Ewing's Sarcoma peripheral primitive neuroectodermal tumor

Ewing's Sarcoma peripheral primitive neuroectodermal tumor (ES/pPNET) is a rare malignant small round blue cell tumor, that shows varying degrees of neuroectodermal differentiation.

Localization

They commonly arise in the soft tissue of the trunk and lower extremity. Those occurring intracranial are rare, and most patients present with progressively intracranial hypertension and/or cranial nerve deficit.

Diagnosis

As small round blue cell tumors look similar, diagnosis often depends on special stains, immunohistochemistry, and molecular techniques. While the combination of membranous immunohistochemical reactivity for CD99 with cytoplasmic glycogen provides effective screening, demonstration of characteristic translocations of EWSR1 (chromosome 22) or FUS (chromosome 16) by fluorescent in situ hybridization (FISH) can confirm the diagnosis.

VandenHeuvel et al report three primary ES/pPNET of the CNS, two of which occurred in children. While the adult case demonstrates the classic histopathology, the two pediatric cases have histopathology that significantly deviates from the usual. One is suggestive of a primary sarcoma, and the other mimics an ependymoma, but all three cases are confirmed with FISH. These observations suggest that primary ES in the CNS may have histology different from the classic morphology and a high index of suspicion should be maintained in order to make the correct diagnosis. A search of the literature suggests that these tumors are most frequently seen in children and young adults. Imaging often shows a supratentorial enhancing mass that touches the leptomeninges. Survival over three years is good but long term prognosis is unknown [1].

Differential diagnosis

They must be distinguished from other tumors such as medulloblastoma, Atypical teratoid rhabdoid tumor, ependymal tumors, metastatic sarcomas, hematologic malignancies, and other mimics. Although therapy for ES/pPNET is effective, it brings severe side effects, including cardiac toxicity, making correct recognition important.

Complications

The occurrence of intracerebral hemorrhage due to primary intracranial pPNET/ES is exceedingly rare. The role of adjuvant therapy in this condition is yet to be investigated [2].

Case series

Primary intracranial Ewing sarcoma (ES)/peripheral primitive neuroectodermal tumors (pPNETs) are extremely rare, and only a few studies have reported more than four cases of this disease. The purpose of this study was to explore the clinical features, treatment, and outcome of primary intracranial ES/pPNETs.

The clinical data of 14 patients who had been surgically treated from February 2003 to November 2017 and in whom immunohistochemical staining results had confirmed the diagnosis of primary intracranial ES/pPNETs were retrospectively analyzed. Kaplan-Meier survival analysis was used to estimate the survival rate and the median survival time (MST).

Gross total resection (GTR) was achieved in 7 cases, and subtotal resection (STR) was performed in 7 cases. During follow-up, 10 (71.4%) patients had local recurrence and 3 (21.4%) patients had distant metastasis. The overall 1-year, 2-year, and 5-year survival rates were 78.6%, 47.6%, and 19.0%, respectively. Kaplan-Meier survival analysis showed that postoperative radiotherapy was a significant prognostic factor for longer MST (P=0.034). GTR and radiotherapy with or without adjuvant chemotherapy yielded the highest 2-year survival rate (100%). Three patients who underwent GTR, radiotherapy, and chemotherapy had the highest 2-year survival rates (100%) and the longest MST (48 months).

Primary intracranial ES/pPNETs have an aggressive clinical course, with a high tendency for both local recurrence and distant metastasis. Radiotherapy plays a significant role in improving the survival of patients. GTR combined with radiotherapy and chemotherapy may be the most beneficial treatment modality [3].

Case reports

2014

Cole et al. report a unique case of peripheral PNET presenting as an intracranial mass in an adult following chemotherapy and radiotherapy for a solid tumor. A 51-year-old woman with previously treated left breast cancer was evaluated for a newly developed brain mass. She underwent craniotomy with resection. Surgical pathology was consistent with a peripheral PNET/EWS with Ewing sarcoma gene translocation. She was treated appropriately with vincristine, cyclophosphamide, and doxorubicin (later dactinomycin) alternating with ifosfamide and etoposide.

Although development of PNET/EWS presenting along the CNS is exceedingly rare in adults, establishing the proper diagnosis of this “small blue cell tumor” is critical. The further distinction between central PNET and peripheral PNET can greatly impact both prognosis and treatment. Our case also highlights the importance of considering the impact of prior intensive therapies, including radiation and chemotherapy, on predisposing to future PNET/EWS [4].

2008

The patient was a 10-year-old boy who presented with progressive symptoms due to right lower

cranial nerve palsies. Computed tomographic (CT) scan and magnetic resonance imaging (MRI) revealed a tumour at the right jugular foramen which showed extra-cranial extension. Open biopsy of the extra-cranial lesion was performed, and diagnosis of ES/pPNET was made by histopathological, immunohistochemical and genetic investigations. The patient received a combination of multi-drug chemotherapy and irradiation. By 12 months after the diagnosis, MRI showed complete remission of the lesion, and the patient has been well apart from slight dysphagia. Previously, there was only one report of a jugular foramen ES/pPNET and in which treatment had failed. To the best knowledge, this is the first patient treated successfully with chemoradiotherapy [5)].

1)
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