implies clear occasional evidence of self-awareness or the environment and the confusional (or amnesic syndrome) is a transient state to the normal consciousness state (4), (5), (6).

The best prognosis is for the young patient and for the post-traumatic persistent vegetative state (4).

Road accidents have very harsh medical, family, social, and economic consequences (7) (8). Therefore, research into the acute, subacute and chronic rehabilitation evolution of road accident survivors is very important.

## Materials and Methods

We present a clinical case of a 33-year-old male patient, having the occupation refrigeration technician. The patient was a great smoker and he weaned smoking in 2019. In 24.04.2019, the patient had an road accident (driver) resulting in severe TBI (right frontal hemorrhagic contusion, diffuse axonal lesions) with conservative treatment at "Sf Andrei" Hospital (Constanța). In 28.06.2019 the patient was transferred in Neurosurgery 3 Clinic of Teaching Hospital Emergency "Bagdasar-Arseni" and in the period 11.07- 19.12.2019 he was fragmentally hospitalized of the Neuro-Muscular Rehabilitation Clinic in the same hospital.

The clinical examination at the admission revealed: suffering facies, right thoraco-abdominal eczema, grade 3 decubitus sores (in the left heel and right buttock), a lingual bite wound, bilateral foot onychomycosis, tracheostomy (bearing cannula), bilateral wet bronchial rallies, oxygen saturation - SaO<sub>2</sub> = 99% (spontaneous),

blod pressure =125/90 mmHg, pulse= 105/min, regulare, percutan endoscopic gastrostoma, Foley urinary catheter. At the neurological examination we found: vegetative state, spastic tetraplegia; exhaustible left plantar clonus, bilateral live osteotendinous reflexes, bilateral Hoffman at a patient that inconstantly blinks to order.

The evaluation scales were: GOS = 2 (severe / profound disability), modified Rankin = 5 (profound disability), modified Ashworth = 4 (marked spasticity), PENN = 3 (6-9 spasms / day), ADL = 0, IADL = 0, Barthel = 0 , FIM = 18, MMSE= 0.

	11.iul	01.aug	20.aug	25.aug	10.sept	20.sept	04.nov	16.nov	28.nov	17.dec
FE (µg/l)	35,00	44,00	11,00	26,00	10,00	67	77,00		62,00	42,00
TGO (mg/dl)	37,00	44,00	21,00	31,00	30,00	40	37,00	24,00	106,00	54,00
TGP (mg/dl)	58,00	39,00	30,00	42,00	41,00	53	85,00	42,00	240,00	205,00
GGT (mg/dl)	73,00		47,00	62,00		72	72,00	59,00		92,00
VSH (mm/h)	58,00	75,00			70,00	38	40,00	90,00	70,00	38,00
FIBRINOGEN (mg/dl)	622.45			514.64	900.25		550.54	535.00	446.00	618.49
LEU/µl	8700,00	9030,00	19800,00	11100,00	11400,00	8870	5400,00	10730,00	4280,00	4600,00
HGB (g/dl)	10,60	11,60	12,70	12,70	12,70	12.45	11,90	11,93	10,82	11,20
Albumin (g/dl)	3,1		3,4	3,4		2,8	3	3,1	2,9	3,5

**Table 1. Patient's blood tests**

From the table with the patient's blood tests we can see that the iron level correlated with the inflammatory samples. We also observe a very balanced biological condition for a patient with a persistent vegetative condition - which shows how well the patient was cared for by his family.

Date	Urine summary	Urine culture
11.iul		Proteus- MDR
23.iul		Proteus- MDR
04.aug	Nitrite 2+, Protein +/-, RBC 3+	Proteus- MDR
25.aug	RBC 2+, Nitrite 2+	
20.sept		Polymorphic flora
24.sept		Polymorphic flora
21.oct		Polymorphic flora
04.nov		G- MDR bacilli
11.dec		Polymorphic flora

**Table 2. Patient's urine tests**

Urine tests showed frequent infection with multidrug-resistant bacteria, which could caused the inflammatory syndrome.

Date	Thoraco-pulmonary Rx	Cervical spine Rx
11.iul	No bilateral pulmonary condensation	
25.iul	Normal	
21.aug		Minimum posterior thought C6-C7
22.aug	Minimal accentuation of the intestinal and infrared bronchial pattern	
28.nov	Normal	

**Tabel 3. Patient's radiological examinations**

During the hospitalization the patient presented episodes of tracheobronchial hypersecretion, reason for which several thoraco-pulmonary radiographs were performed. Radiological investigations showed no changes of a medical emergency.

At the hospitalization in Constanta, immediately after the road accident, the cranio-cerebral imaging examination revealed: extensive diffuse axonal lesions, including in the corpus callosum and brainstem (and the medical documents remained in the respective neurosurgical clinic).

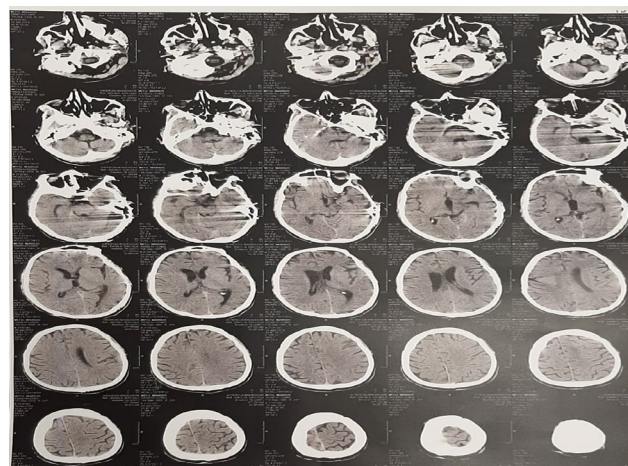
The native brain computed tomography (CT) in 28.06.2019 showed: without heterodense lesions of acute intracerebral posttraumatic type; without extracerebral fluid collections; symmetrical internal and external liquid spaces, of normal dimensions; ventricular system of normal dimensions located on the midline; midline structures located on the mid-sagittal line; without bone lesions of the cranial box; without post-traumatic CT changes in the frontal, maxillary, ethmoid and sphenoid sinuses; normally pneumatized mastoid cells (in a non-cooperating patient).

During the hospitalization in our clinic, the patient presented episodes of increased spasticity, which culminated in the second half of November 2019; which led to CT cranio-cerebral, toaraco-pulmonary and abdomino-pelvic investigations (in order to discover an organic cause of aggravation of spasticity).

Native brain CT in 29.11.2019 showed: left pontine sequelae lesion and widening of the supra- and subtentorial intergyral grooves

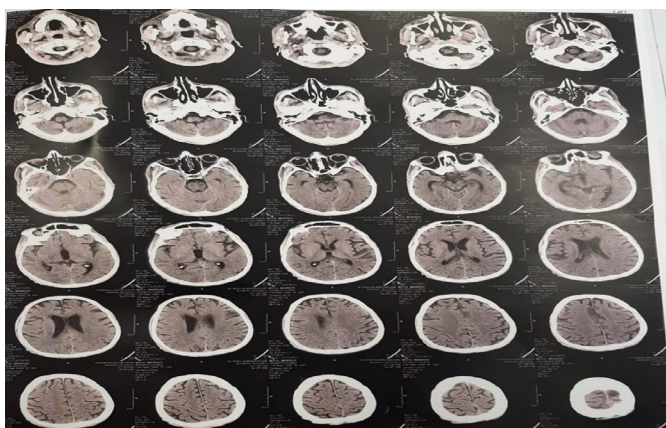
Native CT abdomen in 29.11.2019 showed: liquid accumulation adjacent to the visceral contour of the spleen with a thickness of 3 cm and an antero-posterior axis of 7 cm, PEG.

And native thoracic CT 29.11.2020 showed: bilateral pleurisy with a thickness of 1 cm right and 1.5 cm left, pericardial fluid 11-18 mm, left postero-basal lamellar atelectasis.

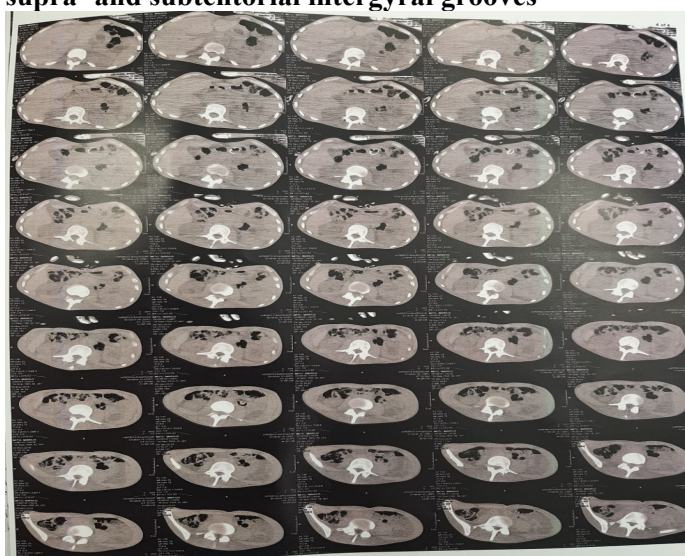


**Figure 2. Native brain CT (28.06.2020) showing a normal appearance**





**Figure 3. Patient native brain CT 29.11.2019 showing: left pontine sequelae lesion and widening of the supra- and subtentorial intergyral grooves**



**Figure 4. Patient native CT abdomen 29.11.2019 showing: liquid accumulation adjacent to the visceral contour of the spleen, PEG**



**Figure 5. Patient native thoracic CT 29.11.2020 showing: bilateral pleurisy, left postero-basal lamellar atelectasis.**

The diagnosis at discharge from our clinic division the was: spastic tetraplegia and state of minimum consciousness after severe TBI in polytraumatic context (road accident), PEG; status after tracheostoma, neurogenic bladder, secondary urinary tract infection. The pharmaceutical treatment of the patient was with: injectable anticoagulants, antibiotics painkillers, neurotrophics, gastric protectors, vitamins, antispasmodics, hydro-electrolytic rebalancing, urinary antiseptics, hepatoprotectors, brain anti-edematous and albumin. The physical therapy consisted in: posture exercises, bilateral elbow orthosis, passive exercises to maintain joint mobility, muscle relaxation, normalize the tone of somatic muscles; neuromuscular proprioceptive periferal facilitating technics and progressive verticalizations with the bed, in the wheelchair and at the verticalization table.

#### Results

The patient evolution was slowly favorable, with improving neuro-psycho-cognitive status, partial improving of swallowing disorders (oral feeding with semi-solids), relief of respiratory disorders (tracheostoma suppressed at discharge), improved sphincter control (spontaneous urination, spontaneous defecation every 2-3 days) and healing of all skin/subcutaneous lesions. The possible complication of the patient evolution are: skin trophic lesions, infectious: respiratory, urinary, (sub)cutaneous; urinary lithiasis, constipation, subocclusive syndrome, immobilizing osteoporosis, joint stiffness, muscle atrophies. The case prognosis is also influenced by the family support network.

#### Discussion and conclusion

We presented the case of a patient who evolved from vegetative state to a state of minimal consciousness after a car accident. The patient's evolution was unexpectedly favorable due to the teamwork in the rehabilitation process; and family support was essential too in this process. Last but not least, we emphasize the huge importance of primary prevention of road accidents to avoid the occurrence of traumatic brain injuries.

#### References

1. García-Altés A, Suelves JM, Barbería E. Catalonia, Cost savings associated with 10 years of road safety policies in. 91(1):28-35, Spain. : Bull World Health Organ., 2013.
2. <https://www.politiaromana.ro/ro/structura-politiei-romane/unitati-centrale/directia-rutiera/statistici>. [Cited: 11 08, 2020.]
3. Iaccarino C, Carretta A, Nicolosi F, Morselli C. injury., Epidemiology of severe traumatic brain. doi: 10.23736/S0390-5616.18.04532-0, 2018 Oct, Vols. 62(5):535-541.
4. Bender A, Jox RJ, Grill E, Straube A, Lulé D. procedures., Persistent vegetative state and minimally conscious state: a systematic review and meta-analysis of diagnostic. doi: 10.3238/arztebl.2015.0235., 2015 Apr 3, Vols. 112(14):235-42.
5. Giacino JT, Ashwal S, Childs N, Cranford R, Jennett B, Katz DI, Kelly JP, Rosenberg JH, Whyte J, Zafonte RD, Zasler ND. criteria., The minimally conscious state: definition and diagnostic. doi: 10.1212/wnl.58.3.349, 2002 Feb 12, Vols. 58(3):349-53.
6. Giacino JT, Fins JJ, Laureys S, Schiff ND. science., Disorders of consciousness after acquired brain injury: the state of the. 10(2):99-114., Epub 2014 Jan 28., Vol. Nat Rev Neurol.
7. van der Vlegel M, Haagsma JA, de Munter L, de Jongh MAC, Polinder S. Types., Health Care and Productivity Costs of Non-Fatal Traffic Injuries: A Comparison of Road User. doi: 10.3390/ijerph17072217. P, s.l. : Int J Environ Res Public Health., 2020 Mar 26, Vol. 17(7):2217.
8. <https://www.who.int/news-room/fact-sheets/detail/road-traffic-injuries>. [Online] [Cited: 11 08, 2020.]