

Frequency of brain injury in a forensic psychiatric population

Freqüência de traumatismos craniencefálicos numa população psiquiátrica forense

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Abstract Objective: Over the last years, a growing number of studies involving individual patients and/or populations have demonstrated that Traumatic Brain Injuries (TBI) determine innumerable psychiatric symptoms, including significant alterations which may influence diagnoses, prognosis and treatment, not to mention clear psychosocial implications (both legal and those related to social security). The objectives of this study were 1) to detect the existence of TBI in a forensic psychiatric population before the occurrence of the wrongs; 2) To verify whether or not those injuries had been identified by the experts at the psychiatric institution.

Method: 3,323 records of patients examined by forensic experts at the Forensic Psychiatric Institute *Dr. Maurício Cardoso* in Porto Alegre were analyzed; the records covered the period between 1995 and 1999.

Results: in the studied population, there were 133 cases of TBI prior to the wrongs, 39 of which were mild, and 94, moderate or severe. Out of the total number of TBI cases found, 111 cases were not taken into account, many of them having motoric, cognitive, psychic and sensori perception alterations.

Conclusion: the significant number of patients that had had TBI before having committed a wrong - a fact that had not been considered by the experts (neurologists and psychiatrists) at the institution - is a strong indicator of how little attention is paid to the consequences of these injuries. Considering the relevance of the psychosocial aspects, new studies should be conducted in psychiatric populations to increase the knowledge about the consequences of these injuries.

Keywords Traumatic brain injury. Population research. Forensic psychiatry. Psychiatric epidemiology.

Resumo Objetivo: Cada vez mais, nos últimos anos, estudos em pacientes individuais e em populações demonstram que os traumatismos craniencefálicos (TCE) determinam inúmeros sintomas psiquiátricos, com significativas alterações que podem influenciar os diagnósticos, os prognósticos, os tratamentos e com evidentes implicações psicossociais, incluindo as jurídicas e previdenciárias. O objetivo deste estudo foi o de 1) Detectar numa população psiquiátrica forense a existência de TCE antes do cometimento de delitos; 2) Verificar se houve reconhecimento desses traumatismos por parte dos peritos da instituição.

Método: Foram analisados 3.323 prontuários de pacientes submetidos a exames periciais no Instituto Psiquiátrico Forense "Dr. Maurício Cardoso" de Porto Alegre, entre 1995 e 1999.

Resultados: Na população estudada, foram encontrados 133 TCE ocorridos antes dos delitos, sendo 39 leves e 94 moderados e graves. Do total dos casos encontrados, não foram considerados 111 casos, muitos deles com alterações motoras, cognitivas, psíquicas e sensoriais.

Conclusão: O expressivo número de pacientes que sofreu TCE antes dos delitos cometidos e que não foi considerado pelos peritos (neurologistas e psiquiatras) da instituição forense é forte indicativo do pouco conhecimento das consequências desses traumatismos. Considerando a relevância dos aspectos psicossociais envolvidos, novos estudos necessitam ser realizados junto a populações psiquiátricas de maneira a aprimorar o conhecimento a respeito das consequências desses traumas.

Descritores Traumatismos craniencefálicos. Pesquisa populacional. Psiquiatria forense. Epidemiologia psiquiátrica.

This study was performed in Forensic Psychiatric Institute 'Dr. Maurício Cardoso' of Porto Alegre, RS, Brazil.

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Introduction

As a rule, traumatic brain injuries (TBI) and especially mild ones (MTBI) have been scarcely studied regarding their psychiatric consequences. It was only after the denounce of Parker in the US in 1990 that MTBI started to be considered as potentially capable of promoting significant psychiatric alterations. In his denounce, Parker stated that the absence of this consideration would determine an actual *silent epidemic*, developing as a result from sequels (mainly cognitive and behavioral).¹ Even after his denounce, only after 1995 the medical community (notoriously represented by neurologists and psychiatrists) has somehow woken up. Since then, year after year MTBI has started to be increasingly studied.²

In 1996, Kay mentioned that careful interviews with people who later in lifetime had important emotional, interpersonal and behavioral problems had identified that they had suffered a mild TBI at some periods of their lives, and this fact was likely to be found in patients examined in psychiatric clinics or in forensic examinations.³ His expressive words were based on individual interviews and on empirical findings performed by other authors, and were connected only to mild traumatic brain injuries (MTBI).

Jorge et al⁴ (2000) reported that the association between brain injury and psychiatric disorders, although already registered by the medical literature for many years, has been sporadic. As an example, they mentioned the fact that in 1904 Adolf Meyer identified a number of disorders which he called *traumatic insanities*. During World War II, physicians identified a high incidence of psychiatric complications after brain injuries. Many of these studies emphasized the importance of frontal lesions in the pathogenesis of behavioral disorders.⁴

These authors recognize that the majority of such disorders has not been examined in their extension, be it on individual patients, be it in a population of patients with TBI. They highlight that studies about the interface between TBI and psychiatry in populations has been, until recently, rare or inexistent, but acquire a significant psychosocial importance.^{ibid}

However, already since that same year and in the three subsequent years of the new decade, studies about this interface have started to be accomplished, encompassing greater or smaller populations, distinct objectives, research instruments and at different times after the TBI. Populations with the most varied ages were examined in mental health ambulatories, in psychiatric hospitals, in recovery programs after the TBI, etc. The association between TBI and psychiatric disorders, have started to be investigated, in an unequivocal demonstration of the concern with this interface, a product of the new knowledge which recognized their relevance.

Most of the recent studies also point out that the prevalence of TBI among psychiatric patients is unknown and that investigations in the general population are rare. Existent studies found that children and adolescents who had TBI are more likely to develop anxiety disorders (generalized anxiety, obsessive-compulsive symptoms, separation anxiety and simple phobias),⁵ oppositional, conduct and attention-deficit with hyperactivity disorders, besides a higher trend to develop alcohol or substance

dependences.⁶ Among hospitalized or ambulatory psychiatric populations there has been a higher number of TBI than among control groups, with predominance of depressions and panic episodes.^{7,8} A higher vulnerability to the development of psychiatric disorders after TBI,⁹ the need of psychosocial support for these patients,¹⁰ bipolar disorders and history of sexual abuse,¹¹ secondary personality disorders and sexual transgressions,^{12,13} increase of rehospitalizations due to epilepsy and psychiatric disorders among patients who had TBI,¹⁴ patients with post-traumatic epilepsy and anti-social attitudes,¹⁵ psychotic syndromes and a higher number of TBI among schizophrenic patients.^{16,17} Other studies reported that patients with Organic Personality Disorder after a TBI had higher difficulties in psychosocial adjustment and more emotional problems than patients with TBI without diagnosis of Organic Personality Disorder.¹⁸ Other recent study found a close relationship between subjects with genes related to schizophrenia and previous TBI and their being more likely to develop the disorder.¹⁹

Although preliminary and subject to new studies, these researches have identified significant psychiatric alterations after the severe, moderate and mild TBI. In the same way, they show that these alterations can be transitory, moderate or remain along the lifetime of patients who TBI. They also register that electroencephalographic (EEG) and neuroimage studies, such as computer tomography (CT) and magnetic resonance (MR) - which are currently used in large scale in emergency services and neurological clinics in Western countries -, are most of times incapable of diagnosing a mild brain injury - characteristically represented by subtle alterations, by chemical and electrical modifications and not detected by CT or MR, creating significant secondary symptoms due to the dilemma of returning to school or to the job in the presence of incapacitating symptoms or impairing alterations.

Considering all these findings, in our study we decided to verify the number of TBI before the wrongs and whether these traumas were taken into account by experts (neurologists and psychiatrists), responsible for examinations of criminal liability in a Brazilian forensic institution.

Methods

Design

We established, in a previous protocol, that we would examine the records performed by neurologists regarding neurological exams, if any, (including the clinical neurological assessment, laboratory tests requested by them, such as EEG, CT and MR) in patients who had had TBI at any time before the wrong.

The criteria used in the study regarding the TBI were those established by the neurologists of the institution when they gave their official opinions, assigning severe, moderate or mild TBI at each assessment. Criteria for those diagnoses were not explicit, but contained references which allowed inferences about them, as neurologists always marked 'severe or moderate TBI' indicating protracted post-traumatic loss of conscience or amnesia, long hospitalization period and/or a posterior surgery and discharge from hospital with sequels, without distinguish-

ing the degrees. On the other hand, referring to mild TBI, they reported to 'TBI without loss of conscience' or 'with rapid loss of conscience' and without hospitalization or with a brief period of hospitalization, without sequels.

Regarding recoveries, data remained purposely open, and there were no parameters established by neurologists and the research attempted to know how neurologists or psychiatrists assessed patients.

Besides, the items 'personal morbid antecedents', 'psychiatric observation', 'diagnostic discussion' and 'positive diagnosis', that are part of the 'standard expert report', were examined to verify if expert witness psychiatrists had reported or not the TBI in those topics (having in their hands, obviously, the result of the neurological exams which are included in the Diagnostic Discussion).

In the cases in which psychiatrists had requested a psychodiagnostic assessment, due to a hypothesis of 'organic' impairment, it would be also examined and verified whether or not their results were taken into account by expert psychiatrists, provided they were related to TBI.

Site

The study was performed in the Forensic Psychiatric Institution 'Dr. Maurício Cardoso' (IPFMC) of Porto Alegre, state of Rio Grande do Sul, Brazil, an institution which receives patients from all Criminal Circuits of the state.

Participants

Medical records of all patients who had been subjected to psychiatric assessment in the institution were analyzed. The time period of the assessments was randomly chosen, between the years 1995 to 1999. Although the period was random, two issues influence this choice: first, the fact that the new contributions about TBI had been expanded since 1995 (the degree of awareness of technicians about the issue was not known) and second, due to the fact that this period, besides having a significant sample of 4,500 to 5,000 records, would correspond to the last years (if a study were performed before 1995 it would be hindered, as TBI and their psychiatric repercussions were totally unknown in Brazil at that time).

Results

When we examined the records, we noted that the initial estimated number would not be achieved. We observed then that the Institution had different criteria to register its data: the Technical Department used to include in its statistics the total of performed procedures, regardless to how many examinations or exams the same patients were submitted (some of them with three or more assessments in the same or subsequent annual period). On the contrary, the Archives Department, recorded only the new patients, not taking into consideration the reentries for further assessments.

Considering that in the reentries patients had inevitably their historical data and diagnoses only revalidated, we understood that the statistics of this sector would be the chosen one (new patients).

Therefore, according to the Institution's official data, provided by the Archives Department, in the year 1995 there were records from number 10,432 to 11,047, totaling 615 records. In 1996 the number of records would reach to 590, numbered from 11,048 to 11,638. In 1997 there would be 593 records, ranging from numbers 11,639 to 12,232. In 1998 there would be 795 records, between numbers 12,233 and 13,028 and, lastly, in the year 1999 there would be 950 records from numbers 13,029 and 13,979. The total of records, according to the official registers provided by this sector would reach 3,543.

However, when carefully examined, we noted the absence of several numbers, the sequences being interrupted innumerable times such as skipping from number 12,331 to number 12,333. Sometimes, we found records of different patients with the same number (few cases) and unnumbered records (few cases).

Obviously, due to the absences, out of the established and official total we found and examined 3,323 records. Out of this total, 503 records were excluded due to the lack of data (absence of psychiatric assessment, assessments which had been suspended due to any bureaucratic or legal reasons, patients who had come from prisons only due to the Supervenience of a Mental Disease for psychiatric treatment, others who had deceased during the slow legal procedures, etc.). Therefore, subtracting 503 records from the examined total, we included a total of 2,820 records that were analyzed according to the study's presuppositions.

According to the distribution of yearly occurrences of TBI, among the 2,820 records, which had occurred any time before the wrongs and regardless gender, race, origin and schooling of patients (the age corresponded to the limits of patients who are, usually, examined in the IPFMC, i.e., from 18 years old onwards) we found 15 cases in 1995, 25 in 1996, 31 in 1997, 34 in 1998 and 28 in 1999, totaling 133 cases.

Out of the existent TBI before the wrongs (133), 39 were diagnosed as mild and 94 as severe or moderate. The distribution of TBI occurrences according to the result of neurological exams evidenced that 105 were diagnosed as normal, 20 had pathological results, 7 had diagnosis of post-traumatic epilepsy and 1 had mental impairment.

The diagnose of the 105 subjects considered as normal by neurologists were based on the clinical neurological exams and in the EEG. The 20 subjects with a pathological diagnosis, added to the 8 with post-traumatic epilepsy and mental impairment, had pathological neurological exams which included the clinical exam, EEG, Brain X-rays and CT. From these total, 9 CT and no MR were requested.

Out of 9 CT requested by neurologists, in three of the patients there were, immediately after the injury, pathological results (parenchyma alterations) and at the expert neurological assessment, some time after the injury (months or years), they were normal.

According to the type of alteration, out of the total of TBI (133), there were 34 physical, 8 psychical and 7 mixed alterations and 84 without alterations (without records).

Found alterations are described below:

- *Physical alterations*: loss of audition, loss of sight, convulsive crises, most diverse neurological sequels, worsening of a previous neurological condition, temporo-spatial disorientation, loss of conscience (faintings or falls), divergent strabismus and motoric difficulty to move parts of the body.
- *Psychical alterations*: depression, irritability, altered conduct or behavior, worsening of a previous psychiatric condition, disorientation, impulsiveness and aggressiveness, hallucinations, delusional ideas and memory impairment.
- *Mixed alterations*: with symptoms that included a combination of the previously-mentioned symptoms.

In the remaining 84 subjects there was no specification (record) regarding the presented symptomatology, if there was any.

From the total of TBI cases, expert psychiatrists only took into account 14.

Among all assessed cases, expert psychiatrists requested 4 (four) psychodiagnostic assessments in order to solve diagnostic doubts. One of these four assessments established a causal relationship between the TBI and the deficits presented by the patient, although the result was disconsidered. The other three assessments did not identify related impairments.

Two of the TBI cases had not even been submitted to neurological exams and the expert reports were emitted without them. One patient had two TBI in distinct moments of his/her life and, due to the fact of having normal clinical-neurological exams and EEG, was not taken into account.

Comments

The survey evidenced, in a studied population of 2,820 records of examined patients of the IPFMC for the performing of legal examinations between the years 1995 and 1999, the existence of 133 cases of traumatic brain injuries of any degree. This total represented 4.71% of the studied universe, a quite higher rate than that found in the general population.

Out of the 133 cases of TBI, 94 were severe and 39 mild. Considering the assessments performed by neurologists, even though a number of patients had significant neurological deficits (34), others had psychical alterations (8) and still others had mixed alterations (7), most of examined subjects (105) was understood as having 'normal neurological exams'. The grounds for this diagnosis was supported only by the clinical neurological assessment and the EEG.

On the other hand, of note, only 28 of the patients were understood by neurologists as having neurological disorders including, as a diagnostic basis, the clinical neurological assessment, EEG, x-rays and CT. Also of note, only 9 brain tomographies had been requested for the diagnostic elucidation of these 28 cases. This fact demonstrated an excessive confidence in the clinical assessment, in EEG and in X-rays as capable of detecting the neurological alterations that occur in the TBI or an attitude stemming from the limits imposed by the financial problems of the institution or a fact which illustrated the difficulties of recognizing the clinical consequences of these injuries and how the laboratory exams can be unable of identifying any existent alterations.

Also of note, out of the 9 CT requested by neurologists, three showed, just after the trauma, pathological results (parenchyma alterations) and, at the time of the expert neurological examination, after several months or years after the injury, they were normal. Could this finding or evolution in the CT images be considered as brain recovery with the subsequent statement that these patients are neurologically normal? As verified in the studies, the answer is no; the normality of neuroimage exams does not imply a clinical symptomatic recovery, as significant manifestations of impairment could still be present and determining important psychopathological and/or psychosocial consequences.

Comparing the assessment performed by expert psychiatrists with that of neurologists, we found that the number of TBI rejected by the former reached to 111, while the latter found 105 with normal exams. Based on this fact we can infer that most of examinations accomplished by expert psychiatrists had been directly influenced by the assessments performed by neurologists. This inference can be confirmed in the inverted sense: no case of TBI was diagnosed by expert-psychiatrists when neurological exams were normal. At the same time, we may say that expert psychiatrists had not taken into consideration 6 cases pointed out by neurologists as having physical, psychical or mixed symptoms, what may be interpreted as a discrepancy.

Another verification can be made observing the data: ten cases identified by neurologists as having sequels of TBI had been ignored by expert psychiatrists in their respective expert reports. We may think that neurologists only recorded physical symptoms and EEG results, without reference to any psychical impairment. However, observing that two patients with TBI (recorded in their history) were not submitted to the neurological exams and even then psychiatric expert reports were emitted, we may think that expert psychiatrists had given little attention to neurological exams. While normal, these exams would apparently help to rule out any existent neuronal impairment, although possibly in a bureaucratic and not technical or scientific way, as few of them acknowledged the possibility that TBI could also generate cognitive, perceptive, psychical or behavioral impairments besides physical ones. This is well exemplified by the fact that 61 patients had significant neurological, psychical, behavioral or mixed alterations, while 28 were so considered by neurologists and 18 by expert psychiatrists.

We may mention that out of the 28 cases which were taken into account by neurologists and out of the 18 by expert psychiatrists, there were 7 cases of 'post-traumatic epilepsy' and one case of 'mental impairment', which are well-established diagnoses, although without the acknowledgement that they may be part of a wider diagnosis, with other implications, due to TBI.

Our data allow us to state that in the Forensic Institution of Porto Alegre there is a classical division between the organic and the psychical, being the former represented by neurology and the latter by psychiatry. In the assessments, there is a well-separated functioning between these instances, although they have a harmonic relationship regarding the bureaucratic per-

forming of their functions. Neurologists perform the neurological exam, request exams regarding their field, such as EEG, x-rays, CT, etc. Psychiatrists perform the psychiatric assessment, request neuropsychological tests and compile all information in order to formulate the definitive diagnosis. More generally, psychiatrists base their diagnostic formulations on dynamic understandings, more concerned in determining the psychological roots of wrongs, with scarce or limited opening to the understanding of the human behavior as a whole, mainly when the brain is impaired by injury.

It was noteworthy the fact that most of found TBI were severe and moderate. At the same time, it is interesting how some of the patients who had had these injuries had obtained an apparently complete recovery along time, according to the diagnostic criteria employed by neurologists in charge of expert examinations. However, we might ask: had they really had a complete recovery? Can the clinical neurological exam and the EEG confirm this recovery? Out of 133 cases, 105 had their exams deemed normal by means of these simple assessments, even though some of these patients had previous pathological results in their neuroradiological exams.

If in mild TBI the consequences in terms of impairment cannot be verified by the currently-employed neurological exams, could the same phenomenon occur with moderate and severe TBI some time after the injury? Could cognitive alterations, which are not detected by these exams, be present and causing impairment in several areas of impaired subjects? Could the epidemic denounced by Parker regarding the consequences of mild TBI be expanded, including the consequences of moderate and severe TBI?

Regarding the conduct of psychiatrists, it is noteworthy that only 4 neuropsychological assessments had been requested among 133 patients with TBI. Even when the result of one of these assessments had been positive - establishing the causal relationship between the presented symptoms and the TBI - their results were not taken into account. In a different way, these data confirm what has been already mentioned: the scarce concern of the institution's neurologists and expert psychiatrists with the consequences of the TBI, be them arising from severe or moderate and mild injuries. Such lack of concern can be based, certainly, on the ignorance of the consequences of these injuries on people who endure them or to survivors, a fact that does not deprive of merit the institution or its technicians, as the recognition of these lesions has occurred only in the last years, mainly after 1995, when they started to be identified and valued in the literature, whereas the most recent diagnostic classifications, such as the DSM-IV and the ICD-10, have scarcely contributed to these recognition.

Also of note, in our study patients with MTBI were not totally taken into account both by neurologists and expert psychiatrists, as if their illness had not any psychopathological or psychosocial consequences. This lack of recognition demonstrates that MTBI and their effects or consequences are not identified, do not promote neither concern nor even consideration by the physicians of the Forensic Institution of Porto Alegre, what does not differ, possibly, from the other Western

physicians, who are used to hermetic divisions between the physical and the psychical, besides knowing quite little about the consequences of TBI on the psychism and behavior.

Conclusion

Our study allowed to verify that mild TBI is not deemed determinant of neuropsychiatric sequels both by expert neurologists and psychiatrists. The most significant fact is that moderate and severe TBI, according to normal exams at the examinations - after some time from the injury - caused lack of awareness on experts. Many of these patients still had significant neurological, psychical and mixed alterations, surprising their not being taken into account.

The study shows the abyss that exists in the interface between the TBI and neurology and psychiatry in the studied population, especially in the consequences on the practice of clinicians and experts. This finding does not differ from other services, possibly due to the dichotomy between the organic and the psychic, which prevails in Western medicine. Besides, other similar or more systematized researches should be performed to replicate our findings, although there are many studies, as already mentioned, that had already evidenced the severe neuropsychiatric implications in several distinct populations.

Complementing these conclusions we must remind the implications of the absence of a correct diagnosis, both for clinicians and experts (social security or forensic), that may represent to subjects who had TBI and who had their sequels not taken into account.

Until few time ago, the importance of TBI in the genesis of many cognitive or behavioral difficulties, understood as psychic or psychiatric, was ignored. However, the current state of knowledge demonstrates the opposite. According to Hyman, with this new knowledge, up to now deeply-rooted conceptions may be replaced and promote new approaches to the interpretation of neuropsychological profiles of patients who had TBI, providing better assessment and, consequently, treatment and follow-up.²⁰

This study was the first in Brazil and Latin America who dealt with this theme. Although the results, as a rule, are in accordance with population studies regarding the scarce consideration given to the consequences of TBI in the production of psychiatric manifestations, there is no similar study in the literature. It is necessary to consider that existent studies with populations impaired by TBI have started only few years ago and are, due to that, very recent. There are almost no identical studies, with different objectives and methodologies, assessing distinct populations and in varied periods.

Therefore, these studies, including ours, have to be interpreted with caution. Studies with the same objectives, methodologies and populations need to be performed with patients who had TBI and psychiatric patients. Multicentric studies, in the near future, could generate the lacking epidemiological data. The reproduction of knowledge is fundamental for the obtained results to have credibility and to be useful to the medical science and to its purposes of contributing for the health of people and populations.

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