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CHILDHOOD SEIZURE IN PEDIATRIC EMERGENCY DEPARTMENT: MANAGEMENT AND TREATMENT

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Abstract

IIt is quite frequent in Emergency Department dealing with seizures or convulsive episodes, especially in pediatric age. Different could be the causes behind an epileeptic episode, usually distinguished in traumatic and non traumatic. Equally important, it should be always considered the negative impact that an acute-onset episode could have on children parents, relatives, or caregiver, even if they have a positive outcome in most cases. Different are the options available in a Pediatric Emergency Department (PED) to face a sudden event like seizure or convulsive status epilepticus but actually still no concert about which drug or which schedule should be used. This work means to describe and review a 5 years' single-center experience on assessment and treatment of children admitted to the PED affected by febrile and afebrile seizures and status epilepticus.

Introduction

One of the main causes of admittance in Emergency Department, especially in pediatric age, is represented by seizures. A first classification of neurological consultations distinguish traumatic and no traumatic causes. Belonging to no traumatic we can have congenital metabolic imbalance as for hyperammonaemia, hypoglycemia or elctrolite impairment, but also cerebral anomalies and malformation including vascular, stroke, sinus venous thrombosis and not last, tumors; infections of central nervous system are reported in 1/3 of cases. Furthermore, it may either present several kind of poisoning with drugs, alcohol or carbon monoxide [1]. Anyhow, the most common reason that requires immediate assistance are: syncope, headache, closed head traumas and mostly, seizures (febrile, afebrile, status epilepticus) as reported by Reuter and Brownstein [1]. Osamura et al. [2] indicate as most frequent disorders febrile seizure (41.4%) and epileptic seizures (29%), with convulsions and consciousness disturbances as most frequent symptoms.
We report a 5 years' single-center experience on assessment and treatment of children admitted to the Pediatric Emergency Department (PED) affected by febrile and afebrile seizures and status epilepticus.

Materials and Methods

During a 5-years' period ranging from May 2013 to May 2018, 15.543 children were admitted to University Hospital Policlinico - Vittorio Emanuele of Catania, Italy for general clinical and neurological problems.

Catania is a Metropolitan City, the second largest in Sicily with 1,115,310 inhabitants. The University Hospital is a referral center of this area for neurological problems in children. At the PED during this period of years, children with neurologic problems including headache, seizures, trauma, vertigo and lipotimia and with less frequency other disorders as anxiety crises, affective spasms, acute confusional status, facial palsy were examined.

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Among the 15.543 children admitted to the PED 2,007 (12.9%) presented with seizure consultation: 1,488 (72%) febrile and 519 (26 %) afebrile seizure types. On arrivals of convulsing child, was started an immediate assessment and neurologic evaluation of the clinical signs, including Glasgow coma scale, an intravenous access for laborathoristic parameters and prompt treatment, stabilization (airways, breathing, circulation) of the functional activity following the cardiac, respiratory rate, body temperature, blood pressure, CAB sequency, focused history with the parent's information (duration of the seizure activity, development status, drug used, prehospital management). ECG, EEG monitoring and TC were performed in accordance to the clinical requests. Buccal administration of Midazolam (Mz) was started with the dosage and the route is reported in tables 1-2. In the children with status epilepticus after 5 minutes by the administration of Mz, without arrest of seizures, a treatment was followed up according to the scheme reported in table 3.

Results

In 892 (60 %) children with febrile seizure treatment was not performed at the PED since the seizures were already remitted at the arrival; 595 (40%) needed treatment with MZ, among these 532 (89 %) reached remission shortly after MZ treatment while the other 63 (11%) were treated according to the algorithm reported in the table 3. Remission in 44 (69%) children was obtained after the second step; in 17 (27%) after the third step and in 2 (3%) was necessary to transfer the children to Pediatric Intensive Care Unit (PICU). In children with epileptic seizures, convulsive status epilepticus were registered in 261 (50%) among these the response was obtained in 241 children (92%), but no response after the first treatment was reported in 20 (8%) children; in 12 (5 %) was necessary to apply a second step treatment in 4 (1.6 %) the third step of treatment and in other 4 (1.6%) transfer to the PICU because necessary (table 4).

Discussion

Either Seizures or Epileptic status are sudden dangerous eventualities that requires immediate assessment. It is documented that the length of epileptic episodes associates with the severity of damage on cerebral function, and therefore the importance of attempting a precocious and rapid arrest of seizure themselves [7-9]. Seizures could be defined as stereotyped manifestations of synchronous uncontrolled electrical activity of cortical neurons which may produce a physical convulsion, or a combination of different symptoms. In pediatric age the prevalent types of seizure are represented by Febrile seizures, distinguishable in simple or complex, also called typical and atypical. They pertain to around 2-5 % of children, especially in the age between 6 months and 6 years and have mostly favourable outcomes [10]. According to the area initially involved in abnormal activity, epileptic seizures are classified in focal, generalized or unknown onset. Convulsive status epileptic (CSE) has been historically described as single epileptic seizure of >30 minutes duration or a series recurrent tonic-clonic seizures during which function is not regained between ictal events in a 30-minute period. New guidelines, anyhow, suggest beginning treatment once seizure have continued for more than around five minutes. The new definition is based on the consideration than generalized convulsive seizures is to solve spontaneously, usually in few minutes, while longer duration seizures needs pharmacological treatment [5,14-22].

Most frequently applied drugs in acute treatment of convulsive children are Diazepam and Midazolam (MZ). Midazolam belongs to medications class of benzodiazepines, which produce a calming effect on the brain and nerves (CNS) by increasing the effect of inibithory neurotransmitter GABA in the brain. This medication has several uses in children, like before a procedure or anesthesia to cause drowsiness, or decrease anxiety. It is characterized by ultrashort action that can be used in several administrations including intravenous, intramuscular, buccal, intranasal and rectal. It has a latency of effect of just 2-3 mins with an half-life time of 45-60. Only rare, mild side effects are present in children and consisting in nausea vomiting, coughing, euphoria, hallucination.
A comparison between Midazolam and Diazepam, as in the large meta-analysis of McMullant et al. documented a more efficacy of MZ in arrest crisis independently from the way of administration (RR 1.52, 95 % CL 1.27-1.82). In the acute convulsive children admitted to our institution, recovery was usually obtained by few minutes. We submit all the children to EEG with the intent of shedding light on the subtypes of CSE, if focal or generalized,

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relapsing convulsive seizures, due to its high predictive diagnostic factor. Useful was suggestions from Dalziel et al. work, indicating potential benefit of Levetiracetam if compared to Phenytoin since it may be given as a 5 minutes' intravenous infusion with less risk of serious adverse events. This treatment lead to cessation of crisis in 40.4 % of the children affected by febrile status epilepticus and in 10% by convulsive status epilepticus refractory to the previous treatment. Two children belonging to the group of febrile status epilepticus and 4 of the group of convulsive status epilepticus were transferred to PICU before proceeding the treatment. In one of the first group and 3 in the second the exitus was lethal.

Finally, to conclude, in treatment of convulsive episode in pediatric age, Midazolam could represent a good weapon either in children with febrile status epilepticus or with convulsive status epilepticus. Unfortunately, belonging to this second group could represent a serious threaten for children life. Even though further data are necessary to support our evidence, a notable progress has been achieved.

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