Association of Breast Cancer With Meningioma

A Report of Five Cases

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Five patients with diagnosed breast cancer who developed meningiomas are reported. The literature contains reports of an additional 25 such patients. Some authors have noted hormonal sensitivity and the presence of hormone receptors in some meningiomas. Because breast cancer is a common tumor of women, it is probable that any association between breast cancer and meningioma is fortuitous. Two patients in this small series each had a sister with breast cancer, one of them also had three other first-degree relations with colon cancer. Three of the patients had other tumors as well as breast cancer. It is important to fully investigate brain lesions in patients with breast cancer so that potentially curable meningiomas are not mistaken for metastases.

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AN ASSOCIATION BETWEEN CARCINOMA of the breast and meningioma has been noted in the literature, and possible epidemiologic and hormonal relationships have been suggested.[1-9] Meningioma is a common intracranial tumor accounting for 19% of all central nervous system tumors.[1] Meningiomas occur twice as often in women as in men, usually in the fifth and sixth decades.[1,4] Our interest in the coincidence of these diseases was prompted by five patients with breast cancer, who also had proven meningiomas. We discuss the potential significance of this observation.

Case Reports

Case 1

A 43-year-old woman had a left radical mastectomy for an intraductal comedocarcinoma that demonstrated one area of microinvasion. Histopathologic examination of the lymph nodes was negative. Loss of vision in her right eye after an injury 6 to 8 weeks previously had resulted in her hospital admission, when a breast lump was found on routine examination. A skull radiograph was said to be normal then, as was a right carotid angiogram 1 year later. The vision in the right eye subsequently improved spontaneously. Sixteen years later, she was admitted to hospital complaining of headaches and a seizure. A computed tomography (CT) scan and angiography suggested a diagnosis of meningioma. Craniotomy 9 months later revealed a suprasellar mass described as a "huge tumor involving the right optic nerve, very adherent". A sub-total excision was done. Pathologic review revealed the tumor to be a histologically benign meningioma of meningothelial type with numerous psammoma bodies. She refused radiation therapy and is still being followed 1 year later with no symptoms.

Case 2

A 43-year-old woman had a right radical mastectomy with postoperative radiotherapy for infiltrating adenocarcinoma with negative nodes. Seven years later she developed severe headaches. A radionuclide brain scan with skull radiographs suggested a diagnosis of meningioma in the right parietal region. Craniotomy was performed a month later with total excision of a meningioma in the right parietal region. Pathologic review confirmed it to be of mixed meningothelial and fibroblastic type with many psammoma bodies. The tumor was histologically benign.

Three years later, she had a right radical nephrectomy for renal cell carcinoma. Up to her last follow-up visit, 9 years later, she was symptom-free. There was no family history of cancer.

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Case 3

A 66-year-old woman had a right total mastectomy followed by radiotherapy for a breast cancer, staged T4B N2 MO (International Union Against Cancer [UICC] TNM staging, 1973), estrogen receptor (ER) = 28, progesterone receptor (PR) = 17. During investigations to exclude metastases, grossly abnormal skull appearances were detected on radiographs. A radionuclide bone scan showed a large, lobulated mass just above the lesser wing of the right sphenoid. A CT scan suggested the diagnosis of a meningioma.

Three months later, the patient had a right frontal craniotomy with total removal of a "huge" medial sphenoid wing meningioma. Unfortunately, hormone receptor assays were not done on the tissue. Pathologic review revealed it to be a meningioma of mixed meningothelial and fibroblastic type. Up to the time of her craniotomy she claimed to have been totally asymptomatic and results of a neurological examination were said to be normal. This patient has since developed widespread disease with bone and soft tissue metastases. Fifteen years earlier, she had had a left sub-total thyroidectomy for "low grade follicular thyroid carcinoma", followed by thyroid ablation with radioactive iodine. Her family history included a sister who died of breast cancer shortly after diagnosis at age 36.

Case 4

This 46-year-old woman underwent a left total mastectomy and prophylactic oophorectomy for breast carcinoma. Three months later, she had a right prophylactic total mastectomy. Histopathologic examination of the left breast was reported as showing "multi-focal lobular carcinoma of borderline malignancy, and areas of florid sclerosing adenosis." The right breast revealed severe adenosis only.

For the next decade, this patient complained of a facial "tic" limited to her left eye-lid and left cheek. Numerous investigations and consultations, including electroencephalogram and radionuclide brain scans had been reported as negative when, for the first time, she had a CT scan of her brain, reported as possibly revealing a meningioma. A craniotomy confirmed a right frontoparietal meningioma, which was then totally removed. Histopathologic examination revealed it to be of meningothelial type with many psammoma bodies and foci of calcification. She has remained well up to 3 years later, when she was last seen.

At the time of the left mastectomy, a coin lesion on a routine chest radiograph resulted in a right lobectomy, the tissue revealing a bronchial adenoma, carcinoid type, as well as a sarcoid-like granuloma. Her family history included breast cancer in an identical twin who had bilateral mastectomies (treated in another country, with details not available), and colon cancer in her father, brother, and another sister.

Case 5

In 1976, a 57-year-old woman had a craniotomy for meningioma (details not available) and was still taking phenytoin in 1979 when she was treated for carcinoma of her right breast (Grade III infiltrating adenocarcinoma) by wide excision and radiotherapy.

In 1980, she presented with a history of continuing seizures and recent visual loss. A CT scan of brain a year later revealed substantial recurrent meningioma confirmed by craniotomy. Histopathologic review revealed it to be a meningioma with evidence of malignant degeneration and cerebral cortical invasion.

This patient was followed by letters of enquiry only, up to August 1984, when she died of meningioma, although no details are available of her investigations from 1981 to 1984. As far as can be ascertained there was no spread of her breast cancer up to the date of her death. Her family history is unknown. She was registered in 1972 with carcinoma *in situ* of the cervix.

Discussion

Between 1967 and 1984 registration of breast cancer by the Alberta Cancer Registry was 98% of the total breast cancer patients in northern Alberta. Although meningiomas are not routinely registered by the Alberta Cancer Registry unless malignant, we assume that the five patients reported here, represent most of the patients with breast cancer and meningioma, as 90% of all breast cancer patients are seen at the Cross Cancer Institute and their charts are regularly reviewed. During this time, approximately 4000 women were registered in northern Alberta with breast cancer, giving a 1 to 800 ratio between meningioma and breast cancer, which is considerably less than the 1.2% reported by Smith *et al.*[7] from the Memorial Hospital, and probably less than "the excess of observed to expected cases, 8:3.37" reported by Schoenberg *et al.*[1] The mean ages at diagnosis of breast cancer (51 years) and of meningioma (57 years) in the five patients described are similar to those in other reported series.[10,11]

The occurrence of other tumors as well as meningioma and breast cancer in three of the patients appears consistent with the observation of Schoenberg and colleagues that there is a higher percentage of meningioma in patients with multiple primary tumors.[1]

A possible hormonal relationship has been suggested by Donnel *et al.*[3] They showed a very high concentration of ER in two of six patients with meningiomas. Courriere *et al.*[2] have reported positive PR in 10 of 20 meningiomas, but none had positive ER. The increased frequency of meningiomas in women compared with men and the rapidly progressive course of these tumors in pregnant patients also suggest a hormonal relationship.[5,6,9,12]

No such hormonal relationship was evident in our patients, most of whom were at or beyond menopause. Receptor assays were done on tissue from only one of the breast carcinomas and on none of the meningiomas because facilities for such assays were not available at the time of diagnosis.

Mehta *et al.*,[4] recommend that hormonal receptor assays should be done on all meningiomas and especially in patients already known to have breast carcinoma, as

it is possible that hormonal therapy may be useful in some cases. Another potential role for hormonal manipulation might be in advanced recurrent meningiomas after surgery and radiation therapy have failed.

The relative frequency of metastatic breast cancer *versus* meningioma as a symptomatic intracranial lesion in the patients treated for breast cancer during the years of this study was 54 to 1. Breast carcinoma is very common and frequently metastasizes to the brain. It is important not to assume that all intracranial lesions in these patients are metastatic. Because most meningiomas are resectable, such lesions should not be treated palliatively until full investigation has been undertaken.

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