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Case Report

Lung Cancer Detected by Chest Computed Tomography in a Fever Outpatient Department for COVID-19

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Abstract

Three lung cancers were incidentally diagnosed by chest computed tomography (CT) from 590 patients screened for coronavirus disease 2019 (COVID-19). All three patients were women and non-smokers. Case 1 was a 29-year-old woman with an 8-mm pure Ground-Glass Nodule (GGN) adenocarcinoma in situ. Case 2 was a 72-year-old woman with a 14-mm T1bN1M0 typical carcinoid. Case 3 was a 78-year-old woman with a 13-mm pT1aN0M0 part-solid GGN lepidic adenocarcinoma. COVID-19 has been causing confusion in medical institute worldwide, but the advantage of accidentally finding early lung cancers using chest CT was observed. Lung cancer is included in the COVID-19 severity factors, but this may be due to factors in the onset of lung cancer (e.g, emphysema and smoking) rather than the disease itself. Distinguishing GGN type tumors that cannot be pointed out by chest X-ray from the shadow of viral pneumonia is also important. Comparison with previous and follow-up CT scans is useful for deferential diagnosis.

Keywords: Computed tomography scan; COVID-19; Ground-grass nodule; Lung cancer

Introduction

Since the first known case was identified in Wuhan, China, in December 2019, coronavirus disease 2019 (COVID-19) has spread rapidly worldwide including in Japan. The first confirmed COVID-19 case was reported in Japan on January 16, 2020 [1]. Since when, according to the announcement by the Ministry of Health, Labor and Welfare, the cumulative number of domestic infections exceeded 1,000,000 on August 6, 2020 and 10,000,000 on July 14, 2022. In the early days of the pandemic, chest Computed Tomography (CT) was performed to confirm the diagnosis of pneumonia and to diagnose the spread of infection. Among these cases, lung cancer was discovered incidentally.

Case Report

This study included 590 patients with fever who visited the outpatient department between February 27, 2020, and February 27, 2021, and underwent both COVID-19 examination and chest CT. Three patients were diagnosed with lung cancer. All were women and nonsmokers. Case 1: A 29-year-old woman presented with a fever of 36.8 degrees Celsius and dysosmia and a nasopharyngeal swab tested negative for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) Ribonucleic Acid (RNA). The patient had no medical history and unremarkable family history. No abnormal findings were found on the chest X-ray. A pure Ground-Grass Nodule (GGN) with a maximum tumor diameter of

10 mm was found in the right S4a in the chest CT. The patient was reexamined with chest CT after observation periods of 3 months and additional 6 months, but no changes were found. She requested surgery after the second opinion. Therefore, a right middle lobectomy under the video assisted thoracic surgery (VATS) was performed. . Pathologically, the tumor was an 8 × 7 mm adenocarcinoma in situ. No adjuvant therapy was added. The patient is alive well 12 months after surgery without recurrence (Figures 1a,2a).

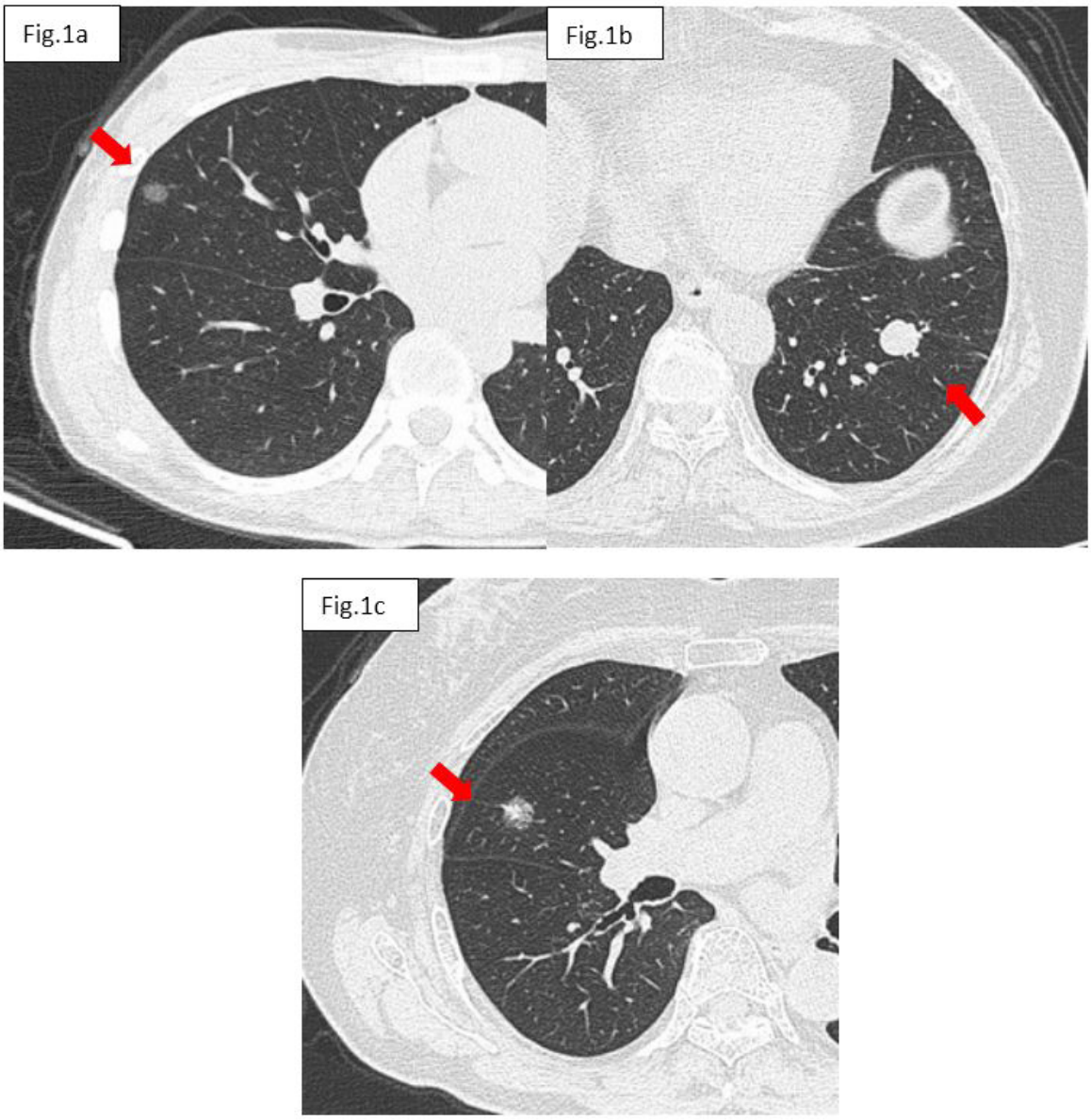

Figure 1: Chest CT of **(A)** case 1 showing a pure GGN with a maximum tumor diameter of 10 mm in the right S4a; **(B)** case2 showing a nodule with a smooth margin of 15 mm in diameter on the left S9b; and **(C)** case 3 showing a part-solid GGN with a maximum tumor diameter of 13 mm in the right S4a.

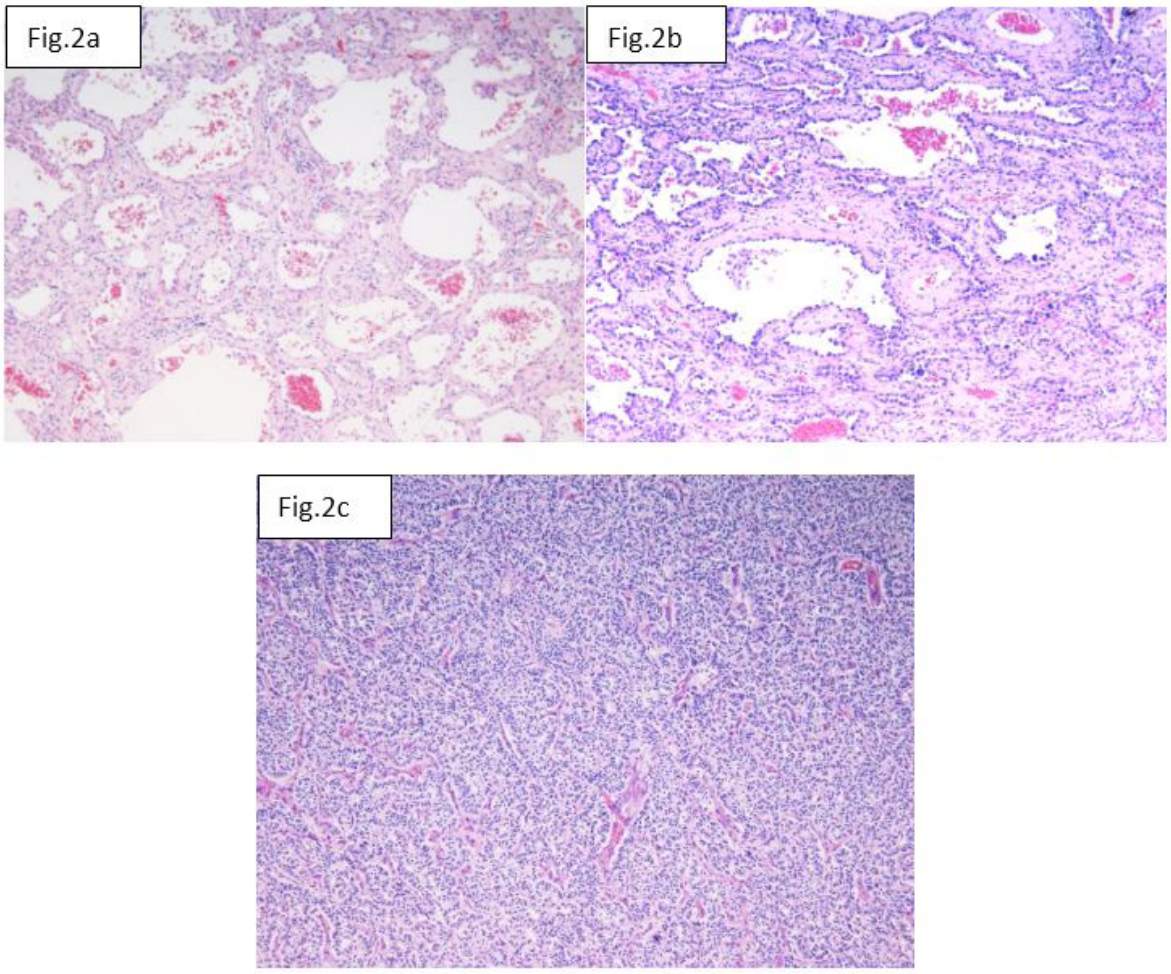

Figure 2: (A) Pathologically, the tumor was adenocarcinoma in situ with a size of 8 × 7 mm in size (HE × 10); **(B)** a typical carcinoid with 14 × 14 in size of T1bN1M0, stage IIB; and **(C)** lepidic adenocarcinoma with a maximum size of 13 mm and 10 mm of solid size with T1a N0M0, stage IA1 (HE × 10).

Case 2

A 72-year-old woman presented with a high fever of 38.5 degrees Celsius and a nasopharyngeal swab tested positive for SARS-CoV-2 RNA. Her family history was not remarkable. The patient had been treated for hypertension. The chest X-ray showed a well-circumscribed tumor ~15 mm in diameter was observed overlapping with the heart. The chest CT revealed a 15-mm nodule with smooth margins in the left S9b. A definitive diagnosis could not be obtained by bronchoscopy. The positron emission tomography-CT (PET-CT) scan revealed an accumulation of fluorodeoxyglucose in the nodule with a max standard uptake value ($_{max}$SUV) of 1.7, indicating a benign lesion. No uptake other than the tumor including lymph nodes could be observed. Video-assisted thoracic surgery was performed because the tumor increased with obstructive pneumonia during follow-up. Pathologically, the tumor was a typical carcinoid of 14 × 14 mm T1bN1M0, stage IIB due to metastasis to the #13 lymph node. After four cycles of chemotherapy composed of carboplatin and etoposide, she was alive and well 15 months after surgery without recurrence (Figures 1b, 2b).

Case 3

A 78-year-old woman presented with a fever of 37.5 degrees Celsius and sour throat. A nasopharyngeal swab tested positive for SARS-CoV-2 RNA. Her family history was unremarkable. The patient had been treated for hypertension. No abnormalities on the chest

X-ray were observed. A part solid GGN with a maximum tumor diameter of 13 mm was found in the right S4a. A right middle lobectomy under the VATS was performed because the solid part of the tumor exceeded 8 mm. Pathologically, the tumor was lepidic adenocarcinoma with a maximum size of 13 and solid size of 10 mm at T1aN0M0, stage IA1. No adjuvant therapy was added. She is alive and well 17 months after surgery without recurrence (Figures 1c, 2c).

Discussion

The nodules of cases 1 and 3 were difficult to detect on the chest X-ray because of the GGN image, and only chest CT could exhibit. Surprisingly, adenocarcinoma was diagnosed in a patient under 30 years old [2]. The nodule of case 2 was difficult to detect earlier because of an overlap with the heart shadow. Even PET-CT did not show a malignant image. COVID-19 has been causing confusion in medical institute wildwide [1], but the advantage of accidentally finding early lung cancers using chest CT was observed. Following the guideline for the management of incidental pulmonary nodules detected on CT images, a GGN >6 mm should be followed by CT at 6-12 months to confirm persistence and every 2 years until 5 years [3]. Considering the young age of case 1 and radiation exposure due to long-term follow-up, a surgical definitive diagnosis was chosen for case 1. For solitary part-solid nodule with a solid component larger than 8 mm, resection is recommended [3]. Case 3 applied to this indication. The lung cancer detection rate in the low-dose lung cancer CT screening conducted as part of the initiative of the Japan Agency for Medical Research and Development [4] at the hospital of the current study is about 3%. The presented three (0.5%) cases were of the 590 patients examined using chest CT for COVID-19, which is inferior compared to low-dose CT scan screening. The age distribution of CT performed in the outpatient department for fever varies from young to elderly. However, the age distribution of low-dose CT scan screening is limited to the elderly. Therefore, the detection rate of lung cancer was predicted to be low, but lung cancer in the 20s was also included.

Lung cancer is included in the COVID-19 severity factors, but this may be due to factors in the onset of lung cancer (e.g, emphysema and smoking) rather than the disease itself [5,6]. Distinguishing GGN type tumors that cannot be pointed out by chest X-ray from the shadow of viral pneumonia is also important. Comparison with previous and follow-up CT scans is useful for deferential diagnosis [7].

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