Metastatic Brain Tumors: A Retrospective Review in East Azarbyjan (Tabriz)

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Abstract- A set of one hundred and twenty nine patients with known primary malignancy and suspected brain metastasis was reviewed in present study. The patients were selected among patients presented to the MRI section of Imam Khomeini Hospital or a private MRI center in Tabriz (Iran). Primary tumor site, clinical manifestations, number and site of lesions were identified in this patient population. The primary tumor site was breast in 55 patients (42.6%), followed by lung (40.3%), kidney (7.7%), colorectal (4.6%), lymphoma (3.1%) and melanoma (1.5%). Most patients were presented with features of increased intracranial pressure (headaches and vomiting), seizures and focal neurologic signs. Single brain metastasis occurred in 16.3% of patients, while multiple lesions accounted for 83.7% of patients. Ninety seven patients had supratentorial metastases (75.2%). Twenty cases (15.5%) had metastases in both compartments. Infratentorial lesions were observed only in twelve patients (9.3%).

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Keywords: Brain; Neoplasm metastasis; Cerebrum; Neoplasm

Introduction

In patients with cancer brain metastasis occur in 10 to 30% of adults and 6 to 10% of children (1,2). American cancer society estimated that 170,000 cancer patients develop brain metastases each year in the United States (3). Recent estimates are as high as 200,000 cases with brain metastases per year in the United States alone (4). Significant morbidity and mortality owing to neurological complications were seen in these patients. It appears that patients with more than three intracranial metastases usually have a short life. It is therefore important to define the exact number of these lesions. Magnetic resonance imaging (MRI) has the ability to detect small brain metastases (5). To the best of our knowledge, there are a few MRI based studies on frequency of brain metastasis among Iranian patients with cancer. The purpose of the present study was to evaluate the primary site of tumor, clinical manifestations as well as number and site of the brain metastases in a set of patients from East Azarbyjan Province (Iran).

Material and Methods

Over a five-year period (2002-2007) one hundred and twenty nine consecutive cases of known primary malignancy with suspected brain metastases who presented to MRI section of Imam Khomeini Hospital or a private MRI center in Tabriz were reviewed. Imam Khomeini Hospital is a referral center and more than 80% of the patients with malignant disease from Tabriz are referred to this center. Patients with following types of malignant disease were included: breast cancer, lung cancer, colorectal cancer, renal carcinoma, systemic lymphoma and melanoma. The data were collected by review of medical records including all available MRI reports. Data were analyzed as regards to the presence of clinical manifestations (headaches, vomiting, seizures, hemiparesis), location of primary tumor, number and site of lesions.

Results

Breast and lung cancer were over denoted as primary tumors occurring in enrolled cases (breast cancer in fifty five cases (42.6%), lung cancer in fifty two patients (40.3%), followed by renal cancer in ten cases (7.7%), colorectal cancer in six patients (4.6%), lymphoma in four cases (3.1%), and melanoma in 2 patients (1.5%). The predominant clinical presentations included headaches in one hundred cases (77.5%), vomiting in forty five cases (34.9%), seizures in 25 patients (19.4%). Single lesion was observed in twenty one cases (16.3%)

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while multiple brain metastases occurred in one hundred and eight patients (83.7%). Ninety seven patients had supratentorial metastases (75.2%), twenty cases (15.5%) had metastatic lesions in both compartments and only twelve patients (9.3%) exhibited infratentorial metastases. Eighty patients had metastatic lesions in the right cerebral hemisphere (62.0%). Only 20 cases showed metastatic lesions in the left cerebral hemisphere.

Discussion

Brain metastasis usually indicates advanced stage of disease progression and is the most common finding in patients with cancer and neurological complications. Brain metastasis occurs in approximately 20-40% of patients with systemic malignant disease (6). It is known that almost 50% of brain neoplasms are metastatic. Brain metastasis is associated with high mortality and morbidity. The most common mechanism of metastasis to brain is through hematogenous spreading of malignant cells (7). Brain metastases have a tendency to place under the grey-white matter junction or at the watershed areas (7). Contrast-enhanced MRI is more sensitive than CT for detecting brain metastasis (5,8-9). The incidence of brain metastases appears to be increasing, due to either improved detection of small metastasis by MRI or improved systemic therapy (8,9,11). According to medical literature, the most common primary tumors in adults are carcinomas (lung, breast, kidney and colorectal) and melanoma. In children, the most common causes of brain metastases are sarcomas, neuroblastoma and germ cell tumors (12-15). The present study showed that breast and lung cancers were the most common tumors followed by renal, colorectal, lymphoma, and melanoma in our patient population.

Approximately eighty percent of brain metastases are located in the cerebral hemispheres (16). Our study showed greater frequency of brain metastasis in the cerebral hemispheres (75.2%) and more than 1/3 of patients suffered from supratentorial metastases. Headaches, vomiting, neurological symptoms were predominant clinical presentation in this study. Colorectal metastasis to brain was accounted for 4.6% of patients with brain metastasis. This is interesting since colorectal carcinoma is known to invade the central nervous system in rare cases (13).

The terms single brain metastasis describes a single cerebral lesion and solitary brain metastasis refers to relatively rare occurrence of a single brain metastasis that is the only known site of metastatic cancer in the body. (18). Brain metastases from breast cancer are often single, in contrast with malignant melanoma and lung cancers which have a greater tendency to produce multiple lesions (11,16). In present study 16.3% of metastatic lesions were single, with greater tendency towards patients with breast cancer (71.4%). This is consistent with the ability of MR imaging in detection of small single brain metastases.

In conclusion, the frequency of brain metastases in this study was highest in patients with breast cancer followed by patients with lung carcinoma, renal carcinoma, colorectal cancer, systemic lymphoma and melanoma.

A better understanding of different primary cancers may lead to a more effective treatment. If the patient has a known primary cancer, the combination of clinical symptoms and the appearance of a secondary brain lesion on the MRI is usually enough evidence for a diagnosis. However, it is important to bear in mind that there are many other possible reasons for a secondary lesion to present itself on MRI (such as brain abscess, demyelinating lesions and stroke).

References

1. Wen PY, Loeffler JS. Management of brain metastases. Oncology (Williston Park) 1999;13(7):941-54, 957-61; discussion 961-2, 9.
2. Johnson JD, Young B. Demographics of brain metastasis. Neurosurg Clin N Am 1996;7(3):337-44.
3. Davey P. Brain metastases: treatment options to improve outcomes. CNS Drugs 2002;16(5):325-38.
4. Eichler AF, Loeffler JS. Multidisciplinary management of brain metastases. Oncologist 2007;12(7):884-98.
5. Sze G, Milano E, Johnson C, Heier L. Detection of brain metastases: comparison of contrast-enhanced MR with unenhanced MR and enhanced CT. AJNR Am J Neuroradiol 1990;11(4):785-91.
6. Soffietti R, Rudā R, Mutani R. Management of brain metastases. J Neurol 2002;249(10):1357-69.
7. Delattre JY, Krol G, Thaler HT, Posner JB. Distribution of brain metastases. Arch Neurol 1988;45(7):741-4.
8. Suzuki K, Yamamoto M, Hasegawa Y, Ando M, Shima K, Sako C, Ito G, Shimokata K. Magnetic resonance imaging and computed tomography in the diagnoses of brain metastases of lung cancer. Lung Cancer 2004;46(3):357-60.
9. Schellinger PD, Meinck HM, Thron A. Diagnostic accuracy of MRI compared to CCT in patients with brain metastases. J Neurooncol 1999;44(3):275-81.

10. Hochstenbag MM, Twijnstra A, Wilmink JT, Wouters EF, ten Velde GP. Asymptomatic brain metastases (BM) in small cell lung cancer (SCLC): MR-imaging is useful at initial diagnosis. J Neurooncol 2000;48(3):243-8.
11. Leoffler JS, Patchell RA, Sawaya R. Metastatic brain cancer. In: DeVita VT Jr, Hellman S, Rosenberg SA, editors. Cancer: Principles and Practice of Oncology. 5th ed. Philadelphia: Lippincott-Raven; 1997. p. 2523-6.
12. Posner JB. Management of brain metastases. Rev Neurol (Paris) 1992;148(6-7):477-87.
13. Sundermeyer ML, Meropol NJ, Rogatko A, Wang H, Cohen SJ. Changing patterns of bone and brain metastases in patients with colorectal cancer. Clin Colorectal Cancer 2005;5(2):108-13.
14. Bouffet E, Doumi N, Thiesse P, Mottolese C, Jouvet A, Lacroze M, Carrie C, Frappaz D, Brunat-Mentigny M. Brain metastases in children with solid tumors. Cancer 1997;79(2):403-10.
15. Lassman AB, DeAngelis LM. Brain metastases. Neurol Clin 2003;21(1):1-23, vii.
16. Barnholtz-Sloan JS, Sloan AE, Davis FG, Vigneau FD, Lai P, Sawaya RE. Incidence proportions of brain metastases in patients diagnosed (1973 to 2001) in the Metropolitan Detroit Cancer Surveillance System. J Clin Oncol 2004;22(14):2865-72.
17. Subramanian A, Harris A, Piggott K, Shieff C, Bradford R. Metastasis to and from the central nervous system: the 'relatively protected site'. Lancet Oncol 2002;3(8):498-507.
18. Wen PY, Black PM, Loeffler JS. Treatment of metastatic cancer. In: DeVita VT Jr, Hellman S, Rosenberg SA, editors. Cancer: Principles and Practice of Oncology. 6th ed. Philadelphia, Pa: Lippincott Williams and Wilkins; 2001. p. 2655-70.
19. Biswas G, Bhagwat R, Khurana R, Menon H, Prasad N, Parikh PM. Brain metastasis: evidence based management. J Cancer Res Ther 2006;2(1):5-13.