

ORIGINAL PAPER

**Recording and Management of CCT in a Public Hospital in the
Region of Laconia in Greece**

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Abstract

Background: Cranium-cerebral traumas in today's era are a serious public health problem with both social and economic dimensions. They are characterized as an 'epidemic', due to the increase in car accidents and they particularly affect the productive population.

The objective of this study was to investigate the occurrence and allocation of Cranium- cerebral traumas among the population in the Prefecture of Laconia, in order to determine the explanatory factors or risk factors, the record of how they are managed (diagnosis, therapy, and outcome) and their correlation with demographics and other factors.

Methodology: This study was conducted with the collection of data from hospital archives and Emergency Department logbooks from the General Hospital of Sparta. Specifically designed record forms were used which included patient demographics, means of arrival to the hospital, the clinical pictures, the gravity of the injury, possible accompanying injuries, diagnostic tests, treatment and outcome, as well as evidence related to the causes of the injury.

Results: 2352 cases of children and adults with Cranium-cerebral traumas were included in this study who came to the Emergency Department from 1st of January 2005 to 31st of December 2010. The cause of Cranium-cerebral traumas in adults is affected by gender, nationality and place of residence, while in children it is affected by place of residence and the means of arrival to the Emergency Department. Respectively, the outcome of Cranium-cerebral traumas in adults is affected by place of residence and their means of arrival to the hospital while in children it is affected by nationality and place of residence.

Conclusions: This study has revealed the magnitude of the problem and the epidemiological characteristics of Cranium-cerebral traumas in the Prefecture of Laconia, with the ultimate need for intervention at a level of prevention. Proposals regard the improvement in road networks, informative campaigns to the public regarding enforced road safety driving measures (helmet, seatbelts, baby car seats, etc.), in applied educational programmes for the promotion of road safety conduct, in parental education on the basic safety regulations and prevention of accidents concerning children.

Key Words: Cranium-cerebral Injury, Brain, Treatment, Epidemiology

Introduction

Cranium-cerebral traumas in our times are a complex public health problem with social repercussions that concern all populated age groups. They include physical disabilities, cognitive, psychological, behavioural and emotional deficits and are the third cause of death and chronic disability in people under the age of 35 (Pandeira, 2009).

The most common cause of cranium-cerebral traumas, at a rate of 50%, is road accidents while the second most significant cause is injuries following a fall with a percentage of 20% to 30%, especially among the very young and the elderly. Aggressive attacks, the use of fire arms (approximately 12%) various sport accidents and even accidents of all types from within a working environment to accidents that occur in the home, attribute to causes of cranium-cerebral traumas (Wade & Langton, 1987; Chua et al., 2007; Kostabaras & Kargadou, 2010).

The term cranium-cerebral trauma, usually refers to traumatic brain injury, but it is a more extensive category because it can involve injuries in different structures of the brain such as the scalp and the skull, without it necessarily being an open trauma (Karen et al, 2007; Nomikos, 2009). This is due to direct and indirect trauma mechanisms (Shultz et al., 2005).

They are typically classified into three categories: Mild cranium-cerebral injury or concussion, fractures of the skull and intracranial haemorrhage (Shultz et al., 2008; Schultz et al., 2005) Their characteristics are the loss of consciousness, amnesia, headache, dizziness, the tendency to vomit, vomiting, otorrhagia and nosebleeds (Savola, Hillbom, 2003; Sakas et al., 1998). The important points that have to be checked are the level of consciousness and the level of deterioration, the size of the eye pupil, the positive or non-presence of the Babinski sign. The upper and lower control of muscle strength in lower and upper limbs is paramount as is the testing of vital functions of the sufferer with a blood pressure test, heartbeats, respiratory movements and his temperature (Morali & Tsioloy, 2007). Furthermore, research should be carried out to determine the

presence of Battle sign while only a mere observation is sufficient to determine the presence of raccoon eyes.

The rehabilitation of a patient with cranium-cerebral injury requires long-term and arduous effort on the part of the sufferer but also from the side of the rehabilitation teams which consists of a responsible doctor, nurse, physical therapist and clinical psychologist. This team may be comprised of other people, such as doctors of other specialties, speech therapist and others (Pantiera, 2009). With the help of these people and of the family, the patient manages to return, to the maximum extent, to his daily lifestyle (Sakas et al., 2005; Sosin et al 1996, Wesserman & Buccini, 1990).

Material-Method

Population surveyed

This is a retrospective descriptive study which was conducted in the Prefecture of Laconia and specifically concerns cranium-cerebral injuries which were recorded in the General Hospital of Sparta from January 1st 2005 to December 31st 2010.

Included in this survey were 2354 patients who came to the Emergency Department of the General Hospital of Sparta on their own or accompanied by a relative or transferred by means of ambulance. Patients who had access to the General Hospital of Sparta were individuals from the General populations of the Prefecture of Laconia and come from all social and economic classes which can be attributed to the general shifts of the only legal hospital in the Prefecture. All of the patients were treated with same therapeutic protocols.

Procedure

The specific survey was carried out with a collected data, which was obtained from the hospital archives and emergency logbooks from the Emergency Department of the General Hospital of Sparta.

In order to collect the data, specific forms were used in order to meet the need of the research, which included patient demographics, (age, gender, place of residence, nationality), means of arrivals to the hospital, the clinical picture of the patient, the nature and gravity of the injury,

possible accompanying injuries, tests carried out for diagnostic purposes, the type of treatment which was applied, the outcome of the patient's progress and the evidence related to the cause of the injury and the way the injury was induced and the cause of this (fall, underlying disease, accident, substance use, driving behaviour, seatbelt use, helmet, etc.).

Statistical processing

In order to analyze the data parametric statistical tests were used. For the comparison of ages between the two groups, a t-test for independent samples was used. In order to compare ages among more than two groups, an analysis of variance (ANOVA) was used. When the assumption of homogeneity of variances was not valid, a Welch test was used. Exploring the relevance of cranium-cerebral injuries and their outcome with demographic factors, the χ^2 test of independence was used. The statistical analysis was carried out through IBM SPSS Statistics 20. The significance level was set as $p < 0.05$. Statistical analysis was performed using IBM SPSS Statistics 20.

Results

Characteristics of participants

From 1 January 2005 to 31 December 2010, 2354 incidents of Cranium-cerebral traumas were recorded from the ages of 1-106.

Gender

Of all the cases reported, 1785 (75.8%) were adults while the remaining 569 (24.2%) were children (Table 1). 60.3% of the adults were men while 39.7% were women. As far as the children are concerned, 68.5% were boys while 31.5% were girls.

Age

The average age among the adults is equivalent to 49.54 (± 21.892) years, 47.33 (± 21.368) for men, 52.89 (± 22.263) for women while for children the average age is equivalent to 7.95 (± 5.470) years, 8.53 (± 5.520) for boys and 6.69 (± 5.152) for girls (Table 1).

Causes of CCT

Of all the cases 38.2% of cranium-cerebral traumas were caused by falls, 28.0% were from car accidents, 21.7% were from

fractures while the remaining 12.1% was from physical abuse (Table 2). As far as the adults are concerned, the main cause was falls (47.6%) the second was fractures (36.0%), the third was car accidents (13.3%) while a small percentage of cranium-cerebral traumas were caused by physical abuse. (3.3%) The study showed that the main cause of cranium-cerebral traumas among men was car accidents (35.8%) for women it was falls (41.7%) while for boys and girls it was falls with a percentage of 47.2% and 48.6%, respectively.

Nationality

As far as nationality was concerned (Table 1), 87.9% of the people were Greek while the remaining 12.1% were of other origins. Among the adults, 86.8% were Greek (85.4% men-88.9% women) while 13.6% were of other origins. Among the children, 91.2% were Greek (92.8% boys-87.7% girls) while 8.8% were of other origins (7.2% boys-12.3% girls).

Place of residence

The majority of people 68.8% lived in the municipality of Sparta, 12.7% in the municipality of Evrotas, 9.5% in the municipality of Eastern Mani, 7.8% lived outside Laconia while the remaining 1.2% resided in the municipality of Movemvasia (Table 1). The results were similar both for adults and children of both genders.

Means of Arrival to the Emergency Department

A 64.5% of the cases arrived at the General Hospital of Sparta with their own means of transport while the remaining 35.5% were taken by ambulance. The results were similar both for adults and children. 53.7% of the men arrived at the General Hospital of Sparta with a private means while the remaining 46.3% were taken by ambulance. As far as the women are concerned, 62.6% arrived at the hospital using a private means of transport while the remaining 37.4% arrived by ambulance. 85.6% of the boys arrived at the General Hospital of Sparta with a private means of transport while the remaining 14.4% were taken there by ambulance. As for the girls, 90.5% arrived at the hospital with a private means of transport while the remaining 9.5% were taken by ambulance.

Table 1: Demographic characteristics

| | | Frequency (%) | | Frequency (%) |
|---------------------------|-----------------|---------------|----------------|---------------|
| Gender | Adults | 1785 (75.8) | Men | 1076 (60.3) |
| | | | Women | 709 (39.7) |
| | Children | 569 (24.2) | Boys | 390 (68.5) |
| | | | Girls | 179 (31.5) |
| | | Total | Adults | Children |
| | | | Mean (SD) | Mean (SD) |
| Age | | | 49.54 (21.892) | 7.95 (5.470) |
| | | Frequency (%) | Frequency (%) | Frequency (%) |
| Nationality | Greek | 2065 (87.9) | 1546 (86.8) | 519 (91.2) |
| | Other | 285 (12.1) | 235 (13.2) | 50 (8.8) |
| Place of residence | Eastern Mani | 223 (9.5) | 182 (10.3) | 41 (7.2) |
| | Evrotas | 296 (12.7) | 242 (13.7) | 54 (9.5) |
| | Movemvasia | 27 (1.2) | 22 (1.2) | 5 (0.9) |
| | Sparta | 1608 (68.8) | 1182 (66.8) | 426 (75.0) |
| | Outside Laconia | 183 (7.8) | 141 (8.0) | 42 (7.4) |

Table 2: Characteristics of CCT

| | | Total | Adults | Children |
|--------------------------|--------------------|---------------|---------------|---------------|
| | | Frequency (%) | Frequency (%) | Frequency (%) |
| Causes | Physical abuse | 284 (12.1) | 265 (14.9) | 19 (3.3) |
| | Falls | 898 (38.2) | 627 (35.1) | 271 (47.6) |
| | Car accidents | 659 (28.0) | 585 (32.8) | 74 (13.0) |
| | Fractures | 511 (21.7) | 306 (17.2) | 205 (36.0) |
| | Gunshot | 1 (0.0) | 1 (0.1) | 0 (0.0) |
| Scale of injuries | Severe (GCS≤8) | 18 (0.8) | 18 (1.0) | 0 (0.0) |
| | Average (9≤GCS≤12) | 19 (0.8) | 16 (0.9) | 3 (0.5) |
| | Slight (GCS ≥ 13) | 2301 (98.4) | 1735 (98.1) | 566 (99.5) |

Scales of injuries CCT

The vast majority of people (98.4%) had a slight form of injury, 0.8% had an average form of injury while the remaining 0.8% had a severe form (Table 2). The results for the adults were similar. It is worth noting that no child had a severe form of cranium-cerebral trauma.

Outcome of cases

A 34.0% of the cases needed hospitalization, 33.9% were treated for CCI, 23.8% refused to be admitted to hospital or to be transferred to a bigger hospital, 7.4%

were transferred to a bigger hospital and a mere 0.8% died due to the injury. The results for adults of both genders were similar. As for the children, half the cases (50.1%) were treated for CCT, 23.3% were required to remain in hospital, in 19.0% of the cases the parents refused hospitalization or transfer, 8.6% of the cases were transferred to a bigger hospital while no child died.

Year of incidents

The majority of the cases (21.9%) occurred in 2006. It then follows 2009 (18.5%), 2008

(17.3%), 2010 (16.4%), 2005 (15.2%) while the fewest cases occurred in 2007 (10.7%).

The results were similar both for adults and children of both genders (Figure 1).

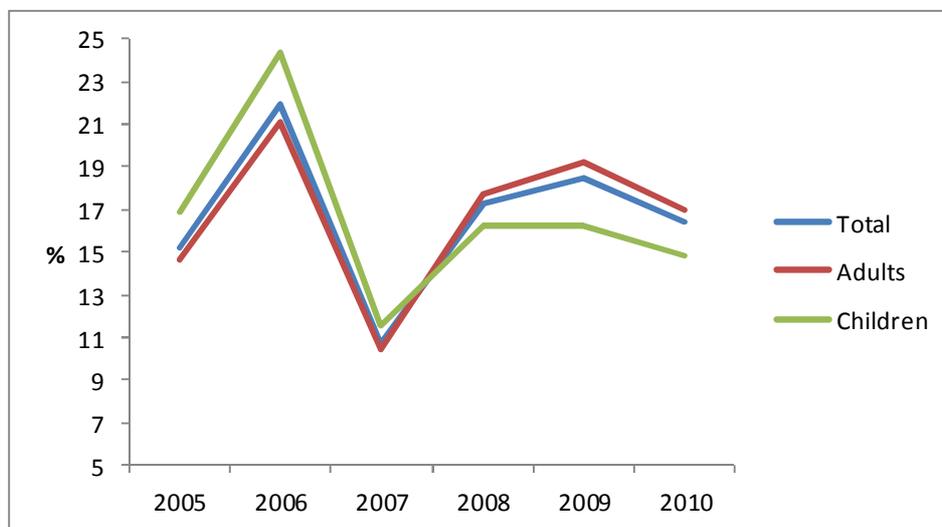


Figure 1: % of incidents per year

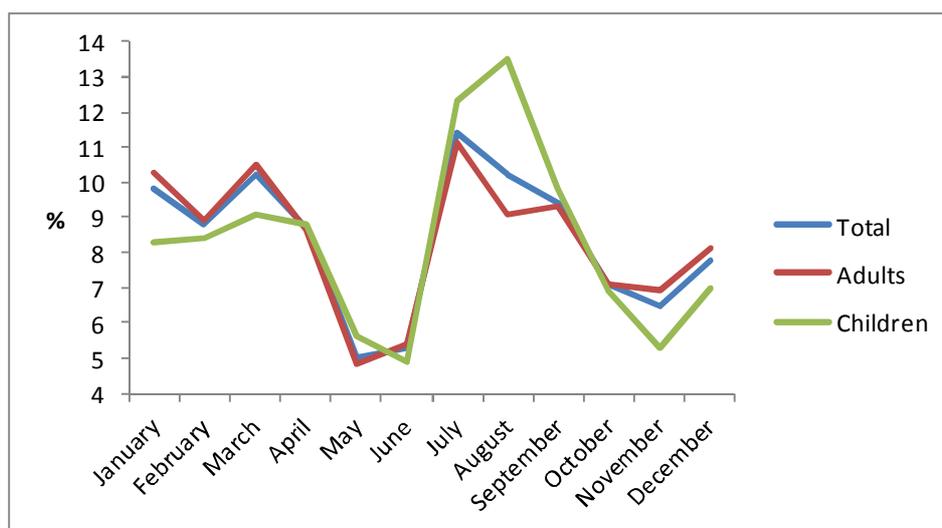


Figure 2: % of incidents per month

Month of incident

As far as the months in which the cases occurred: 26.9% of the cases occurred during the summer months, 26.3% during the winter months, 23.8% during the spring months while the remaining 23.0% during the autumn months (Figure 2).

As far as the adults of both genders is concerned, the majority of the cases occurred in winter (27.2%) (men 26.3% -

women 28.5%) while as far as children are concerned, the majority of the cases occurred in summer (30.8%), (boys 32.1% - girls 27.9%)

The majority of people (41.2%) were insured by OGA (farming population). The results were the same for adults and children of both genders. Finally all cases were treated with the same therapeutic protocol, while the variation in the methods of testing varies depending on the cause of CCT.

Exploring the CCT causes

Exploring the association of cranium-cerebral causes with demographic factors, as far as the adults are concerned the following emerged: The causes of CCT are influenced by gender ($p < 0.001$), nationality ($p < 0.001$), place of residence ($p < 0.001$), and means of arrival to the General Hospital of Sparta ($p < 0.001$). The main cause of CCT for men was car accidents while for women it was falls. The main cause of CCT among Greeks is falls while among foreigners it is physical abuse. In all the municipalities of Laconia the main cause of CCT was car accidents, apart from the residents of Evrotas and Sparta for whom the main cause was falls. Similar results revealed for each gender. The main cause of CCT in those who were transferred by ambulance was car accidents, a fact that testifies that these cases had suffered severe injuries while for those who were transferred by other means the main cause was falls.

For the children we have the following: The cause of CCT is associated with the place of residence ($p < 0.001$) and the means of arrival ($p < 0.001$). Car accidents are referred to as the main causes in which they were possibly involved as victims (pedestrians or passengers) or as teenage drivers and falls for which tripping and slipping have been implicated. The main cause of CCT for those who were transferred by ambulance was car accidents while for those who were transferred with a private means of transport, it was falls or fractures. The results were similar for each gender.

Exploring the outcome of CCT

The analysis revealed that the outcome is associated with the municipality ($p < 0.001$), the method of arrival to the General Hospital of Sparta ($p < 0.001$), and the cause ($p < 0.001$). The main outcome for the residents of Sparta was CCT treatment while in all other cases it was admission to hospital. The majority of those who were transferred by ambulance were admitted to hospital having suffered a probable severe injury while the majority of those who were transferred by a private means of transport, received CCT treatment. Severe injuries were treated admission to hospital, while in injuries caused by fractures, were given

CCT treatment. Similar results were revealed for each gender.

As far as children are concerned the results of the study of Cranium-cerebral traumas with demographic factors are as follows: The outcome is associated with the nationality of the children ($p = 0.003$), the place of residence ($p < 0.001$), the means of arrival ($p < 0.001$), and the cause of CCT ($p < 0.001$). The main cause for both Greek and foreigners was CCT treatment, the second one was admission to hospital for the Greeks while for foreigners it was their refusal to be admitted. The main outcome for the residents of Sparta was the CCT treatment while in all other cases it was admission to hospital, which means that the cases from other Municipalities were more serious. It is significant that children outside Laconia were neither given treatment nor were admitted to hospital.

Discussion

As the analysis revealed the main cause of CCT for men was car accidents while for women it was falls. One possible interpretation is that men, unlike women, drive more or are unwilling to conform to appropriate driving conduct regulations. We must not neglect the poor road construction in the prefecture which in many cases, combined with carelessness, is the main cause of road accidents. Greeks suffers from CCT because of falls while foreigners because of physical abuse. This testifies the possible racist behavior of people which in recent years has evolved into a country with a strong multi-cultural character. People of different races, religions, languages, conditions, traditions, customs and behaviour seek refuge in it. We can exclude the possible disagreements among themselves as the levels of poverty they experience often lead to acts of violence and indignation.

Our analysis also revealed that in all the municipalities of Laconia the main cause of CCT was car accidents, apart from the residents of Evrotas and Sparta for whom the main cause was falls. This may be due to the poor road conditions in the Prefecture of Laconia and that a rural prefecture justifies falls during agriculture work. It is

significant that car accidents are the main cause for foreigners, who possibly are not acquainted with the roads.

The main cause for both boys and girls of all nationalities is falls, which in most probability was provoked by the hour of the game or the sport. Car accidents are referred to as the main causes in which they were possibly involved as victims (pedestrians or passengers) or as teenage drivers and falls for which tripping and slipping have been implicated.

The main outcome for the adults residents of Sparta is CCT treatment while in all other cases it was admission to hospital. One possible interpretation is that either the incident was not severe enough to require admission to hospital or by having easy access to the hospital, they preferred CCT treatment rather than to be admitted to hospital. The remaining cases in the Municipality were more severe or due to distance they were admitted for observation. When the injuries were severe there was admission to hospital, while those with injuries caused by fractures, they were given CCT treatment. A significant percentage (25.3%) refused to be admitted, a fact that testifies the ignorance of consequences of the injuries.

The majority of boys and girls were administered CCT treatment, a fact that testifies that none of the cases were serious. While the main cause for Greek and foreigners was CCT treatment, the second was admission to hospital for the Greeks while for foreigners it was their refusal to be admitted. A possible interpretation of this is that foreigners do not stay in the hospital due to financial capabilities or due to the fear of deportation from the country, since many of them do not possess the necessary documents for legal residence in our country. The main outcome for the children residents of Sparta was the CCT treatment while in all other cases it was admission to hospital, which means that the cases from other Municipalities were more serious. It is significant that children outside Laconia were neither given treatment nor were admitted to hospital.

Conclusions

The present study has presented the magnitude and the epidemiological characteristics of the problem of cranium-cerebral traumas in the Prefecture of Laconia, and revealed the need for intervention at a level of prevention. Suggestions regard the improvement of road conditions, in informative campaigns towards the population and the need for the implementation of road safety driving measures (helmet, seatbelts, baby car seats), in the implementation of educational programmes for the promotion of road safety, in parental education of safety regulations and preventing accidents with children (Lezak, 1979; Milton, 1986; Schiff et al., 2002; Shultz et al., 2008). In addition, because we are referring to a rural county, it would be useful for the rural cooperatives in collaboration with relevant services in the Peloponnese Region, to develop informative campaigns in order to prevent and avoid accidents during agricultural work. Also, farmers could use appropriate protective measures such as a helmet, suitable footwear, gloves, etc. Finally, the appropriate organization of recording cases, the ongoing and lifelong education of health professionals will help them deal with incidents more effectively.

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