Development of an intracranial mass-like lesion during growth hormone treatment in a pediatric patient with history of medulloblastoma

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Abstract:

In this brief report we describe an extraordinary case of a pediatric patient with a history of medulloblastoma who developed an intracranial mass-like lesion during growth hormone treatment. To our knowledge this is the first case report of a mass-like lesion as a consequence of parenchymal fluid leakage adjacent to an intra-ventricular catheter due to increased intracranial pressure during growth hormone therapy which has been proven by biopsy.

Introduction:

Growth hormone deficiency is one of the most common long-term side effects of the treatment of childhood brain tumors with radiation therapy of the craniospinal axis. Growth hormone replacement therapy is known to be associated with a slightly increased risk of developing intracranial hypertension [1] whereas the potential associated risk of brain tumor recurrence or development of secondary malignancies due to its mitogenic nature has not been established [2,3,4].

Results:

Against this background we would like to draw the attention to an interesting case of a five-year-old boy, who had been treated for a group 3 medulloblastoma with leptomeningeal metastases originating from the fourth ventricle in 2016. Therapy consisted of surgery and chemotherapy (systemic and intrathecal administration due to age at diagnosis). Initial therapy was followed by high dose chemotherapy and radiotherapy of the craniospinal axis (54.6 Gy posterior fossa radiation; 24 Gy to the craniospinal axis) due to residual disease. An Ommaya drain in the right frontal horn of the lateral ventricle was placed 9 days after surgery due to hydrocephalus. He presented at the emergency room in May 2019 with history of new swelling around the drain reservoir since several days and new onset of nausea and vomiting. The patient had been treated with growth hormone during one month before presentation with a dosage of 0,7 mg/m^2 initially. Due to severe facial edema the dosage had been reduced to 0,2 mg/m^2 seventeen days before presentation. Twelve days before presentation the dosage had been slightly increased (0,3 mg/m^2). Two days before presentation the dosage had been reduced to 0,2 mg/m^2 due to increased fluid retention. At clinical examination there was a remarkable swelling around the Ommaya reservoir without any neurological symptoms. Within one day after admission to the hospital, the patient's consciousness decreased. CSF puncture showed an opening pressure of 240 mm Hg. CSF examination did not show signs of infection or malignancy.

Unenhanced CT scan was performed initially to screen for signs of increased intracranial pressure. The white matter was diffusely hypodense in almost the entire right frontal lobe with sparing of the grey matter. There was subfalcine herniation and slight uncal herniation on the right side. MR examination of the brain and spinal axis was performed on the same day (Figure). Interestingly, there was a lesion of approximately 4 cm diameter with signal intensity of fluid on all sequences adjacent to the drain with a big amount of surrounding vasogenic edema. The lesion showed neither diffusion restriction nor increased perfusion or enhancement after administration of intravenous Gadolinium. There were no signs of a dural sinus or cortical venous thrombosis.

Open biopsy was performed one day after the MRI scan and showed neither malignancy (recurrent medulloblastoma or other malignancies like lymphoma) nor infection or inflammation.
The patient recovered to preexistent clinical condition.

Discussion:

Given the history of the patient and the results of imaging studies and open biopsy, we concluded that the observed lesion in the right frontal lobe most probably resulted from fluid leakage adjacent to the drain due to increased intracranial pressure during growth hormone treatment. To our knowledge this is the first case report of a mass-like lesion as a consequence of parenchymal fluid leakage adjacent to an intraventricular catheter due to growth hormone therapy which has been proven by biopsy.

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Figure legend:

Figure: Representative slices of the performed unenhanced CT (left) and MR (right) examination (T2-weighted sequence)