Case Report
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Brain Metastasis in a Wilm's Tumor Patient: A Case Report

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Abstract

The brain is a rare site for metastasis in most extracranial pediatric solid tumors, including Wilm's tumor. Outcome for these patients are generally dismal. Very few cases have been reported to have good survival even after therapy. This paper reports a case of stage IV Wilm's tumor with lung metastases in a patient who developed a solitary brain metastasis five months after completion of chemotherapy. She underwent resection of the brain tumor followed by chemotherapy and radiotherapy. The patient was alive at the 20-month follow up after diagnosis of brain metastasis and was considered to have radiologically stable disease.

Keywords: Wilm's tumor, Solitary brain metastasis, Pulmonary metastasis

Introduction

The brain is a rare site for metastasis in most extracranial pediatric solid tumors. Children with metastatic cancer who develop headaches or any other neurologic symptoms should be investigated for possible brain metastasis. The outcome for these patients is dismal in the literature.[1,2,3] Reports of long term survival in a few cases with Wilm's tumor, osteosarcoma and alveolar soft part sarcoma with isolated brain metastasis suggest that a subset of patients may benefit from therapy.[1]

We hereby present a case of stage IV Wilm's tumor with lung metastases that developed a solitary brain metastasis five months after completion of chemotherapy. The patient underwent resection of the brain tumor followed by additional chemotherapy and radiotherapy. The patient was alive at the 20-month follow up after diagnosis of the brain metastasis and was considered to have radiologically stable disease.

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Case report

A 6-year old Malay girl who was diagnosed with stage IV Wilm's tumor of the right kidney with lung metastases two years ago was admitted with focal seizures. She underwent The Societe Internationale D'oncologie Pediatrique (SIOP) Wilm's Tumor 2001 chemotherapy protocol soon after diagnosis and a right nephroureterectomy after the third cycle of chemotherapy. She also received radiotherapy for lung nodules. The patient was treated with a 6 MV photon beam and anterior-posterior parallel opposed to both lung fields. The daily dose was 1.5 Gy administered five days per week for a total dose of 15 Gy in 10 fractions over a two-week period.

One month after completion of the chemotherapy, computed tomography (CT) of the thorax-abdomen-pelvis showed that the lung nodules and the para-aortic nodes reduced in size which indicated good response to treatment. The patient subsequently underwent a left thoracotomy and the nodules were removed from the upper and lower lobes. Histopathological examination (HPE) results showed no residual tumor.

After five months, she presented with focal seizures. There was no fever, vomiting or blurred vision noted. An urgent brain CT revealed an enhancing lesion with cystic component in the left parietal lobe that measured 4.9×3.8×3.6 cm. There was no significant perilesional edema surrounding this lesion (Figure 1). An MRI further confirmed the mass which was hypointense on T1 and hyperintense on T2. This lesion showed restricted diffusion in the posterior inferior aspect of the mass. There was no perilesional edema, however a mild midline shift of 0.5cm to the right was observed. The ventricles and basal cisterns were normal (Figure 2).

The patient underwent a left craniectomy and tumor excision. Histopathological examination of the lesion confirmed the diagnosis of metastatic Wilm's tumor (Figure 3). She received six courses of radiotherapy and the Relapsed Wilm's Tumor protocol [United Kingdom Children's Cancer Study Group (UKCCSG)]. The radiotherapy was administered in two phases. In the first phase, treatment was with a 6 MV photon beam parallel to the opposed field. The daily dose was 1.5 Gy for five days per week. A total dose of 24 Gy was given in 16 fractions over a three-week period. In phase two, the patient received a 6 MV photon beam to the planned fields to the left parietal tumor. Daily dose was 1.43 Gy given for five days per week. A total dose of 10 Gy was given in 7 fractions over a 1.5-week period. Serial MRI and CT of the brain after completion of the

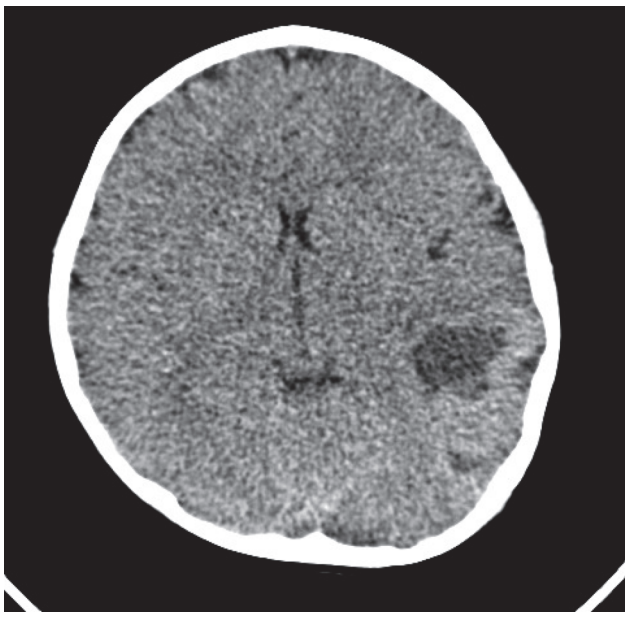

Figure 1. Plain brain CT scan that showed a mass in the left parietal lobe.

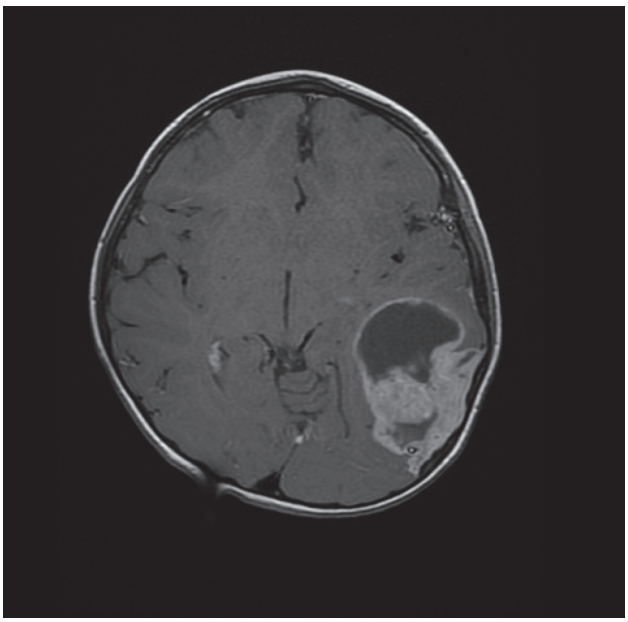

Figure 2. MRI T1 post-gadolinium images that showed the mass.

chemotherapy showed only encephalomalacic changes with ex-vacuo dilatation of the occipital horn of the left lateral ventricle in the posterior parietal region. No enhancing component or new lesion was seen in the brain (Figure 4). CT thorax-abdomen and pelvis also showed that patient had stable disease.

Discussion

Kebudi et al. reported the prevalence of extracranial solid tumors that developed brain metastases to be 1.45%.[1] The incidence of brain metastases in children with solid tumors has been shown to range from 1.5%-2.5% in clinical series and 6%-13% in autopsy series, but varies considerably depending on histology, location, stage and duration of survival and pattern of systemic metastases.[2] This condition is even more unusual in those with Wilm's tumor where only 1% of children develop brain metastases.[4]

Before the introduction of effective chemotherapy, intracranial metastasis of Wilm's tumor had been reported only as postmortem findings in up to 13% of patients who died from metastatic disease. The majority of cases with central nervous system (CNS) metastases had advanced disease. In the UKCCSG trials (UKW 1, 2 and 3) 7/1249, 0.6% of children with Wilm's tumor developed brain metastases between 2 and 27 months after initial diagnosis.[3] In our patient, brain metastasis was detected at 24 months after the initial diagnosis of stage IV Wilm's tumor with lung metastases.

Presentation with brain metastasis at diagnosis is typical for any other intracranial tumors and includes headaches, seizures, hemiparesis and loss of consciousness. A small number of patients may also present with emesis, nystagmus, ptosis, head-tilt, speech disorder and impaired vision.[1,2,3] Our patient suddenly presented with focal seizures five months after completion of chemotherapy. There were no complains of headaches, hemiparesis or neurological deficits. The lesion was solitary and located in the left parietal lobe. MRI further confirmed that this lesion was solitary. There was no significant perilesional edema that surrounded this lesion.

The imaging method recommended for detecting brain metastasis is a cranial CT or MRI. MRI is suggested to assess metastatic brain lesions due to its higher accuracy in detecting multiple brain metastases.[5]

The development of a CNS metastasis commonly appears to be associated with concurrent or prior lung metastasis.[1-3] It has been suggested that brain metastases most likely arise

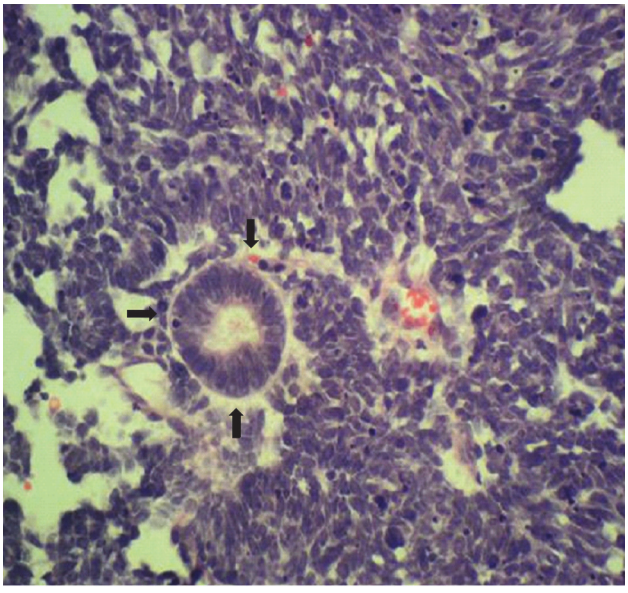

Figure 3. Histopathological examination (HPE) of the brain lesion that showed malignant blastema cells with an epithelial component that formed tubular structures (black arrows).

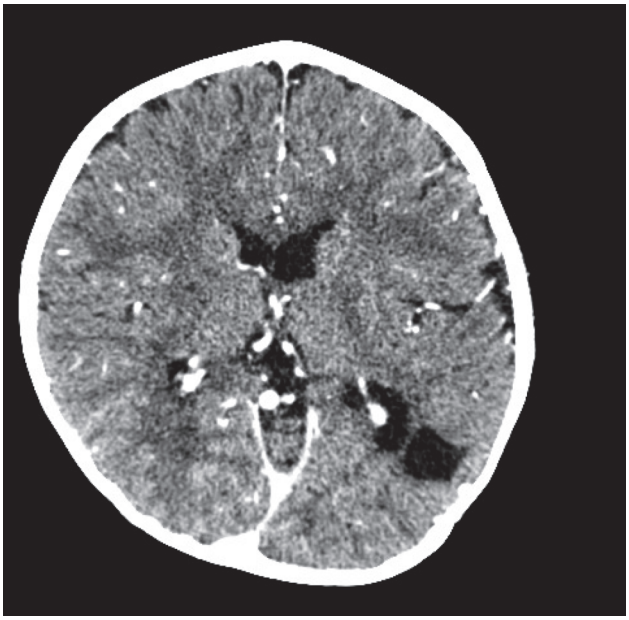

Figure 4. CT scan that showed no recurrence.

from hematogenous tumor emboli from the lungs.[1-3] Similar characteristics were found in our patient who was diagnosed with stage IV Wilm's tumor with metastases to the lungs.

Management of brain metastasis includes both symptomatic and definitive treatments. Symptomatic therapy consists of corticosteroids to treat peritumoral edema and anticonvulsants for seizure control. Definitive treatment includes surgery and/or radiotherapy either with or without chemotherapy directed at eradicating the tumor cells.[5]

For the few patients with solitary metastases and no systemic disease, surgery may be indicated. In our patient the brain metastasis was a new finding as biopsy of her lung nodules did not show residual tumor. For patients with multiple metastases, the benefit of surgery, chemotherapy, or radiotherapy is questionable. It has been assumed that the blood brain barrier prevents the penetration of the chemotherapeutic agents from penetrating the parenchyma, however evidence exists that the blood brain barrier is partially disrupted in brain metastasis.[6]

Concomitant radiotherapy and chemotherapy with vincristine, dactinomycin, cyclophosphamide, doxorubicin, and cisplatin has been effective in producing long term remissions. Drugs effective in primary brain tumors such as etoposide, ifosfamide and carboplatin have also been administered.[3] Our patient underwent total excision of the parietal lesion followed by radiotherapy plus six cycles of the relapsed Wilm's tumor chemotherapy protocol that consisted of topothecan and vincrystine. Since surgery alone showed early local recurrence in one child, therefore it was concluded that radiotherapy should be considered following resection.[2] Children treated with radiotherapy for brain metastases showed better freedom from neurologic progression than those who did not receive radiotherapy.[4] Whole-brain irradiation might benefit those patients with multiple metastases.

According to reports, most patients died at a median time of two months from the diagnosis of brain metastases (two days to six months). However one patient was reported alive at a mean follow up of 63 months from recurrence, which suggested that in the absence of a massive pulmonary metastasis or resistance to chemotherapy, there might be a chance for cure with a combination of surgery, chemotherapy and local radiotherapy in Wilm's tumor patients.[3] Our patient has so far been disease-free for 20 months.

Conclusion

This case report presented a rare case of Stage IV Wilm's tumor with lung metastases and solitary brain metastasis five months after completion of chemotherapy. Physicians should consider Wilm's tumor as a possible origin for solitary brain tumors in children.

Conflict of interest

No conflict of interest is declared.

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