

Successful bronchial arterial infusion chemotherapy combined with radiotherapy for an endobronchial metastasis after resection of small cell lung cancer

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Keywords

Bronchial arterial infusion, chemotherapy, endobronchial metastasis, radiation therapy, small cell lung cancer.

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Abstract

Bronchial arterial infusion (BAI) chemotherapy has been reported to be an effective treatment option for centrally located early-stage squamous cell lung cancer (SCC) and has a favourable response rates for patients with stage III or IV or recurrent non-small cell lung cancer (NSCLC) without distant metastases who cannot tolerate standard chemotherapy. Here, we report a case of an 83-year-old male with a solitary polypoid endobronchial metastatic tumour in the left main bronchus one year and 10 months after video-assisted thoracoscopic surgery (VATS) combined segmentectomy (left S6 + S8a) for small cell lung cancer (SCLC), pT1bN0. He was treated with BAI of 100 mg of cis-Diamminedichloroplatinum/cisplatin (CDDP), followed by thoracic radiotherapy (56 Gy in 28 fractions). There was no recurrence for 2.5 years. BAI chemotherapy combined with radiotherapy seemed to be an effective salvage option for the treatment of solitary endobronchial metastases of SCLC in patients unfit for standard chemoradiotherapy.

Introduction

Small cell lung cancer (SCLC) is an aggressive neuroendocrine carcinoma characterized by rapid growth, early development of extensive lymphatic and haematogenous metastases, high sensitivity to initial chemotherapy and radiotherapy, and a poor prognosis. As surgery is often avoided due to the extent of disease at initial presentation, only patients with early limited-stage (LS) SCLC without lymph node involvement are eligible for curative surgery followed by systemic chemotherapy with or without radiotherapy. Stereotactic ablative radiotherapy (SABR) is an option for some patients with early LS-SCLC who are medically inoperable.

There are several reports on the efficacy of bronchial arterial infusion (BAI) chemotherapy for patients with centrally located early-stage squamous cell lung cancer (SCC), locally advanced SCC, as well as patients with stage III or IV or recurrent non-SCLC (NSCLC) without distant metastases

who cannot tolerate standard chemotherapy [1–3]. It is generally believed that BAI of chemotherapeutic agents can enhance anticancer effects by increasing local concentrations and minimize adverse events including haematological and non-haematological toxicities, although it requires the skills of well-trained physicians and may cause haemoptysis, spinal paralysis, bronchial ulcers, and oesophageal ulcers. Here, we present a case of an elderly male patient with a polypoid endobronchial metastasis in the left main bronchus after video-assisted thoracoscopic surgery (VATS) combined segmentectomy for SCLC, who was successfully treated with BAI chemotherapy and radiation therapy.

Case Report

An 81-year-old male patient with a 75 pack-year smoking history presented with a solitary pulmonary nodule

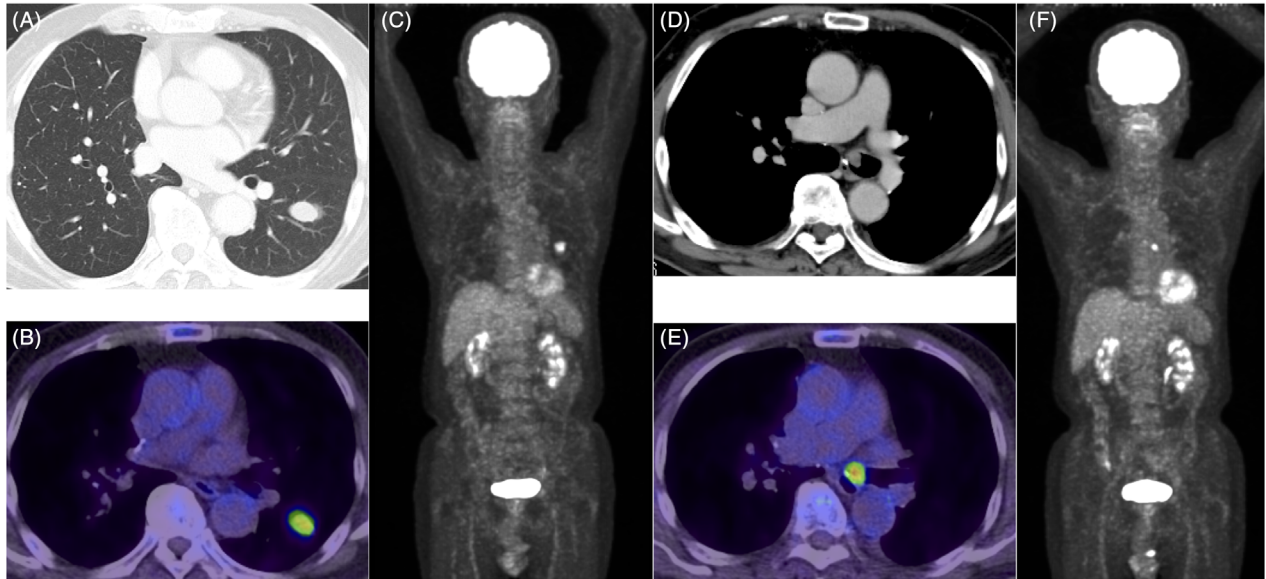


Figure 1. Images before video-assisted thoracoscopic surgery (VATS) combined segmentectomy and at recurrence. (A) Computed tomography (CT) before VATS surgery revealed lung tumour of the left lower lobe. (B, C) Positron emission tomography (PET/CT) showed fluorodeoxyglucose (FDG) uptake of the lung tumour. (D) CT at recurrence revealed an endobronchial tumour in the left main bronchus. (E, F) PET/CT showed FDG uptake of the endobronchial tumour.

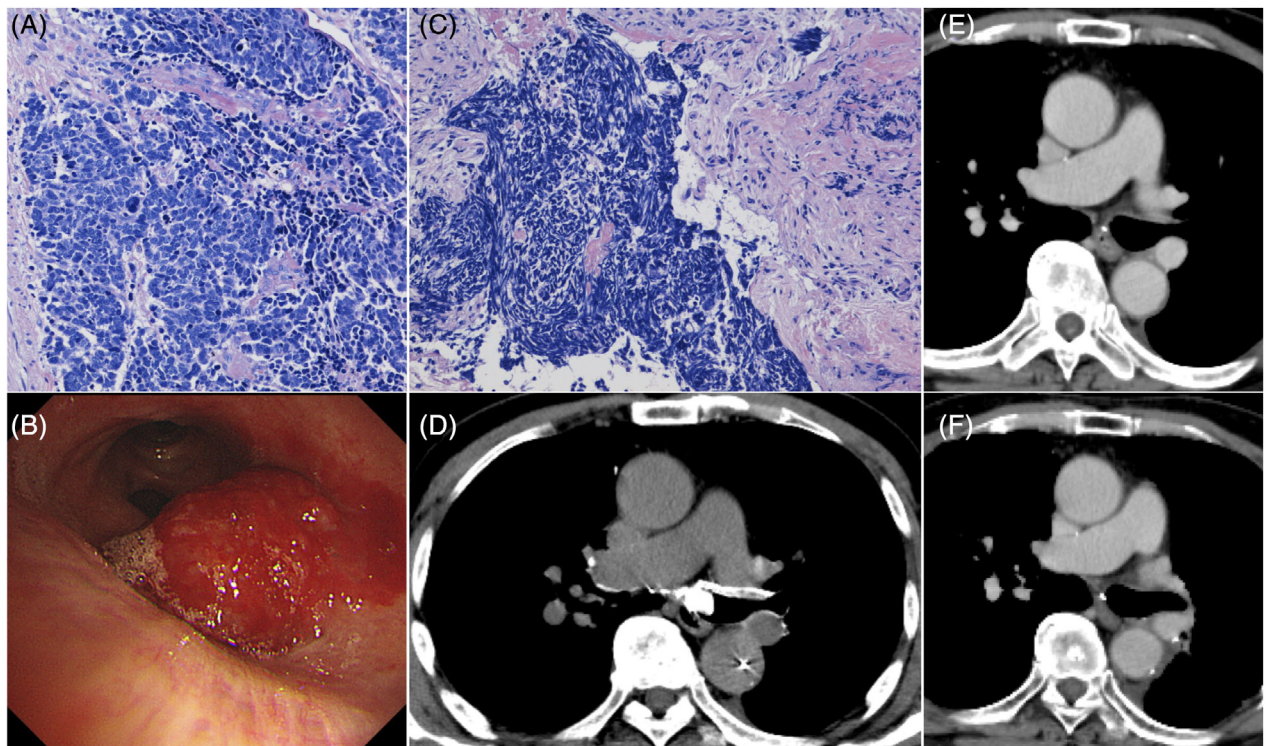


Figure 2. A solitary polypoid endobronchial metastatic tumour. (A) Haematoxylin and eosin (H&E) staining section of the resected lung tumour. (B) Bronchoscopy revealed a polypoid endobronchial metastatic tumour in the left main bronchus. (C) H&E staining section of the transbronchoscopic biopsy specimen. (D) Computed tomography (CT) scan during bronchial arteriography clearly showed a notable contrast-enhanced endobronchial metastatic tumour, indicating blood supply to the tumour. (E, F) CT scans at one month (E) and 2.5 years (F) after bronchial arterial infusion (BAI) chemotherapy revealed no endobronchial tumours.

(18 mm × 15 mm) in the left lower lobe on computed tomography (CT) (Fig. 1). He had a medical history of surgery and adjuvant chemotherapy for rectal adenocarcinoma and SCC in the right upper lobe at the ages of 71 and 72, respectively. He underwent VATS combined segmentectomy (S6 + S8a) and was diagnosed with SCLC, pT1bN0 (Fig. 2). Due to his old age and intolerance to previous post-operative adjuvant chemotherapy for the resected SCC, he was followed up without post-operative chemotherapy.

One year and 10 months after the surgery, surveillance CT scans revealed a solitary polypoid endobronchial tumour in the left main bronchus, although he had no signs or symptoms of lung cancer on physical examination at the time of follow-up visit (Fig. 1). The transbronchial bronchoscopic biopsy (TBB) specimen of the tumour revealed an endobronchial metastasis of the resected SCLC (Fig. 2). As he was intolerant to previous post-operative adjuvant chemotherapy, he was treated by BAI of 100 mg of cis-Diamminedichloroplatinum/cisplatin (CDDP) after we confirmed that CT scan during bronchial arteriography showed a well-enhanced endobronchial tumour, and then chest radiation therapy (56 Gy in 28 fractions) was started on day 5. A month after BAI chemotherapy, CT scan revealed no endobronchial tumours and he remained in good health. Two and a half years of physical examination and surveillance CT scan showed no evidence of disease (Fig. 2). Although BAI chemotherapy in combination with radiation therapy is rarely used for recurrent lung cancer, it might be an effective salvage option for the treatment of endobronchial metastases of SCLC in patients unfit for standard chemoradiotherapy.

Discussion

We reported a case of BAI chemotherapy in combination with thoracic radiotherapy for an endobronchial metastasis after resection of SCLC. Selective bronchial arteriography and intra-arterial chemotherapy for lung cancer have been reported for more than 50 years. However, the efficacy of BAI chemotherapy for lung cancer has not been adequately validated because of the requirements for well-trained physician's skills and specialized equipment. A study with a small number of patients with centrally located early-stage SCC reported that BAI chemotherapy was a highly effective treatment modality besides photodynamic therapy, brachytherapy, and Neodymium-Doped Yttrium Aluminum Garnet (Nd: YAG) laser [1]. Zhu et al. reported that neoadjuvant BAI chemotherapy prolonged progression-free survival (PFS) and overall survival (OS) in patients with unresectable stage III SCC [2]. In a prospective study of locally advanced NSCLC, the response

rates as well as 1-, 2-, and 3-year survival rates of radiotherapy in combination with BAI chemotherapy were reported to be intermediate between conventional radiotherapy and combination of hyperfractionated radiotherapy with BAI chemotherapy [4]. Another prospective study reported that in patients with stage III or IV or recurrent NSCLC without distant metastases who cannot tolerate standard chemotherapy, BAI chemotherapy achieved overall response rate of 52%, median PFS of 6.5 months, and OS of 17.4 months [3]. Based on his past experience of intolerance to post-operative adjuvant chemotherapy after resection of SCC and the aforementioned reports, we decided to choose BAI chemotherapy combined with radiotherapy, although there are no reports on the application of BAI chemotherapy in SCLC.

SCLC patients with a solitary peripheral pulmonary nodule without lymph node metastasis account for less than 5% of all SCLC patients. The 5-year survival rate of patients with early LS-SCLC treated with curative surgery and subsequent systemic chemotherapy with or without radiotherapy was reported to be 40–60% [5]. The local recurrence rate after surgical treatment of early LS-SCLC has been reported to be almost similar compared to that of the common LS-SCLC patients treated with chemoradiation. Among single-, oligo-, and poly-metastatic recurrence, single metastatic recurrence is the most favourable factor by which local therapy may impact long-term survival [6]. Therefore, chemoradiotherapy would be recommended for relapsed/recurrent SCLC patients with a single metastasis. However, the combination of BAI chemotherapy with radiotherapy might be an appropriate treatment option for unfit patients, such as the elderly or those with poor performance status or comorbidities including impaired organ function, because BAI chemotherapy has the advantage of shorter treatment time and less toxicity due to lower dosage compared to that required for conventional systemic chemotherapy [1].

Direct injection of chemotherapeutic agents via precise feeding arteries provides high local control efficacy due to their high concentration into local lesions. However, feeding arteries for endobronchial metastatic tumours include not only the bronchial arteries, but also a variety of other feeding arteries. In our case, feeding arteries were checked by CT during bronchial arteriography, and then 100 mg/body of CDDP was administered according to a previous report [1]. Precise detection of feeding arteries is crucial for successful BAI chemotherapy.

In SCLC, bronchial submucosal invasion by cancer cells is common but endobronchial polypoid growth is extremely rare [7]. We here present a case of a male patient with an endobronchial polypoid metastasis of SCLC in the left main bronchus after VATS combined segmentectomy. To our knowledge, this is the first case report of an endobronchial polypoid metastasis after

resection of peripheral SCLC and successful treatment with BAI chemotherapy combined with radiation.

Disclosure Statement

Appropriate written informed consent was obtained for publication of this case report and accompanying images.

Author Contribution Statement

All authors contributed to the patient's therapy and manuscript preparation. Waki Hosoda also participated in the histological diagnosis. All the authors have read the manuscript and have approved this submission.

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