

Imaging diagnosis

Case 449

3. Medulloblastoma

【Progress】

She was transported to Mother-Children Healthy Center Hospital where brain surgery, radiotherapy and chemotherapy can be served. Three months later, surgical resection revealed medulloblastoma.

【Discussion】

Medulloblastoma is reported to arise in the development process from stem cells of cerebellum to mature cerebellar cells. Cerebellar cells layers are microscopically, categorized into cerebellar granule cells layer, Purkinje cells layer, and molecular cells layer. Granule cells accept, input the motor signals from spinal cord, Purkinje cells output motor signals to spinal cords, and molecular cells integrate and process of signals. Purkinje cells are only found in human brain with two-leg walking (1, 2). In other words, in the evolution process of two-leg walking of human, Purkinje cells develop, leading to enable human to walk with two-legs.

Cerebellum is divided into three parts: cerebellar hemisphere, vermis, and flocculonodular. Cerebellar hemisphere functions as motor output to spinal cord for walking with two-legs of human. Vermis situated in the center of cerebellum, functions input from motor information mainly from spinal cord. Flocculonodular lobe situates at the upper part of cerebellum horizontally right to left, functions via vermis to function for balancing body together with vestibular nerve. This part of cerebellum is originally classical, before mammal age. Tonsil situates anteriorly, bilaterally across vermis and functions to coordinates the motor movements for two-leg walking.

Medulloblastoma arises from near fourth ventricle where stem cells originate, namely, from vermis, vermis to cerebellar hemisphere. The peak age of its onset is around 8 years but even occur in 30ties. The gender ratio is 2 in male versus 1 in female (3, 4).

Medulloblastoma is full of cellular component, inducing iso-slightly high density of tumor depicted on CT. Calcification in the tumor is found with 20% incidence (5). The tumor is easily disseminated into spinal cord with the incidence of 40%. The high cellularity of medulloblastoma with small sized-cells reflexes high signal intensity in Diffusion MRI accompanied with low ADC values of around 0.5 (6-9).

Treatment is basically surgical resection plus radiotherapy. Radiation therapy is served to cover total brain irradiation plus total spinal cord irradiation. Survival rates are reported 60%, 52%, and 47% at 5 years, 10 years, and 20 years, respectively (3, 4, 8). Platinum-based medicine, carboplatin associated with surgical treatment and radiotherapy is reported to contribute survival rate to elevate to 82% at 5 years (3, 4).

In our case, the tumor is located at vermis to left cerebellar hemisphere depicted with iso- to slight high attenuation of CT values of 40 on brain CT. Brain MRI was not taken. The imaging diagnosis is listed, germinoma, pilocystic astrocytoma and hemangioblastoma. Medulloblastoma was not listed. If the patient took MRI, the imaging diagnosis could be narrowed because ADC values of medulloblastoma are low around 0.5 (6-9).

【Summary】

We presented four-year-old female with head ache accompanied with her mother. Cerebellar tumor expanding from vermis to left cerebellar hemisphere whose CT vales are around 40, is depicted on CT. She received brain surgery in other hospital where brain surgeon can serve, revealing the tumor is medulloblastoma. It is borne in mind that medulloblastoma arises in the development process to mature cerebellar cells from stem cells that habituate around 4th ventricle, namely vermis and center of cerebellar hemisphere. Since medulloblastoma is full of small cells with high cellularity that induces iso-to slight high density on CT and high signal intensity on Diffusion WI MRI with lowering ADC values of around 0.5.

【References】

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