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CASE REPORT

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Case of a lung collision tumor consisting of squamous cell carcinoma of the lung and diffuse large B-cell lymphoma

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Abstract

Among the reports of malignant collision tumors, collision tumors consisting of lung cancer and malignant lymphoma are extremely rare. We report case of a lung collision tumor consisting of squamous cell carcinoma of the lung and diffuse large B-cell lymphoma.

KEYWORDS

collision tumor, double tumor, lung cancer, malignant lymphoma, nodular shadow

1 | INTRODUCTION

The collision tumor consisted of two malignant tumors that independently developed and were contiguous or had invaded each other. Among the reports of malignant collision tumors, these tumors consisting of lung cancer and malignant lymphoma are extremely rare.[1–3] Here, we report a resected case of a collision tumor that included squamous cell carcinoma of the lung and malignant lymphoma.

2 | CASE REPORT

A 74-year-old man was admitted to our hospital for identification of an abnormal nodular shadow in the right upper lobe found incidentally on computed tomography (CT) of the chest. At the time of admission, a swollen lymph node measuring 7 × 5 cm was palpable in the left neck. Smoking history was 1 pack/day for 55 years. The patient worked in alcohol sales. He had no fever, no respiratory symptoms, and no weight loss in the preceding 3 months.

Body temperature was 37.1°C on admission; heart rate was 88 beats/min and regular; blood pressure was 120/66 mmHg; peripheral oxygen saturation was 98%; and elastic soft, mobile lymph node was palpable in the left neck without pain. No other swollen lymph nodes were identified in bilateral axillary or groin regions. On palpation, the abdomen was non-tender without organomegaly. His laboratory findings on admission reveal the following: red blood cell count of 4.11 × 106/μl; levels of C-reactive protein, 1.50 mg/dl; lactate dehydrogenase, 416 U/L; alkaline phosphatase, 746 U/L; neuron-specific enolase, 20.7 ng/ml, and soluble interleukin 2 receptor, 5862 U/L. A nodular shadow approximately 2 cm in maximum diameter was found in the upper right field on chest radiography (Figure 1A). CT of the chest revealed a 24 × 21 × 18 mm nodule with a cavity in Segment 1 of the right upper lobe (Figure 1B). However, no swelling of the mediastinal lymph nodes was evident. Fluorodeoxyglucose-positron

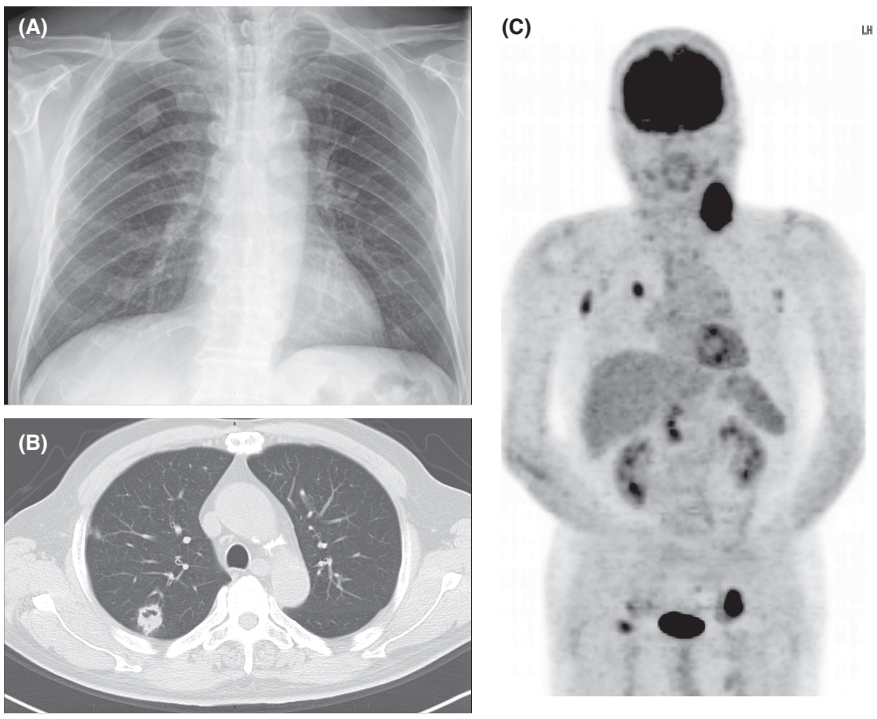

FIGURE 1 Findings of Chest radiography, CT of the chest and FDG-PET. (A) Chest radiography: A nodular shadow approximately 2 cm in maximum diameter was found in the upper right lung field. (B) CT of the chest: A 24 × 21 × 18 mm nodule with a cavity was found in the first segment of the upper right lobe. (C) FDG-PET: SUV max accumulation of 9.4 was observed in the nodule in the right upper lobe. In addition to strong accumulation in the left cervical lymph nodes, accumulation also occurred in both axillary lesions, near the pancreatic head, in both external iliac arteries, and in the right inguinal lymph nodes

emission tomography (FDG-PET) (Figure 1C) showed a maximum standardized uptake value (SUVmax) of 9.4 for the nodule in the right upper lobe. In addition to strong accumulation in the left cervical lymph nodes, accumulation was also seen in both axillary lesions, near the pancreatic head, in both external iliac arteries, and in the right inguinal lymph nodes. No abnormal accumulation was apparent in other organs (liver, bone, adrenal glands, or spleen). Contrast-enhanced magnetic resonance imaging of the head showed no obvious abnormalities. Transbronchial lung biopsy (TBLB) was performed to assess the lung lesions, and squamous cell carcinoma of the lung was diagnosed. Left cervical lymph node biopsy was performed. Immunohistochemistry of the lymph node revealed that CD20, CD79a, Bcl-2, and CD10 were positive. Based on the World Health Organization classification of tumors 4th edition, the diagnosis of the cervical lymph node was classified as diffuse large B-cell lymphoma NOS. At this point, the clinical stage of the lung cancer was stage IA, and the stage of malignant lymphoma was stage IVA, and thus, treatment for malignant lymphoma was given priority. After two courses of R-CHOP (Rituximab + cyclophosphamide + hydroxydaunorubicin + vincristine + prednisolone) therapy for malignant lymphoma, sIL-2R normalized to 466 from 14,003 U/mL. However, chest radiographs and CT of the chest revealed nodular shadows in the right upper lung field that had increased, and new cavities appeared. On FDG-PET, maximum SUV in the lung tumor increased from 9.4 to 10.5, but accumulation in the lymphoma lesions remained only in the left inguinal region, with little accumulation in other areas. Surgery was then performed for the lung cancer. A right upper lobectomy and mediastinal lymph node dissection was performed for his lung cancer. The lesion was a white lobulated mass approximately 33 mm in size with cavitation.

Pathological findings (Figures 2A–C, hematoxylin and eosin stain): Poorly differentiated squamous cell carcinoma of the lung and malignant lymphoma-like lesions were observed in the same foci (Figure 2A). Immunohistochemical staining revealed that CD20, CD79a (Figure 2B), Bcl-2, and CD10a were positive, indicating diffuse large B-cell lymphoma NOS. The findings of this lung tumor were the same as those of the immunohistochemical staining of the cervical lymph nodes described above. In addition, the area where AE1AE3 (Figure 2C), which is an epithelial marker, was positive and the area where CD79a was positive overlapped, suggesting that squamous cell carcinoma and malignant lymphoma were both present in the same lesion (Figure 2B,C). After the operation, eight courses of R-CHOP therapy were performed. However, the malignant lymphoma worsened, and 2nd- and 3rd-line treatments were attempted. However, the disease was not controlled, and he died 10 months after the operation.

3 | DISCUSSION

To the best of our knowledge, this is the fourth case in the world of a collision tumor that consisted of malignant lymphoma and primary lung cancer[1–3] (Table 1).

Meyer et al.[4] and Foulds et al.[5] classified collision tumors in the same organ into three categories. The first is

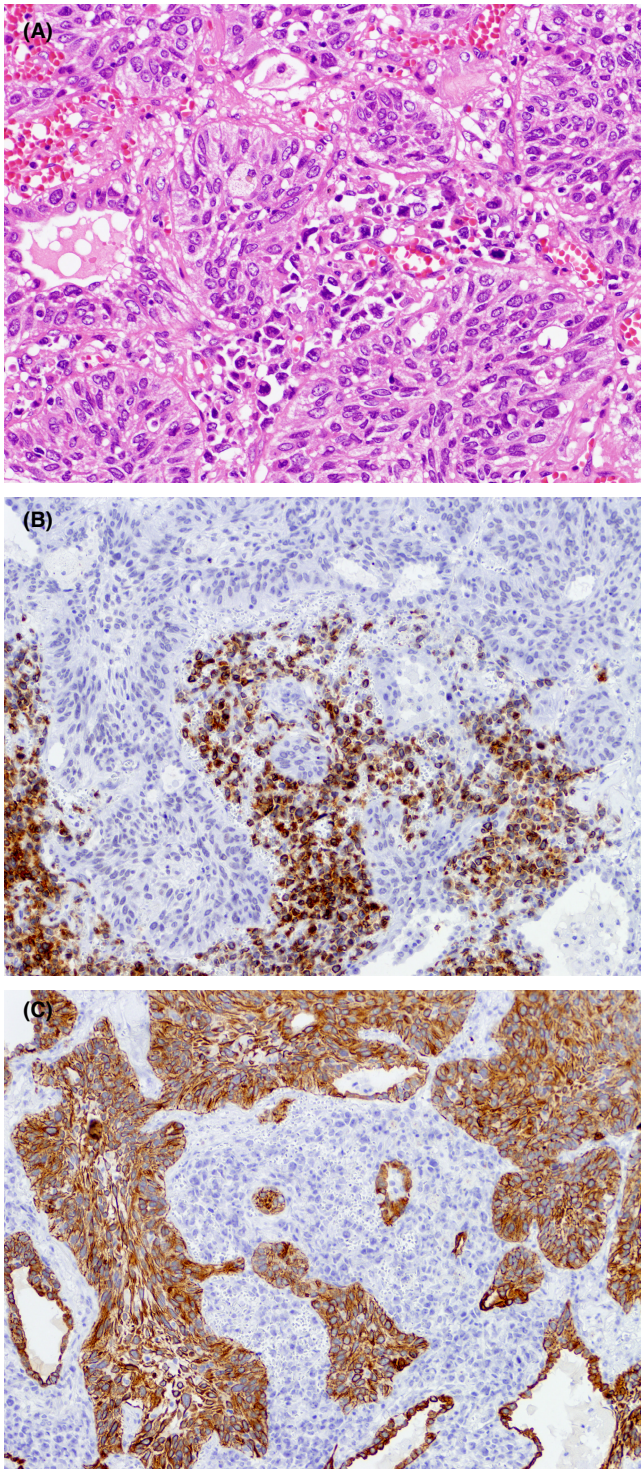

FIGURE 2 Pathological findings of lung tumor. (A) (hematoxylin and eosin stain, x20): Pathological findings: Poorly differentiated squamous cell carcinoma of the lung and malignant lymphoma-like lesions were observed in the same foci (upper). (B and C) Immunohistochemical staining revealed that CD79a (B, ×20), a B-cell marker, was positive, indicating diffuse large B-cell lymphoma. In addition, the area where AE1AE3 (C, ×20), which is an epithelial marker, was positive and the area where CD79a was positive overlapped, suggesting that squamous cell carcinoma and malignant lymphoma were both present in the same lesion

TABLE 1 Cases of collision tumors primary malignant lymphoma and primary lung cancer reported

Source	year	Age Sex	Lung cancer Histology Pathological-Stage	Malignant Lymphoma Pathological-Stage	Treatment	Prognosis
O Kawashima et al.[1]	1998	71 Female	Squamous cell carcinoma T2aN0M0 StageIB	T-cell Lymphoma	Operation CHOP	7 months death after the operation
C Du et al.[2]	2016	60 Female	Adenocarcinoma	Diffuse large B-cell lymphoma	CDDP+Gemcitabine →CHOP	Alive
S Ikemura[3]	2018	67 Male	Adenocarcinoma T4N3M1 Stage IV	Diffuse large B-cell lymphoma	Chemotherapy not administered	17th day death after admission
Our case	2020	74 Male	Squamous cell carcinoma T1aN0M0 Stage IA	Diffuse large B-cell lymphoma Stage IVA	CHOP-Operation -CHOP	10 months death after the operation

a collision tumor in which two malignant tumors have independently developed and are contiguous or have invaded each other. The second is a combination tumor consisting of multiple morphologies that originated from a common mother cell. The third is a constituent tumor in which a relationship between the parenchyma and the stroma is present. The mechanism of the occurrence of such collision tumors in lung squamous cell carcinoma and malignant lymphoma depends on certain factors that facilitate the formation of a collision tumor. Hypotheses include the following: (a) Chronic irritation of lung tissue by malignant lymphoma causes lung squamous cell carcinoma. (b) Immune deficiency in the lung due to malignant lymphoma and a microcirculation disorder in the mucous membrane cause carcinogenesis. (c) Malignant lymphoma is caused by a direct chronic immunological reaction to lung cancer. (d) Common carcinogens for both tumors are likely to present.[4,5]

Collision cancers including digestive organ cancer and malignant lymphoma have also been reported.[6–8] Collision cancers, which consist of gastrointestinal cancer and malignant lymphoma, tend to be more common than cancers in other organs. Generally, double cancers of gastrointestinal malignancies account for 5%–20% of non-Hodgkin's lymphomas and 30–40% of extra-nodal lymphomas.[9,10] In contrast, double cancers of primary malignant lymphoma of the lung are rare due to the small absolute number of 0.3% of non-Hodgkin's lymphomas.[11] Both the lungs and digestive tract are organs that function in the presence of external substances such as bacteria and eliminate them. The immune system is present in both organs. The digestive tract is exposed to more external substances than the lungs, and the immune system is enhanced for that purpose.[12] The authors speculate that collision tumors that include gastrointestinal tract tumors and lymphomas are more common because of the higher exposure to external substances. The coexistence of pulmonary adenocarcinoma and malignant lymphoma in the same location is an extremely rare event.[1–3]

Some reports have been published of collision cancers consisting of different histological types of lung cancer.[13,14] This type of collision tumor belongs to the second category mentioned by Foulds.[5] In these cases, two collision cancers with the same disease but different histological types are present, a situation that is less of a therapeutic problem. A clinical problem occurs, for example, when the diseases are different, such as malignant lymphoma and a solid cancer, and treatment is prioritized for the more advanced tumor. As in our case, we prioritized the treatment of malignant lymphoma, but due to advancing lung cancer, surgery became necessary.

Regarding treatment options, if we prioritized surgery for lung cancer, the physical invasiveness of the surgery may exacerbate malignant lymphoma and cause the condition to become un-controllable. Therefore, chemotherapy was able to prioritize in this case. By prioritizing R-CHOP, malignant lymphoma was controlled and effective. We believe that the treatment choice was very appropriate as we could continue R-CHOP treatment after surgery for lung cancer.

The collision tumor is a special type of double tumor. The rate of complications with other malignancies in patients with diffuse large B-cell lymphoma is 15.2%.[15] Therefore, in the case of advanced-stage malignant lymphoma, physicians must consider which treatment should be prioritized according to the degree of progression of coexisting solid tumors.

4 | CONCLUSION

We experienced a case in which squamous cell carcinoma of the lung and malignant lymphoma were mixed in the same lesion. Chemotherapy was performed, but lung cancer worsened, and surgery was required. Following surgery, chemotherapy was continued. Three cases of collision tumors consisting of malignant lymphoma and primary lung cancer were reported, and this case is the fourth rare case in the world to our knowledge.

AUTHOR CONTRIBUTIONS

M Sasaki, K Sakon, and T Ikeda are the attending physicians for this case. M Sasaki is responsible for the concept and design of this report, and everything. The co-authors contributed to the acquisition and interpretation of the reference. M Sasaki drafted the report and other co-authors revised it. All authors approved the publication of the manuscript and agree to take responsibility. All authors reviewed, edited, and agreed on the final draft of the manuscript.

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CONFLICT OF INTEREST

The authors have stated that they have no conflicts of interest.

DATA AVAILABILITY STATEMENT

The dataset is available upon request.

ETHICAL APPROVAL

The patient siblings provide written informed consent for publication of this case report and any other images. We conducted the present study following the World Medical Association Declaration of Helsinki.

CONSENT

The patient's siblings provided written informed consent for publication of this case report and any other images. The present study was conducted in accordance with the World Medical Association Declaration of Helsinki.

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