

Adolescent Anaplastic Ependymoma of the Spinal Cord: A Case Report

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Abstract: We present a case of a 15-year-old male patient with anaplastic ependymoma of the spinal cord. The patient presented with limb weakness and urinary incontinence. These symptoms led to a CT brain followed by MRI radiological intervention which revealed intramedullary spinal lesion in C2 to T4. He had tumour resection done. Unfortunately his condition deteriorated post operation and died one month later. Our diagnostic experience in the management of this case may provide a good reference for others.

Keywords: anaplastic ependymoma; spinal cord; adolescent.

I. Introduction

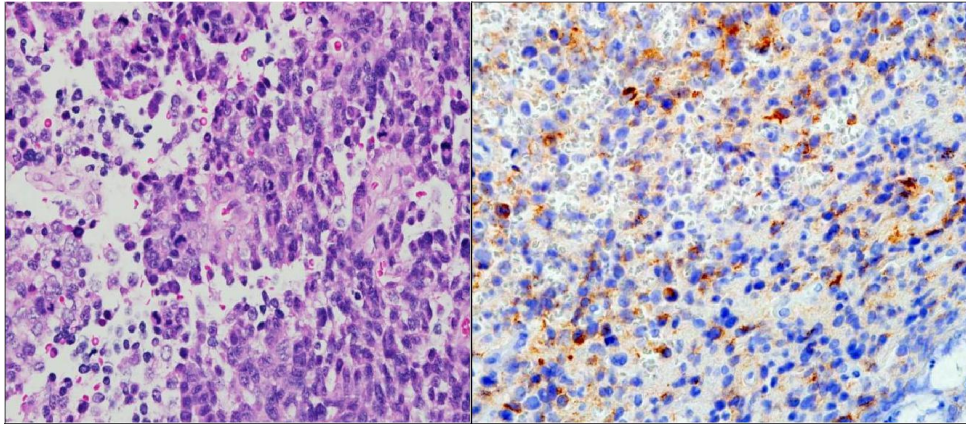
Ependymoma are primary neoplasms of the central nervous system that arises from the cells lining the ventricular system and central canal in the spinal cord. It accounts for 2-9% of the incidence of neuroepithelial tumours, and intracranial tumour in children about 6-12% (McLendon RE, 2007b). In the spinal cord, ependymoma comprises 50-60% of spinal glioma in adults, and rarely in children. Ependymoma is classified according to its cellular morphology according to the WHO grading system, Grade I (subependymoma and myxopapillary ependymoma), Grade II (ependymoma) and Grade III (anaplastic ependymoma). Anaplastic changes are more frequently seen in childhood intracranial ependymoma compared to those of in the spinal cord (McLendon RE, 2007a)

Only one case of spinal anaplastic ependymoma in young age has been reported so far (Mork et al., 1980). While the other 18 cases reported involved primary spinal intradural, extramedullary adult ependymoma with variable histological grade (Guppy et al., 2011)

II. Case report

15 year old boy with an underlying global developmental delay presented with bilateral lower and upper limb weakness for 5 months and became bedbound with urinary incontinence for 8 days at home prior to admission. Initial CT brain was performed revealed cervical spinal cord lesion. Further magnetic resonance imaging (MRI) showed intraspinal mass at C2 until T4 level which exhibited peripheral enhancement post contrast. No other lesion was seen elsewhere in the spinal cord or within the brain parenchyma. Intraoperative findings revealed intramedullary tumour at C3 until T7 with extramedullary extension. Only partial lesion removal was possible due to unclear resection margin.

Histopathological examination revealed hypercellular tumour showing areas of medium sized tumour cells that are moderately pleomorphic with brisk mitotic activity. Foci of microvascular proliferation and distinctive perivascular pseudorosette. We observed necrosis without palisading feature. Ki-67 index was about 70%. The tumour showed strong glial fibrillary acidic protein (GFAP) expression. Epithelial membrane antigen (EMA) show 'dotted-line' staining in the cytoplasm. Cytoplasmic staining of Vimentin and S100 were also present. Immunoreactivity of pancytokeratin (CKAE1&AE3), leucocyte common antigen (LCA) and synaptophysin were absent. These morphological and immunohistochemistry findings were considered to be consistent with anaplastic ependymoma (WHO grade III).



Haematoxylin& Eosin stain ;H&E: 400 magnification shows: pseudo-vascular rosette formation
Immunohistochemistry stain (epithelial membrane antigen ; EMA): 400 magnification shows dotted-like positivity

Post operation, his neurologic functions did not improve, patient became quadriplegic . He had recurrent prolonged intubation due to respiratory failure. Patient had succumb to death a month after the operation and about 5 months after the symptoms started.

III. Discussion

Anaplastic ependymoma is a high-grade malignant tumor, (WHO) grade III which develops rapidly and has a poor prognosis. In term of histopathological diagnosis, it is controversial due to lack of consensus of criteria of anaplastic ependymoma, which leads to difficulty in the management of the patient (Godfraind, 2009). We will discuss the criteria that had been proposed for the diagnosis of the anaplastic ependymoma in later paragraph.

Spinal ependymoma occupies about 40-60% primary spinal cord tumour and usually located intramedullary. It arises commonly from conus medullaris and filum terminale. About 90% of the tumour is low grade (Guppy et al., 2011). Only a few percentage are malignant and uncommon (Schuurmans et al., 2006). This case report represents a very rare anaplastic ependymoma in adolescent.

Symptoms of ependymoma include headache, nausea, vomiting, seizures or hydrocephalus in children. If ependymoma extend into the spinal cord, it may cause pain, weakness and paralysis (Zhao et al., 2013). In this case, patient experienced recurrent fall due to weakness 5 months prior to admission and later become bed bound with urinary incontinence. We could not establish whether this tumour arising from low grade ependymoma or behave as primary malignant ependymoma from the start. However, with the short history of the symptoms suggested towards primary anaplastic ependymoma which is very rare in a young age group.

The size of intraspinal ependymoma are varies, with an average length of 3–4 vertebral body segments at the time of diagnosis (Lefton et al., 1998) . Spinal ependymoma initially involve the central cord region owing to their ependymal lining originated in the central canal and will extend peripherally, displacing the surrounding tissue. On T1-weighted image, usually intraspinal ependymoma shows isointense to the spinal cord and hyperintense on T2-weighted image (Moriwaki et al., 2013). On post gadolinium sequence, the pattern of enhancement is usually heterogenous but may be uniform in 30–40%. The MRI appearance of spinal cord ependymoma is almost the same as astrocytoma except for the marked vascularity as seen in this case.

Anaplastic ependymoma shows hypercellularity with medium size cells and brisk mitotic activity with association of endothelial proliferation and +/- necrosis. Perivascular pseudorosette is a histological hallmark of this anaplastic ependymoma. Ependymoma rosette are hardly seen in the anaplastic ependymoma as contrast to low grade counterpart (Shintaku and Hashimoto, 2012). The differential diagnoses in this case were high grade lymphoma, glioblastoma and medulloblastoma. However, the fibrillary background with absence of lymphoid globules and negative for LCA has excluded lymphoma. No moulding of cells and negativity of synaptophysin exclude medulloblastoma. All other morphological features include distinct pseudovascular rosette and IHC such as positivity of GFAP, S100, vimentin and a small number of tumour cells contained tiny ring or dot like cytoplasmic positivity of EMA pointed towards ependymoma rather than glioblastoma multiforme. High mitotic activity with atypical mitosis, endothelial proliferation (glomeruloid vessels and high Ki-67 index favoured anaplastic ependymoma WHO grade III. (Shintaku and Hashimoto, 2012).

The diagnostic criteria for anaplastic ependymoma have not been well established and the prognostic predictive value of the histopathological findings remains unclear. However some author reported that certain histopathological features such as increased cellularity, nuclear anaplasia and brisk mitotic activity are the

criteria for anaplastic ependymoma. Vascular proliferation-intramural or glomeruloid and necrosis including pseudopallisading necrosis may be seen. Eventhough perivascular pseudo-rossetteare hardly seen in a high grade ependymoma, but its presence aids in distinguishing from high grade astrcytoma (Schuurmans et al., 2006). In the WHO classification, anaplastic ependymoma is defined as glial tumour with high mitotic activity, often accompanied by microvascular proliferation and pseudopallisading necrosis to grade them as WHO grade 3. Differentiation from glioblastoma relies on the presence of distinct perivascular pseudo-rossette and immunohistochemistry.

As for treatment,it usually starts as surgical removal of the lesion, followed by radiotherapy, chemotherapy or steroid to reduce the oedema. Chemotherapy plays a role in younger children to avoid or delay the use of radiation. chemotherapy also may improve surgical resectability and may be used in recurrent tumors (Moriwaki et al., 2013). The prognosis of anapalsticependymoma is usually poor. The 5-year survival rate for patients with anaplastic or high-grade ependymoma is 10–47% (Romero et al., 2012).

IV. Conclusion

The reported case added a new case of spinal cord ependymoma which is relatively rare in children. Pathologist must be aware of its possible to occur in this site because it can be confused with other tumour which is more commonly located here . One of the interesting differential diagnoses is glioblastomamultiforme. The hallmark histological and unique immunohistochemical staining features are helpful clues in the process of making diagnosis such as in this case. However, the question still remain, the relationship between anaplastic ependymoma and glioblastomamultiforme. Further exploration of this question with regards to molecular study will add up further information of this tumour.

The authors declare they have no conflict of interests. They report no financial disclosure

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