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ED Presentation of Child Suprasellar Mass Presenting as a Headache with New-onset Seizures: A Case Report and Review of Pediatric Brain Tumor, Headache and Seizures in the Emergency Department

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ABSTRACT

Brain tumors are one of many possible causes of both new-onset headaches and new-onset seizures in the pediatric population. This report describes a case in which a pediatric patient presented to a local ED for new-onset partial seizures after 3 weeks of progressive headaches. The patient ultimately required neurosurgical intervention after identification of a large suprasellar mass causing obstructive hydrocephalus by compression of the 3rd ventricle. This paper will provide examples of red flag signs and symptoms in the patient's history and physical may clue the general emergency physician to such a disease process.

Keywords: Brain tumor; Headaches; Seizures; Pediatric

INTRODUCTION

This report describes a case in which a pediatric patient presented to a local ED for new-onset partial seizures after 3 weeks of progressive headaches. This paper will also provide examples of red flag signs and symptoms in the patient's history and physical may clue the general emergency physician to such a disease process.

BACKGROUND

Brain tumors are the most common solid neoplasms in the pediatric population.[1-4] In different populations under the age of 18, the incidence ranges from 5 to 7 per 100,000 person-years depending on the source.[1,2] Males and females are similarly affected.[1,2] Brain tumors are categorized by histologic origin (WHO classification) and neuroanatomic location.[1-3] The location of the neoplasm informs the differential diagnosis of brain tumor type, operative planning, and other potential treatments.[1,2]

Gliomas are the most common intracranial mass in children overall, including older children.[1-4] Gliomas are astrocyte-derived tumors grade from I to IV depending on severity.[1,2] The most common glioma in children is

the juvenile pilocytic astrocytoma, which is a low-grade glioma.[1,2] Tumors of embryonal origin such as medulloblastoma and ependymoma are also among the most common of pediatric brain tumors.[1-3] Medulloblastoma is the most common malignant brain tumor of childhood as well as the most common cause of intracranial neoplasm in children ages 0 to 4.[1-3] Tumors of embryonal origin and of this age group are most commonly located in the posterior fossa.[1-3]

Brain tumors are one of many possible causes of both new-onset headaches and new-onset seizures in the pediatric population.[3-5] Such masses are quite variable in their presentation depending on their location.[3,4,6] Symptoms can include headaches, changes in levels of consciousness, focal neurologic deficits, nausea or vomiting, and more.[3-6]

CASE PRESENTATION

A 7-year-old overweight female with otherwise unremarkable history who presented to the ED for symptoms of new-onset convulsions and progressive headaches for 2 days. She reportedly had been experiencing intermittent frontal headaches for 3 weeks that had worsened in intensity and severity within the last 4 hours - sometimes awakening the patient from sleep. Her headaches were refractory to ibuprofen, acetaminophen and aspirin. Mom reported photophobia, but the patient denied changes in vision at the time. She had a few episodes of vomiting associated with her headaches. She had new-onset headaches 2 months prior that self-resolved. The patient reportedly had two episodes of convulsions in the morning several hours apart. The mother states that both of the patient's arms were clinched with rhythmic stereotyped movement of the right upper limb, closure of both eyes, flexion of both elbows, and extension of both knees. She had a second similar episode only several hours later - prompting the walk-in ER visit.

On the initial ED presentation, she was afebrile with vital signs notable for elevated BP (181/79 mmHg) and bradycardia (56 bpm). The patient was somnolent yet arousable to voice. The patient herself provided a good portion of the history and was appropriately conversational for her age. She had no apparent dysarthria or aphasia. Her cranial nerve exam was unremarkable. She had a normal gait with symmetric 5/5 motor strength to all four extremities in various muscle groups. She was ambulatory with a normal gait. Her level of consciousness would wax and wane over spans of 10-15 minutes between drowsy to obtunded or stuporous.
Given the history of recent headaches, suspicion was high for an intracranial pathology. An EKG was obtained revealing a sinus bradycardia to a HR 56 bpm with non-specific T-wave abnormalities (Figure 1). A CT brain without contrast and a CT venogram were obtained to search for an apparent intracranial mass and rule out cerebral venous thrombosis, the latter of which was recommended by the consulting pediatric neurologist. Less than an hour before the formal radiology report was back, we appreciated a large mass near the diencephalon creating an apparent obstructive hydrocephalus of the left lateral ventricle (Figures 2 and 3). Given the acute deterioration in mental status plus these CT findings, the patient was started on a mannitol 5 mL/kg bolus and levetiracetam 60 mg/kg for potential pending brain herniation and seizure prophylaxis respectively. The patient was subsequently transported by helicopter to our regional children's hospital, where she was accepted for ED-to-ED transfer.

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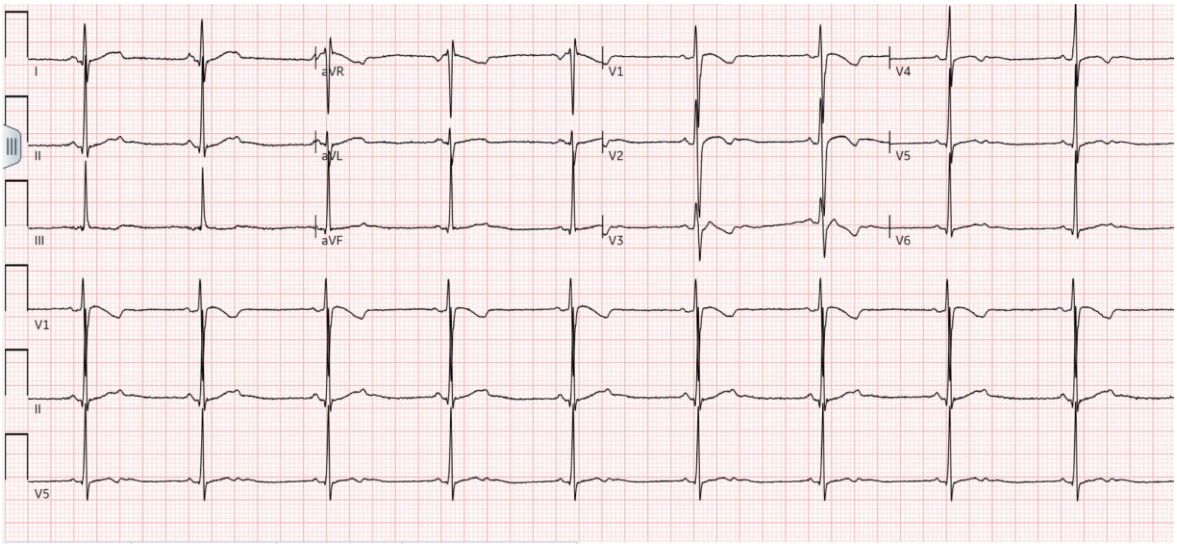

Figure 1: EKG on initial ED evaluation showing a sinus bradycardic rhythm with non-specific T wave abnormalities

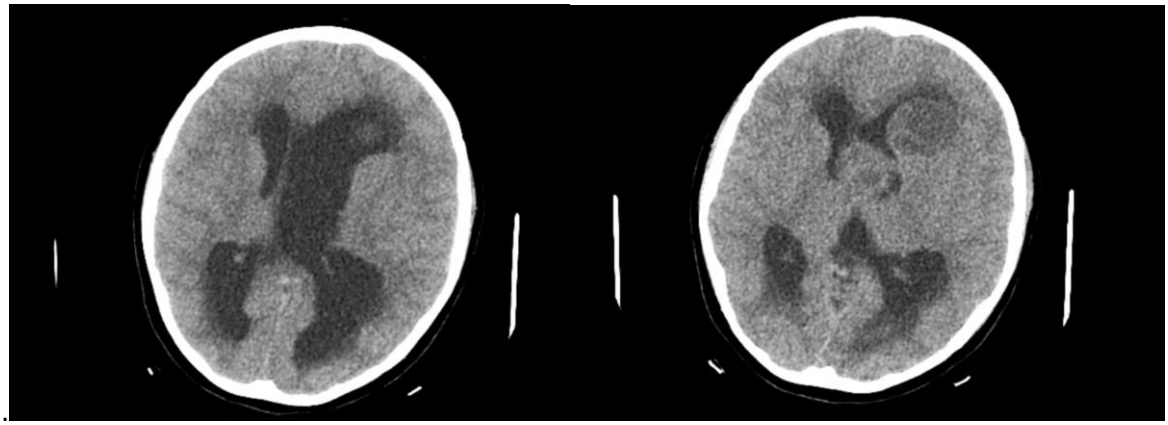

Figure 2: Axial sections on CT brain without contrast reveal an intracranial neoplasm and obstructive hydrocephalus

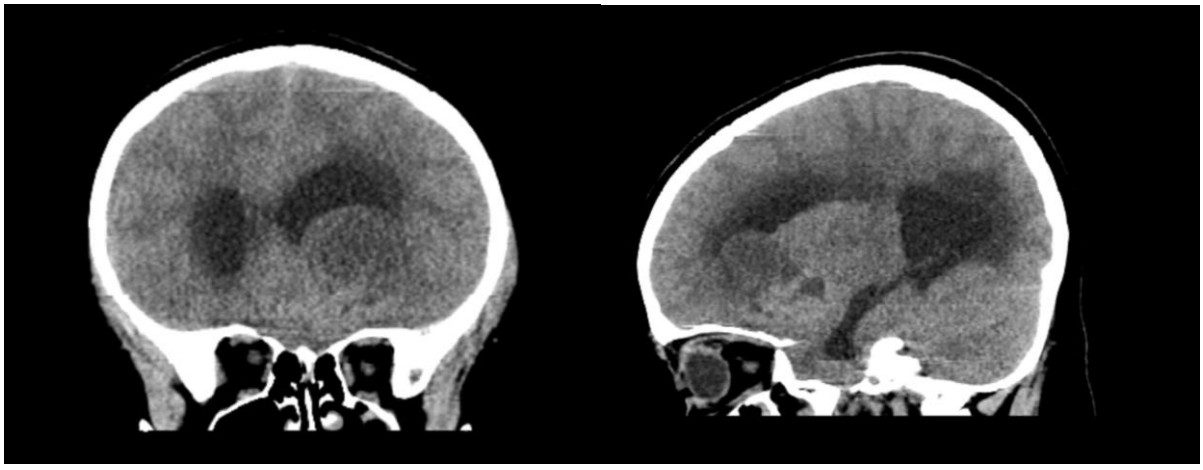

Figure 3: Coronal and Parasagittal views of the intracranial mass on CT brain without contrast

At the accepting facility, an MRI of the brain (Figure 4) was performed demonstrating the following:

- A large hyperdense mass within the sella turcica and suprasellar cistern measuring 6.5 x 5.0 x 4.9 cm
- Complete effacement of the 3rd ventricle with ventriculomegaly of both lateral ventricles
- Decreased attenuation of periventricular white matter consistent with transependymal edema

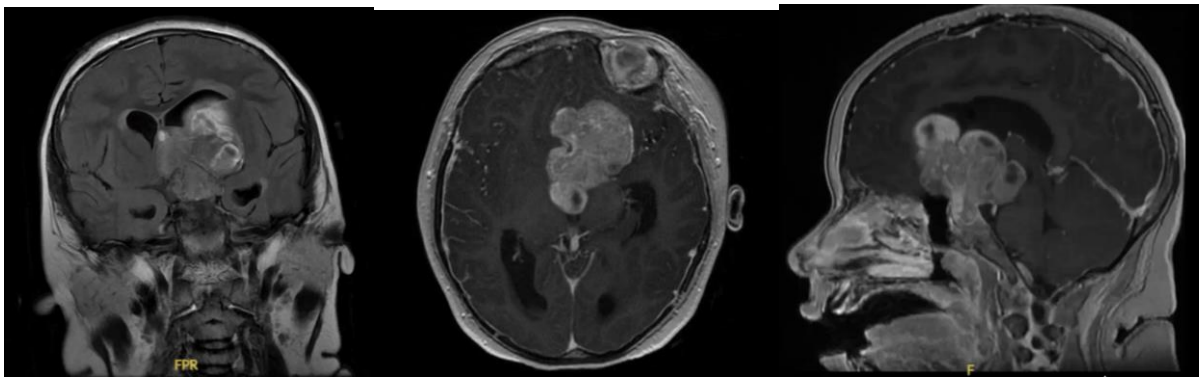

Figure 4: Coronal, axial, and parasagittal views of the intracranial mass on MRI

The patient was taken to the OR the day of arrival for placement of a left-sided external ventricular drain and was subsequently admitted to the pediatric ICU. In the ICU, the patient was placed on a nicardipine drip for blood pressure control, dexamethasone for her intracranial mass, and continued on her levetiracetam. Two days later, she returned to the OR for a right frontal burr hole for septostomy and endoscopic tumor biopsy with image guidance. Intra-operative biopsy specimen was revealed to be a pediatric neuroendocrine tumor. A few days later, the final pathology report concluded the mass to be a pituitary adenoma. The patient was started on cabergoline; and several days later, the EVD was removed.

The patient was finally discharged after an 11-day hospitalization. She has been following up with multiple subspecialists, including pediatric neurosurgery, endocrinology, and ophthalmology. On re-examination, the child was noted to have bilateral peripheral visual field deficits and was also prescribed glasses. The patient was reportedly quite well at multiple follow-up visits and is back in school.

DISCUSSION SECTION

Pediatric patients infrequently present to the emergency department with neurologic complaints, such as headache, new-onset seizure, vertigo, and dizziness.[7] The differential diagnosis for acute neurologic complaints in children can be quite extensive and vary by age group, which can make it difficult for the emergency physician to parse out.[7,8]

The patient in the case discussed here had presented to her primary pediatrician multiple times two months prior and was presumed to have a primary headache disorder. Intracranial masses can present quite ominously as

discussed here. This paper will now delve into considerations of the presentations of headache and seizure within the pediatric patient respectively.

Headache

Primary headache disorders are uncommon below the age of 5.[7] One should be suspicious of a secondary pathology in toddlers and young children.[7]

In pediatric patients presenting with a headache, specific historical features are red flags for a more urgent pathology.[5-7] Temporal patterns include a chronic progressive headache, a headache that is worst in the morning, or a headache that awakens the patient at night.[5-7] These could suggest a space-occupying lesion or pseudotumor cerebri.[7] An abrupt severe headache plus at least 1 objective neurological examination finding (i.e., ataxia, altered mental status) suggests an acute intracranial bleed or a tumor.[7] Headache plus effortless vomiting without additional gastrointestinal symptoms is highly suspicious for a high intracranial pressure.[6,7] On examination, positional preferences of the child–such as a head tilt or not looking upwards–is highly suspicious for an intracranial pathology.[6] On examination, positional preferences of the child–such as a head tilt or not looking upwards–is highly suspicious for an intracranial pathology. The child may be doing this to avoid symptoms of a high ICP or diplopia from a cranial nerve deficit.

Tension headaches peak at incidence at 7-years-old and have a 10-25% prevalence in children.[7] Migraines in children have a prevalence of 4-18%.[7] Migraine headaches in children tend to occur abruptly, peak within an hour, and are generally of similar severity.[7] Migraine headaches peak in onset at 10-12 years in boys and 12–14 in girls.[7] Migraine with aura often presents 3-4 years younger.[7] Migraine headaches in younger children are often generalized and bilateral in location, while adolescents often have unilateral frontal or temporal headaches.[7] A child who is able to describe the quality of their headache and one with a pulsating headache is more likely to have a benign etiology.[7] Severity and duration of headache are not useful for risk stratification.[7] The term “status migrainosus” may be used to describe a migraine headache lasting for over 72 hours.[7]

In children presenting with a headache, intracranial imaging should be reserved for children with a suspicious history, neurologic deficits, or concern for an intracranial bleed or mass.[7,9] A CT scan of the brain can miss infratentorial masses, which are among the most common locations for pediatric brain masses.[9]

Seizure

Signs and symptoms associated with seizures in a young child can be quite subtle and are highly variable.[8,9] Small rhythmic or repetitive movements involving a single extremity, head deviation, eye deviation, lip smacking, bicycling, a change in breathing pattern, or an elevation in heart rate or blood pressure may be among the only signs appreciated in younger children representing a new seizure episode.[2,8] In an especially young child or infant, the clinician should have a high index of suspicion for a seizure in a child presenting with such symptoms.[8]

There are many potential etiologies, including an intracranial mass, a metabolic disturbance (i.e., electrolyte disturbance, an inborn error of metabolism), a hereditary neurologic disorder (i.e., tuberous sclerosis, neurofibromatosis, von Hippel-Lindau syndrome), toxicologic, infectious (i.e., meningitis, encephalitis).[2,8] In pediatric patients with a single new-onset afebrile seizure, many are frequently discharged from the ED with close neurology follow-up.[8] Consider the global presentation of the patient and a neurologic examination after the post-ictal period to search for focal deficits, as these may be suspicious for an intracranial mass.[5,8]

In neonates, the most common etiology of seizure is hypoxemic-ischemic encephalopathy.[2] A new-onset seizure in the neonatal period is thus associated with a poor prognosis.[2] Look for features such as a bulging fontanelle, assess tone, search for features of non-accidental trauma, rashes, and more.[2,8] When collecting blood in an infant with a seizure, be sure to collect extra blood for inborn errors of metabolism.[8] The neonatal population especially presents with the subtle features discussed above (as many as 50%), and only 5% present with overt tonic-clonic episodes.[2]

In infants and young children, many events may mimic seizures; and thus the clinician should not anchor on the diagnosis of seizure without considering other potential non-neurologic etiologies.[8] Syncope, breath-holding spells, tics, myoclonic jerks, chills, Sandifer's syndrome (GERD), sleep disorders, vertiginous disorders and migraine variants are among only some of the potential etiologies that can mimic a seizure in the young child.[8,10]

CONCLUSION

Brain tumors are an important cause of new-onset headaches and seizures in the pediatric population. Although headaches account for a significant proportion of pediatric ED visits, the majority are benign; however, recognition of high-risk features is critical. This case highlights several red flag features suggestive of intracranial pathology, including progressive headaches over weeks, nocturnal awakening, vomiting, and new-onset focal seizures. Additionally, the presence of bradycardia and hypertension is concerning for elevated intracranial pressure (Cushing response) and should prompt urgent neuroimaging. Such signs as a focal neurologic deficit, certain temporal features, and a decreased level of consciousness are red flags for a potential underlying intracranial mass or other pathology. One should maintain a high index of suspicion for an intracranial structural disorder while also considering potential non-neurologic mimics.

In the case presented, initial CT imaging rapidly identified a large sellar/suprasellar mass with obstructive hydrocephalus, while MRI further characterized the lesion and its mass effect on critical neurovascular structures. This case underscores the importance of early imaging in pediatric patients presenting with suspicious headache patterns, even in the setting of a non-focal neurologic exam.

From an emergency medicine perspective, this case emphasizes:

- The need to differentiate benign from high-risk headaches
- Recognition of seizure with headache as a high-risk combination
- Early identification of signs of increased intracranial pressure

- Timely escalation to advanced imaging and neurosurgical consultation
- Early recognition of these features can expedite diagnosis, reduce morbidity, and guide appropriate intervention

Pediatric brain tumors are quite variable in presentation. As seen in our case described here, they may present with quite catastrophic features requiring prompt intervention. In the pediatric patient presenting with a headache or a new-onset seizure, the emergency department clinician should be mindful of potentially catastrophic underlying pathologies before considering discharge of the patient.

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