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Case Report

Neuroblastoma presenting as hip pain and skull prominence in a child

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ABSTRACT

Neuroblastoma is a common cancer in children especially those under 5-years old, however they can have varied presentations that may make diagnosis difficult. Neuroblastoma is not usually high on a clinician's differential for a child's gait dysfunction. We describe a case of a 6-year-old female who presented to the Emergency Department for new onset right hip pain. She had associated gait disturbance and pain with ambulation as well as a new lump on her right parietal skull. An MRI of the brain, lumbar spine, and pelvis revealed the diagnosis of a left adrenal neuroblastoma that had metastasized to the femur, the lumbar spine, and the skull. This case shows the importance of early suspicion of malignancy in a patient with seemingly disparate symptoms to ensure early intervention.

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Case presentation

A previously healthy 6-year-old presented to the Emergency Department with a 6-day complaint of right hip pain. She had begun to walk on her toes with a limp. She also reported a 4-day headache that improved with sleep and didn't improve with nonsteroidal anti-inflammatory medication. Her family reported an atraumatic "bump" on her head for 2 weeks. Other than her complaint of headache she had no neurological complaint or finding on initial evaluation.

The patient was febrile (100.8°F) with a hard deformity on the right parietal skull. She had decreased range of motion of the right hip and tenderness over the right buttocks. Her hemoglobin/hematocrit was decreased and her sedimentation rate and C-reactive protein were increased. Plain radiograph (Fig. 1) and ultrasound of the hip were normal. An ultrasound of the skull showed a noncompressible/not fluctuant hypoechoic mass abutting the calvarium that caused significant irregularity of the adjacent calvarium border. Brain MRI (Figs. 2 and 3) was performed with and without gadolinium contrast and showed metastasis causing parietal skull

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Fig. 1 – Plain radiograph of the hip (normal).

protrusion and compression of the right hemispheric sulci and lateral ventricle with subfalcine herniation, resulting from a large right-sided lesion.

MRI of the lumbar spine (Fig. 4) revealed a large left adrenal lesion and multiple lesions throughout the lumbar spine and bilateral iliac bones. MRI of the right hip (Fig. 5) showed diffuse marrow replacement with numerous metastases throughout

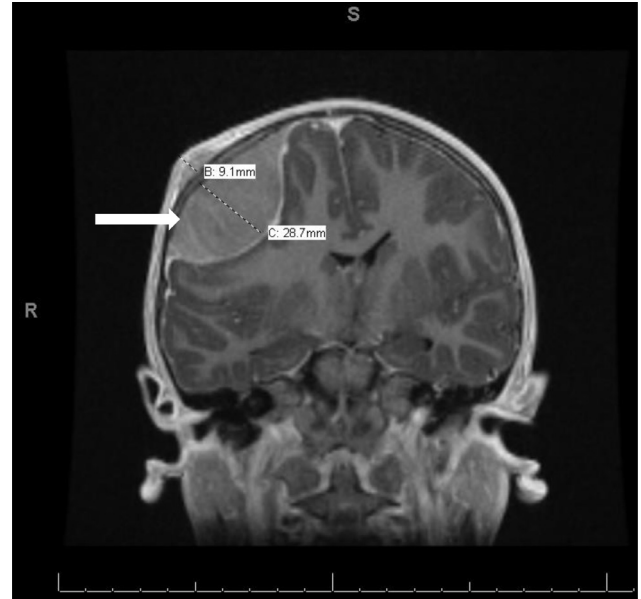


Fig. 3 – MRI Brain showing neuroblastoma Metastasis and parietal bone protrusion. Coronal T1-weighted image showing mass (white arrow).

the lumbar spine, pelvis, and femurs, consistent with neuroblastoma metastases. The patient was admitted to the hospital and other than a mild right eye esophoria that evolved on the

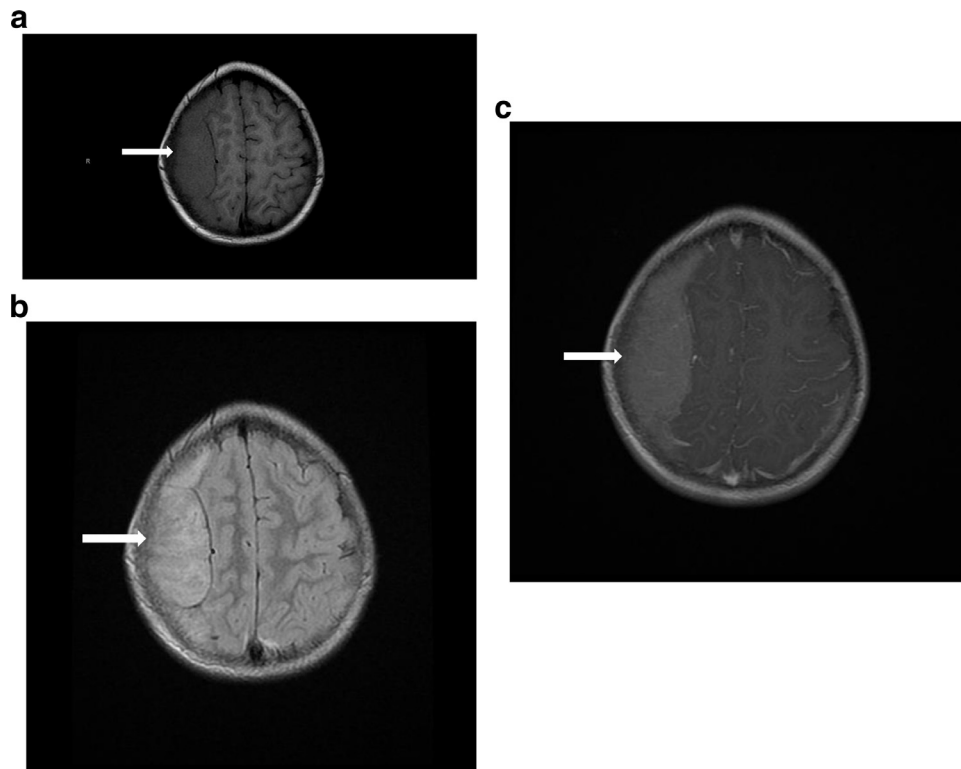


Fig. 2 – MRI brain. Neuroblastoma metastasis (arrow) causing the skull protrusion and compression of the right hemispheric sulci and lateral ventricle with subfalcine herniation. (a) Axial T1-weighted image precontrast (b) Axial T2-weighted-Fluid-Attenuated Inversion Recovery (c) Axial T1-weighted image postcontrast.



Fig. 4 – MRI lumbar spine. Large left adrenal lesion (arrow). (a) Coronal single-shot fast spin echo (b) Coronal T2-weighted image.

fourth day of hospitalization (and subsequently resolved) had no other neurological signs or symptoms. She subsequently had a diagnostic bone marrow aspiration demonstrating the histologic characteristics of neuroblastoma tumor cells (Fig. 6).

Discussion

Neuroblastoma is not usually high on a clinician's differential for a child's gait dysfunction and right hip pain. Neuroblastoma is a pediatric malignancy of the sympathetic nervous



Fig. 5 – MRI hip. Coronal short tau inversion recovery sequence showing diffuse marrow replacement with metastases (arrows) throughout the femurs, consistent with neuroblastoma metastases).

system, specifically neural crest cells [1]. It can arise from any sympathetic nerve ganglion, but it usually occurs in the abdomen, and often from the adrenal gland [2]. The most common areas of metastasis for this tumor type are bones, bone marrow, and liver [3]. While bone and central nervous system (CNS) are common sites of metastatic neuroblastoma [4], as was found in our patient, it is unusual for the presentation to be a limp or have a skull protrusion. Unfortunately, neuroblastoma has no classical symptomatology to raise a clinician's suspicion. Original presentation of neuroblastoma can range from signs of spinal cord compression, to a generalized rash, or in the case of our patient, joint pain [3]. Our patient was a female but when primary tumor site is stratified on the basis of sex, 2-fold more adrenal tumors occur in boys than girls with no known clear reason for these differences [5].

Additionally, our patient was 6 years old, well above the median age of diagnosis, 19 months—in context, neuroblastomas accounts for 6% of all cancers until age 14 and is the most common cancer found in children under 5 years [3,6–7]. While overall outcomes of patients with neuroblastomas are highly dependent on prompt diagnosis [1] our patient has had the following outcome. She was initially treated with 5 cycles of chemotherapy and subsequent primary tumor resection. Due to continued tumor burden, she had a further 2 cycles of chemotherapy. She underwent 2 autologous stem cell transplants with good response. She also received 4 rounds of maintenance immunotherapy with IL-2 and dinutuximab [8]. Depending on the grade of the neuroblastoma, mortality rates can exceed 90% [9], with this in mind, our patient has done well. She currently has no evidence of disease on her post-treatment evaluations.

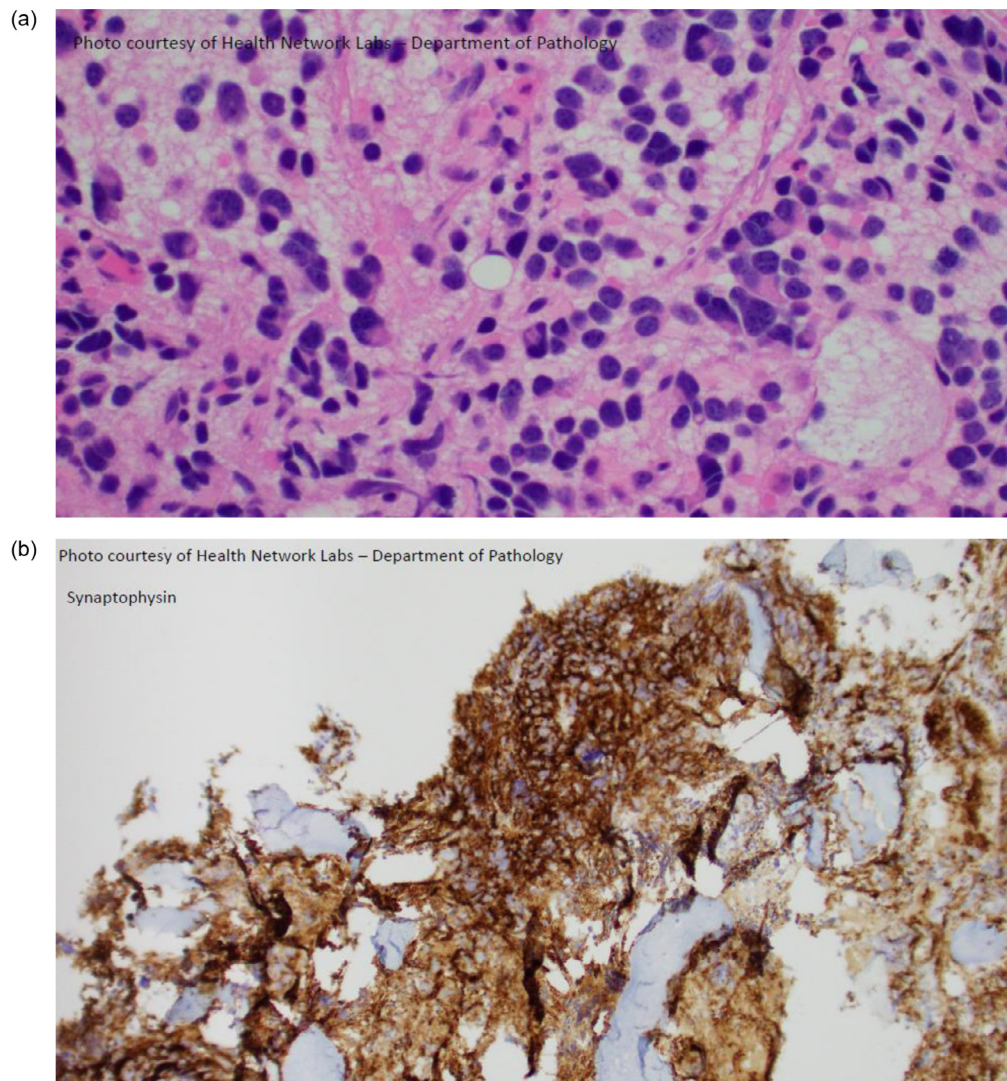


Fig. 6 – Histological Images of Bone Marrow. a) Histologic section of bone marrow, demonstrating diffuse distribution of neuroblastoma cells. Hematoxylin and eosin stain, 40x magnification. b) Immunohistochemical staining of paraffin-embedded bone marrow sections for synaptophysin, confirming neuroendocrine differentiation of the bone marrow cells consistent with neuroblastoma, 10x magnification. c) Immunohistochemical staining of paraffin-embedded bone marrow sections for chromogranin, confirming neuroendocrine differentiation of the bone marrow cells consistent with neuroblastoma, 40x magnification. d) Immunohistochemical staining of paraffin-embedded bone marrow sections for CD56 (Neural cell adhesion molecule), confirming neuroendocrine differentiation of the bone marrow cells consistent with neuroblastoma, 10x magnification.

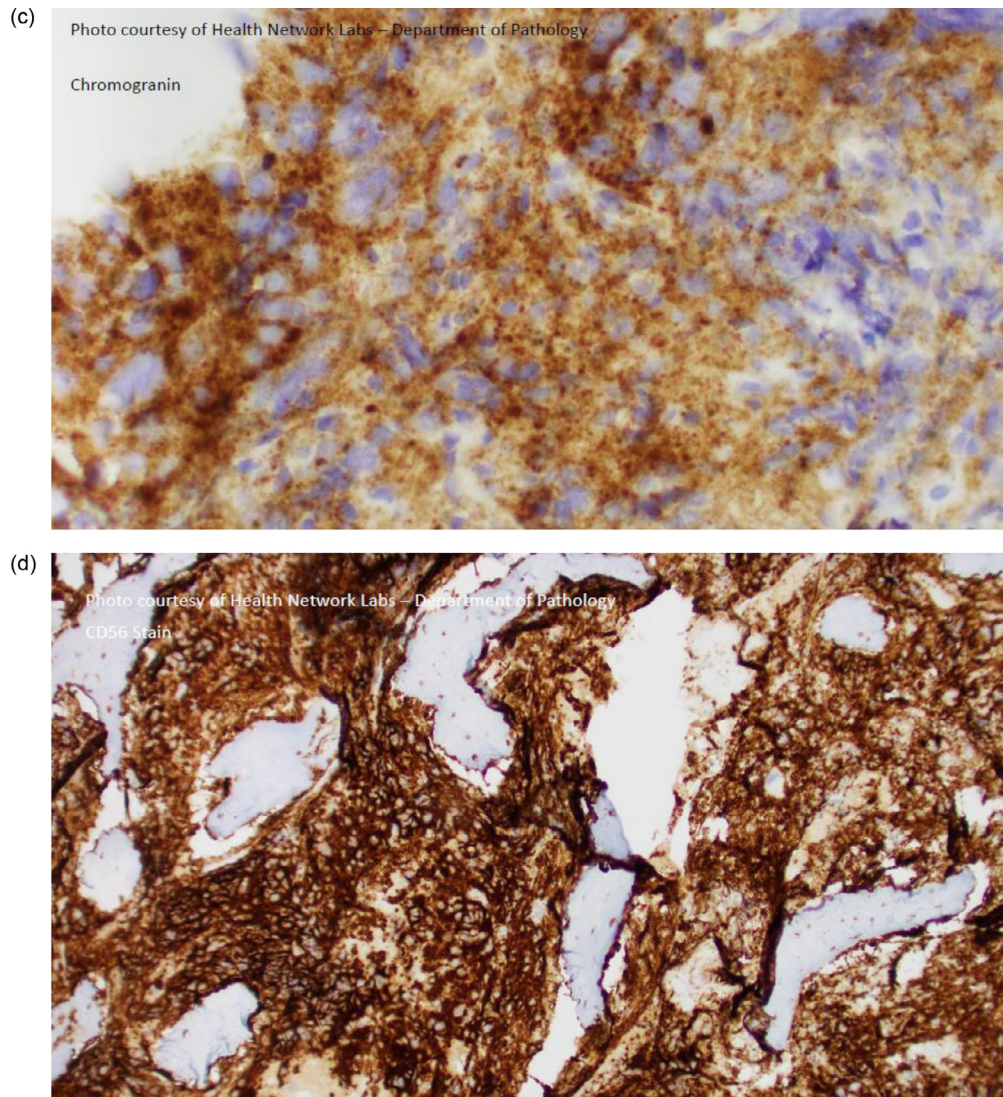


Fig. 6 – Continued

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