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Management of Brain Metastases: A Case Study

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Introduction

A 53-year-old male patient presented with headache, right-sided motor dysfunction, impaired vision, and intermittent confusion since one week. The medical history included former alcoholism, chronic pancreatitis with insulin-dependent diabetes, and nicotine abuse.

Computed cranial tomography (CCT) showed an 8-cm, partially cystic lesion with marked contrast agent uptake and perifocal edema in the left temporoparietal lobes (Fig 1A) and an additional small lesion in the right parietal lobes (Fig 1B). Due to the cerebrospinal fluid circulation impairment, acute craniotomy and neurosurgical resection of the left parieto-occipital lesion was performed.

What Is Your Diagnosis?

The histopathological examination revealed metastases of a solid carcinoma, most likely a non-small-cell carcinoma of the lung (Fig 2). Immunohistochemically, the tumor tissue was positive for cytokeratin 7 (CK-7) and thyroid transcription factor 1 (TTF1) and negative for synaptophysin, neuron-specific enolase (NSE), and chromogranin A. Indeed, a whole-body CT showed a 5-cm and several smaller tumorous lesions with inhomogeneous contrast medium enhancement in both lungs (Fig 3). In addition, there were a 4-cm metastasis in the right adrenal gland and abdominal lymph node metastases.

Clinical Course

We treated the patient with whole-brain radiotherapy (WBRT) at 30 Gray (Gy) in 10 fractions, stereotactic radiosurgery of the right parietal metastasis, and 8 cycles of intravenous chemotherapy with cisplatin and etoposide. The therapy was well-tolerated. Periodic re-staging CTs showed a stable systemic disease according to the RECIST criteria and initially there was complete response of the cerebral metastases. However, 11 months after first diagnosis, a follow-up MRI showed 2 new intracerebral metastases, one in the cerebellum and one in the parietal lobe. At this time, there was stable systemic disease as documented by CT and the patient was in good clinical condition (Karnofsky Performance Status 80 %). We treated both new brain metastases with radiosurgery. Two months later, a follow-up MRI showed no neoplastic lesions but...
marked leukencephalopathy (Fig 4). There was progressive
decline with episodes of confusion, repeated seizures, and
somnolence despite intensive symptomatic therapy. A home
palliative care unit was involved and the patient died 14
months after initial diagnosis.

## Comments

Brain metastases are the most common malignancy of the
central nervous system. The most common primary carcino-
mas are lung cancer, breast cancer, melanoma, colorectal can-
cer, renal-cell carcinoma, and cancer of unknown primary ori-
gin [1]. Prognosis of patients with brain metastases is gener-
ally poor (median survival 2.3–7.1 months) and therapy aims
to provide optimum quality of life while reducing tumour re-
lapses [2]. Appropriate treatment is based on prognostic indi-
ces which consider the patient’s age, Karnofsky Performance
Status, number of brain metastases, and the activity of extra-
cranial disease [3]. The modern multidisciplinary manage-
ment of brain metastases includes neurosurgical resection,
stereotactic radiosurgery, WBRT as well as systemic therapies
[4]. Surgery of a single metastasis may be considered in pa-
tients with controlled systemic disease and good performance
status with the aim to relieve symptoms associated with a
large tumor or impairment of CSF flow, achieve local control,
or establish a histopathological diagnosis [2]. Stereotactic ra-
diosurgery permits the treatment of few metastases of 3–
3.5 cm maximum diameter. [2] Adjuvant WBRT after surgery
or radiosurgery significantly reduces intracranial relapses and
neurologic deaths, but does not improve functional indepen-
dence or overall survival [5]. The true risk of cognitive defi-
cits in long-term survivors is not well-known. The limiting
factors for systemic therapy like chemotherapy, radiosensi-
tizers, and biologic agents are the blood-brain-barrier pen-
etration and the efficacy in specific tumour histologies [2].
In conclusion, the ideal combination of treatments remains a
matter of research. Further prospective series are needed to
optimize and individualize care of patients with brain me-
tastases.

![Figure 4. Axial FLAIR-MRI.](image)

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