

Received: 12.01.2013  
Accepted: 28.10.2013

A – Study Design  
B – Data Collection  
C – Statistical Analysis  
D – Data Interpretation  
E – Manuscript Preparation  
F – Literature Search  
G – Funds Collection

# THE SPECIFIC NATURE OF PSYCHOLOGICAL REHABILITATION FOR CHILDREN AFTER SEVERE TRAUMATIC BRAIN INJURY AT THE EARLY STAGES OF RECOVERING CONSCIOUSNESS

Valentina I. Bykova<sup>(B,D,E,F)</sup>, Ekaterina V. Fufaeva<sup>(A,E)</sup>,  
Ekaterina A. Lvova<sup>(B,C)</sup>

Clinical and Research Institute of Emergency Pediatric Surgery and Trauma,  
Moscow, Russia

## SUMMARY

### Background:

Psychological support for children with TBI and their families plays a very significant role in early neurorehabilitation. The aim of our study was to investigate some particularities of psychological support for children afflicted by severe traumatic brain injury. 30 children aged 11-16 with severe traumatic brain injury (GCS≤ 8) participated in the study. A case study technique was employed. The parents' involvement in the rehabilitation process was studied, using clinical interviews and observations.

### Material/ Methods:

Two complementary directions were identified as regards children's psychological rehabilitation after severe TBI: the psychological support offered by the parents and psychological work with children who are in states of consciousness that have been profoundly altered. In children the interaction with parents becomes important, because trauma causes dysfunction in the family. Analyses of clinical cases using case histories where one can find information about signals coming from children in such states of consciousness during psychological contact have revealed common patterns in the dynamics of recuperation. As the energetic and functional possibilities of patients improve during their vegetative state, a number of physical manifestations start to appear. Afterwards, mimetic and emotional reactions emerge, and consequently the amount of body "gesturing" increases. Thus psychological help for children with altered states of consciousness is an important procedure in early neurorehabilitation, insofar as their contact and interaction with the outer world is concerned.

### Results/ Conclusions:

**Key words:** coma, neurorehabilitation, parental involvement

## INTRODUCTION

With a noticeable increase of pediatric trauma in Russia through the last decade, traumatic brain injury (TBI) remains one of the most significant medical and social problems. In the overall incidence of trauma, severe traumatic brain injury (TBI) varies from 4 to 20% (Konovalov, Likhтерman & Potapov, 2002).

In recent years, mortality has declined, thanks to technological development and enhanced approaches to neuroresuscitation and neuroimaging, while the number of disabled children has sharply increased. When it comes to brain trauma, problems concerning TBI outcomes and the quality of life of disabled children and their families has become a critical problem. Thus timely psychological support for children with severe TBI and their families plays a very significant role in early neurorehabilitation.

Within the framework of neurosurgical procedures, brain trauma is an example of impaired anatomical integrity; with respect to neuropsychology, this is an instance of damaged brain activity with diffuse symptoms of cognitive dysfunction. From the point of view of a clinical psychologist, trauma is the destruction of the child's personal wholeness and that of his family. The destroyed wholeness of a family member triggers a chain of deformations and disorders in the entire family system, with alterations in habitual relations, priorities and values. Hence the main task for the rehabilitation team is to restore the integral image of a person in all its complexity.

One of the consequences of severe brain injury may be a long-lasting impairment of consciousness (Zaytsev, 2011; Zaytsev & Tsarenko, 2012; Owen, 2008). Subsequently, a principal sphere of psychological rehabilitation at the acute stage of TBI is the restoration of consciousness. While working with patients during the early stages of consciousness recovery, the clinical psychologist should assume that conscious manifestations are likely to be replaced by unconscious mechanisms and "body gestures" after severe TBI (Mindell & Mindell, 2005).

The term "unconscious" was introduced into scientific parlance by Sigmund Freud in the 19<sup>th</sup> century (Freud, 1991). Freud spoke of personal, individual unconsciousness. The unconscious can be defined as the sum of those psychic processes that are beyond subjective control. The unconscious includes the following:

1. unconscious motivation;
2. behavioral automatism and stereotypes;
3. supraconscious processes (intuition, inspiration, dreams, insights);
4. subliminal perception, given a large volume of information.

Karl Jung extended the theory of the unconscious by adding a collective aspect to unconscious processes, and highlighting common archetypal features that people possess as bearers of a particular culture (Jung, 2010). It should be noted that Freud and Jung investigated the unconscious in patients who had a clear state of consciousness or suffered from psychiatric disorders that left their verbal functions intact, with which they translated their EGO. Consciousness disorders after severe TBI presumably lead to a mute response from the patient.

In the case of brain trauma, the unconscious cannot be considered “a priori” or clear, because the unconscious part of one’s personality is likewise affected by the traumatic deformation caused by the incident. In Jung’s works, we find the term “preconsciousness,” i.e. something that exists before the foundation for one’s consciousness is laid (Jung, 2010).

Following on from Jung, Arnold Mindell, relying on the theory of the unconscious, began to work with patients whose consciousness states were profoundly altered. Mindell developed techniques that allowed scientists to perceive communication signals and have a relationship with such patients at a body level. Mindell has also proposed some new terms: “consciousness continuum” and “primary and secondary signals” (Mindell, 2005; Mindell & Mindell, 2005; Berezkina, 2010). He has also suggested a simultaneous multi-sense translation of signals during contact with other people.

According to the process-oriented approach, the basic principles at work are:

1. Verbal contact with patients is possible only in their immediate field and must develop at a very slow speed;
2. Deep psychological contact is possible using patients’ breathing movements;
3. Psychological work may develop only in the state of resonance with the patient;
4. Any movement of the patient, even the smallest, has a psychological implication;
5. During contact with a patient the psychologist is to verbally explain his own movements and the patient’s.

The long-term rehabilitation process requires a systematic approach to the setting of tasks, the identification of targets and the methodology used to fulfill them at every stage. The establishment of these tasks and the contribution of each team specialist changes depending on the step of consciousness restoration. For example, the clinical psychologist, being a member of a multidisciplinary team, should try to restore consciousness by utilizing the manifesting signs of the unconscious, while a neuropsychologist should work with patients displaying conscious voluntary movements, and as such try to deepen and widen their range (Bratus, 1993; Bratus, 1988).

It should also be noted that neurorehabilitation after severe TBI must be planned individually for each child, based on his personal peculiarities, possibilities and deficits (Gusarova, Ignatyeva & Maksakova, 2012; Maksakova, Gusarova & Ignatyeva, 2011).

The aim of our study was to uncover some particularities of psychological support for children with severe traumatic brain injury.

The following tasks were outlined:

1. to define the fundamental lines of psychological work during the early stages of recovery after severe TBI;
2. to develop psychological instruments for evaluating consciousness recovery and the communicative possibilities of a child and his environment.

The study was a prospective, longitudinal trial, using case study methodology.

## **MATERIALS AND METHODS**

30 children aged 11-16 with severe traumatic brain injury (GCS $\leq$  8) participated in the study.

To assess the child's recovery of psychic activity and communication signals, a follow-up chart was used. This instrument assesses 104 communication signals coming from the child and distributes them by categories: verbal and non-verbal. A value from 0 to 3 indicated the degree of intensity for a given signal.

The involvement of parents in their children's recovery process after severe TBI was assessed using interviews and observations.

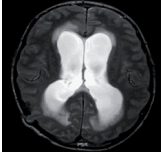
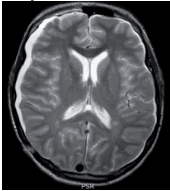
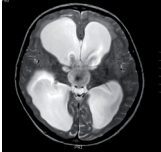
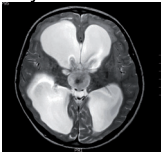
## **RESULTS**

Two complementary directions were defined as regards the psychological rehabilitation of children after severe TBI: psychological support from the parents and psychological work with children who are in consciousness states that have been profoundly altered. In contrast to psychological rehabilitation in adults after brain trauma, in childhood work with the parents acquires an essential role. This is because children and their parents are in a single field of interaction, which is why a child's sufferings involuntarily cause deformation in the entire family system (Bykova, Semenova, Fufaeva, Lvova & Valiullina, 2012; Akulenkova, 2012; Davydkin, Novokonov & Chernykh, 2012; Shuttsenberg, 2011).

Case studies have shown that the adequate participation of parents in the rehabilitation process, such as their involvement, their informational awareness, the levels of their expectations and identified tasks, all play an important role in the rehabilitation process (Table 1). The information presented in Table 1 enables us to determine the factors that essentially influence recovery after severe TBI. The proposed technique allows for complete and accurate analyses of both the medical and psychological components of the rehabilitation process at an acute stage in children after severe TBI; it also permits us to understand and evaluate the role of parents and their participation and involvement in the rehabilitation process. The quality and extent of parents' participation, their "embeddedness" within the context of their child's disease (Beslan, 2009; Venger & Morozova, 2011) and cooperation with physicians may either promote the child's recovery or, unfortunately, hinder it.

While analyzing 30 clinical cases, we discovered that only 52% of parents whose children survived severe TBI could adequately integrate into the process of their child's recovery. In these families, the level of expectations is reasonable, rehabilitation goals are correctly planned at every stage, and there is an observable awareness of "here and now." 34% of parents view their participation in the rehabilitation process as a formality, whereby they feel responsible solely for the provision of nurture, while holding others (including doctors) accountable for their child's recovery. 14% of parents entirely ignore their child's needs during his recovery after severe TBI. This comprises families where the injured child was abandoned by his parents or when the parents have died.

Table 1. The factors that essentially influence recovery after severe TBI

Events	Patient A.	Patient B.
State on admission	On admission Coma 2. GCS– 4-5 scores	On admission Coma 2. GCS– 4-5 scores
MRI brain examination on admission to the hospital	Zygomatoco-orbital complex fracture. Fracture of all walls in the left sinus. Consequences of right hemisphere contusion looking like a cystic-glioma transformation. Tense hydrocephaly Periventricular edema. Chronic hematoma of the right hemisphere of the cerebellum. Thrombosis of the right transverse sinus. Open posttraumatic hydrocephaly. Sphenoiditis. Bilateral petrositis, astoiditis  Day 30 after trauma  At discharge	Complex, open comminuted fracture of face skeleton bones and skull base. Depressed comminuted fracture of orbital frontal bone, injuries of left orbit walls, and an open fracture of the bottom of anterior skull notch. Subarachnoidal hemorrhage, traumatic subdural hygroma to the right above the right frontal lobe. Cerebellum hemorrhagic contusion with hemorrhage into the cerebellum peduncle and medial cerebellum structures, perifocal edema and compression of the fourth ventricle. Diffuse brain edema  Day 25 after trauma  At discharge
Total period of hospitalization	57 days	174 days
Surgical interventions	1. Trepannage bilaterally, attachment of ICP monitor (day 2 after trauma) 2. By-pass (day 38 after trauma )	Fluid drainage
Complications	Pneumonia	1. Interstitial lung edema, 2. mycotic infection, 3. pneumonia
Sessions with psychologist	13 sessions with the child and psychological support of his parents	Refusal to work with the psychologist
Psychological peculiarities of parents	Increased contentiousness and anxiety of both the mother and the child	Unconflictive parents, unwilling to hear “another” opinion as to the treatment
<b>Joint work of rehabilitation team and parents</b>	Alignment of cooperation between parents and team Parents’ agreement for surgical interventions Complementarity of all members of the rehabilitation team, adequate and conflictless relations in the team	No cooperation between parents and team Refusal of surgical interventions Multiple problematic and conflict situations within the rehabilitation team, polar opinions on the course of recovery
Consciousness state at discharge	Clear consciousness with elements of confusion in fatigue	Vegetative state

Two years of experience in clinical work with families at the early stages of consciousness recovery in children after severe TBI has allowed us to distinguish some problematic zones that require a psychologist's participation.

1. the reassessment of values and possibilities for social contact after an accident;
2. disorders in the parents' inner chronotype: the replacement of the future by past reminiscences; deformation, fantasy images of the future (Beslan, 2009).
3. the inability to accept their child as a different, considerably changed person after the trauma;
4. the inability to accept responsibility for what is going on and an attempt to "pass on" this responsibility to other family members and doctors;
5. the underdevelopment or incorrect setting of tasks and intermediate goals at each stage of the child's consciousness recovery process;
6. the refusal to accept rehabilitation as a process that requires long-lasting efforts, and overinflated expectations at each stage;
7. the formation of stereotypical behavioral patterns in parents at each stage of rehabilitation, which interfere with the further recovery of their child.

The second direction of psychological work is time spent with the child. The psychological rehabilitation of children with severe TBI may start at early stages of consciousness recovery, commencing from deeply altered states of consciousness (coma, vegetative state, akinetic mutism).

The main aim of psychological work at the acute stage is the assessment of possibilities for the child to interact with the surrounding world, further extension of this contact. and the identification and replacement of inner resources for recovery (Pachalska et al. 2011; 2012a).

To make the psychologist's work more objective and to study the communicative dynamics at the early stages of consciousness restoration, we have developed a Follow-up Chart. This Chart enables us to record 104 communicative signals from a child, as well as their intensity in dynamics and frequency. Communicative signals are conditionally divided into two groups: verbal and non-verbal. Non-verbal signals include body movements, vegetative reactions, gestures and postures, emotional manifestations and mimicry and the possibilities of social symbolic reaction. Verbal signals are recognized through actual verbal responses and timbre coloring, loudness and speech intonation. The Follow-up Chart is filled in every 7-10 days and reflects the dynamics of changes in contact in psychological work with children suffering from a depressed state of consciousness.

Analyses of clinical cases have revealed some common patterns in the dynamics of the number and intensity of communicative signals during consciousness recovery. For example, as the energetic and functional possibilities of patients grow within their vegetative state, a number of body manifestations surface as well. Afterwards, mimetic and emotional reactions emerge, and consequently the amount of body "gestures" increases.

Thus several particularities of consciousness restoration have been found in children after severe TBI:

1. There is considerable regression in children's psychological age, which is displayed through behavioral peculiarities, emotional reactions, together with a decrease in the depth and standard of social interaction.
2. A scenario in which social activity has been restored and contact levels extended has been recorded as well:
  - contact is established with a close adult (mother or father). If no such person is present, such a role may be undertaken by a clinical psychologist;
  - upon increasing energetic resources and functional capabilities, the child begins interacting with other adults. However, contact with other children is not necessarily beneficial to a traumatized child;
  - brief communication with other disabled children or children with limited possibilities. It should be noted that traumatized children show interest in babies;
  - a stage where social contact is established with healthy children. At first, this contact will be limited in time; the child will choose quiet and "slow" children for communication purposes, interacting with whom should prove to be safe.

With less control and arbitrariness, premorbid peculiarities start to occur in the child (character, temperament, psychological evolutionary traumas, etc.). All these peculiarities have a more pronounced, accentuated character than before trauma (see also Pachalska et al 2012).

## CONCLUSION

1. Two complementary directions have been defined in the psychological rehabilitation of children after severe TBI: psychological support from the parents and psychological work with children whose states of consciousness have been seriously altered.
2. Analyses of clinical cases where the Follow-up Chart was used to record signals from children affected by major changes in their state of consciousness have revealed common patterns in the dynamics of recovery during psychological contact. As the energetic and functional possibilities of the patients grow within their vegetative state, a number of bodily manifestations appear as well. Afterwards, mimetic and emotional reactions emerge, and consequently the amount of body "gestures" increases. Thus, psychological help for children with altered states of consciousness is an important procedure in early neurorehabilitation, insofar as their contact and interaction with the outer world is concerned.
3. It should be taken into consideration that the family of a seriously injured child suffers some deformation as well. The adequate involvement of parents in the recovery process and their cooperation with doctors may either promote their child's recovery or hinder it.

## REFERENCES

- Konovalov, A.N., Likhberman, L.B. & Potapov, A.A. (2002). *Cherepno-mozgovaya travma. Klinicheskoye rukovodstvo v 3-kh tomakh*. Moscow: Institut Neyrokhirurgii im. N.N. Burdenko.
- Jung, K.G. (2010). *Ocherki po psikhologii bessoznatelnogo*. Moscow: Kogito-Tsentr.

- Freud, S. (1991). "Ya" i "Ono." Trudy raznykh let v 2-kh tomakh. Tbilisi: Merani.
- Freud, S. (2002). *Lektsii po detskomu psikhoanalizu*. Seriya "Psikhologicheskaya kolleksiya." Moscow: Aprel Press. Izd-vo Eksmo.
- Beslan (2009). 5 let vmeste. Sbornik materialov spetsialistov, rabotavshikh v Beslane. Moscow: Agava.
- Venger, A.L. & Morozova, Y.I. (2011). *Ekstrennaya psikhologicheskaya pomoshch detyam podrostkam*. Moscow: VNII geosistem.
- Bratus, B.S. (1993). Ot gumanitarnoy paradigmy v psikhologii k paradigme eskhatolicheskoy. Psikhologiya i novye ideally nauchnosti. Moscow: Voprosy filosofii no. 5, 3 – 43.
- Bratus, B.S. (1988). *Anomalii lichnosti*. Moscow: Mysl.
- Mindell, A. (2005). *Koma: klyuch k probuzhdeniyu*. Moscow: AST.
- Mindell, A. & Mindell, E. (2005). Vskach, zadom napered: protsessualnaya rabota v teorii i praktike. Moscow: AST.
- Gusarova, S.B., Ignatyeva, N.S. & Maksakova, O.A. (2012). Rannaya psikhologicheskaya neyroreabilitatsiya: rabota s patsientami v izmenennom sostoyanii soznaniya. In: *Materialy IV Megdunarodnogo kongressa "Neyroreabilitatsiya 2012"*.
- Maksakova, O.A., Gusarova, S.B. & Ignatyeva, N.S. (2011). Komanda v neyroreabilitatsii. In: *Materialy megdunarodnoy nauchno-prakticheskoy konferentsii "Aktualnyye problemy psikhologicheskoy reabilitatsii lits s ogranichennymi vozmozhnostyami zdorovya"*. Moscow.
- Zaytsev, O.S. (2011). Psikhopatologiya tyageloy cherepno-mozgovoy travmy. Moscow: MEDpressinform.
- Zaytsev, O.S. & Tsarenko, S.V. (2012). Neyroreanimatologiya. Vykhod iz komy. Moscow: Litass.
- Bykova, V.I., Semenova, Z.B., Fufaeva, E.V., Lvova, E.A., Valiullina S.A. (2012). Psikhologicheskaya reabilitatsii detey posle tyazheloy cherepno-mozgovoy travmy. *Neyrokhirurgiya i nevrologiya detskogo vozrasta, 2–3 (32–33)*, 161-167.
- Berezkina, V.B., ed. (2010). *Telesnaya psikhoterapiya*. Moscow: AST.
- Akulenkova, M.V. (2012). Semeynoye sovladayushcheye povedeniye kak factor adaptatsii patsienta k situatsii ostrogo zabolevaniya. *Materialy IV Megdunarodnogo kongressa «Neyroreabilitatsiya 2012»*.
- Davydkin, N.F., Novokonov, G.G. & Chernykh, E.F. Rol rodstvennikov v organizatsii lechebnogo i reabilitatsionnogo protsessov bolnykh s tsebralnym insultom. In: *Materialy IV Megdunarodnogo kongressa "Neyroreabilitatsiya 2012"*.
- Shuttsenberg, A.A. (2011). Sindrom predkov. Transgeneratsionnyye svyazi, semeynyye tayny, sindrom godovshchiny, peredacha travm I prakticheskoye ispolzovaniye genosotsiogrammy. Moscow: Psikhoterapiya.
- Owen, A.M. Disorders of consciousness. In: A. Kingstone & M. Miller (eds.), *The Year in Cognitive Neuroscience*. Proceedings of the New York Academy of Sciences, 2008.
- Pachalska M., Łukowicz M., Kropotov I.D., Herman Sucharska I., Talar J. (2011) Evaluation of differentiated neurotherapy programs for a patient after severe TBI and long term coma using event-related potentials. *Medical Science Monitor*. 17(10). CS120-128.
- Paçalska M., Mańko G., Chantsoulis M., Knapik H., Mirski A., Mirska N. (2012) The quality of life of persons with TBI in the process of a Comprehensive Rehabilitation Program. *Medical Science Monitor*. 8(13) CR432-442.
- Pachalska M., Mańko G., Kropotov I.D., Mirski A., Łukowicz M., Jedwabińska A., Talar J. (2012a) Evaluation of neurotherapy for a patient with chronic impaired self-awareness and secondary ADHD after severe TBI and long term coma using event-related potentials. *Acta Neuropsychologica* 10(3):399-417.

**Address for correspondence:**

Valentina I. Bykova

Clinical and Research Institute of Emergency Pediatric Surgery and Trauma  
str.Bolshaya Polyanka, number 22, 119180 Moscow, Russia

Email: v\_i\_bykova@mail.ru