

Carcinoma of the Breast and Meningioma

Association and Management

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An association between carcinoma of the breast and meningioma has been recognized recently. Three more cases are added to the few previously reported in the literature. An awareness of this association together with modern techniques of investigation, particularly CAT scanning, may permit earlier diagnosis and treatment of more cases. Meningioma as well as carcinoma of the breast is more common in women and the incidence of both tumors reaches a peak in the fifth and sixth decades. Both are related to pregnancy and have an estrogen-receptor protein. Lesions of the central nervous system following the diagnosis and treatment of breast cancer are usually presumed to be metastatic. Therefore, these lesions may be irradiated without complete clinical investigation. If the clinician is aware of this association, appropriate diagnostic procedures could lead to the surgical removal of a benign meningioma. Skull x-rays, bone scan, brain scan, CAT scan, and cerebral angiograms are useful in making a diagnosis. Besides surgery, radiation therapy and hormonal therapy may play a role in the management.

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Case Reports

Case 1

A 57-year-old woman was admitted to The Brooklyn Hospital for the first time in December 1972, with a complaint of imbalance for a period of two months. There was no mass on breast examination. X-ray of the skull revealed demineraliza-

tion of the dorsum sella and the posterior clinoid process. Brain scan showed a well defined midline lesion with increased activity. Bilateral carotid angiogram demonstrated a large subfrontal mass with intensive and persistent tumor staining and prominent vascular supply from the right ophthalmic artery. A diagnosis of an olfactory groove meningioma was made. In January 1973 a craniotomy was performed with removal of an olfactory groove meningioma. She was discharged two weeks after surgery without any neurological deficit. In October 1973 she was readmitted for excision of a leptomeningeal cyst at the site of previous craniotomy and was discharged in satisfactory condition. In December 1974 she was found to have carcinoma of the breast and a left radical mastectomy was performed. In March 1976 the patient was readmitted with low back pain due to metastasis to the lumbar spine. She received 3000 rad of Cobalt 60, in two weeks, locally. Systemic chemotherapy of 5-fluorouracil (5 FU), Cytosan (cyclophosphamide) and methotexrate was also started. In May 1977 she had a total hip replacement following a pathologic fracture of the left hip. In December 1978 she died due to visceral metastasis. She had no evidence of central nervous system metastasis.

Case 2

A 76-year-old woman underwent a left radical mastectomy in October 1977 at The Brooklyn Hospital for carcinoma of the breast. In June 1981 she was readmitted for an episode of seizure and history of an occasional headache. She was investigated for a possible metastatic lesion to the brain. Brain scan revealed a large round tumor mass in the left posterior parietal region. CAT scan showed a smoothly marginated well defined mass of high density in the same area. Left selective carotid

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TABLE 1. Differential Diagnosis of Meningioma from Metastatic Lesions

	Meningioma	Metastasis
X-ray Skull	Hyperostosis	—
Bone scan	Well-defined lesion with increased uptake	Irregular lesion
Brain scan	Well-defined lesion with increased uptake	Irregular lesion
CAT scan	Well-defined mass with high density	Irregular mass with low density
Cerebral angiogram	Usually midline meningeal arteries prolonged staining	Randomly distributed cortical arteries early drainage of veins

angiogram demonstrated the presence of large mass in the left posterior parietal region. In June 1981 a craniotomy was performed with total excision of the mass which was subsequently reported as meningioma by histopathologic study. She has been free of symptoms since with no recurrence of the breast cancer.

Case 3

A 73-year-old woman underwent right radical mastectomy in August 1980 at The Downstate Medical Center for carcinoma of the breast. In November of 1981 she was readmitted with complaints of headache, unsteady gait, and poor memory of three weeks duration. On admission, neurological examination revealed her to be alert and oriented but somewhat forgetful and confused. Her speech was normal. There was bilateral papilledema, mild dysarthria, nystagmus on right lateral gaze, and truncal ataxia. General examination revealed

a healed mastectomy incision and some enlarged lymph nodes in the left supraclavicular region. Routine blood and urine tests were normal. Brain scan revealed a large mass in the right posterior fossa. CAT scan revealed a very large tumor in the posterior fossa to the right of the midline, which was regular, more dense than brain, surrounded by edema and intense enhancing. A cerebral arteriogram performed showed a very large, mostly avascular tumor with some blood supply from the right posterior cerebral and superior cerebellar arteries. On November 4, 1981, a left ventriculoperitoneal shunt and left supraclavicular lymph node biopsy were performed. The biopsy specimen showed only inflammation. The shunt worked well and eventually her status improved considerably. On November 13, 1981, she underwent a craniotomy with total excision of the mass in the posterior fossa which was subsequently reported as meningioma by histopathologic study. She had an uneventful postoperative recovery and since then has been asymptomatic.

Discussion

Association

Carcinoma of the breast is more common in women, the peak age between 45–60 years. A history of breast cancer in the immediate family places a woman at a greater risk.¹ Hormonal factors play an important role in the incidence and development of breast cancer. MacMahon has stated that the ovaries clearly are the prime target for etiologic investigations in breast cancer.² Estrone and Estradiol are carcinogenic. Estriol, the production of which increases during pregnancy, is non-carcinogenic. Estrogen-receptor proteins present in carcinoma of the breast are primarily of the 8s variety when measured by the sucrose gradient method.³ Sixty percent of breast cancer cases have estrogen-receptor protein.

Meningiomas occur twice as frequently in women than men and usually manifest symptoms in the fifth and sixth decade.⁴ The relationship between pregnancy and rapid progression of symptoms in patients with meningioma was described by Cushing and Eisenhardt in 1929.⁵ Since that time many authors have postulated that an acceleration in the growth rate of the tumor may occur perhaps secondary to hormonal changes.^{6–8} The epidemiologic factors and clinical course of some meningiomas suggest that these tumors may be hormonally sensitive. Donnell *et al.*⁹ reported the presence of the 4s and 8s fraction of estrogen-receptor protein in their study. Posner,¹⁰ in an autopsy based retrospective study of 324 patients with end stage breast cancer, found four cases of meningioma, and incidence of 1.2% which is significantly higher than in the general population. Two additional breast cancer patients under his care underwent successful excision of meningiomas.¹⁰ Meningiomas are benign curable lesions accounting for 12–

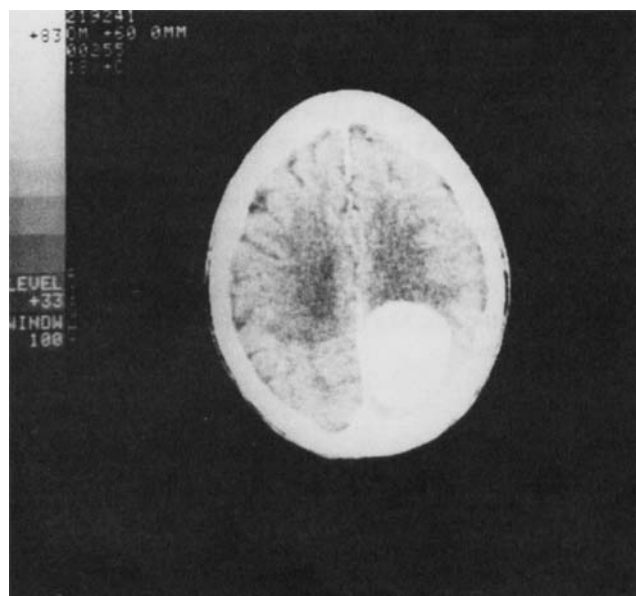


FIG. 1. Meningioma.

20% of all intracranial tumors. Although usually solitary lesions, they may be multiple in up to 3.4% of all cases.¹¹ About 8–10% of Stage IV breast cancer patients have central nervous system involvement. A physician finding a lesion of the central nervous system, in association with carcinoma of the breast is likely to presume that it is metastatic and complete clinical investigation may not be carried out. Schoenberg *et al.*⁸ in a retrospective study of nervous system neoplasms and primary malignancies of other sites found a unique association between meningiomas and breast cancer. Among eight cases reported, five had breast cancer first and meningioma was subsequently diagnosed, and three patients with meningioma subsequently developed breast cancer.⁸ Seventy-five percent of the meningiomas in their study were symptomatic. Smith *et al.*² in 1978 reported two cases of meningioma following breast cancer. In the first case, central nervous system manifestations developed two weeks after mastectomy. A brain scan revealed two lesions for which she was irradiated under the impression of a metastatic lesion. However, the neurologic symptoms did not improve. After one year, further investigations and craniotomy revealed meningiomas which were excised and the patient became asymptomatic. Autopsy in the second case, in which the patient had central nervous system manifestations before her death, showed diffuse metastatic disease. However, the brain was free of metastasis, but as well circumscribed meningioma was present.¹² Since then, three more patients with breast cancer under his care underwent successful excision of meningiomas.¹³ A review of the literature shows that prior diagnosis of either meningioma or breast cancer does not preclude the possibility of developing the other lesion at a later date. An awareness of this association could lead to the removal of a benign meningioma. Therefore, a patient with meningioma should be closely followed-up for subsequent development of breast cancer which can then be treated in an earlier stage. No data is available as to the incidence of breast cancer in patients with a prior diagnosis of meningioma.

Management

Investigation

Table 1 lists the investigations which are useful in diagnosis and management. In the CAT scan, meningiomas (Fig. 1) appear as a well-defined mass of density equal to or slightly higher than that of the adjacent brain tissue. Their density usually enhances homogeneously after contrast medium injection.^{1,14} Meningiomas are usually in the midline. Metastasis (Fig. 2) from breast cancer appears as a low density lesion due to the large amount of edematous fluid in the tumor and surround-

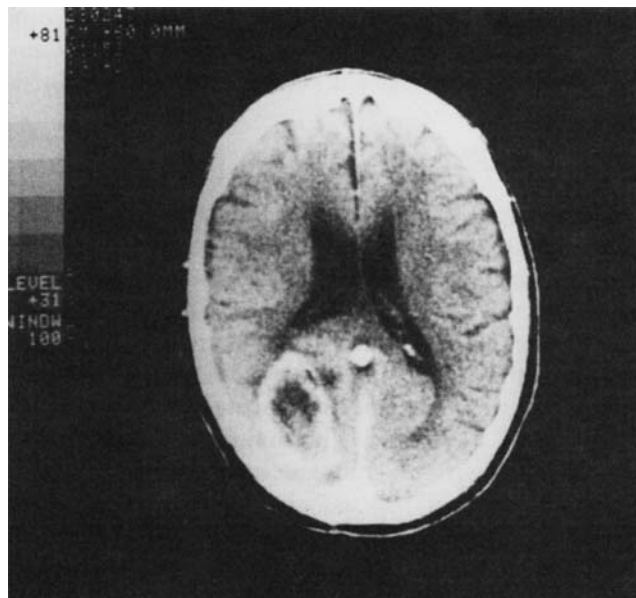


FIG. 2. Metastatic lesion.

ing tissue. There is enhancement after injection of contrast medium with no change in the density of peripheral edema.¹⁵ The accuracy of CAT scanning in making a specific diagnosis of meningioma is as high or higher than any of the other methods, including the invasive ones, 96%.

Cerebral angiogram is invasive and makes a specific diagnosis in 75% of the meningiomas.¹¹ Meningiomas are usually found in the midline, supplied mainly by meningeal arteries and may have a diffuse, homogenous, and prolonged staining in the early and late phases. Tumor staining is not seen in every case. Metastatic lesions are randomly distributed, usually fed by cortical arteries, and show tumor vessels and early draining veins. Periodic physical examination and mammography should be done in patients with prior meningioma.

Treatment

Carcinoma of the breast: Depending on the stage and estrogen-receptor protein studies breast cancer can be treated with surgery, irradiation chemotherapy, or hormonal ablation.

Meningioma: Surgical excision is the treatment of choice. In some cases radiation therapy might be helpful.⁴ If hormonal therapy were found to be successful in slowing or halting the growth of some meningiomas it could have some clinical importance.⁹

Before designating a patient with carcinoma of the breast as having a metastatic lesion to the brain, the above described investigation should aid in making a diagnosis. However, to be certain of the exact pathology one has to proceed with excisional biopsy of the mass,

particularly if it is a solitary lesion following carcinoma of the breast. Multiple lesions to the brain should also be completely investigated before labeling them metastatic.

Conclusion

There seems to be a possible epidemiologic and hormonal relationship between carcinoma of the breast and meningioma. Meningiomas may be multiple in 3.4% of all cases.¹¹ About 8–10% of Stage IV breast cancer have central nervous system metastatic involvement. Hence, lesions of the central nervous system following the diagnosis and treatment of breast cancer are usually presumed to be metastatic. The majority of these lesions are irradiated without complete investigation. If the clinician is aware of this association, proper diagnostic procedures could lead to the removal of a benign meningioma in some cases. Likewise, a patient with meningioma should be closely followed for subsequent development of breast cancer which can then be treated in an earlier stage. Screening of relatives of these patients might detect some lesions earlier. Estrogen-receptor studies in cases of meningioma might be helpful. With modern techniques of investigation, particularly CAT scan, cases will be diagnosed earlier. Besides surgery, irradiation and hormonal therapy might be helpful in a small number of cases.

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