

## **Focal brain lesions in 16-year-old patient with epileptic seizure – different neuroimaging procedures**

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### **ABSTRACT**

#### **Introduction**

A brain tumor is the most common solid cancer in children and the most common cause of cancer-related death in this age group. Its first symptom presented by child may be some irritation symptoms, primarily in the form of focal seizures. In case of such problem clinician has a wide range of neuroimaging methods available.

#### **Case Report**

A 16-year-old girl was admitted to the Paediatric Department on December 6, 2018 after the first episode of generalized tonic-clonic seizures with retrograde amnesia. In EEG paroxysmal acute and slow theta-delta 3-4 Hz high-voltage discharge in the temporal leads and in CT with contrast no focal changes. The treatment was postponed due to fact that was the first episode of seizures in life, On June 4, 2019 a second epileptic attack occurred. CT of the head without contrast did not reveal focal changes. In EEG focal lesion in the right posterior temporo-occipital-parietal region in the form of low-voltage slow delta 1-2 Hz waves and concomitant seizure changes in the form of very numerous short discharges of acute and slow theta-delta 3-4 Hz waves. In MRI, in the occipital lobe cortex at the height of the wedge and the visual cortex after administration of the gadolinium contrast agent 3 focal lesions with contrast augmentation: 7mm and below 2 changes 15x6mm in diameter and 5mm in diameter were visualized. In the flair and T2 sequence at this height there was edema of up to 25x13mm.

#### **Conclusions**

CT of the head without contrast should be a screening test to exclude mainly traumatic changes and intracranial bleeding. The correct picture of such an examination does not exclude abnormalities within the brain structures. MRI is more accurate in imaging of brain structures and should be the examination of choice if CNS diagnostics is needed.

Key words: Brain Neoplasms, Magnetic Resonance, Computed Tomography

## INTRODUCTION

A brain tumor is the most common solid cancer in children and the most common cause of cancer-related death in this age group [1]. The most common type of brain tumor is astrocytoma. Focal changes in brain may produce many symptoms. The so-called brain tumor triad, which includes early morning headache accompanied by vomiting or nausea and severe pain is not very often observed. In case of not rapidly-growing brain tumor the first symptom presented by child may be some irritation symptoms, primarily in the form of focal seizures [2]. It is assumed that the first seizure attack in life is an indication for the hospitalization of the child in the pediatric ward to determine the diagnosis and in some cases treatment. While the most common reason of seizure attack in children is high fever, abnormal Central Nervous System imaging results may be present in 8% of children [3] and diagnostics is always needed, and the main tool is brain imaging.

## CASE REPORT

A 16-year-old girl was admitted to the SPWSzS Paediatric Department in Chełm on December 6, 2018. after the first episode of generalized tonic-clonic seizures with retrograde amnesia and associated vomiting. The attack was preceded by prolonged use of electronic devices and playing a computer game. In addition, in history, for about 3 months recurrent headache in the frontal and temporal region. In family history, mother's brother was diagnosed with epilepsy from a young age.

On admission, the child's condition was stable, consciousness was slightly clouded, obesity and in physical examination without any other deviations from the norm. Blood cell count, electrolyte levels (Na, K, Mg, Ca), transaminases and renal parameters were within normal limits. Thyroid hormones normal. Urine analysis without any pathologic changes. Urine drug test negative.

On the second day of hospitalization, EEG was performed - incorrect recording with changes in the form of paroxysmal acute and slow theta-delta 3-4 Hz high-voltage discharge in the temporal leads with predominance of the left side with radiation to the apical parietal-motor region. Diagnosis was extended to include head CT examination with contrast - the hypoplasia of the right PCA P1 segment with well developed PcoA on this side, physiological calcifications in the pineal gland and choroid plexuses of both lateral chambers, thickening of the mucosa in the alveolar ridge of the right maxillary sinus up to 10mm, without any other deviations from the norm.

The patient was instructed on how to proceed in the event of another seizure attack and was referred to a Neurological Outpatient Clinic for Children. In the relation of the patient's mother, in the Clinic EEG was repeated (record with analogous irregularities, no result to view), the treatment was postponed due to the fact that was the first episode of seizures in life. On June 4, 2019, due to malaise, nausea and weakness, the patient decided to report to the Emergency Department under care of her older sister. From the morning she was at the military training ground (she studied in a technical college in a class with a military profile). An epileptic attack occurred just in front of the hospital building, which resolved spontaneously and then a second one. In ED, the patient was given 10mg Diazepam and 500ml 0.9% NaCl. CT of the head without contrast was performed, in which the marked

asymmetry of the lateral ventricles was described - a slightly wider right ventricle, in the right maxillary sinus at the posterior-medial wall, hypodense changes in fluid density of about 12mm - most likely a cyst or polyp, otherwise without abnormalities. Convulsions in the ward did not occur again, the patient periodically reported headache in the fronto-parietal area and abdominal pain, therefore the diagnostics was extended to include abdominal ultrasound - without deviations from the norm. In the re-performed EEG - an incorrect recording with a focal lesion in the right posterior temporo-occipital-parietal region in the form of low-voltage slow delta 1-2 Hz waves and concomitant seizure changes in the form of very numerous short discharges of acute and slow theta-delta 3-4 Hz waves with predominance over the right temporo-frontal region or on both sides. Due to the pathological recording of the EEG, it was decided to perform MR of the head, in which the occipital lobe cortex at the height of the wedge and the visual cortex after administration of the gadolinium contrast agent 3 focal lesions with contrast augmentation: 7mm and below 2 changes 15x6mm in diameter and 5mm in diameter were visualized. In addition, forward of these changes within the right occipital temporal gyrus were areas of blurred strengthening after administration of the contrast agent. In the flair and T2 sequence at this height there was edema of up to 25x13mm. Above, within the white matter of the upper right temporal gyrus, venous malformation draining to the choroid plexus in the right side ventricle triangle is visible. Hypoplastic right posterior connecting artery. Mucosal thickening in the alveolar ridge of the right maxillary sinus. Due to the need for further diagnosis and treatment, the patient was transferred to the USD Pediatric Neurology Clinic in Lublin.

#### Discussion

Presented case of a 16-year-old girl can delineate a need of precise brain imaging in the process of first epileptic attack in life. During first hospital stay EEG result was undoubtedly incorrect. This was a reason for performing brain CT scan with contrast, not revealing any focal changes. The patient had also CT scan without contrast performed, during the visit in Emergency Department, which was only the test to exclude features of current intracranial bleeding and severe trauma (like hematoma or bone infraction). Finally, the last imaging test – magnetic resonance imaging was the only procedure to reveal, what is the reason for the second seizure attack in patient`s life. It is consistent with results of studies involving children with epilepsy or status epilepticus. In article by Singh et al. assessing new-onset seizures presenting as status epilepticus in children 14 of 44 children who underwent CT and MR, only MR showed abnormalities, while CT did not reveal focal changes [4]. It shows that MR is more accurate, while brain imaging and allow the detection of some smaller changes. When compared to the CT examination, MRI by assessment current state of magnetization of the examined tissue provides much more information about the structure of tissue and allows to differentiate between normal and tumor tissue.

#### Conclusions:

1. CT of the head without contrast should be a screening test, performed to exclude mainly traumatic bone changes and intracranial bleeding. The correct picture of such an examination does not exclude abnormalities within the brain structures.
2. Magnetic resonance imaging is more accurate in imaging of brain structures and should be the examination of choice if CNS diagnostics are needed.
3. Despite the lack of abnormalities in the performed imaging tests, sometimes it is worth deciding to repeat the examination, especially when functional test changes coexist.

References:

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