Spinal subarachnoid hemorrhage associated with leptomeningeal metastases

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Key words: leptomeningeal metastases, spinal neoplasms, subarachnoid hemorrhage

Summary

Retrospective evaluation of 120 patients treated for leptomeningeal metastases at the Hadassah Hebrew University Hospital disclosed 3 patients with spontaneous spinal subarachnoid hemorrhage (SAH) occurring in the absence of bleeding tendency. These patients are described in detail. A search of the English literature revealed only 2 additional cases. The primary neoplasm originated in the central nervous system in 4 of these 5 patients; a resection of an intraparenchymal posterior fossa tumor antedated the development of subarachnoid seeding in 3 of the 5 patients; SAH occurred in face of a negative CSF cytology and in the presence of macroscopic subarachnoid deposits that were diagnosed with the aid of neuroimaging techniques. It is suggested that spontaneous spinal SAH in a patient with a history of primary or secondary brain tumor and with no bleeding tendency indicates probable presence of macroscopic leptomeningeal deposits.

Introduction

Subarachnoid hemorrhage (SAH) complicating spinal intradural tumor is rare, and is most frequently reported in association with ependymomas [1]. Occasionally the bleeding is related to neurofibromas, meningiomas, astrocytomas or other locally arising neoplasms [1–5]. Metastatic intradural extramedullary tumors associated with SAH have been previously described in only 2 case reports [6, 7]. We present 3 additional patients whose manifestations of spinal leptomeningeal metastases were associated with SAH in the absence of bleeding tendency. They were encountered during a retrospective evaluation of 120 patients with leptomeningeal metastases treated in the Neuro-Oncology Clinic of the Hadassah Hebrew University Hospital between 1980 and 1989.

Case reports

Case 1
A 16 year-old girl was admitted on October 1981 for investigation of headaches, vomiting and nystagmus. Computed tomographic (CT) scan demonstrated an enhancing midline cerebellar mass which was completely resected and diagnosed as medulloblastoma. A postoperative staging myelogram disclosed irregular thickening of the cauda equina nerve roots, suggestive of malignant infiltration. The cerebrospinal fluid (CSF) was clear and colorless with elevated protein level and negative cytology.

After completion of radiotherapy (whole brain: 4000 cGy, posterior fossa boost: 1500 cGy, spinal cord: 3950 cGy), repeated myelogram and CSF analysis were interpreted as normal. Six months later she developed diplopia, low back pain and a bilateral positive straight leg raising sign. CSF evaluation revealed an increased opening pressure and
an acellular fluid with a high protein level. She was treated with intrathecal and intraventricular methotrexate for a presumed symptomatic leptomeningeal seeding. Repeated CSF analyses showed no malignant cells, the level of protein gradually returned to normal, and the patient's symptomatology subsided.

In August 1982, over several days, she developed a severe headache, neck pain and pain radiating into both upper extremities. On examination neck stiffness was prominent and hypoesthesia of the right C6-C8 segments was noted. CSF analysis was repeated twice and showed high opening pressure, xanthochromic fluid containing $1 \times 10^4 - 2 \times 10^4$ RBC/mm$^3$, 724 mg/l total protein (normal 200-600 mg/l), 12 WBC/mm$^3$ and negative cytology. Head CT scan revealed no evidence of tumor recurrence, nor contrast enhancement or blood in the subarachnoid space. The blood coagulation profile was normal. Myelogram demonstrated an intradural extramedullary mass at C3-C6 vertebral levels, encasing the cervical nerve roots. Additional radiotherapy to the cervical area was given (2000 cGy) with rapid clinical improvement. The lumbar puncture, performed at completion of radiotherapy, did not contain erythrocytes. Eight months later she developed a progressive quadriparesis due to a massive spinal seeding and died after failing to respond to cisplatin chemotherapy.

**Case 2**

A 49 year-old woman had undergone an abdominoperineal resection of a rectal adenocarcinoma in 1984. There was no evidence of an active disease until August 1988, when she presented with headaches and left cerebellar syndrome. CT scan demonstrated a single enhancing left cerebellar mass. The mass was resected and diagnosed as a metastatic adenocarcinoma. Following a postoperative radiotherapy course (whole brain: 5000 cGy, posterior fossa: 1260 cGy), a repeated CT study showed no evidence of residual tumor. Six months later a right Horner syndrome was noted and subsequent investigation revealed a right lung mass, liver metastases and pericardial effusion. Radiotherapy to the mediastinum, followed by 5-Fluorouracil chemotherapy resulted in marked clinical response.

In April 1989 she was admitted because of severe low back pain, incontinence and paraparesis of several days duration. On examination, percussion over the lower thoracic vertebrae caused severe pain, the straight leg raising sign was positive bilaterally and there were no antigravity muscle movements. Hyporeflexia of the lower extremities was evident with equivocal plantar reflexes. A sensory deficit was present up to the level of T10. A CT-myelogram study revealed a complete subarachnoid block at T10 and T11 levels secondary to an intradural extramedullary mass. The CSF was xanthochromic with 1820 mg/l total protein, $8 \times 10^3$ RBC/mm$^3$, 25 WBC/mm$^3$ and negative cytology. The blood coagulation profile was normal. Following the first dose of spinal irradiation (200 cGy), she became paraplegic and underwent an urgent decompressive surgery. The intradural tumor mass was located at the vertebral level of T10-T11. It measured 2.5 x 1.0 cm, penetrated the arachnoid and was surrounded by a blood clot that trailed cephalad. A complete macroscopic resection was followed by the rest of radiotherapy course. The tumor was diagnosed as a metastatic adenocarcinoma. The patient completed our treatment protocol for intraventricular chemotherapy [8], her CSF cytology has been consistently negative and she is maintained on systemic chemotherapy. Her neurological status is gradually improving, she regained sphincteric control and is ambulatory with a walker (last follow up – January 1991).

**Case 3**

(partially described in reference 9). A 17-year old girl was hospitalized in August 1984 with a two months history of headaches and vomiting. Physical examination revealed bilateral papilloedema and a minimal left hemiparesis. CT scan showed an enhancing intraaxial lesion at the cranio-cervical junction. A suboccipital craniotomy and laminectomy of C1 were performed and a complete macroscopic removal of an intramedullary tumor was accomplished. The tumor was diagnosed as a low grade fibrosarcoma. No radiotherapy was given in light of this diagnosis.