Clinical Study

Cerebellar liponeurocytoma/lipidized medulloblastoma
Case report and review of the literature

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Summary

Cerebellar liponeurocytoma that has been recently identified as a distinct entity by the World Health Organization is characterized by areas of lipomatous differentiation and apparently by a favorable prognosis. In this paper, we described a case of 49-year-old female showing progressive clinical course despite a low labeling/mitotic index. We also review the relevant literature. Although, basically all reported cases share a similar histological pattern, i.e. focal accumulations of adiposities in an otherwise typical small cell tumor like central neurocytoma, some clinical properties such as (age, proliferative potential, therapy and survival) are not uniform. The exact biological behavior of this special variant tumor is established. Yet, this needs further confirmation on a large number of cases with longer follow-up periods.

Cerebellar liponeurocytoma is a rare posterior fossa tumor that differs from medulloblastoma with prognostic, epidemiological and clinical aspects. It was previously called as ‘lipomatous medulloblastoma’ [1–3], ‘lipidized medulloblastoma’ [4,5], ‘medullocytoma’ [5], ‘neurolipocytoma’ [6], ‘lipomatous ganglioneurocytoma’ [7], ‘lipidized mature neuroectodermal tumor of the cerebellum’ [8]. However, according to the recent WHO-2000 classification it is grouped as ‘cerebellar liponeurocytoma’ [9]. In this study, light microscopic, immunohistochemical and flowcytometric properties of liponeurocytoma of a female patient was examined and compared with the previously published cases.

Case report

A 49-year-old female patient was admitted to the neurosurgery clinic with a 2-year history of hypertension, vertigo and vomiting and progressive vision and gait disturbances. On neurological examination, a slight papilledema and truncal ataxia were revealed. Cranial magnetic resonance imaging (MRI) demonstrated a lesion located within the vermis and the fourth ventricle that was protruding to the posterior of the third ventricle through the aqueductus sylvii. The lesion was showing contrast enhancement. Triventricular hydrocephaly was also present (Figures 1 and 2). Patient did well after microscopic subtotal tumor resection. Subsequently she received conventionally craniospinal radiotherapy (RT) that was 36 Gy/20 fractions to the whole brain, followed by a boost of 18 Gy/8 fractions to the posterior fossa, bringing the total posterior fossa dose to 54 Gy/28 fractions. Residual tumor was observed by postoperative MRI. There was a slow progression in tumor mass despite RT. At the same time the postoperative course of the patient was uneventful and the symptoms were improved. Later then the patient died after 19 months and autopsy was not performed.

Pathological examination

The tumor tissue was routinely processed. Five micron thick sections of the tumor were stained with hematoxyline and eosine (H&E) and additionally, immunohistochemical (IHC) staining has been done. No fresh tumor tissue was available to stain with oil red O for detecting lipid droplets or performing ultra-structural examination. IHC staining with monoclonal antibodies against glial fibrillary acidic protein – GFAP (1 : 75, Neomarkers, CA, USA), synaptophysin (1 : 100, Neomarkers, CA, USA), S-100, P53 and Ki-67 (ready to use, Neomarkers, CA, USA) were performed. IHC staining was applied by an enhancement method based on repetitive microwave heating technique using sodium citrate buffer. The proliferative activity was evaluated by counting the MIB-1 labeling index; i.e. percentage of MIB-1 positive nuclei in 10 high power field in the areas with the highest density of labeled nuclei.

DNA analysis with flow cytomteric study was performed on tumor tissue which was removed from the paraffin sample. To obtain the cell suspensions, mechanical disaggregation with scalpels was applied to samples after xylene and alcohol treatment. Cells were filtered through 50 μm nylon mesh. After adjustment of concentration (1–3 × 10⁶ ml⁻¹), cells were stained with DNA Prep Kit (Beckman Coulter, USA). DNA Prep Kit consists of two solutions: LPR solution is used for opening pores on the cell membrane, the second one
which is used as DNA stain contains RNAse and propidium iodide. After 20 min of incubation at room temperature and dark, flow cytometry analysis was done with EPICS XL-MCL (Beckman Coulter, USA) in 2 h. Daily standardization and calibration was checked with flow check and flow set fluorospheres (Beckman Coulter, USA). Measurements were made with FS (Forward Scatter), SS (Side Scatter), FL3 and AUX FL3 parameters. As a reference of diploidy, lymphocytes obtained from healthy donors were used. Data analysis was evaluated for cell cycle statistics with MultiCycle Analysis (Phoenix Flow Systems, USA) software.

The general architecture was that of a highly cellular neoplasm composed of a monotonous population of small round to oval cells. The nuclei exhibited finely distributed chromatin and small nucleoli. Apart from small cells, there were multinuclear and bizarre shaped pleomorphic cells scattered within the tumor. Their cytoplasms were scanty. They formed patternless sheets and Homer–Wright rosettes in some areas. The small cells intermingled with varying amounts of mature adipose cells (Figure 3). The adipocytes had a single fat vacuole and peripherally located, indented nucleus and other vacuoles were of variable size (Figure 4). The vasculature was formed of delicate capillaries and medium-sized vessels with perivascular hyalinization. The mitotic index was very low (less than 1 per 10 high power field). There was no obvious invasion in cerebellar tissue. The reticulin pattern was not observed in Gomori’s stain. Positivity of GFAP was limited to some intercellular spaces and around blood vessels (Figure 5). Staining with synaptophysin was diffuse and especially strong within rosette areas (Figure 6). We

Figure 1. An axial T2 weighted MR image of the lesion located in the fourth ventricle.

Figure 2. A sagittal T1 weighted MR image, displaying the tumor that is extending into the third ventricle through the aqueductus sylvi.

Figure 3. Highly cellular neoplasm composed of a monotonous population of small round cells intermingled with varying amounts of mature adipose cells. (H&E × 40).

Figure 4. High power of the adipocytes demonstrate mostly solitary large vacuole, with eccentric compression of the nucleus. (H&E × 200).