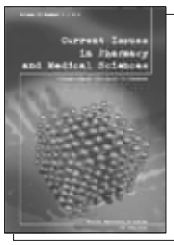

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Epidemiology, diagnosis and pharmacotherapy of head injuries in children treated in the Children's Clinical Hospital in Lublin

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ABSTRACT

Head injuries are one of the most common injuries in children. This work is a study of the causes and consequences of such injuries in children, and in so doing, the effects of age and seasons on the injury formation in children in Lublin were analyzed. In Lublin, head injuries accounted for 29.5 % of all treatments at the Children's Clinical Hospital in Lublin, and the majority of cases were reported in the months from April to June. Serious head injuries such as skull fractures predominated in patients over 14 years of age and among children between 1 and 2 years of age.

Keywords: head injuries, skull fractures, hospitaliation

INTRODUCTION

Head injuries are one of the most common injuries in children, and these have serious repercussions, such as epilepsy, impaired mental development or impaired mobility. Head injuries are also common in childhood victims of traffic accidents, where it accounts for about 60 % of all cases, and 80% of children with head injuries died as a result of multiple-organ injuries.

The treatment after the craniocerebral trauma can be divided into three stages. The first stage is performed by the prehospital emergency medical services (EMS) at the scene of the accident (if the EMS was called in). The second step is the emergency medical operations performed in the Emergency Department (ED), where the child is transported to by the EMS, or is brought in by any possible means. If the injury consequences are considered to be serious, a decision about admittance to the specialist hospital theaters and wards (surgery or neurology) is then made. This is the third stage.

The prehospital actions held by EMS are primarily based on trauma diagnosis and anamnesis collection. If there is a life-threatening condition, then securing and maintaining the patient's vital signs (medical rescue operations – ALS, ATLs) is done. Procedures performed in the ED are, first of all, the continuation of the activities undertaken by the EMS. In addition, the laboratory diagnostic and diagnostic imaging that will be done, helps responders make the correct decisions so as to stabilize the child's condition. The actions performed in the hospital departments depend primarily on the observed damages and the patient condition. Based on clinical observations, pharmacological treatment or surgical interventions (specialized treatment) are undertaken.

Head injuries in children are caused by many factors. In small children, the predominant cause of the injuries is by way of a fall (from heights equal to their own or greater), as well as by injuries caused because of their guardians' carelessness or rage. In older children, the dominate source of injury is associated with their physical activities (injuries during sports) or by way of accidents (especially traffic accidents) [3, 6, 2, 7].

THE AIM OF THIS STUDY

The aim of this study was to investigate the causes and consequences of the injuries that children sustain, and to analyze the effects of age and season on injury formation in children, in the Lublin province. In addition, this study is intended as a way of assessing the characteristics of diagnosis and treatment in the Children's Clinical Hospital in Lublin.

MATERIAL AND METHOD

In this study, an analysis of data from the computer system Info-Medica is presented, as Info-Medica is used in the hospital to collect information about patients. All patients admitted to the Children's Clinical Hospital ED, in 2008, were included in the study. The following data were analyzed: the diagnosis according to ICD 10, the date of the services, type of services (counseling or admission to the clinic), the cause of injury, the child's age, the place of the child residence. An analysis of the medical records of selected patients hospitalized in the Department of Surgery

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and Traumatology of the Children's Clinical Hospital in Lublin, is also presented.

RESULTS

In 2008, the emergency department (ED) provided services for 29 034 patients. Each patient's stay in the emergency department ended with either ambulant advice or admission to an appropriate hospital clinic, depending on the child's injuries. There was also one death recorded (Fig. 1). Number of children requiring surgical intervention was significantly different in each month. The majority of patients were reported in June (Fig. 2). Among patients registered in the Lublin area, the largest number of children required surgical intervention due to head injuries, wrist and hand injuries, or ankle and foot injuries (Fig. 3).

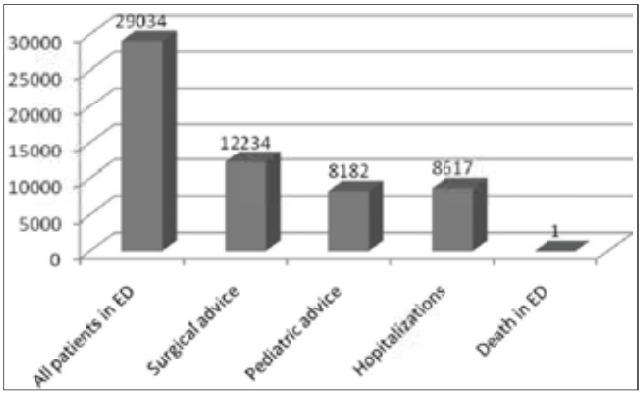

Fig. 1. Number of patients treated in the emergency department in 2008

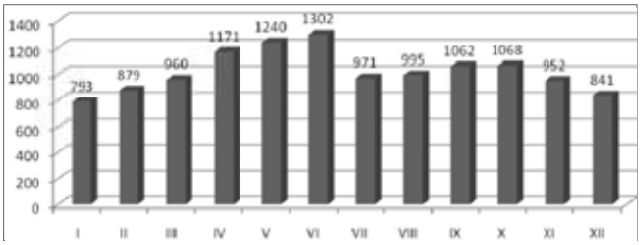

Fig. 2. Number of patients requiring surgical intervention in the individual months of 2008

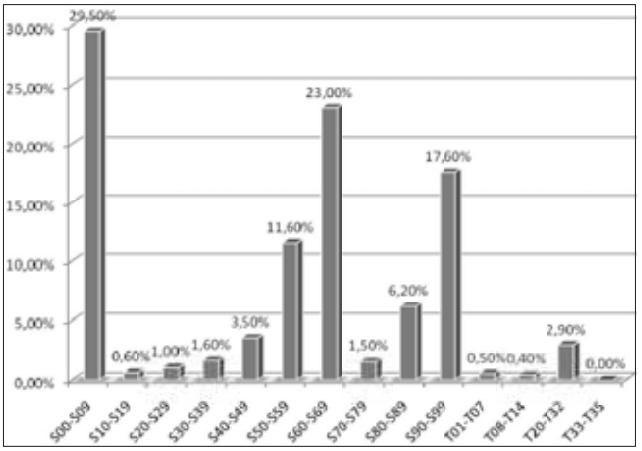

Fig. 3. The percentage distribution of the injury type according to the ICD-10 classification recorded for patients registered in Lublin

In this hospital, if the patient requires hospitalization, the child is admitted by the physician to an appropriate hospital clinic. Until 10 July 2008, three surgical branches worked in the Children's Clinical Hospital: Surgery A – general physical injuries, Surgery B – burn injuries, Surgery C – non-traumatic injuries. From 11 July 2008, surgery A was liquidated and the traumatic patients qualified for hospitalization were admitted by way of units B and C. In the computer system, the different branches of the surgery are not distinguished, therefore the number of patients admitted to the Department of Surgery is presented cumulatively in Fig. 4.

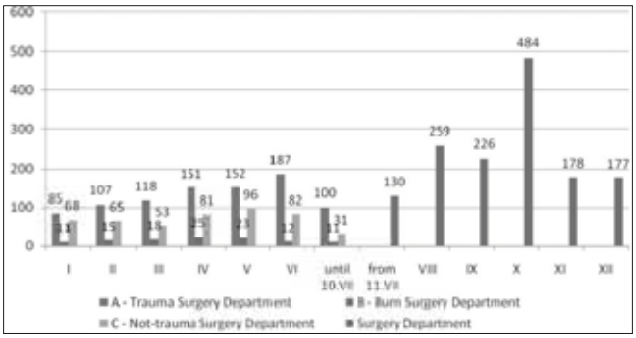

Fig. 4. Number of patients admitted to the various branches of the Department of Surgery and Traumatology in the individual months of 2008

The patients treated in ED can either be discharged or admitted to other hospital wards. The number of patients with head injuries who were admitted to the clinics or received outpatient advice is shown in Figure. 5. The figure for the quantity of head injuries was characterized by seasonal variability, and the most significant number of hospitalizations

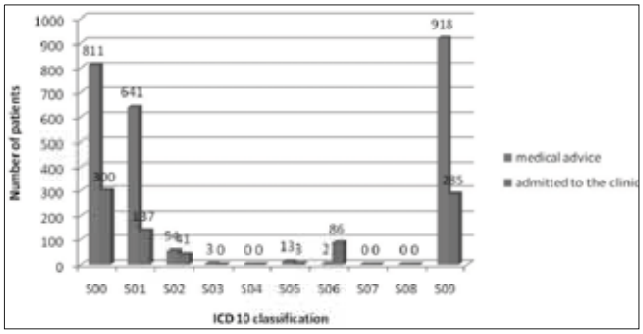

Fig. 5. The number of patients with head injury who were admitted to the clinics or received outpatient advice

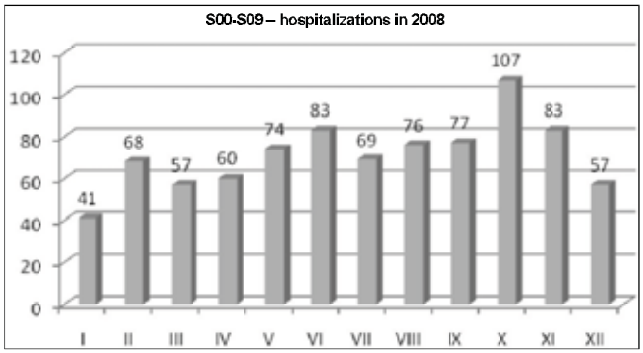

Fig. 6. Number of head injuries admitted to the hospital surgery ward in all months of 2008

due to head injury were recorded in October 2008 (Fig. 6). The statistics also reveal that the injuries children sustained are dependent on age. The frequency of a particular type of the injury depending on the age of the child is presented below, while the amount of the superficial head injuries in the different age groups of patients is shown in Fig. 7. In addition, the number of open head injuries in different age groups of patients is shown in Fig. 8, and the number of skull fractures in the different age groups of patients is shown in Fig. 9.

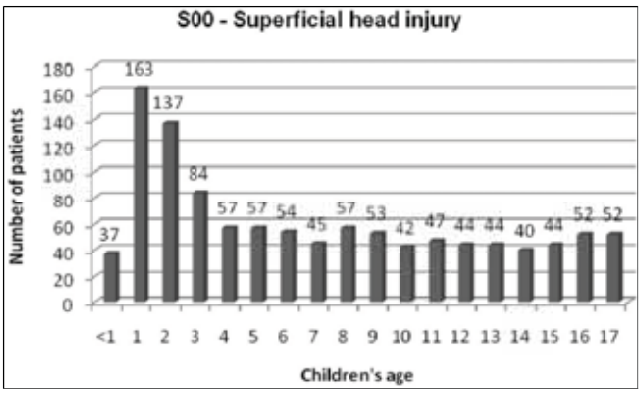

Fig. 7. The amount of superficial head injuries in different age groups of patients treated in the ED

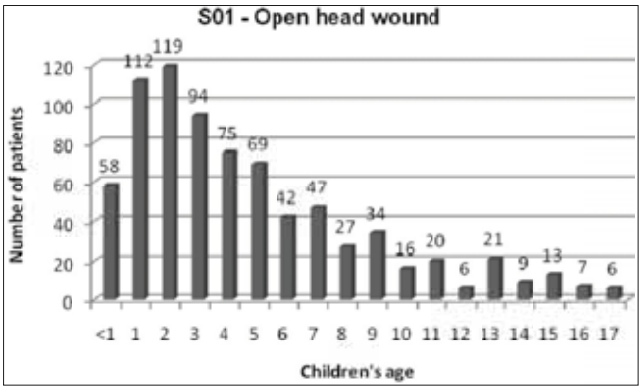

Fig. 8. The number of open head injuries in different age groups of patients treated in the ED

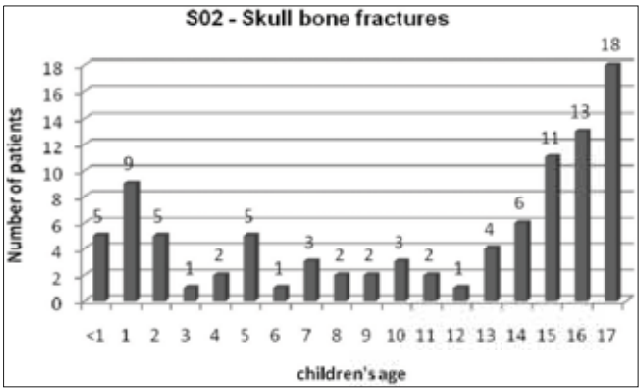

Fig. 9. The number and age of the patients with skull fractures and facial bone fractures treated in the ED

CLINICAL CASE STUDIES

Under the current strategy of diagnosis and treatment in the Children's Clinical Hospital, all children who have suffered from a head injury that show particular symptoms (loss of consciousness, vomiting, headache, dizziness, drowsiness, pupils' disparity) are hospitalized in the relevant hospital clinics. Because the majority of patients arrive at the ED within a few hours after the injury, the main activities taken in the ED are early diagnosis (imaging) and patient observation, combined with pharmacological treatment. In the department of pediatric surgery, observation of the patient is continued and medical therapy (analgesics, anti-swelling), or if necessary, surgery, is applied.

Case 1

This is a nine year old boy who suffered his head injury at school. He fell down the stairs and was brought to the ED by the Medical Rescue Team (EMS). The EMS examined the patient, measured vital signs and set up a flexible indwelling. In the ED, the attending physician re-examined the patient, performed an X-ray of the skull and measured vital signs. In the patient's history, the loss of consciousness, vomiting and drowsiness were stated. The patient was admitted to the surgical clinic. The unit recommended:

1. head computed tomography (CT),
2. anti-swelling treatment (mannitol),
3. analgesia (paracetamolum),
4. liquid treatment (Multi-electrolyte liquid, 0.9% NaCl + 5% glucose).

Due to the lack of post-traumatic changes in the description of the CT, as well as the lack of any distressing symptoms (drowsiness, vomiting), the patient was discharged on the fourth day.

Case 2

This is a nine year old boy with multi-organ injury, who was hit by a car. He was brought to the ED by the EMT. The EMT responders examined the patient, measured vital signs and set up a flexible indwelling. In the ED, the attending physician re-examined the patient, performed an X-ray of the skull and the cervical spine, then did an abdominal ultrasound and measured vital signs. Analgesic (paracetamolum) and antioedematous (furosemidum) treatment was started. In the patient's history, head trauma with loss of consciousness, abdominal trauma, injuries and elbow joint arthroplasty were stated. The patient was admitted to the surgical clinic. The unit recommended:

1. CT of the head twice (the first and fourth day of hospitalization),
2. antioedematous treatment (mannitol),
3. analgesics (paracetamolum, morphine),
4. liquid treatment (Multi-electrolyte liquid , 0.9% NaCl + 5% glucose),
5. ondansetron.

As a result of the patient's improvement and the absence of alarming symptoms, he was discharged on the fifth day of his hospitalization.

DISCUSSION

Head injuries are the predominant type of injury in children. In children treated in the ED of the Children's Clinical Hospital in Lublin, head injuries accounted for 29.5 % of all cases. This is also confirmed in studies performed in other hospitals in Poland, where the quantity of treated head injuries is also high, eg. in Chorzów Pediatrics and Rehabilitation Center – 41% [7]. In addition, most children treated in the emergency department due to head injuries required ambulatory assistance (12 234 cases).

Among the patients who needed pediatric surgeon help, most cases were reported in the months from April to June (respectively 1171, 1240 and 1302 patients). In Lublin, the majority of hospitalizations due to head injury were recorded in June and October. In other regions of the country, the seasonality of the traumas is shaped differently. In the Pediatrics and Rehabilitation Centre in Chorzów, the majority of head trauma hospitalizations were recorded in May, June and August [7], while in the hospital in Grodno, most hospitalizations were reported in May and September [4]. This is similar to the results obtained in the Children's Clinical Hospital in Lublin. The highest amount of injuries being in the months of May and August had also been recorded in Norway [1].

Most patients admitted to the surgical ward in the Children's Clinical Hospital in Lublin were children with superficial head injuries that were associated with loss of consciousness (concussion), or with worrying symptoms such as vomiting or pathological sleepiness. Similar results were obtained in Konin, where concussion accounted for 38% of all hospitalized head injuries [5]. The hospital treatment in this type of injury consisted primarily of observation and administration of analgesics and anti-swelling medicaments. In comparing the number of patients with skull bone fractures that were treated in the Children's Clinical Hospital in Lublin, and in a hospital in Konin, we found similar results. In both centers, skull bone fractures constituted a small percent of all hospitalizations.

According to the literature we surveyed, as well as our own study, among young children under 3 years, not serious, minor superficial bruises and wounds of the head skin dominated. However, the number of reported head injuries is high – 29.5% for all patients treated in Children's Clinical Hospital in Lublin, and over 50% of patients up to 6 years of age in the study performed in Norway [1]. What is more, serious head injuries such as skull fractures predominated in patients over 14 years of age and among children between 1 and 2 years of age [7,4,1,5]. Furthermore, the increased number of serious head injuries among older children is mainly due to sport activities. These results are confirmed by studies conducted in Canada. However in their study, 50% of the head injuries occurred in the younger age group – males aged 10–14 years [1].

CONCLUSIONS

1. Among all patients with injuries, children with head injuries are the largest group of patients requiring hospi- talization.
2. The majority of head injuries were recorded in April, May and June, while the most serious cranio-cerebral injuries requiring hospitalization occurred in October, November and June.
3. Superficial injuries and head wounds occurred most often in patients up to 3 years of age, while skull fractures most often were the purpose for hospitalization for head injuries among young people over 15 years of age.
4. Diagnosis in the ED was based on X-rays of the skull. Diagnosis by way of a CT of the head, as well subsequent pharmacological treatment were implemented in the department of pediatric surgery.

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