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Spreading Evaluation in Primitive Bronchogenic Carcinoma: Benefit of Cerebral MRI Compared to CT Scan

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CEREBRAL METASTASES are a frequent secondary localisation of lung cancer, which changes its prognosis and occasionally its therapy. Forty to fifty per cent of lung cancers, and particularly small cell carcinoma, induce cerebral metastases [1, 2]. Cerebral computed tomography (CT) scan is used in bronchogenic carcinoma's spreading evaluation. The place of cerebral magnetic resonance imaging (MRI) in spreading evaluation of lung cancer is not yet clearly established.

The aim of our study was to evaluate precisely MRI with Gadolinium injection versus CT scan in primitive bronchogenic carcinoma spreading. We investigated 24 patients with primitive bronchogenic carcinoma: 13 squamous cell carcinomas, five adenocarcinomas, three large cell cancers, one neuro-endocrine cancer, one small cell carcinoma, one haemangiopericytoma. Each patient underwent a cerebral CT scan with an iodinated product injection and a MRI with Gadolinium injection (at usual dose) when the spreading evaluation was performed. MRI was performed with T1-weighted images before and after Gadolinium injection, occasionally completed with T2-weighted images. Sagittal plane was the most often used, completed with another plane, when metastases were detected. Gadolinium was used at usual dose (0.1 mmol/kg). All MRI were performed with a 1.5 Tesla superconducting magnet. Maximum delay between CT scan and MRI was 3 weeks. Between the two examinations, patients had no treatment (radiotherapy, chemotherapy or surgery). The interpretation of the MRI was made by two neuroradiologists and the results were compared.

CT scan detected 19 metastases, whereas MRI indicated more than 52. Results were discordant in 6 of the 24 cases (MRI detected more lesions than CT scan). 8 patients had a solitary metastasis at the CT scan, and in 3 of these MRI showed several metastatic sites. Asymptomatic patients with normal CT scan also had a normal MRI. Our study revealed better sensitivity of contrast-enhanced MRI versus enhanced CT scan, supporting previous published data [3, 4].

Gadolinium improves the sensitivity of MRI and metastases detection, indicating with a high-intensity signal, the blood–brain barrier breaking zones. Indeed, both Healy and Russel's groups in 1987 [5, 6] demonstrated better performance of enhanced MRI versus unenhanced MRI. MRI is more efficient in detecting lesions of the posterior fossa, temporal area (badly analysed because of bone artefacts) and small lesions; MRI also detects very well the median line metastases which are uncommon. However, in our study, MRI never showed cerebral metastasis among 12 asymptomatic subjects with normal CT scans.

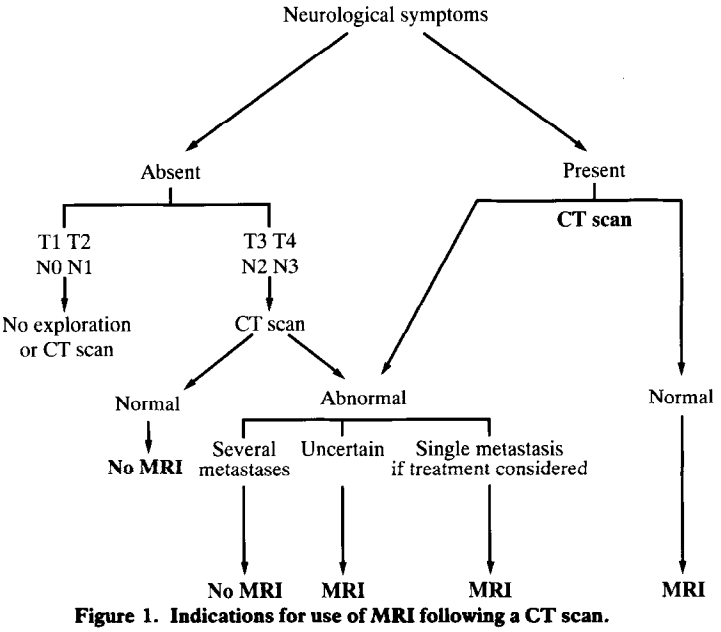

Figure 1. Indications for use of MRI following a CT scan.

MRI is obviously more sensitive than CT scan, but nevertheless, there is no value in conducting a MRI when: (a) a CT scan already shows several lesions, since the result of the MRI will not modify therapeutic practice; or (b) a subject is asymptomatic and has a normal CT scan, as the probability of detecting metastases by MRI is then highly unlikely.

However, enhanced MRI seems appropriate under the following circumstances: (a) solitary metastasis on cerebral CT scan, which could be treated by surgery. Discovering a second localisation with MRI can obviously influence therapy, since in some cases a local treatment could be under consideration; (b) when a lesion is uncertain or small on CT scan, since MRI permits better visualisation; (c) when a patient has neurological symptoms and a normal CT scan because MRI can detect a lesion undetected by CT scan; and (d) when a treatment with gamma unit is considered (metastasis diameter below 3 cm) since the exact metastasis localisation by MRI is essential.

The different neuroradiological exploration indications are shown in Figure 1.

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