CASE REPORT

Long-term survival for 93 months of limited-stage small cell lung cancer: A case report and literature review

Yujie Zhong, Qihong Zhang, Wenjing Deng, Yuping Zhang, Zongjuan Ming, Yanli Hou, Zequn Niu & Shuanying Yang

Department of Respiratory Medicine, the Second Affiliated Hospital, Xi'an Jiaotong University, Xi'an, China

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Correspondence

Shuanying Yang, Department of Respiratory Medicine, the Second Affiliated Hospital, Xi'an Jiaotong University, Xi'an 710004, China.

Tel: +86 13991392919

Fax: +86 02987678599

Email: yangshuanying66@163.com

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Abstract

A 49-year-old man was diagnosed with small cell lung cancer in May 2005. Chemotherapy was started with 60 mg/day cisplatin iv drip (from days one to three), 2 mg topotecan (TP) hydrochloride iv drip (from days one to four), and traditional Chinese medicine (TCM) AiDi injection for anti-tumor. After four cycles, he underwent conformal radiotherapy with 56Gy/28 fractions in October 2005. In April 2006, a mass on the right supraclavicular area was found. Therefore, he underwent another course of radiotherapy. The fields included the right supraclavicular area and the radiation dose was 50Gy/25 fractions. After completion of chemoradiotherapy, the patient achieved complete remission. Subsequently, the patient received prophylactic cranial irradiation (PCI). Until April of 2012, he had been followed up regularly. Since the SCLC diagnosis, he had received TCM for seven years. In April 2012, the patient complained of coughing again. Subsequently, the patient was given five cycles of an etoposide carboplatin regimen. A computed tomography (CT) scan was performed for review, which showed no obvious change. The patient underwent a second-line chemotherapy irinotecan cisplatin three times. However, the symptoms and CT of this patient showed no significant improvement. We changed the chemotherapy regimen to TP (topotecan 1.2 mg iv drip, days one to five; carboplatin 100 mg iv drip, days one to five). After two TP regimens, the patient died in his sleep on 3 March 2013. In this case, the standardized sequential chemotherapy and radiotherapy treatment, PCI, TCM, and good compliance may have contributed to the patient's longer survival.

Introduction

Lung cancer is the leading cause of cancer-related mortality worldwide.¹ Small cell lung cancer (SCLC) has a high risk of early hematogenous and lymphatic dissemination and has particular propensity to metastasize to the brain. It leads many clinicians to consider it a systemic disease. It is sensitive to chemotherapy and radiotherapy, which have good short-term effects. However, the one-, two-, and three-year survival rates are 81.72%, 54.95%, and 41.09%, respectively.² The median survival time (MST) of a patient without treatment is two to four months and the MST of patients in limited-stage with standardized radiotherapy and chemotherapy is 15–20 months.³ Here we report a case of a patient with controlled SCLC for 93 months.⁴ The procedure that was followed complied with the ethical standards of the Second Affiliated Hospital, Medical College of Xi'an Jiaotong University Institutional Review Board (IRB) and was approved by the

hospital committee. Informed written consent was obtained from the subject.

Case presentation

A 49-year-old man, who had a 20-year smoking history of 20 cigarettes per day, complained of coughing, shortness of breath, and chest pain for three months on 23 May 2005. After physical examination, the main finding was that the breathing sound of the left lung was low and the left tactile fremitus was weak. A family history of cancer was denied. A chest computerized tomography (CT) scan showed that the left bronchus became narrow and the mediastinum shifted left, with the likely cause being obstructive pneumonia of left upper lobe (Fig 1).

The fiberoptic bronchoscopy examination showed that the bronchus opening of the left upper lobe was completely blocked by a papillary tumor. Histopathologic examination revealed small cell undifferentiated carcinoma (Fig 2).

Figure 1 Computed tomography scan in 2005 showed atelectasis of the left upper lobe.

Diagnosed as SCLC, chemotherapy was started with 60 mg/day cisplatin iv drip (from days one to three), 2 mg topotecan (TP) hydrochloride iv drip (from days one to four), and traditional Chinese medicine (TCM) AiDi injection for anti-tumor.⁵ No fever, chills, abdominal pain,

Figure 2 Histopathologic examination revealed small cell undifferentiated carcinoma.

diarrhea or jaundice were observed after the procedure. After four cycles, the above symptoms had notably eased. The patient underwent conformal radiotherapy with 56Gy/28 fractions in October 2005.⁶ Treatment fields included all gross tumors plus a 2 cm margin of normal surrounding tissue, and the ipsilateral hilum. In April 2006, an approximately $1.0 \times 0.8 \times 0.6$ cm mass on the right supraclavicular area was found. The lymph node was firm, smooth, and fixed. Upon recheck, brain, liver and adrenal CT scans were performed and were all identified to be normal. Therefore, the patient underwent another course of radiotherapy. The fields included the right supraclavicular area and the radiation dose was 50Gy/25 fractions. After completion of chemoradiotherapy, the patient achieved complete remission (CR). Subsequently, the patient received prophylactic cranial irradiation (PCI). The inferior margin included the base of skull with shielding of the ocular globes. The dose was 30Gy/15 fractions.⁷ Until April of 2012, the patient was followed up regularly: three times per year from 2007 to 2009, and twice per year from 2010 to 2012. In 2009, the patient had a slight cough, and a CT scan (Fig 3) showed that the left upper lobe had cord-like opacity. It indicated that he had radiation pneumonia. After PCI, he did not develop recurrence or metastasis on regular follow-up. Since the SCLC diagnosis, TCM was administrated immediately and at follow-up appointments (Table 1).⁸

Figure 3 Computed tomography (CT) scan in 2009 showed no pulmonary tumor findings compared with previous CT scans.

In April 2012, the patient complained of coughing, expectoration, and shortness of breath once again. A chest enhanced CT scan in April 2012 (Fig 4) revealed the lumen of

Table 1 Ingredients of traditional Chinese medicine

Chinese name	English name	Mass (g)
Shudi	Rehmannia glutinosa	9
Danggui	Angelica sinensis	6
Zhihuanghua	Roast chrysanthemum	15
Cangshu	Rhizoma atractylodis	15
Baishu	Rhizoma atractylodis macrocephalae	12
Caoguo	Amomum tsako	6
Fuling	Poria cocos	15
Shengbiandou	Raw lentils	15
Shengyiren	Raw coix seed	15
Lujiaoqiao	Colla Corni Cervi	12
Gouqizi	Matrimony vine	12
Shengcao	Sward	3
Lianchi	Fructus Forsythiae	12
Jianqu	Jianqu	18
Jiaozha	Coke Hawthorn	18

right middle lobe was a little narrow. CT scans of the brain, liver and adrenal showed no obvious abnormality. Subsequently the patient was given five cycles of EP (etoposide 100 mg iv drip, days one to five; carboplatin 500 mg iv drip, days one to four). A CT scan was performed for review, which showed no obvious change.

The patient underwent a second-line chemotherapy IC regimen (irinotecan 80 mg iv drip, days one, eight, and 15; carboplatin 100 mg iv drip, days one to five) three times. During chemotherapy, the main side effect was white blood cell (WBC) reduction. However, after granulocyte colony-stimulating factor (G-CSF) treatment, the WBC returned to normal. In January 2013, the patient experienced coughing again. A CT scan in February 2013 (Fig 5) showed the lumen of right middle lobe was narrow and atelectasis had occurred in the middle lobe of the right lung. The symptoms and CT of this patient showed no significant improvement. It was considered that long-term use of chemotherapy had led to drug resistance. The chemotherapy regimen was altered to TP (topotecan 1.2 mg iv drip, days one to five and carboplatin

Figure 4 Computed tomography scan in October 2012 showed the lumen of the right middle lobe was mild narrow.

Figure 5 Computed tomography scan in February 2013 showed the lumen of the right middle lobe was narrow and atelectasis had occurred in the middle lobe of the right lung.

100 mg iv drip, days one to five). After two TP regimens, the patient died in his sleep on 3 March 2013. The general condition of this patient was good. No fever, vomiting, or hearing impairment were observed after the procedure. The patient was very overweight, and had a history of hypertension. We believe the cause of death of this patient was obstructive sleep apnea hypopnea syndrome (OSAHS).

Discussion

SCLC easily makes inroads on the vascular in early stage and metastases to the hilum of lung, mediastinal lymph nodes, and distant metastases. The cancer cells grow extremely fast. The traditional treatment of SCLC is chemotherapy, but the side effects are serious. In addition, the recurrence rate is high, while the cure rate is low. More than 90% patients relapse after treatment, and the five-year survival rate is only 1%–3%.⁹

Huang *et al.* published an article detailing the long-term survival of six patients with limited-stage SCLC with no evidence of brain metastasis in 2005. Table 2 outlines the basic situations and clinical treatment characteristics.¹⁰

These six patients were all given concurrent chemoradiotherapy. After achieving CR, all patients received PCI. After completion of chemotherapy and radiotherapy, the patients were rechecked regularly. Until the latest follow-up, the median survival time was 53 months (range: 36 to 75 months). Three patients (50%) had distant metastasis.

The patient that we observed survived for at least 89 months. He had no distant metastasis, and his general condition was good. Compared with the above six patients, TCM may play an important role in prolonging the survival time. The common characteristics in these seven patients were the standardized combined radiochemotherapy, PCI, and regular follow-up.

According to the related diagnostic criteria of the International Association for the Study of Lung Cancer on SCLC, the patient was in limited-stage. Based on the treatment of this patient, our findings are as follows: First, we emphasize that chemotherapy is the foundation in the treatment of limited-stage SCLC. Radiotherapy is valued for reducing local recurrence, increasing the local control rate, and improving overall survival time.¹¹ Secondly, brain metastasis is one of the most important causes of treatment failure in patients with SCLC.

Table 2 A comparison of clinical treatment characteristics

Case	Gender	Age	Thoracic irradiation dose (Gy)	PCI dose (Gy)	Local relapse (Gy)	Other distant metastasis	Brain metastasis	Follow up
1	Male	63	54.0	35.0	–	–	–	Alive, 75 months
2	Male	62	54.0	–	–	–	–	Alive, 68 months
3	Female	61	60.0	30.0	+	Bone	–	Alive, 47 months
4	Male	61	54.6	36.0	–	Bone	–	Alive, 56 months
5	Male	61	52.2	39.6	–	Kidney	–	Alive, 36 months
6	Male	65	55.8	30.0	–	–	–	Alive, 36 months

PCI, prophylactic cranial irradiation.

Several randomized studies showed that PCI could reduce the rate of brain metastases in patients with SCLC who achieved CR.¹² In these studies, the rates of brain metastases were from 42.0% to 67.1% in the patients who did not experience PCI and 11.0% to 40.0% in the patients who experienced PCI. For the patients with limited stage SCLC who achieve CR after first-line treatment, PCI is effective in decreasing the rate of brain metastasis and tends to improve survival rate.¹³ Thirdly, TCM plays an important role in multidisciplinary treatment of malignant tumors. The main mechanisms of anti-tumor include: the direct cytotoxic effect, inducing tumor cell apoptosis, inhibition of angiogenesis, and modulating autoimmunity. TCM can increase the efficacy of radiotherapy and chemotherapy, and reduce the side effects.¹⁴ Finally, although SCLC is sensitive to chemotherapy and radiotherapy, local recurrence and distant metastasis remain the leading causes of death in patients. Regular re-examination can assist in finding the metastasis earlier, ensuring that appropriate treatment is applied in time.

We report a rare case of long-term survival of limited-stage SCLC for 93 months. In this case, standardized sequential chemotherapy and radiotherapy treatment, PCI, TCM, and good compliance contributed to the patient's long-term survival.

Disclosure

No authors report any conflict of interest.

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