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MHI - comparative study between adults and children

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Abstract

Assessment of the effects of Mild Head Injury, not only in terms of dysfunction but also of disability and quality of life. The ultimate goal is to capture comparative these changes, of the evolution and consequences of MHI to children and adults. Psychological Investigation was made on 96 children and 84 adults, to capture neuropsychological, emotional, behavioral and psychosocial aspects. Behavioral disorders were found mostly in adults and cognitive dysfunctions in children. Neurosurgeon should make a full assessment of the patient with mild head injury. Psychotherapy can intervene in the benefit of individuals.

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1. Introduction

1.1. Theoretical premises

Head trauma (TCC) is the most common neurological disease to young people (Achte, Jarho, Kyykka & Vesterinen, 1991; Adams, Graham, Murray & Scott, 1982). Most mild traumatic brain injuries are with a loss of consciousness for 5 minutes or less, a posttraumatic amnesia of less than 12 hours and an initial Glasgow Coma Scale...
Scale score of 13 to 15 (Alexander, 1992; Alves, Maccicchi, & Barth, 1993). Recent studies show that even an easy head trauma (MHI) can cause neuropathological changes leading to growing recognition that post-commotion syndrome (PCS) may be the result of a MHI. PCS symptoms are observed in most patients who have suffered a MHI and persist: in 25% to 79% of cases after 3 months; in 10% to 20% after 6 months; in 2% to 6% after one year. Specific criteria for the diagnosis of PCS are not established but were suggested research criteria (DSM IV). Apart from a SPC historical, abnormal cognitive, somatic and affective spheres should be sought (Alexander, 1992). Cognitive deficits may relate to attention, concentration and memory. Headache, fatigue, small blackouts or dizziness, trouble sleeping, irritability or aggression crisis, anxiety, depression, emotional lability or apathy represents affective and somatic symptoms. (Basson, Guinn, Mc Elligott. et al, 1991; Bohnen, Jollesm & Twijnstra, 1992; Bornstein, Miller, Van Schoor, 1989).

1.2. Issues:

1.2.1. Neuropsychological:

1.2.1. a. Cognitive deficits can occur even in patients without having suffered a loss of consciousness and may affect information processing speed, attention, memory and executive functions. (Mittemberg, DiGiulio, Perrin, & Bass, 1992);

1.2.1. b. It is present a reduction in the speed of processing the information with a diminution in the performance to measure the response time with multiple options (Mittemberg & col., 1992; Ponsford, Willmott, Rothwell, Cameron, Kelly, Nelms, Curran & Na, 1999);

1.2.1. c. Distributed attention is more affected than focused attention or sustained attention (Bornstein, 1989; Ponsford, 2000);

1.2.1. d. Deficits may be present on short-term memory, judgment, reasoning, impulse control, planning and organization and anticipation behaviour (Mittemberg, 1992; Ponsford, 2002);

1.2.1. e. Not so good results as the control subjects in reproduction tests of a complex geometric figure. (Mittemberg & col., 1992);

1.2.2. Neurosurgical

1.2.2. a. This category of severity contains a significant clinic-pathological heterogeneity corresponding the risk of deterioration and the need for urgent surgery (Ingebrigtsen, Romner, Trumpy, 1997);

1.2.2. b. Absence of consensus protocols and clinical guidelines can lead to deficiencies in the treatment of these patients and inappropriate use of resources;

1.2.2. c. For better categorization of patients it was used the expanded system of classification proposed by Stein: “The Head Injury Severity Scale” (Stein, Spettell, Young & Ross, 1993);

1.2.2. d. According to this classification, patients with a Glasgow Coma Scale score between 14 to 15, plus amnesia and a brief loss of consciousness (≤ 5 minutes) or decreased orientation or memory are classified in Mild Head Injury diagnostic category (MHI).

2. Clinical Material and Method

2.1. Subjects and selection criteria

Psychological research conducted from January 2000 to December 2009, was designed as a longitudinal study (based on theoretical premises, the synthesis of findings at scientific level in the literature), on patients presented in the emergency room and hospitalized with MHI. They were distributed into two groups according to age: the first group of 96 children aged between 5-15 years and the second group of adults aged 16-60 years. Both groups were selected according to the EPSEM principle (Equal Probability of Selection Method) based on a stratified randomization, according to the following criteria, necessary for standardizing the lots from both perspectives: medical and psychological:

2.1.1. Glasgow Coma Scale (GCS) score between 14-15p.

2.1.2. To avoid tangling effects, the subjects with no other associated diseases.
2.1.3. Longitudinal study tries to capture the changes observed over a period of 1 year from the date of injury, every 3 months following their evolution at individual level (cross-sectional study) because finally to be able to make a quantitative computerized processing with the interception of significant correlations and extracting the final conclusions. The ultimate goal is to comparative capture these changes, of the evolution and MHI consequences, to children and adults.

2.1.4. The ages between of 5 years old and 60 years old

2.2. Research methods and tools

2.2.1. Methods:

2.2.1.1. "Armed' clinical observation - in which appeal for various strategies, techniques and tools which put in expression useful information about attitudes, behaviour and even the personality with all mechanisms used by the subject;

2.2.1.2. The experiment "ex post facto cause-effect" of functional type-centred on establishing the functional relationship between different values of the independent variable - MHI - and the changes occurred in the subject conditions;

2.2.1.3. Standardized and semi standardized conversation with the inserting of free conversation, spontaneous, associative, depending on the particular situation and the individual psychological characteristics of the subject;

2.2.1.4. Psychological investigation based on clinical interview conducted and semi-conducted;

2.2.1.5. Psychometric methods based on psychological tests.

2.2.2. Tools:

2.2.2.1. Wechsler complete battery of tests - for adults WAIS (Wechsler Adult Intelligence Scale) and for children WISC (Wechsler Intelligence Scale Children) - captures 10 different cognitive functions; personal scores are converted into standard scores by age from which it can be made a series of calculations highlighting verbal IQ, nonverbal IQ and total IQ;

2.2.2.1.b) allow comparison of individuals with healthy subjects of the same age but also with himself and based on possible calculations we obtain the picture of personal deficits resulting from MHI;

2.2.2.1.c) damage coefficient, positive QD, suggesting a loss by damage, so the subject was affected by trauma.

2.2.2.2. "Galveston Orientation and Amnesia Test" (GOAT) highlights the degree of spatial-temporal orientation and the presence or absence of posttraumatic amnesia;

2.2.2.3. Wechsler Memory Scale (WMS) - for adults, it is a full battery, to explore different types of memory to identify the deficit, standardized depending on age, enables the calculation of the coefficient of QM memory and various classifications of individual performance.

2.2.2.4. Auditory Memory Test "Rey 15 words" - highlights the amount of attention and memory in relation to age, speed of work, fatigue curve and a number of behavioural and personality characteristics.

2.2.2.5. "Prague" Distributive attention allows the standardized interpretation in relation to age, speed of work and fatigue curve.

2.2.2.6. "Bender-Santucci" perceptual-motor test highlights the ability to control the activity of the brain in a standardization relating to the age and classified in percentile grouped by level of intelligence.

2.2.2.7. At dispositional level – "Depression Inventory for Children" developed by M. Kovacs, "Cattell Anxiety Questionnaire" for adults.

2.2.2.8. At personality level – for adults, the questionnaires highlighting Schmiescheck Test and Woodoorth-Mathews Questionnaire.

2.2.2.9. "Social Behaviour Assessment Scale" for children, completed by parents.

2.3. Data collection

First contact with patients has been established after 24 hours from hospitalization, after the neurosurgical team has completed the medical assessment and we received the data on which the selection was made in the research group. Patients were initially evaluated during hospitalization after injury, within a period of 48 hours in multiple
sessions and then were called to control and re-evaluated at 3, 6 and 12 months. In addition, were included structured interviews with patients and their families to identify the personal history and changes in family life, work, and school and in their psychosocial functioning. Our attention was focused on detecting any concealment motivated by the desire to gain, such as financial settlements from personal disputes.

2.4. Statistical analysis

The collected data were processed with SPSS 10.0 (Statistical Package for Social Sciences) descriptive and inferential.

3. Results and discussions

Neuropsychological recovery is not uniform among individuals, mental processes having a distinct rhythm of returning at individual level. Immediately after injury, the consciousness is temporarily altered, from confusion until total loss. In the following hours, the registered deficits are not specific to particular cognitive domains but generally refer to the speed of processing information, to the efficiency, execution and complete integration of interrupted mental processes.

In the near future after MHI, a temporary impairment of consciousness is installing with various degrees – from mild confusion (41.7% for children and 35.1% for adults) to the loss of consciousness from a few seconds to tens of minutes (56.3% for children and 62.1% for adults). In the next hours, the observed deficits are not specific to particular cognitive domains but refer generally to the speed, efficiency, implementation and integration of mental processes interrupted in general manner.

3.1. Speed and ability to information processing

Information processing capacity is lower due to the difficulties of adaptation and integration in tasks (expressed by the low volume of attention) occurred as consequences of the concentration effort (“digit span”), ocular-motor coordination difficulties (“code”), emotional distractibility and increased reactivity, decrease of motivation and of interest with the onset of fatigue. In the first days after trauma, pronounced fatigue is common in both children and adults and it is positively associated with the capacity of orientation and evocation of the events (GOAT) in a statistical representation (chi square 0.000 and p <0.001). After 12 months in children, fatigue falls within normal parameters but for adults it remains pronounced.

3.2. Attention

3.2.1. Attention focused and short-term.

Initially, the child was identified with a mild deficiency (M = 9.1, p <0.001), which is corrected during the evolution: 9.2 to 3 months, 9.4 to 6 months and 9.6 to 12 months. These deficits are expressed in difficulties to conduct an activity, difficult integration of attention in simple situations and diminishing mental activism (chi square 0.000, p <0.001). For adults there are not statistically significant correlations.

3.2.2. Distributive attention

The average is lower than the concentrated attention (M = 8.5) and the evolution is inconsistent: it increases to 9.3 after 3 months decreases to 9.1 after 6 months and increases to 9.4 after 12 months. Distributive attention is more deficient than the concentrated attention because there are difficulties in maintaining and switching the attention. The consequences are reflected in the impossibility of efficient complex operations, involving multiple and simultaneous decisions, although they are able to complete each operation separately. Related to age, a decrease as the child is older so the performances of small children are better. For adults there are not statistically significant correlations.
3.3. Learning and memory

The memory presents deficits in children, both for information storage and for reproducing or recalling the information, on medium or long term, auditory or visually. In our study, the initial examination captures a deficient medium volume of memory (M= 79%) which tends to increase and to stabilize at 86% after 3 months. There is a negative association with the age (r = - 0.283, p <0.01), which describes a decrease in the performance for older ages (chi square=0.000, p <0.05), so the volume of memory in the first test is of 72 % in the age group 14-15 years, increasing to 83% after 3 months and slight variations at 6 months (81%) and 12 months (82%) and for the age group 11-13 years the average of the memory volume has a constant value (80%) after a slight decrease at 3 months (79%). For adults there is not representative statistical significance.

The visual memory presents deficits influenced by Glasgow score affecting more the adults (chi square=0.01, p<0.01) than children (chi square=0.006, p<0.01). For children, the standard average score is 58% in GCS = 14 and 70% in GCS score = 15 and for adults, the standard average score is of 53% in GCS score= 14 and 69% in GCS score = 15. In progress, the adults recover better than children do. The age is in a positive relation with the visual memory, for children (r = 0.340, p <0.01) and negative for adults (r = - 0.454, p <0.01) suggesting that the extremes of age correlates with low visual memory performance, most affected in this area are the subjects in the age group 46-60 years (average of the initial score = 34% and after 12 months increased to 54%).

All these results converge to the finding that cognitive functions are affected by trauma and, therefore, selection, organization and external information storage may fail and the patient may ignore important details which disabilities in memorizing accurately. Therefore, the patient has difficulties in acquiring new information and habits and he is disturbed in the course of everyday life.

3.4. Integrative and abstract thinking

Integrative and conceptual thinking was examined as "objects assembling" subtest from WISC and expresses deficits in the ability to make spontaneous connections. Noted on personal array of diseases as "pathologically significant" average ("-" one standard deviation from normal) or severe (" - -" two standard deviations) in our study were captured to 22.7% of the observed children. There are positive associations between " objects assembling" and the orientation in the moment of the accident (r = 0.288, p <0.01) suggesting that a loss of consciousness (LOC) for a few minutes leads to medium and severe deficits installation, negative associations are caught between "assembly" and fatigue (r = - 0.420, p <0.01) in that the severe deficit is accompanied by a reduced fatigue which strengthens the relationship between loss of consciousness and deficit (chi square 0.000, p <0.01). For adults there are not statistically significant correlations.

These deficits are not apparent in ordinary interactions, standard or customary examination and the sufferers are rarely discovered. These deficits result only from demands of school and professional activities or thorough neuropsychological examination. People who may have minor memory deficits or deficits in the ability to solve problems, of problem solving capacity, but not seriously interfere with the professional functioning can relatively easy recover their adaptation, although later they may develop emotional, interpersonal or behavioural problems. However, in a significant number of cases the adjusting of the operation is incomplete and often the disabilities are extended and even very severe. Situations of stress, fatigue, anxiety or even moderate use of alcohol highlights these deficits especially in people with occupations that require speed of processing data areas, attention, memory, learning and integrative thinking. These people with high expectations of themselves see the changes through repeated failures, unexpected, entailing self-blame opening the possibility of installing the depression with dominant damage of personal dignity and the loss of meaning of life.

Anxiety completes the dysfunctional syndrome with reference to the nature of a performance anxiety and of an obsessive anxiety about decisions, choices and options. Coexistence of cognitive deficits exacerbates the anxiety through a diminished flexibility of thinking, reduced ability to "problems solve", increased impulsivity and intensification of emotions. But this increase in anxiety leads to a decrease in cognitive performance by increasing shortfalls and thus install synergistic interaction between cognitive deficits and anxiety that distinguishes the MHI syndrome of conditional anxiety by the traditional syndrome of posttraumatic stress.
The repeated failures, changes in the personality and behavioural level that prevents them to readjust, the perpetuation of any avoidance, lead to serious damage to the families. In such cases, patients are not only unprepared for the difficulties experienced but there is a wrong set of expectations for the emphasized problems that they will experience. The possibility exists because, in terms of neurological and neurosurgical point of view, they are already recovered and discharged as recovered to be able to resume their lives. Typically, the diagnosis of MHI is placed where there is a trauma to the brain, but the trauma results only around the unconscious state, or without this state, and does not appear in EEG recordings, in MRI imagery or CT scan. Victims will suffer a lifetime the consequences that are not medically diagnosed. However, for effective adaptation is required a neuropsychological rehabilitation in which the support is a crucial element and the process is essential psychological, will be identified limitations, alternative strategies will be developed and new behaviours will be determined. Methodologies are used in supportive counselling, behavioural interventions, educational remedial exercises, stress management, systemic-relational therapy, and psychodynamic psychotherapy.

4. Conclusions:

4.1. Children:

The psychological functions and cognitive processes are affected at lower age because the brain has a comprehensive functioning. The dependent structure is a predisposition for the MHI consequences of accident. For a good evolution, the attitude of parents and familial conditions are very important because, if disturbances exist, children develop behavior changes with secondary benefits. At 1 year after MHI, the symptoms are absent for children who are developing in good conditions with appropriate support and education.

4.2. Adults:

The psychological functions and cognitive processes are not affected because the brain is functioning at specializing level; so, any dysfunction is compensated. The medium anxiety with medium depression and the much accentuated hyperthymic or hyper exact structures are a predisposition for MHI consequences of accident. In evolution, medium depression is responsible for the abilities deterioration. At 1 year after MHI, decrease of adaptation and other psychosomatic symptoms are possible if the anxiety and the depression are not discovered and treated.

For future is necessary to indicate a good direction through a counseling or psychotherapy program for training in stress control. This is important because MHI is considered a stressor experience and, it may develop if this is ignored, severe consequences for the patients. Of course, the severity is in terms of human efficacy and high life quality for him and other in its environment.

References


