Prostatic adenocarcinoma metastatic to chronic subdural hematoma membranes

Case report

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A case of adenocarcinoma of the prostate metastatic to chronic subdural hematoma membranes is presented. The relevant literature is reviewed and the mechanism of transdural invasion by metastatic tumor cells is discussed.

KEY WORDS □9 subdural hematoma □9 subdural hematoma membrane □9 subdural metastasis □9 prostatic adenocarcinoma □9 dural metastasis

Prostatic carcinoma, the second most common malignancy found in American males, rarely metastasizes to the central nervous system, and when it does it affects the spinal cord more frequently than the brain. Only 30 cases of metastatic prostatic carcinoma to the brain and 30 cases of subdural hematomas associated with dural metastasis from any source can be found in the literature. Even more unusual is the metastasis of prostatic carcinoma to the dura and the subdural space. Among the eight such cases reported, only five involved subdural hematomas.

A case is reported in which previously undiagnosed intracranial metastasis from a prostatic carcinoma invaded the subdural space, infiltrated the chronic subdural hematoma membranes, and was associated with acute hemorrhage into a chronic subdural hematoma.

Case Report

This 64-year-old male with a history of heavy alcohol and tobacco use initially presented for evaluation to another hospital. He complained of acute lower-extremity weakness with difficulty in walking, a progressive 30-lb weight loss over 1 year, dehydration, and bone pain in the upper part of his chest and the right side of his face.

Examination. Physical examination demonstrated a hard nodular prostate, a left hemiparesis, and an inability to walk. Radiological studies included a chest roentgenogram which showed no evidence of tumor and a computerized tomography (CT) scan of his head which revealed a right frontotemporal chronic subdural hematoma (Fig. 1). Needle biopsy of the prostate yielded a specimen diagnostic for adenocarcinoma of the prostate. The patient was transferred to our institution for treatment of the mass effect of the subdural collection and his mild left hemiparesis.

FIG. 1. Preoperative computerized tomography scan showing the extent of a chronic subdural hematoma (small arrows) and membranes of varying ages (large arrow).
Operation. A right temporal craniotomy was performed for evacuation of the subdural hematoma. At surgery the subdural hematoma was found to be multilayered and membranous, with loculations containing hematomas of varying ages from acute to chronic. Over the posterior frontoparietal region, the subdural membranes appeared hypervascular and hemorrhaged easily. The dura was mildly hyperemic, without evidence of a breach or mass lesion within the dura itself. The calvarial flap was unremarkable on gross examination and a postoperative skull x-ray film showed normal bone density without gross evidence of metastasis to the bone. Although the patient developed a late scalp infection requiring removal of the bone flap, he gained strength steadily and was able to walk without assistance within 1 month. A postoperative CT scan demonstrated resolution of the subdural collections.

Pathological Examination. On histological examination of the pathology specimen, multiple layers of subdural hematoma membrane, pieces of dura mater, and fragments of bone from the craniotomy bone plate sampled at the original surgery were all infiltrated by nests of small cells with hyperchromatic nuclei. Some nests were composed of cells with clear cytoplasm. Immunoperoxidase staining for prostate-specific antigen was positive in areas of tumor. Periodic acid-Schiff staining for glycogen was negative. From these findings, a diagnosis of poorly differentiated carcinoma of the prostate metastatic to the subdural hematoma membranes was made (Fig. 2). A subsequent bone scan showed widespread skeletal metastases including the calvaria.

Postoperative Course. The patient refused orchietomies and agreed to chemotherapy for treatment of his prostatic carcinoma. At the 3-month follow-up examination, the patient's condition remained stable and he could walk without difficulty. Repeat bone scan showed no increase in his metastatic disease.

Discussion

The extreme rarity of subdural invasion by metastatic prostatic carcinoma has been attributed to the role of the dura mater as an effective barrier to such carcinomas. Even when prostatic carcinoma causes extensive metastases to the bone, the dura mater is rarely if ever breached by the tumor cells. In the few cases in which subdural hematomas were associated with breach of the dura mater by prostatic carcinoma, it was suggested that the tumor caused the subdural hematomas by a variety of mechanisms, including hemorrhagic effusion from dural metastases, dural vessel obstruction by tumor cells, or angio-desmoplastic response of the dura to tumor invasion.

Alternatively, we suggest that chronic subdural hematomas, by no means rare among older men and typically associated with membrane formation, may be the mediator of subdural invasion of tumor cells which would otherwise be barred from the subdural space. The process of subdural membrane formation with neovascularization in both the membrane and dura may alter the barrier characteristics of the dura mater in a way that allows either direct or hematogenous spread of prostatic carcinoma cells across the dural membrane. Once these membranes have been seeded, they may become hypervascular or increasingly fragile. This may account for multiple repeat hemorrhages.
within the subdural compartment which result in the septated nature of the loculations of varying ages, suggesting a "stuttering" course of rebleeding.

This case is instructive in that the patient’s presenting symptom for widely metastasized adenocarcinoma of the prostate was mild hemiparesis associated with mass effect from an acute hemorrhage into the chronic subdural hematoma membranes. The widespread nature of his disease became apparent only after abnormal appearing subdural hematoma membranes were submitted for pathological examination. The identification of metastatic prostatic carcinoma in those same membranes lends support to our theory that the neovascularization of chronic subdural hematoma membranes and dura mater compromises the effectiveness of the dura mater as a barrier to tumor cells invading the subdural space. Although it is possible that the subdural metastases resulted from direct extension of the calvarial metastases seen on bone scanning, there was no gross abnormality of the dura other than the focal hyperemia at the site of the subdural membrane metastases. In patients with known prostatic carcinoma, any hemorrhage in the brain should suggest the possibility of metastasis.4

Our patient improved remarkably in motor strength after evacuation of the subdural hematoma and has continued to do well after a course of chemotherapy. Even in the face of widespread metastases, aggressive treatment yielded a reasonable prognosis for a patient whose condition might otherwise have deteriorated rapidly.

References

Manuscript received March 5, 1987. Accepted in final form October 22, 1987.
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