Distinctions between pituicytoma and ordinary pilocytic astrocytoma

Case report

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The term “pituicytoma” was originally applied to a tumor that was presumed to have originated from pituicytes. Now, however, this term is widely applied to other kinds of astrocytomas that arise in the neurohypophysis, especially pilocytic astrocytomas. In this report, we present a case of astrocytic tumor of the pituitary gland. The term pituicytoma and its neuroimaging, anatomical, and histopathological features are discussed.

Case Report

History and Examination. This 32-year-old woman had a 1-year history of amenorrhea and was referred to our hospital for evaluation of a mass on the pituitary gland. Neurological examination revealed a visual field defect in the left upper quadrant of the left eye. A small amount of galactorrhea was observed. A hormone study showed mild hyperprolactinemia (21–51 ng/ml) with a normal response to thyroid hormone–releasing hormone. Levels of other pituitary hormones were normal with regard to both their base amounts and their responses; thyroid function was also normal. On MR images an intrasellar mass was demonstrated that extended up to the suprasellar region and that was isointense on both T₁- and T₂-weighted images (Fig. 1). A dynamic MR study performed after Gd injection revealed marked homogeneous enhancement of the tumor from the early phase (Fig. 2).

Operation. Transsphenoidal surgery was performed following a preoperative diagnosis of nonfunctioning pituitary adenoma, although the dynamic MR study demonstrated atypical early enhancement. The tumor was grayish-white and harder than an ordinary pituitary adenoma, and microscissors as well as curettes were needed to resect it. It also bled easily, so that gross-total removal was achieved only after an overall blood loss of 250 ml, which was much greater than the amount accompanying ordinary pituitary adenoma surgery.

Postoperative Course. The postoperative course was uneventful except for diabetes insipidus, which has lasted for 1.5 years.

Histopathological Findings. The tumor consisted of cells with eosinophilic fine processes, which tended to form bundles around the blood vessels (Fig. 3). Oval- or spindle-shaped nuclei were aligned outside of these bundles. Levels of other pituitary hormones were normal with regard to both their base amounts and their responses; thyroid function was also normal. On MR images an intrasellar mass was demonstrated that extended up to the suprasellar region and that was isointense on both T₁- and T₂-weighted images (Fig. 1). A dynamic MR study performed after Gd injection revealed marked homogeneous enhancement of the tumor from the early phase (Fig. 2).

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Histopathological Findings. The tumor consisted of cells with eosinophilic fine processes, which tended to form bundles around the blood vessels (Fig. 3). Oval- or spindle-shaped nuclei were aligned outside of these bundles. Some irregular space was formed in this region to make pseudopapillary patterns. Neither cilia nor ependymal rosette formation were seen in cells facing the narrow extracellular space. A single mitotic event was found in the entire field. Although the tumor had abundant vessels, there was no abnormal endothelial proliferation or necrosis; Rosenthal fibers and granular bodies were also lacking. Increased reticulin fibers were observed around the
blood vessels after silver impregnation; however, these fibers did not surround each tumor cell.

The tumor was examined by indirect immunoperoxidase staining with antibodies against GFAP (polyclonal, 1:1000; Dako, Glostrup, Denmark), S100 protein (polyclonal, 1:400; Novocastra, Newcastle upon Tyne, UK), CD44 (monoclonal [clone A3D8], 1:20; Sigma Chemical Co., St. Louis, MO), CD56 (monoclonal [clone 1B6], 1:100, Novocastra), epithelial membrane antigen (monoclonal [clone E29], 1:100; Dako), keratin (monoclonal cocktail [clones AE1/AE3], 1:100, Dako), vimentin (monoclonal [clone V9], 1:100; Novocastra), smooth-muscle actin (monoclonal [clone 1A4], 1:100; Novocastra), desmin (monoclonal [clone DERII], 1:100; Novocastra), carcinoembryonic antigen (monoclonal [clone COL-1], ready to use; Nichirei, Tokyo, Japan), p53 protein (monoclonal [clone DO7], 1:100; Novocastra), and Ki-67 (monoclonal [clone MIB-1], 1:100; Immunotech, Marseilles, France). As a result, most tumor cells were immunoreactive for GFAP, S100 protein, CD44, CD56, and vimentin, and negative for epithelial membrane antigen, keratin, smooth-muscle actin, desmin, carcinoembryonic antigen, p53 protein, and Ki-67. There was no transition from tumor tissue to normal adenohypophysis, which was included in the resected specimen.

Because these findings were distinct from those of ordinary pilocytic or other types of astrocytoma and met the criteria recently proposed by Brat, et al., the histologically confirmed diagnosis was pituicytoma.

Discussion

Gliomas that arise in the pituitary gland are extremely rare and are usually astrocytomas. The term pituicytoma was originally applied to astrocytic tumors that were presumably derived from pituicytes of the neurohypophysis, because pituicytes are likely a variant of astrocytes. Some authors, however, have referred to pilocytic astrocytomas involving the pituitary stalk and posterior lobe as pituicytomas. Recently, Brat, et al., reported nine cases of pituicytoma and indicated that this tumor has different histological characteristics from pilocytic or other astrocytomas, and thus should be classified separately. They noted the following differences from pilocytic tumors: 1) pituicytomas feature plump spindle-shaped cells with slightly fibrillar cytoplasm, which is different from the elongated, heavily fibrillated cells seen in pilocytic astrocytomas; and 2) pituicytomas lack Rosenthal fibers, microcysts, and granular bodies, whereas these are commonly seen in pilocytic tumors. It is not clear whether the cases reported in the literature as pituicytoma or other astrocytomas of the pituitary gland were different from what Brat, et al., call pituicytoma, or whether any of these could be considered to be pituicytes in origin even after careful examination. The resected specimen in our case showed histological characteristics similar to those described by Brat, et al. Furthermore, positive immunoreactivity for CD44 and CD56, which these authors had not shown but which is known to be expressed by a majority of astrocytic tumors, was demonstrated in our case.
As for neuroimaging features, pituicytoma, which is distinct from other astrocytomas, is likely to be a solid, contrast-enhancing sellar or suprasellar mass. Its specificity on neuroimaging studies, that is, its differentiation from other pituitary tumors, is still unclear. It is well known that pituitary adenomas manifest gradual enhancement after injection of contrast medium. Although it has never been discussed before, the rapid enhancement in the dynamic MR study in the present case may be a characteristic feature of pituicytoma, reflecting a developed capillary network. Even if it is, however, distinguishing pituicytomas from ordinary pilocytic astrocytomas or intrasellar meningiomas based on this feature may still be difficult. Furthermore, it may not even be practical to perform a dynamic MR study for every pituitary tumor that seems to be an adenoma, considering the cost/benefit ratio and rarity of the disease.

Rapid and marked contrast enhancement indicates that the tumor receives a rich blood supply. This was confirmed histologically in that the specimen included developed blood vessel networks, and intraoperatively by the fact that the tumor bled more than common adenomas. When resecting a brightly enhanced sellar tumor, one should be prepared for more serious bleeding than with ordinary-looking adenomas.

References


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