Primary intracranial Ewing sarcoma in an infant
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DESCRIPTION
A previously healthy infant presented to the emergency department with altered mental status following a first onset seizure preceded by a 1 week history of reported left arm weakness. Physical examination demonstrated macrocephaly and left hemiplegia with hyperreflexia. CT revealed a large hyperdense mass centred in the right parietal lobe (figure 1A). MRI demonstrated reduced diffusivity, mixed solid and cystic features, heterogeneous enhancement and susceptibility artefact (figure 1B–F). The radiographic differential included infantile high-grade glioma, embryonal tumour (atypical teratoid rhabdoid tumour, embryonal tumour with multi-layered rosettes) and anaplastic ependymoma. The patient underwent near total tumour resection. Histopathological findings revealed a highly cellular tumour composed of cells with round uniform nuclei with open chromatin, small distinct nucleoli and scant cytoplasm (figure 2A). Tumour cells showed immunohistochemical reactivity for NKKX2.2 and CD99 with a high Ki67 proliferation index (figure 2B–D). A sarcoma targeted gene fusion panel confirmed the presence of an EWSR1:FLI1 fusion, consistent with a diagnosis of primary intracranial Ewing sarcoma (ES). Staging evaluations included a whole-body positron emission tomography scan, bone marrow study and cerebrospinal fluid cytology, all of which excluded evidence of systemic disease. The patient was treated with focal proton radiation therapy followed by an Ewing tumour-based chemotherapy regimen of vincristine, doxorubicin and cyclophosphamide alternating with ifosfamide and etoposide. The patient has no evidence of disease 3 years post therapy with normal development and mild left hemiparesis.

ES accounts for 1% of all paediatric malignancies and commonly arises from long bones or the axial skeleton.1 Extraosseous ES is rare, and the primary intracranial subtype accounts for only 1%–4% of the extraosseous type.1 Primary intracranial ES frequently originates from the meninges and may be misdiagnosed as supratentorial embryonal tumours or other common primary central nervous system tumours, such as meningioma.7 One literature review reported approximately 50 cases of primary intracranial ES and peripheral primitive neuroectodermal tumour, both included in the Ewing’s sarcoma family of tumours due to their genetic overlap.3 Primary intracranial ES has a median age at first onset of 15 years.3 To our knowledge, our case is 1 of 3 primary intracranial ES reported in an infant.3 14 Initial manifestations include seizure, headache, vomiting, cranial nerve palsy, and a reduced level of consciousness.3 3 The genetic foundation of ES is characterised by chromosomal translocations that create chimeric fusions between the EWSR1 gene and an ETS transcription factor.6 7 EWSR1 gene fusion with FLI1 is recognised as the main genetic abnormality in the development of an Ewing tumour and presents in 90%–95% of cases.5 6 EWSR1::FLI1 fusion participates in dysregulating cell differentiation, proliferation, apoptosis, invasion, angiogenesis and metastasis.8 The treatment approach involves a multimodal regimen of surgery, chemotherapy and radiation.4 5 9 Our case adds to
Images in...

the clinical, neuroimaging, histopathological and molecular findings of a successfully treated primary intracranial ES in an infant without well-defined standard of care therapy.

Learning points

► Primary intracranial Ewing sarcoma (ES) may be considered in the differential diagnosis of intracranial brain tumours in infants.
► A sarcoma targeted gene fusion panel should be considered when histopathological findings demonstrate evidence of a meningeal small round blue cell tumour for accurate diagnosis and treatment guidance.
► A multimodal treatment regimen consisting of surgery, chemotherapy and radiation may improve the prognosis of paediatric patients with primary intracranial ES.

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