CT SCAN OF THE METASTATIC BRAIN TUMORS ; IS NON CONTRAST-ENHANCED CT SCAN NECESSARY ?

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ABSTRACT

Non contrast-enhanced CT scan (NCCT) with subsequent contrast-enhanced CT scan (CECT) are routinely practised in cases of brain tumors. For brain metastases, we observed that the lesions were better demonstrated on CECT and no useful information was obtained on NCCT. We reviewed 58 CT brain of 54 cancer patients who suspected to have brain matastases. We found that 24 cases (40%) had brain metastases. Of these, CECT demonstrated the lesions better than NCCT in 10 cases (42%) ,CECT and NCCT were equally good in demonstration of the lesions in 12 cases (50%). The remaining two cases were difficult to compare because of too numerous lesions. Two false negative results were also found on NCCT. These findings suggested that NCCT was unnecessary. Elimination of NCCT would be more cost-effective, reduce examination time and radiation exposure.

INTRODUCTION

CT or MRI of the brain are widely used in determining the presence of brain matastases in cancer patients.[1] For CT, NCCT with subsequent CECT (combined CT) are routinely practised. In 1990 , McGann GM et al[2] studied CT of cranial metastatic melanoma.They suggested using CECT-only for detection of melanoma metastases. We observed that not only melanoma but other brain metastases as well, CECT-only was sufficient for detection of the lesion. Elimination of NCCT would be more cost effective, reduce examination time and radiation exposure. The objective of this study were to compare each type of CT scan with combined CT and compare NCCT with CECT.

SUBJECTS AND METHODS

We retrospectively reviewed 58 CT brain of 54 cancer patients who suspected to have brain matastases. The origins of the primary tumors were listed in (table 1). CT scans were routinely performed at 10 mm. interval. All examinations were performed before and after abministration of standard dose of the contrast medium. The NCCT and CECT were initially reviewed indepently by two radiologists. Examinations were assessed for the presence of the parenchymal or subarachnoid nodules and their conspicuousness. Comparison of each scan with combined CT and between each scan were evaluated. If the results were disagreed, opinion from the third radiologist was taken for consideration and final decision made.

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Table 1.

Type	No. of patient
Lung	22
Hematologic malignancy	9
Reproductive organs	7
Head and neck	5
GI tract	4
Breast	3
Adrenal gland	1
Larynx + scrotum	1
Melanoma	1
Total	54

Table 2 Results.

	Negative	Positive	Total
NCCT	36	22	58
CECT	33	25	58
Combined CT	34	24	58

RESULTS

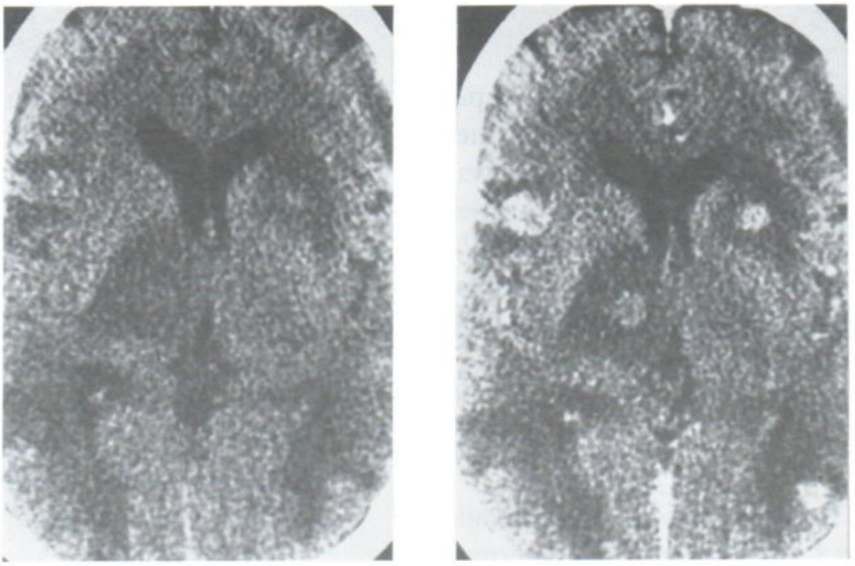
Twenty-four (41%) of the 58cases examined by combined CT had brain metastases. The metastatic lesions were found in 22 cases on NCCT and 25 cases on CECT (table2). Two false negative on NCCT were 1.2 cm. isodense lesion at the suprasellar cistern and 1.4 cm. isodense lesion at the pineal region. One false positive on CECT had hematoma at the right occipital lobe and in the fourth ventricle. Single lesions were found in 11 cases (40%).

To assess the sensitivity of NCCT and CECT in evaluation of suspected brain metasases , the findings on NCCT were eqivalent to those on CECT in 12 of 24 cases (50%). CECT were better than NCCT in 10 cases (42%). CECT showed more lesions in 7 cases , exact localization of the nodule in 1 case and better definition of the lesion in 2 cases. The remaining two cases had numerous lesions and difficult to compare on both types of scan.

DISCUSSION

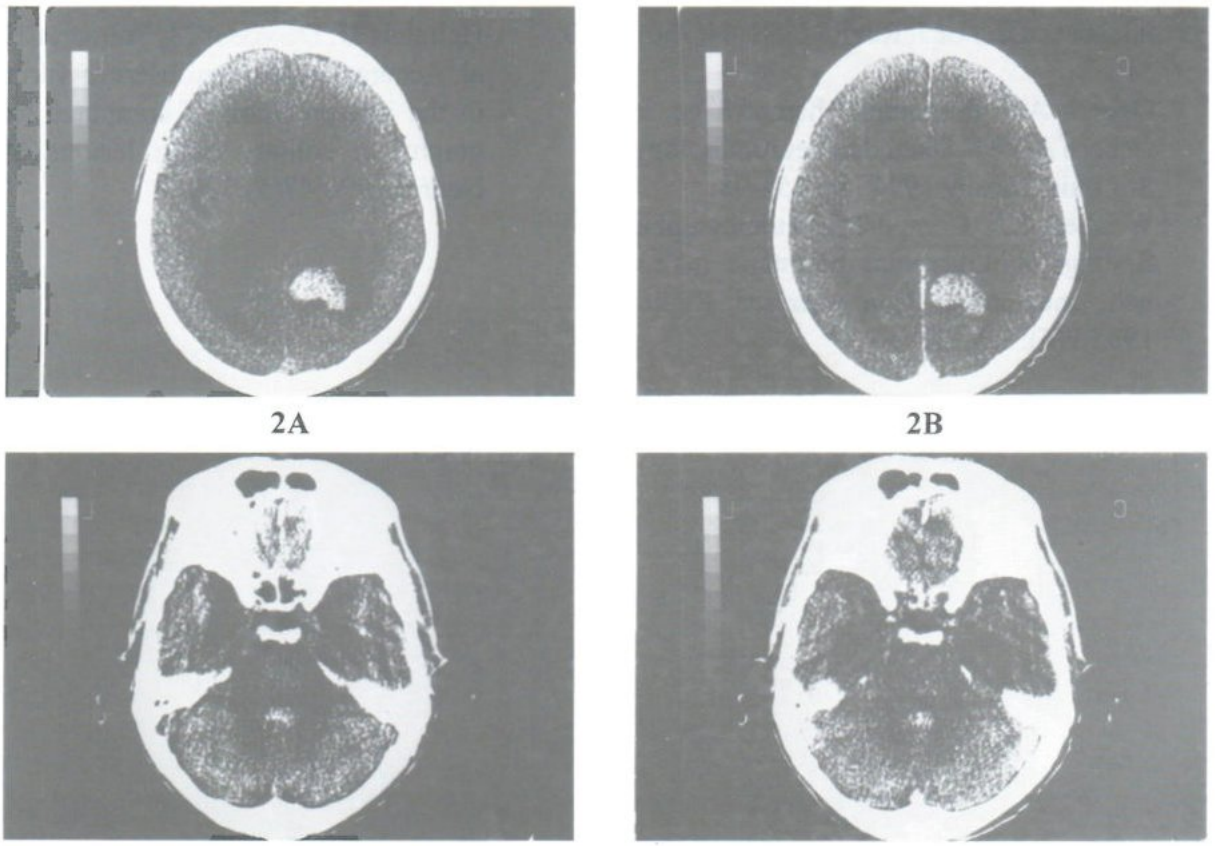
Routine technique of CT scan in evaulation of brain tumor is combined CT. Both types of scans have their own characters which may help in distnguishing various types of tumors. For cancer patients who were suspected to have brain metastases, demonstration of the presence or abscence of brain tumors is necessary while the CT appearance is not important. Our study showed that CECT were better than NCCT.CECT delineated the lesions from surrounding edema better (Fig.1) and detected the lesions that were inapparent on NCCT.[1] Therefore CECT-only is sufficient for diagnosis. This was also shown by McGann GM et al.[2] However there was one case of hematoma (Fig.2) which was assumed as false positive on CECT because there was no histologically prove. This case might be bleeding from metastatic brain tumor as well. It is well known that brain tumors can cause intracerebral hemorrhage especially metastases. The incidence of hemorrhage in brain metastases is upto 15%.[3] Although CECT in this case did not show enhancement which might help in distinguishing bleeding metastases from hematoma as shown by Weisberg CA.[4] Niizuma H et al[5] also found 3 cases of bleeding metastases which CECT could not demonstrate any finding other than those indicating hematoma. The finding that may suggest bleeding metastasis in this case was unusual location of the hematoma.[1] However when NCCT is needed, it can be carried out subsequently.

Frequency of single metastases in our series was 46% which is almost the same as other series.[4,5,6,7] Todd N.V. et al[8] found that 4 of 8 cases diagnosed as metastases were incorrect. However these cases were unknown of primary malignancy which is a major factor in diagnosis of metastasis. Because the design of our study, it was not possible to determine the true sensitvity of each test. We used combined CT as our standard for detection of brain metastasis. Heimans J.J et al[9] reported accuracy of CT diagnosis in 64 patients with solitary brain tumor by comparison with histology. They found that predicted diagnoses agreed with histological diagnoses in only 57% and metastasis was one of the main causes of misdiagnoses. However CT is the only available diagnosis imaging method in most hospital in Thailand.



1A 1B

Fig.1 NCCT showed multiple areas of abnormal hypodensities. CECT showed nodular enhancement of the metastatic tumors which are better delineated from surrounding edema.



2A 2B

2C 2D

Fig.2 A case of hematoma at the right occipital lobe and in the fourth ventricle. NCCT showed area of hyperdensities which represent hematoma. CECT showed no enhancement.

CONCLUSION

We studied 58 CT brain of 54 cancer patients who were suspected to have brain metastases. The study showed that CECT alone was sufficient in the demonstration of brain metastases and NCCT was unnecessary. Elimination of NCCT is more cost-effective and can reduce examination time resulting in increased patient throughput and reduction of the radiation exposure.

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