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Torcular pseudomass in a 14-month-old child: illustrative case

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BACKGROUND "Torcular pseudomass," or redundant soft tissue in the torcular region, is not an infrequent incidental finding on advanced imaging of the brain in infants and young children. It was recently codified among pediatric neuroradiologists; however, its report in the pediatric neurosurgical community has not previously been elucidated.

OBSERVATIONS The authors present a case of a 14-month-old child who presented with fever and a first-time seizure. Computed tomography of the head suggested an epidural abscess; however, magnetic resonance imaging characteristics of the lesion were consistent with torcular pseudomass, a normal variant. At the 3-month follow-up, the child was continuing to do well and had not had another seizure. There have been no indications for surgical intervention or additional radiographic surveillance.

LESSONS The differential diagnosis for torcular pseudomass includes dural venous sinus thrombosis, dermoid cysts, occipital encephalocele, eosinophilic granuloma, and primary and metastatic tumors, such as neuroblastoma. The management of each of these disorders in the differential diagnosis may be much more invasive than continued observation in the case of torcular pseudomass. Therefore, it is important for pediatric neurosurgeons to become familiar with this developmental anomaly of the dura and occipital skull.

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KEYWORDS torcular pseudomass; incidental; pediatric neurosurgery; endovascular

Most incidental findings on computed tomography (CT) or magnetic resonance imaging (MRI) of the brain have no clinical significance and represent normal anatomical variants.[1] However, other incidentalomas, such as torcular pseudomass, may constitute a diagnostic dilemma in the pediatric age group.[2–4] Moreover, the worrisome radiographic characteristics may prompt unnecessary tests and procedures.[1]

We present a case of a 14-month-old girl who presented with postvaccination fever, first-time seizure, and a CT finding concerning for epidural abscess. The mass lesion was nestled between the confluence of dural venous sinuses and the inner table of the occipital skull. On follow-up MRI, the mass was recognized as a developmental anomaly consistent with torcular pseudomass. No further intervention was entertained, and the child did well in follow-up.

The term "torcular pseudomass" was coined in 2017.[1] Since then, there have been additional reports.[5] Although previously reported in radiology publications, it seems to be surprisingly novel in the pediatric neurosurgical literature. In addition to the case report, we review the presentation, distinguishing radiographic findings, embryology, and management of torcular pseudomass.

Illustrative Case

History

A 1-year 2-month-old female with a recent history of coronavirus disease (COVID-19) 3.5 months prior presented to the hospital for a possible febrile seizure versus a vaccine reaction. She had a witnessed seizure with right arm stiffening and abnormal eye movements that lasted for 30 seconds. She vomited immediately afterward and had a postictal state in which she was sleepy, lasting for 10 minutes.

She had received her measles-mumps-rubella vaccine 1 day prior. Before the vaccination, her condition was normal. After the vaccination, she was reported to feel warm; however, no formal temperature was checked. She became fussier on postvaccination

ABBREVIATIONS COVID-19 = coronavirus disease; CT = computed tomography; EEG = electroencephalography; MRI = magnetic resonance imaging.

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day 1 and continued to feel warm. Her medical history was benign other than being born breech at term with suspected right hip dysplasia.

Examination

Upon initial examination by the neurosurgery team, the patient was sleeping soundly but was easily aroused. The head was normocephalic and atraumatic. The anterior fontanelle was closed. Pupils were equal and reactive to light bilaterally. Her oxygenation was normal on room air. Her abdomen was soft and nondistended. Her face was symmetric, and she was moving all extremities spontaneously with good strength.

Diagnostic Studies

Given the new-onset seizure diagnosis, brain CT was ordered to check for any hemorrhage or structural abnormality, and electroencephalography (EEG) was performed. On the brain CT, a low-attenuating, extra-axial collection was noted posterior to the occipital lobe abutting the torcula (Fig. 1). The radiologists were concerned that this was consistent with either a chronic epidural hematoma or an empyema. The EEG was not tolerated by the infant.

Brain MRI with and without contrast was ordered to clarify the etiology of the torcular mass, and an infectious work-up was initiated. The infectious work-up included a complete blood count, a basic metabolic panel, blood cultures, a virus panel, a COVID-19 test, a C-reactive protein measurement, a transcutaneous bilirubin measurement, and a urine analysis with culture. The patient's C-reactive protein was elevated at 37.3 mg/dL (normal $<$0.5 mg/dL). However, her white blood cell count was normal at 15,690/mm^3 (normal range 6,000–17,000/mm^3), as was the bilirubin at 6.6 μmol/L. She had a positive test result for COVID-19, but her remaining virus panel was negative. The urine analysis and culture results were also negative.

Brain MRI demonstrated no diffusion restriction (Fig. 2A and B), ruling out abscess. T2 hyperintensity was observed (Fig. 2C), which did not suppress on T2-weighted fluid attenuated inversion recovery imaging (Fig. 2D). The mass had T1 isointensity (Fig. 2E) and minimally enhanced with gadolinium contrast on T1-weighted imaging (Fig. 2F). A gadolinium contrast, sagittal T1-weighted, three-dimensional turbo field echo image also confirmed minimal enhancement (Fig. 2G).

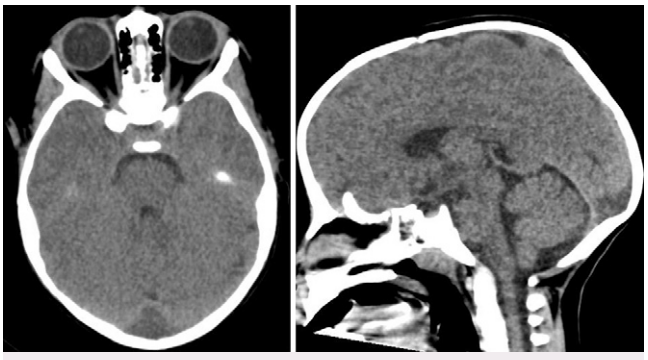

FIG. 1. Noncontrast axial (**left**) and sagittal (**right**) CT images showed a hypodense mass compared with the brain parenchyma straddling the transverse sinuses and situated between the torcula and inner table of the occipital bone. The mass has a slightly higher density than the cerebrospinal fluid.

Clinical Course

The patient remained at baseline without seizures after the imaging. After extensive discussion with the radiologist, it was determined that this mass was a normal variant called a "torcular pseudomass." The patient was discharged home with a diagnosis of febrile seizures with outpatient follow-up with EEG. At her 3-month post–emergency department follow-up, there were no additional seizure episodes.

Discussion

Observations

As presented in this study, a torcular pseudomass is a benign mass that can be misidentified, leading to patient apprehension. Within the neurosurgery community, the presence of these masses is often underappreciated. A large retrospective study identified torcular pseudomass in 291 (13%) of 2,283 children who underwent MRI.[1] Another study performed a similar review of imaging, and additional cases were subsequently added to the literature.[5] In contemporary reviews of supratentorial pediatric midline tumors and tumor-like lesions, there is no mention or description of torcular pseudomass.[6–9]

Presentation

Most torcular pseudomasses were found in children younger than 1 year of age.[1] The developmental history is usually unremarkable.[1] Advanced brain imaging is performed for a variety of unrelated reasons, including preoperative planning, developmental delay, seizure work-up, encephalopathy, encephalitis, endocrine deficiencies, and focal neurological deficits.[1,5]

Distinguishing Radiographic Features

Torcular pseudomasses occur in a singular anatomical location. The distinguishing radiographic features of torcular pseudomass include isointense on T1-weighted MRI, hyperintense on T2-weighted MRI relative to brain parenchyma, and facilitated diffusion on diffusion-weighted imaging. Contrast enhancement is seen following gadolinium administration.[1] Normal flow in the surrounding dural venous sinuses is documented with preserved vascular flow void.[5]

Embryology

During gestation, the periosteal layer of the dura remains adherent to the inner table of the skull at the site of dural reflection (i.e., the torcular region).[1,10,11] The potential space between the periosteal and meningeal leaves of the dura is filled with exuberant extracellular matrix.[1,12] With continued embryological development, the two layers of the dura become more adherent, and the potential space closes.[1] With the normal embryology of the posterior dura and occiput in mind, torcular pseudomass may be related to persistence of the potential space between the dural leaves and intervening extracellular matrix.[10,12,13]

Management

The natural history of torcular pseudomass seems benign. A biopsy or another more invasive surgical intervention is not warranted. Spontaneous regression is seen in most cases, as documented by MRI.[1] Sampaio et al.[1] showed on follow-up MRI with a median follow-up of 18 months that 36% had total involution, 53% had partial regression, and 4% had stability of the pseudomass. There were no cases where the torcular pseudomass increased in size.

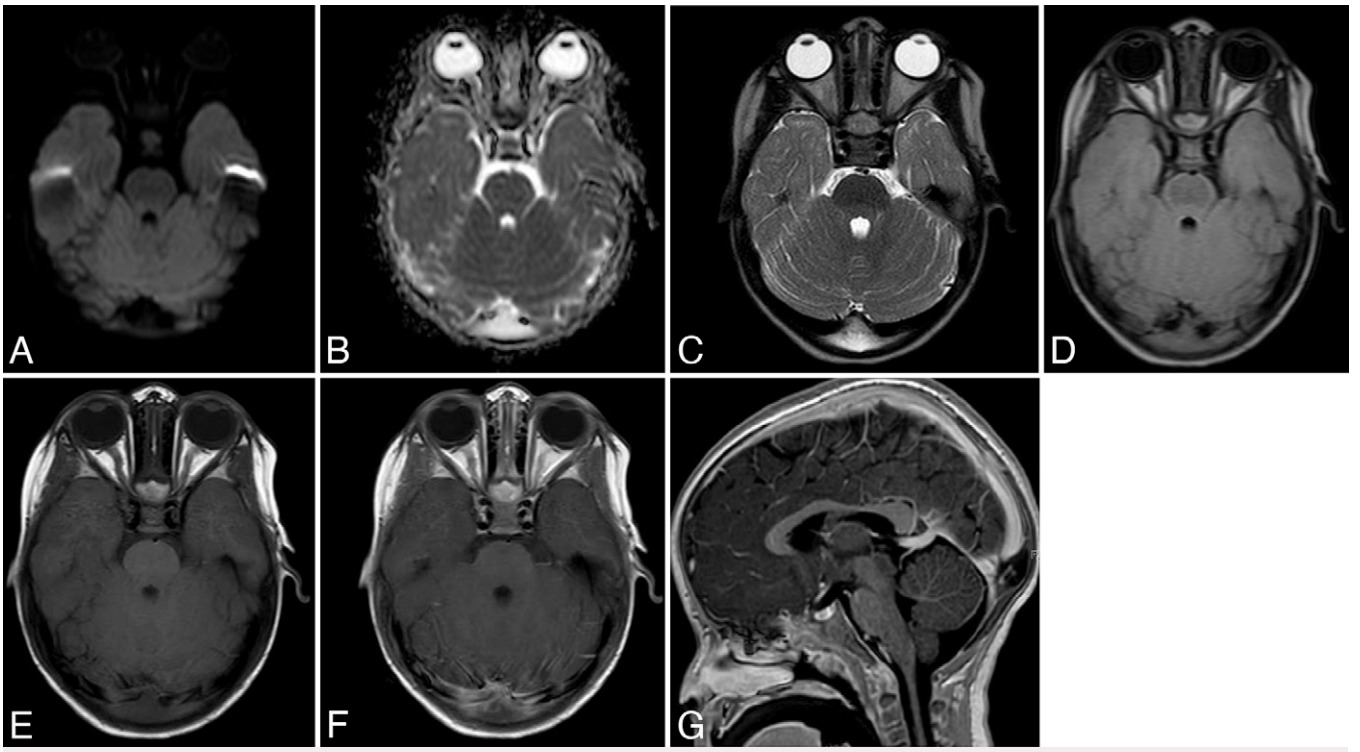

FIG. 2. Redundant soft tissue presented in the epidural space without compression on the surrounding brain structures on axial (**A**–**F**) and sagittal (**G**) imaging. MRI showed facilitated diffusion on diffusion-weighted imaging (**A**) and apparent diffusion coefficient map (**B**), T2 hyperintensity (**C**), T2-weighted fluid-attenuated inversion recovery hyperintensity (**D**), T1 isointensity (**E**), and minimal contrast enhancement on T1-weighted images with gadolinium (**F**). The transverse sinuses showed normal signal voids. A sagittal T1-weighted three-dimensional turbo field echo image (**G**) confirmed minimal contrast enhancement.

Lessons

Torcular pseudomass may be underrecognized in pediatric neurosurgery. As a diagnostic pitfall, it may lead to unnecessary surgery. Characteristic radiographic findings are diagnostic of this pseudolesion. As a normal anatomical variant, torcular pseudomass has a benign natural history with spontaneous regression in many cases.

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Disclosures

The authors report no conflict of interest concerning the materials or methods used in this study or the findings specified in this paper.

Author Contributions

Conception and design: Jea, Propester, Zhao. Acquisition of data: Jea, Nagarajan, Propester, Zhao. Analysis and interpretation of data: Jea, Nagarajan, Propester, Desai. Drafting the article: Jea, Villeneuve. Critically revising the article: Jea, Villeneuve, Zhao, Gernsback, Desai. Reviewed submitted version of manuscript: Jea, Villeneuve, Nagarajan, Zhao, Valenzuela, Gernsback, Desai. Approved the final version of the manuscript on behalf of all authors: Jea. Administrative/technical/material support: Propester. Study supervision: Jea. Radiology review: Cornwell.

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