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(2-3).

1983 1999
1399 61
stage IIA(n=508), stage I(n=366), stage IIB(n=247), stage IIIA(n=189), stage IIIB(n=45), stage 0(n=33), stage IV(n=11)
61 stage IIB(12.5%), stage IIA(3.9%), stage IIIA(3.1%), stage IIIB(2.2%), stage I(0.8%) (Table 1).
40-49 (n=610), 50-59 (n=301), 30-39 (n=291), 60-69 (n=124), 20-29 (n=41), 70-79 (n=28), 80-89 (n=4)
20-29 (14.6%), 30-39 (7.9%), 50-59 (4.6%), 40-49 (2.6%), 60-69 (1.6%) (Table 1).
(infiltrating ductal carcinoma)(n=56) (infiltrating lobular carcinoma)(n=5)

61 35 CT(29) MRI(8)

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Table 1. Incidence of Brain Metastasis of Breast Cancer according to the Stage and Age

	Breast Cancer (Patients No)	Brain Metastasis (Patients No)	Percentage(%)
Stage			
0	33	0	0
I	366	3	0.8
IIA	508	20	3.9
IIB	247	31	12.5
IIIA	189	6	3.1
IIIB	45	1	2.2
IV	11	0	0
Total	1399	61	
Age			
20-29 years	41	6	14.6
30-39 years	291	23	7.9
40-49 years	610	16	2.6
50-59 years	301	14	4.6
60-69 years	124	2	1.6
70-79 years	28	0	0
80-89 years	4	0	
Total	1399	61	

No : Number

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1
35 27 CT , 6 MRI
, 2 CT MRI
, ,
. CT GE 9800 Hilight Advantage(General Electric Medical system, Milwaukee, Wisconsin, U.S.A.)
120 kVp, 140 mA, (FOV) 220 mm, 5 - 10 mm, (window level) 29 - 30, (window width) 86 - 98
(Ultravist, Shering Berlin, Germany) 100 ml
. MRI 1.0 Tesla(Magnetom, Siemens, Erlangen, Germany) 1.5 Tesla(Magnetom Vision, Siemens, Erlangen, Germany)
T1 (TR/TE=600/15, 600/14), T2 (TR/TE=7500/90, 4500/120) 200 - 210, 5 mm, 200 - 240 * 256
Gd - DTPA(Magnevist, Shering, Berlin, Germany) 15 ml
T1 (TR/TE=600/15, 600/14)

가 3

(32/35)
(43.7%) (18.7%),
(12.5%), (9.3%), (6.2%), (3.1%),
(3.1%), (3.1%)
35 22 가
가 가
가 13 13
가 7 , 가

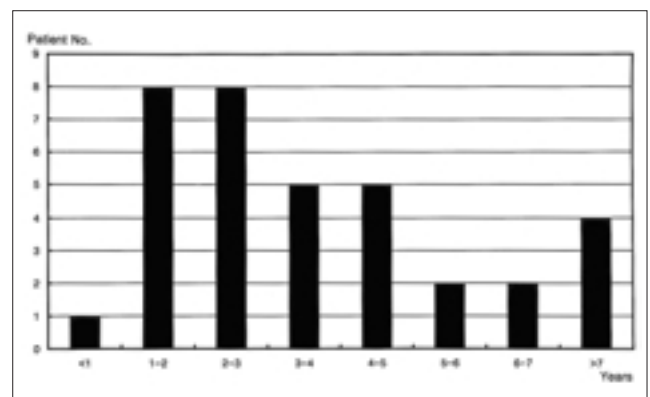


Fig. 1. Interval between breast cancer diagnosis and brain metastasis

22	6	가	(n=11)	(n=24)가
(n=3),	(n=7),	(n=7),	11	(n=3),
가	(n=2)가	(n=3),	(n=2),	(n=1)
가	1	(n=3),	(n=2)	1 cm
(n=1)가	(n=3),	(n=3),	6.5 cm	, 24 (68.5%)
35	35	CT 29	MRI 8	
1 - 2 (n=8), 2 - 3 (n=8)	3	CT 23	가	, 3 가
가 (Fig. 1), 74.2%(26/35)	가	8	7 가	T1
1	가	MRI	T1	
10.2	가	43.7	가	T1
22.7	9.0	가		
(Table 2).	CT	MRI		34
35	(supratentorium)	(n=23),	1	
(infratentorium)	(n=2),	(n=10)가	(n=20)	(n=6) 74.2%

Table 2. Comparison of Interval between Breast Cancer Diagnosis and Brain Metastasis and Interval between Brain Metastasis and Expiry according to the Stage between Succeeding and Initial Brain Metastasis (n = 35)

Stage	Succeeding Brain Metastasis (n = 22)			Initial Brain Metastasis (n = 13)		
	Patients No.	IBB(mo)	IBE(mo)	Patients No.	IBB(mo)	IBE(mo)
I	2	68.5	17	1	20	10
IIA	8	49.7	9.8	4	29	9.6
IIB	11	35.2	9.7	6	23	9.2
IIIA	1	40	4.5	2	10.5	6.8
Mean		43.7	10.2		22.7	9.0

Succeeding Brain Metastasis : Brain metastasis following other systemic metastasis

Initial Brain Metastasis : Brain metastasis as an initial metastasis

IBB : Interval between breast cancer diagnosis and brain metastasis

IBE : Interval between brain metastasis and expiry

No. : Number

mo : Months

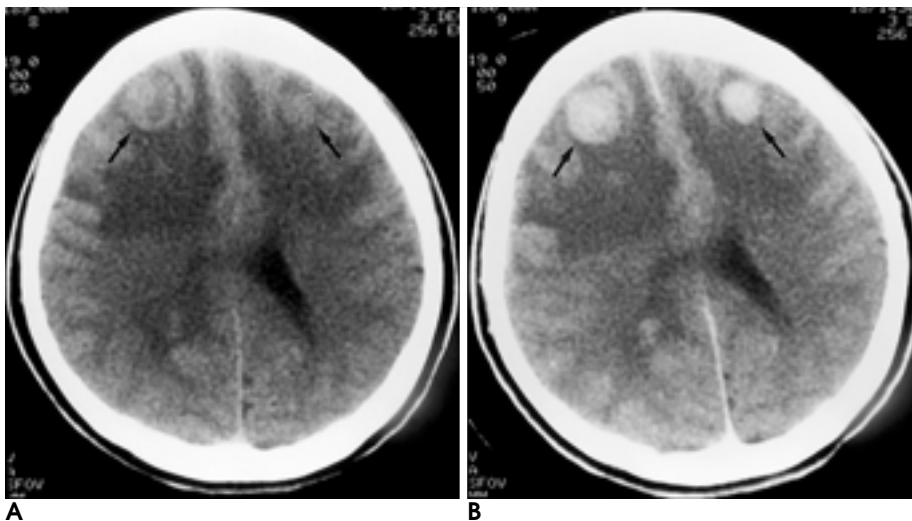
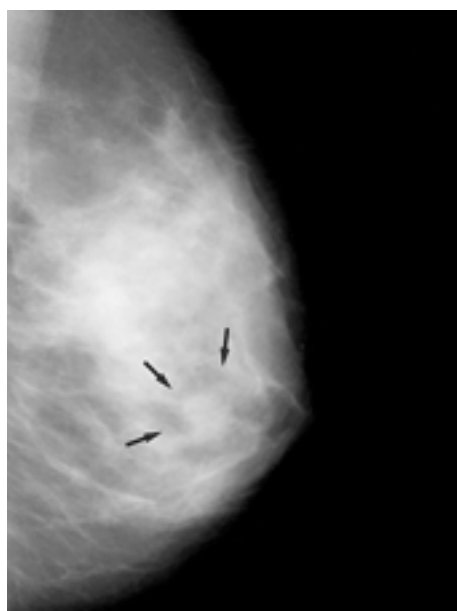


Fig. 2. 43-year-old woman with stage IIB breast cancer at initial diagnosis.

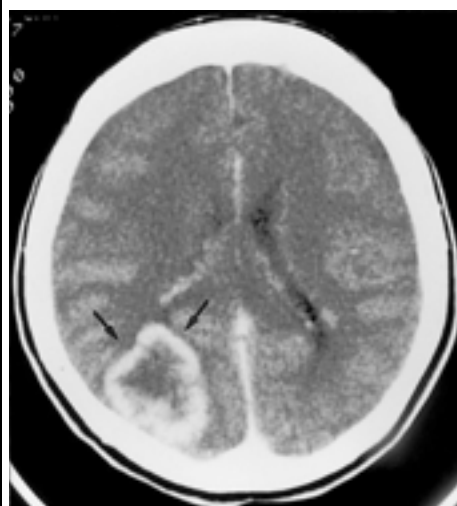
A. Precontrast CT scan shows isodense nodules(arrows) in frontal lobe with massive edema.

B. Enhanced CT scan shows homogeneous nodular enhancement of the lesions(arrows).

(Figs. 2, 3) 가 (> 3 cm) 가 (3). 가
 (n=2) 가 (n=3)
 (Fig. 4). 가
 (n=3) (Fig. 5) (3).
 (n=1) 가
 가
 가
 15 (42.9%) , 8 (22.9%),
 8 (22.9%)
 (4 - 5) 12
 (2 - 3) 35 26 가 가
 (74.3%) 1 1399 stage



A

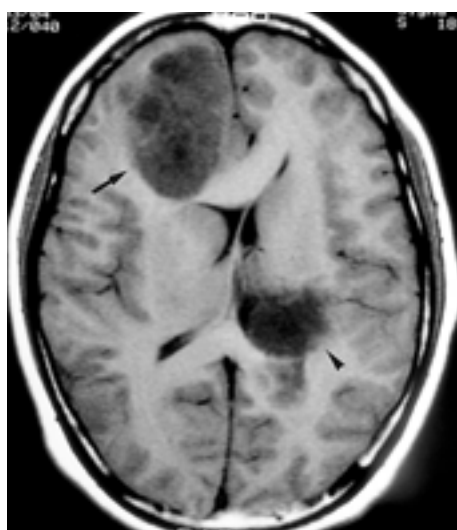


B

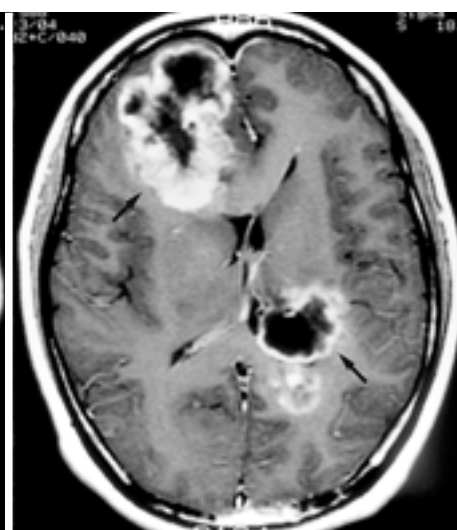
Fig. 3. 32-year-old woman with stage I breast cancer at initial diagnosis.

A. Initial mediolateral oblique mam-mogram shows a small ill-defined nod-ule in central portion of right breast(ar-rows).

B. Contrast enhanced CT scan shows a mass with ring like enhancement(ar-rows) in the right parieto-occipital area.



A

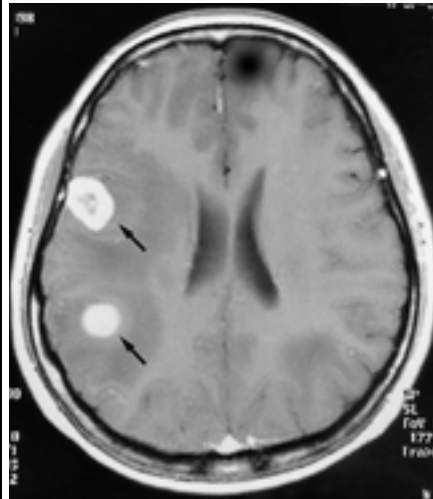


B

Fig. 4. 31-year-old woman with stage IIB breast cancer at initial diagnosis.

A. A huge heterogeneous low signal intensity mass(arrow) is noted in right frontal lobe on T1-weighted spin-echo image(TR/TE = 600/14). Another mass(arrowhead) is located near the posterior horn of left lateral ventricle.

B. Postcontrast image shows marginal enhancement with central necrosis of both masses(arrows).



B. Postcontrast MR image shows two nodules with ring like and nodular enhancement (arrows) and surrounding edema in the right parietal lobe of brain.

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Brain Metastasis of Breast Cancer: Clinical and Radiologic Findings¹

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Purpose: To analyse the clinical and radiologic findings of brain metastasis of breast cancer.

Materials and Methods: Sixty-one of 1399 patients in whom breast cancer was diagnosed between 1983 and 1999 were affected by brain metastasis. Among these 1399, the stage of the breast cancer, in descending order of frequency, was IIA (n=508), I (n=366), IIB (n=247), IIIA (n=189), IIIB (n=45), 0 (n=33) and IV (n=11). The stage of the 61 brain metastases, similarly ordered, was IIB (12.5%), IIA (3.9%), IIIA (3.1%), IIIB (2.2%) and I (0.8%). In all confirmed breast cancers, the age distribution, in descending order of frequency, was 40 - 49 years (n=610), 50 - 59 (n=301), 30 - 39 (n=291), 60 - 69 (n=124), 20 - 29 (n=41), 70 - 79 (n=28), and 80 - 89 (n=4). The age distribution of brain metastasis was 20 - 29 (14.6%), 30 - 39 (7.9%), 50 - 59 (4.6%), 40-49 (2.6%) and 60 - 69 (1.6%). Imaging findings were available for 35 of the 61 patients affected by brain metastasis, and symptoms from brain among the 35, analysis of the symptoms of this metastasis, the site of the first distant metastasis to an extracranial or cranial organ, the interval from the diagnosis of breast cancer to brain metastasis, the interval from brain metastasis to death, and the difference in survival time between patients with initial and succeeding brain metastasis was undertaken. Brain CT findings were analysed in 29 cases and MRI findings in eight.

Results: The most common symptoms were headache and vomiting. Among the 35 brain metastasis patients for whom imaging findings were available, other systemic metastasis occurred in 22. Initial brain metastasis occurred in the remaining 13, and in seven of these there was also coincident organ metastasis, while six showed only brain metastasis. The most frequent intervals from the diagnosis of breast cancer to brain metastasis were 1 - 2 years (8/35) and 2 - 3 years (8/35). Twenty-six of 35 patients died within one year of brain metastasis. Patients in whom this occurred later survived for longer than those in whom it occurred initially. According to CT or MRI, involvement was supratentorial (n=23), infratentorial (n=2) or at both sites (n=10). Twenty-four patients had multiple lesions and 11 had a single lesion. Precontrast CT imaging show the masses were isodense in 23 cases, hyperdense in three, hypodense in two, and calcified in one. In seven of eight patients who underwent MRI, the lesions showed iso signal intensity on T1WI and iso or high signal intensity on T2WI. The most common enhancement pattern was homogeneous nodular (n=20).

Conclusion: Among breast cancer patients in whom metastasis to the brain occurred, those in whom this happened later survived for longer than those in whom it took place initially. In order to delay brain metastasis and prolong survival, screening for the first distant metastasis is therefore important. The metastasis of breast cancer to the brain was mainly multiple. The most frequent location and postcontrast imaging findings were, respectively, the supratentorium and homogeneous nodular enhancement.

Index words : Breast neoplasms
Brain neoplasms, metastasis

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