

Case Report

Successful treatment with carboplatin and etoposide in a small-cell lung cancer patient undergoing hemodialysis

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Abstract

Chemotherapy for cancer patients with chronic renal failure, undergoing hemodialysis (HD), has not been well established. A 78-year-old woman with chronic renal failure due to hypertensive nephropathy, undergoing HD, was diagnosed with small-cell lung cancer (SCLC) with multiple-organ metastases. She was treated with 4 cycles of carboplatin (CBDCA) and etoposide (ETP) chemotherapy and a partial response was achieved. She remained progression-free for at least 12 months after the completion of chemotherapy. Pharmacokinetic analysis (PK) revealed that both agents were rapidly eliminated by HD; however, the remnant platinum remained longer in the plasma. Chemotherapy with CBDCA and ETP was effective and could be safely administered to a patient with SCLC undergoing HD.

1. Introduction

Lung cancer is a leading cause of cancer-related death in many developed countries. Because small-cell lung cancer (SCLC) is one of the most chemo-sensitive solid malignancies, chemotherapy is administered in most cases; however, chemotherapy for patients with chronic renal failure, undergoing hemodialysis (HD), has not been well established. Here, we treated a SCLC patient, undergoing HD, with carboplatin (CBDCA) and etoposide (ETP), and analyzed the pharmacokinetics (PK).

2. Case Report

A 78-year-old woman with chronic renal failure due to hypertensive nephropathy, undergoing HD, presented with lymphadenopathy of the right hilum in January 2008. Histopathologic study of transbronchial biopsy specimens revealed SCLC. She had

metastases in the liver, bone and right adrenal gland; therefore, she was diagnosed with extensive disease (ED). She had been undergoing HD three times a week for the past 2 years. Her Eastern Cooperative Oncology Group performance status was 1. Considering her good performance status and the high chemo-sensitive nature of SCLC, we treated her with a combination of CBDCA and ETP. The treatment schedule and dose of each agent were based on a previous study ¹. In the first cycle, 300mg/m² CBDCA on day 1, and 50mg/m² of ETP on day 1 and 3 were administered. Each agent was diluted in 250ml of 5% glucose solution and injected over 60 minutes. CBDCA was administered after the completion of ETP administration on day 1. HD was started 1 hour after administration of the anticancer agent each day. Prophylactic administration of granulocyte colony-stimulating factor (G-CSF) was not carried out.

She received 4 cycles of chemotherapy at 3- to 4-week intervals. No non-hematologic toxicities were observed, except for alopecia, throughout the treatment. Hematologic toxicities, such as grade 3 neutropenia and grade 4 thrombocytopenia, were observed during the first cycle and each agent was reduced to 80% dose from the second cycle. Platelets and red blood cells were transfused during the first and second cycles, respectively. G-CSF administration was not required. Table 1 shows the hematologic toxicities in each cycle. After two cycles of treatment, she achieved a partial response and has remained progression-free for at least 12 months after the completion of chemotherapy (Fig.1).

PK analysis was conducted for each agent. Blood samples were collected 1, 2, 4, 6, 8, 24 h after the administration of each agent in the first cycle. For the analysis of CBDCA, blood samples were also collected just before the administration of CBDCA in subsequent cycles. Total platinum and ETP in the plasma were measured by atomic

absorption spectrometry and high-pressure liquid chromatography, respectively (Figs. 2 and 3; ^{2,3}. The PK pattern of each agent was similar to the previous report of SCLC patients undergoing HD ^{1,4} and of patients with normal renal function ^{5,6}. The serum CBDCA concentration rapidly decreased during the first 24 h by HD; however, the remnant platinum remained longer in the plasma: 0.29 μ g/ml at the beginning of the second cycle, 0.48 μ g/ml at the beginning of the third cycle, and 0.52 μ g/ml at the beginning of the fourth cycle, respectively.

3. Discussion

Currently, it is not uncommon for patients undergoing HD to suffer from various types of cancer; however, the safety and efficacy of chemotherapy have not been well described in such patients. In this paper, we reported a patient with small-cell lung cancer who was successfully treated with CBDCA and ETP combined with hemodialysis. To our knowledge, this regimen, with the same treatment schedule for patients with SCLC undergoing HD, has been reported in 5 patients by 3 authors ^{1,4,7}, and our report has confirmed the safety and efficacy of this treatment strategy.

The PK pattern of each agent during the first 24 h was almost identical to previous reports ^{1,4}. In this report, we measured the serum CBDCA concentration also just before the second, third, and fourth cycles, and found that it remained longer in the plasma. In this patient, hematologic toxicities persisted even after the reduction of both agents from the second cycle. As Inoue et al. mentioned remnant platinum could cause prolonged myelosuppression. When platinum agents are repeatedly administered in patients undergoing HD, more careful attention should be paid to toxicity.

In conclusion, we report a patient with SCLC, undergoing HD, who was successfully treated with CBDCA and ETP. Combined with the results of previous reports, this regimen can be recommendable for such patients. Other regimens, such as cisplatin and ETP⁸, CBDCA and irinotecan⁹, and amrubicin¹⁰, have also been reported to be safe and effective in patients undergoing HD. Although further studies are needed, chemotherapy for SCLC patients should not be withheld because of HD.

Conflict of interest statement

The authors have no conflicts of interest to declare.

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Figure legends

Figure 1.

CT images before and after chemotherapy. Arrows indicate shrinkage of mediastinal lymphnode and liver metastasis.

Figure 2.

Platinum concentration in plasma after the administration of carboplatin.

Figure 3.

Etoposide concentration in plasma after administration. Solid and dotted lines indicate etoposide concentration on day 1 and day 3, respectively.

Table 1. Hematologic Toxicities

Cycle	Dose (mg/m2)		Neutrophils (/mm3)		Hemoglobin (g/dl)		Platelets ($\times 10^4$/mm3)	
	CBDCA	ETP	Before	Nadir	Before	Nadir	Before	Nadir
1	300	50	5000	600	12.7	9.4	24.3	2.2
2	240	40	4800	1600	9.3	6.2	29.6	6.1
3	240	40	3300	1500	11.0	10.2	28.6	6.5
4	240	40	2500	1500	10.6	8.2	9.0	2.4

CBDCA, carboplatin; ETP, etoposide

Figure 1

Before treatment

After treatment

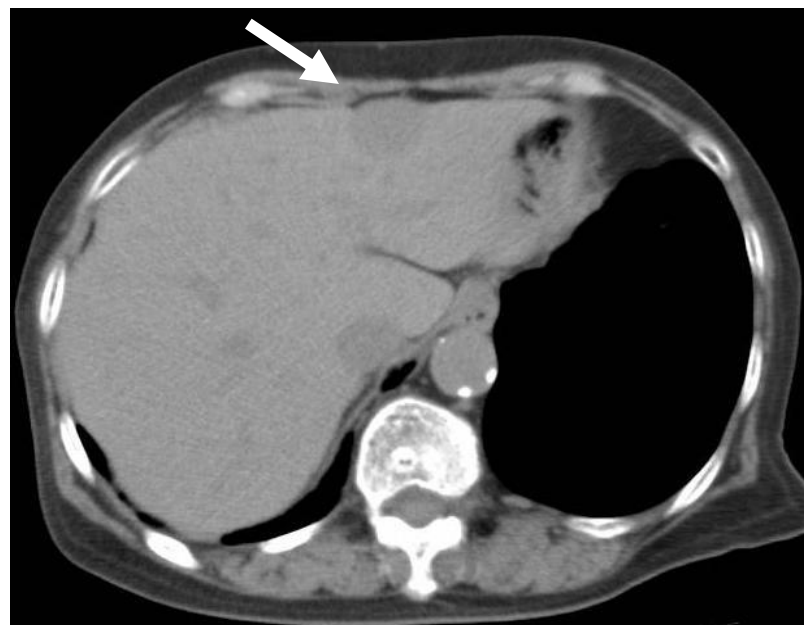
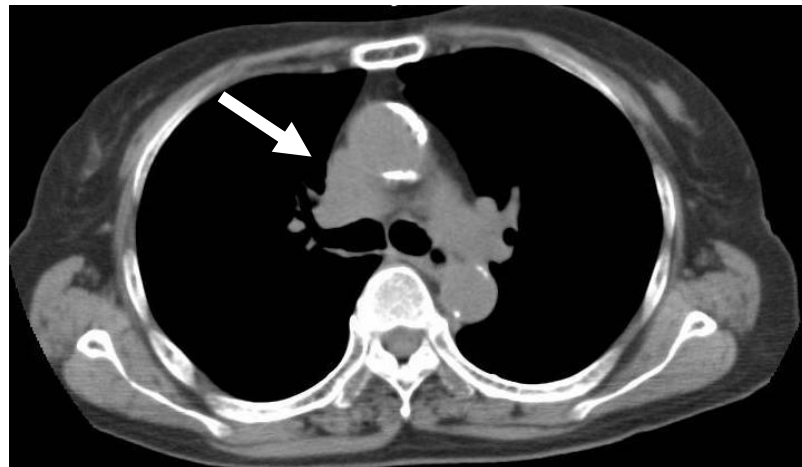
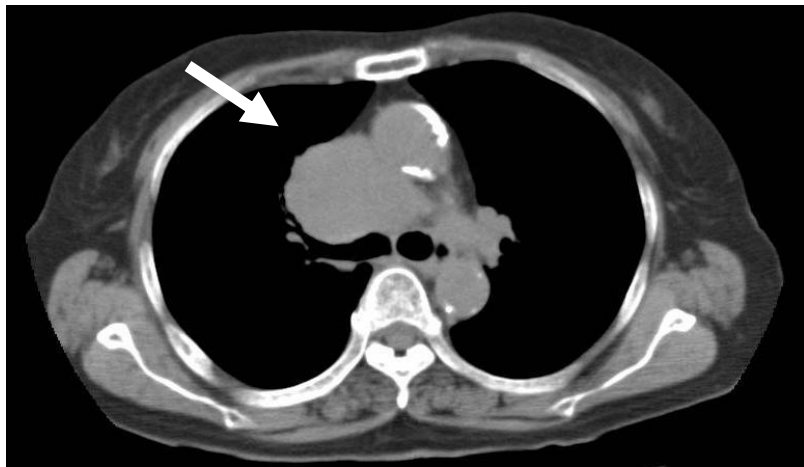


Figure 2

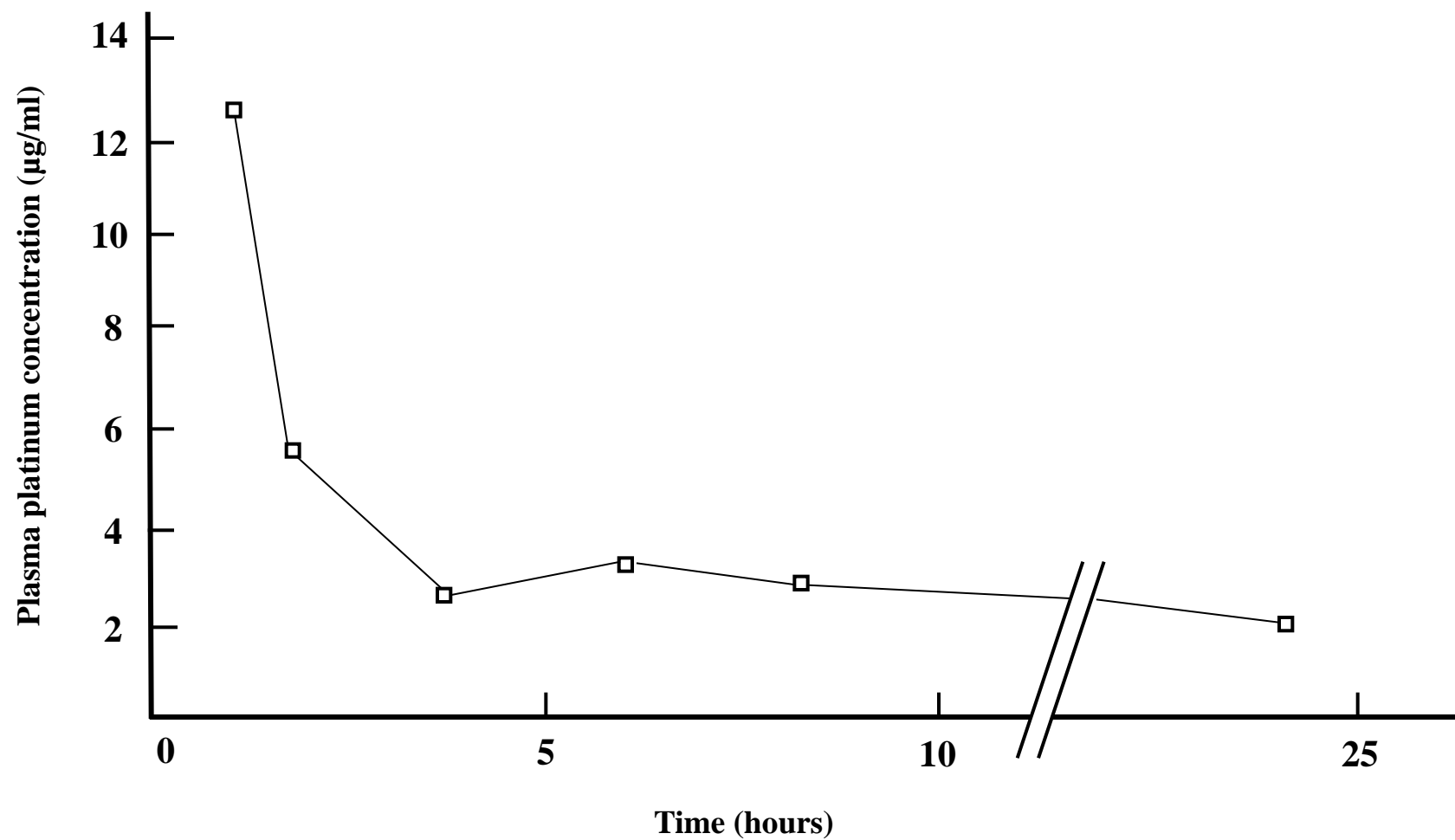


Figure 3

