# Posttraumatic Seizures - Prevention or not

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## Abstract

Early posttraumatic epilepsies (EPTE) are epileptic attacks that appear in first seven days after brain injury, with incidence of 3-5%. Predictors for development of EPTE are: impressive skull fracture with rupture of dura, intracranial haemorrhage, neurogical deficit (brain contusion), and posttraumatic amnesia longer than 24 hours. It is more common in children than in adolescents and adults. It carries four times increased risk for development of late posttraumatic epilepsy. Aspects of pharmacological prophylaxis was often considered, but scientifically neglected, without clear standings regarding controversial data in literature. Patients with severe head injury, hospitalised at Neurosurgical Hospital and Pediatric Hospital, Clinical Centre University of Sarajevo, in period from 6$^{th}$ of April 1992 till 1$^{st}$ of July 1994, were included in study. Prophylaxis of EPTE was carried out with phenobarbital (2-3 mg/kg) or phenytoin (3 mg/kg) parenteraly. Decision was made upon clinical findings. CT scan was done in 13,5% patients, and in 31,9% patients serum concentrations of antiepileptic drugs were monitored. 310 patients aged 0-18 years (105 patients 0-10 years, and 205 patients 11-18 years) were investigated. Predictors of EPTE presented were posttraumatic amnesia longer than 24 hours in 90,6%, neurogical deficit in 86,45%, impressive skull fracture with rupture of dura in 81,3% and intracranial haemorrhage in 40,6%. Only two boys developed EPTE in first 24 hours after injury. This study has showed that use of antiepileptic drugs can decrease incidence of EPTE. However, problem remains, management of injured patients is still highly individualised, based on different experiences of doctors that treat patient, and without clear guidelines.

**KEY WORDS**: early posttraumatic epilepsy, prophylaxis

## Introduction

For long ago it is known that epilepsies can appear after head injury. Trauma plays an important role in aetiology of epileptic manifestations. It is considered that about 20-25% of epilepsies have head trauma as aetiological factor (1). Craniocerebral trauma has a distinct place in modern pathology, because it has become so frequent, often severe and leaves neurological and psychical sequel.. Epileptic seizures can appear at different time period after trauma. Early posttraumatic epilepsy (EPTE) is constituted of epileptic attacks during first seven days after head injury. Kuhl et al. (2) stated that the incidence of EPTE is 3-6%. Lee et al. (3) assessing 3340 adults with severe closed head injuries found EPTE in 3,6% patients. Predictors for development EPTE are: impressive skull fracture with rupture of dura, intracranial haemorrhage, brain contusion, unconscious state or posttraumatic amnesia lasting more than 24 hours (4, 5, 6, 7, 8). EPTE in these patients is usually manifested as partial motor seizures, that are closely related with localisation of brain lesion, and in 2/3 of patients appear in the first 24 hours after the head injury. In about 33% cases seizures are generalized tonic-clonic. Pharmacological prophylaxis of posttraumatic epilepsy is still often debated, without true consensus about benefit of antiepileptic drugs in prevention of EPTE, despite the fact that the first clinical trials done more than 50 years ago have shown benefit from such a therapy (8,9). According to investigations of Konjhodžić (10) during the war in seized Sarajevo, from 1992-1995, craniocerebral traumas were extremely severe.

## Patients and Methods

Patients hospitalised at Neurosurgical Hospital and Paediatric Hospital, University Clinical Centre in Sarajevo in period from 06th of April 1992 to 01st of July, 1994 due to severe brain trauma, and in whom prophylaxis of early posttraumatic epilepsy was given, were included in this study. At that time, because of war shortages, we had at our disposal only Phenobarbital and Phenytoin for parenteral use. During this period, in 1993, we run out of Phenytoin for parenteral use and from that time on prophylaxis was done only by Phenobarbital. Treatment was started in admission room of the Hospital, with Phenobarbital in doses 2-3 mg/kg, or Phenytoin in doses 3 mg/kg, both drugs given parenteraly. Parenteral treatment lasted for seven days, or shorter, and after establishing steady serum levels the treatment was continued per os. In the majority of cases the decision was made upon clinical findings.

## Results

Three hundred and ten patients aged 0-18 years were assessed in this study (105 aged 0-10 years and 205 aged 11-18 years). Predictors for development of early posttraumatic epilepsy were present as follows:

- Posttraumatic amnesia lasting more than 24 hours was found in 281 patients (90,6%);
- Neurological deficit was found in 268 patients (86,45%);
- Impressive skull fracture with rupture of dura in 252 patients (81,29%);
- Intracranial haemorrhage in 126 patients (40,64%).

CT scan was done only in 42 patients (13,54%). Serum levels of antiepileptic drugs that we used were performed in 98 patients (31,29%). In the group of patients we assessed 249 children (80,32%) received Phenobarbital as prophylaxis of EPTE and 61 children (19,68%) received phenytoin for same purpose. Only two boys (0,64%) had early posttraumatic epilepsy during the first 24 hours after head injury. One of them was aged 6, and the other was 7 years old. Both of them had partial motor seizures with secondary generalization. One of them had only one attack, while the other had recurrent seizures.

## Discussion

Discussion on prevention of posttraumatic epilepsies remains opened. Today, when practically all epileptologiests agree that prophylaxis of late posttraumatic epilepsy should not be done, prophylaxis of early posttraumatic epilepsy is still dilemma making a lot of disputes. It is interesting to note that in basic and clinical trials aspects of pharmacological prophylaxis of early posttraumatic epilepsies was often discussed, but scientifically neglected. There was never mutual consensus between different investigators about therapeutic regime on this condition with precise criteria for treatment. Data from literature are highly controversial (2, 11, 12). Why had we opted for pharmacological prophylaxis with Phenobarbital or Phenytoin? There were several reasons. First, craniocerebral injuries were extremely severe, and more than 80% of our traumatised patients had three, and in many of them four factors determining high risk for development of early posttraumatic epilepsies. As the second reason there were data from literature that in this age group EPTE is more common than in adults. This especially applies on the age group of 5 years and less, and it is considered that this problem should be evalu-

ated carefully because of possible development of *status epilepticus*, even when we are dealing with relatively mild injuries. This is in correlation with findings of other authors (6, 13). Newer studies also confirm our opinion (14), and find that severity of primary brain lesion dictates severity of EPTE, and later neurological status. Besides that, EPTE carries four folds increased risk for development of late posttraumatic epilepsy. American Academy of Physical Medicine and Rehabilitation (15) also recommends prophylaxis of EPTE. Third, in study of Konjhodžić et al. (16), with 1830 cases of closed and opened head injuries, where the injuries were much less severe, and where no pharmacological prophylaxis of EPTE was conducted, incidence of EPTE was 2,40%. This problem remains in focus of interests of epileptologists around the world. Recent studies (1, 17) have also confirmed that prophylaxis of EPTE is useful and highly recommend it. They have also found that it is possible to reduce incidence of EPTE by introducing antiepileptic treatment.

## Conclusion

This study has confirmed that antiepileptic drugs introduced immediately after severe head injury can prevent development of early posttraumatic epilepsy in children and adolescents, and reduce further disability and development of late posttraumatic epilepsy. Despite this, problem remains, because there are yet no precise guidelines for treatment of this condition, and treatment of these patients remains highly individualized, according to knowledge and experiences of physicians that are treating these patients.

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