We report a case of small cell lung cancer whose initial presentation was a solitary brain metastasis. On chest radiography the primary tumor was unclear and only detected by bronchofiberscopy. A small single pulmonary metastasis was noted in the right lower lobe. Subtotal resection and external irradiation were applied to the brain tumor and external irradiation was applied to the lung. Concurrently one course of systemic chemotherapy was administered. The tumors in the brain and lung had disappeared by the end of the treatment. The patient has been alive and well for 5 years without recurrence.

Key words: small cell lung cancer – radiotherapy – brain metastasis

INTRODUCTION

Small cell lung cancer (SCLC) comprises about 20% of all lung cancer cases (1). It has the propensity to progress aggressively and nearly always to metastasize to extrathoracic organs. At presentation, approximately 10% of patients with SCLC have brain metastases (2). Although SCLC is highly sensitive to chemotherapy and radiation therapy (RT), the prognosis of patients with brain metastases of SCLC is poor. We recently treated a patient with SCLC accompanying a single brain metastasis well controlled with surgery, RT and only one course of chemotherapy for 5 years and report the clinical features of this patient.

CASE REPORT

A 59-year-old male was referred to our hospital for postoperative radiation therapy for a metastatic brain tumor. He had caused several traffic accidents about 3 months earlier because of left hemianopsia. He visited another hospital where a solitary tumor in the right occipital lobe of the brain was found (Fig. 1). He underwent grossly subtotal resection of the brain tumor. The histopathological findings were consistent with a metastatic tumor of SCLC (Fig. 2). Immunohistochemically, cytokeratin, neuron-specific enolase (NSE) and chromogranin were positive. He had no other medical record but a 36-year history of smoking 30 cigarettes per day. His family history was unremarkable. On chest radiography only a solitary nodule measuring 1 cm in diameter was noted in the superior segment of the right lower lobe. (Fig. 3). A white viable tumor was observed in the orifice of the superior segmental bronchus of the right lower lobe on bronchofiberscopy, but not in the same place as the nodular shadow on the chest radiograph (Fig. 4). The solitary pulmonary nodule was diagnosed as a metastatic lesion, although a primary tumor was located in the same superior segmental bronchus of the right lower lobe, because it looked separated from the superior segmental bronchial orifice on CT (Fig. 5). Histopathological findings for the bronchofiberscopic biopsy specimen also revealed SCLC, the same as that of the brain tumor. No other metastasis could be found anywhere except for the right lung and the brain. Tumor markers of serum carcinoembryonic antigen (CEA) and squamous cell carcinoma related antigen (SCC) were negative but NSE was slightly high. Based on these findings, he was diagnosed as having SCLC. The TNM stage of this case was T4N0M1, stage IV (UICC, 1987).

External irradiation with 10 MV X-rays was first applied to the brain with a total dose of 56 Gy by using a conventional fractionation of 2 Gy/day in 5.5 weeks. Whole brain irradiation was performed for a total of 40 Gy in 20 fractions and 16 Gy in eight fractions added as boost therapy. Thoracic irradiation was also given for a total dose of 52 Gy in 26 fractions. The thoracic irradiation field involved mediastinum up to 40 Gy but not supraclavicular fossa. Concurrently, one course of systemic chemotherapy was administered. The chemotherapy regimen consisted of cisplatin (100 mg on day 1) and etoposide (150 mg for 3 days). The tumors in the brain and the right lung had disappeared by the end of the treatment. After the first course of chemotherapy, he rejected further treatment. He has remained alive and well for 5 years without recurrence. His left hemianopsia remains but he has been enjoying life.
DISCUSSION

The case is impressive in three ways. First, the primary tumor could not be detected on the chest radiograph. The primary tumor in the proximal portion of the superior segmental bronchus of the right lower lobe was very small but distant metastases were found in both the brain and right lung at first presentation. This may be a rare condition because SCLC proliferates rapidly and usually appears as a bulky mass on a chest radiograph at the time of diagnosis.

Second, intrathoracic disease was well controlled by radiation therapy with a total dose of 56 Gy and only one course of chemotherapy. The pulmonary metastasis was in the same lobe as the primary tumor. We could therefore encompass both primary and metastatic lesions within the same radiation field. The dose was considered sufficient to eliminate the tumor. On the other hand, it is thought that in this case the progression of the tumor was by bronchial dissemination. If pulmonary metastasis is in the same field as the primary sight, it may be possible to control the intrathoracic tumor with radiation.

Third, the patient has survived without disease for a long time regardless of SCLC with brain metastasis. Some patients with brain metastases of non-small cell lung cancer (NSCLC), especially adenocarcinoma, who underwent effectively brain and thoracic treatment, lived for over 10 years according to one

![Figure 1](image1.png) Figure 1. Before subtotal resection there was a marginal enhanced mass in the right occipital lobe.

![Figure 2](image2.png) Figure 2. Specimen from resectable brain tumor. The cells are small. The nuclei are spindle-shaped and full of chromatin.

![Figure 3](image3.png) Figure 3. Chest radiograph showed a small nodule in the superior segment of the right lower lobe (S6).

![Figure 4](image4.png) Figure 4. A white viable tumor was observed in the orifice of the superior segmental bronchus of the right lower lobe.
report in the literature (3). On the other hand, the prognosis of patients with brain metastases of SCLC is very poor. The median survival of patients with brain metastases from SCLC is 2.8 months (4). The cumulative risk of brain metastases reached about 47% for patients with limited and 69% for those with extensive disease at 2 years from diagnosis (5). Survival after the diagnosis of brain metastases is significantly longer for patients with brain metastases at the first diagnosis of SCLC than for those with delayed brain metastases (5). One reason for this phenomenon may be that there is a difference between newly diagnosed and relapsing SCLC in tumor cell sensitivity to anti-cancer agents. The other reason may be that the type of the tumor is different. The therapeutic outcome for SCLC with only brain metastases at first diagnosis is similar to that for limited-stage SCLC (6). Aggressive treatment with appropriate cranial radiation and thoracic irradiation may be necessary if the patient’s performance status permits. No relationship between the histological subtyping of SCLC and brain metastases was found either, although there is hope that histological subtyping could be useful in deciding when to use prophylactic cranial irradiation (PCI) (7).

This case is impressive as to the natural history of the tumor. Systemic dissemination of the tumor was not dominant. It is suggested that some type of SCLC may slowly proliferate like a type of small cell neuroendocrine carcinoma and that they should be distinguished from the common type of SCLC (8). It is reported that immunohistochemical analysis, e.g. NSE, CEA and chromogranin, of fiberscopic biopsy specimens does not add prognostic information on SCLC (9). Newer diagnostic methods, including molecular biological techniques, may be worth investigating for the diagnosis of a slow-growing type of SCLC.

Long-time survivors continue to suffer high mortality due to relapses, second malignancies and tobacco-related disease (10). There is a report that late relapse occurred 6.5 years after initial treatment (11). Chemotherapy, including alkylating agents and epipodophyllotoxins, has been shown to induce leukemias and lymphomas (10). However, most second malignancies are smoking-related cancers such as aerodigestive cancers (12), hence smoking cessation is very important. This patient stopped smoking at the time of admission to our hospital and underwent periodic medical examination.

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References