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Case report

Small-sized peripheral squamous cell lung carcinoma with chest wall invasion

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ABSTRACT

In lung cancer, chest wall infiltration caused by a tumor with a small diameter is extremely rare. The pathophysiologic features and prognosis of this phenomenon are poorly understood. Here, we report on a case in which a small peripheral lung cancer showed marked invasion into the chest wall. Although complete resection and postoperative adjuvant treatment were performed, lymph node recurrence developed and the patient died in one and a half years. Peripheral lung cancer can show exophytic development and infiltration of the chest wall, leading to poor prognosis, even if the tumor size is relatively small.

1. Introduction

As it progresses, peripheral lung cancer sometimes directly infiltrates the adjacent chest wall. There have been various reports on whether the depth of the invasion affects prognosis [1–6]. However, chest wall invasion is often observed in tumors with large diameters and is extremely rare in small peripheral tumors. Here, we report on a case of small-sized peripheral squamous cell lung carcinoma with chest wall infiltration towards the ribs.

2. Case presentation

A 75-year-old man presented with right anterior chest pain. The patient was a smoker with a Brinkman index of 180 (5/day, 36 years). Chest radiograph showed consolidation in the upper right lung field (Fig. 1). Computed tomography indicated infiltration in the periphery of the right upper lobe in contact with the chest wall (Fig. 2). Laboratory data showed elevated levels of carcinoembryonic antigen (7.4 ng/ml; normal level, <5 ng/ml) and squamous cell carcinoma-related antigen (3.5 ng/ml; normal level, <1.5 ng/ml). Lung cancer with chest wall infiltration was suspected, and a transbronchial lung biopsy was performed. The diagnosis was non-small cell lung cancer. A right upper lobectomy and systemic lymph node dissection with a combined resection of the second and third ribs were performed. The patient's postoperative course was uneventful.

Histopathological examination revealed keratinizing-type squamous cell carcinoma. The tumor diameter in the lung was 15 mm

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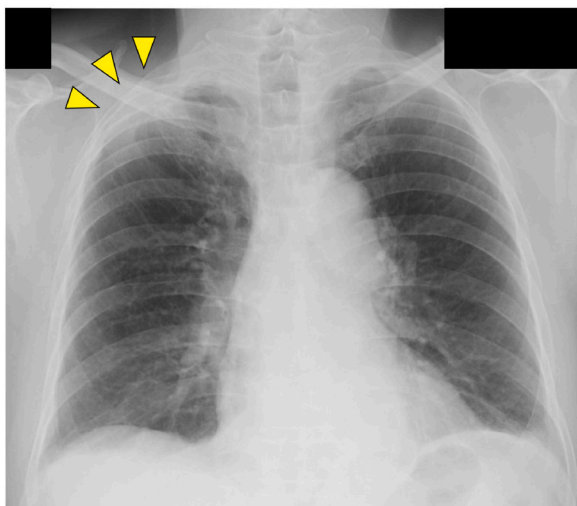


Fig. 1. Chest radiograph at the first visit revealed consolidation in the upper right lung area (arrowheads).

and the parietal pleura was directly infiltrated, accompanied by the development of stromal tissue. The tumor also invaded the bone marrow of the second and third ribs, and the intercostal muscles osteolytically. Vascular and perineural invasions were also observed (Figs. 3 and 4). The resection margins of the ribs and intercostal muscles were negative for tumor cells. All lymph nodes were negative

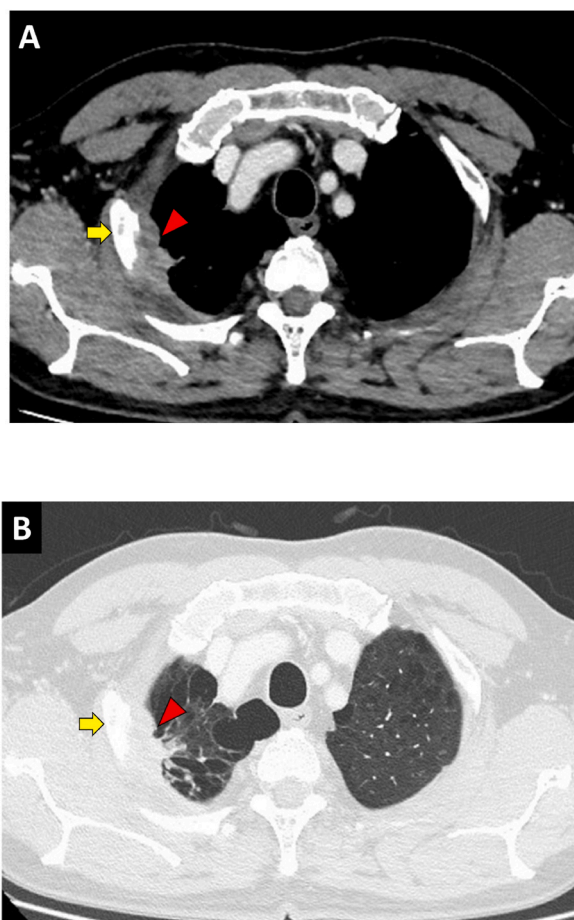


Fig. 2. (A) Computed tomography demonstrated infiltration of the periphery of the right upper lobe. (B) Lung cancer (arrowhead) with a second rib (arrow) invasion was suspected.

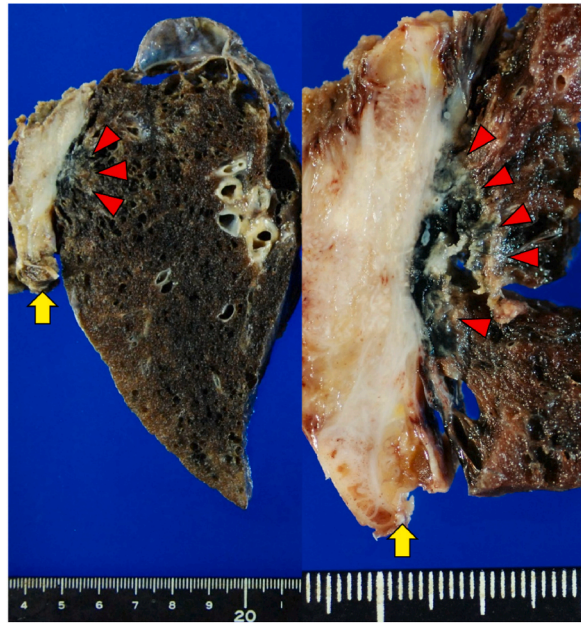


Fig. 3. Macroscopic examination of the tumor and surrounding tissues. The tumor diameter in the lung was 15 mm (arrowheads) and it directly invaded the adjacent ribs (arrow).

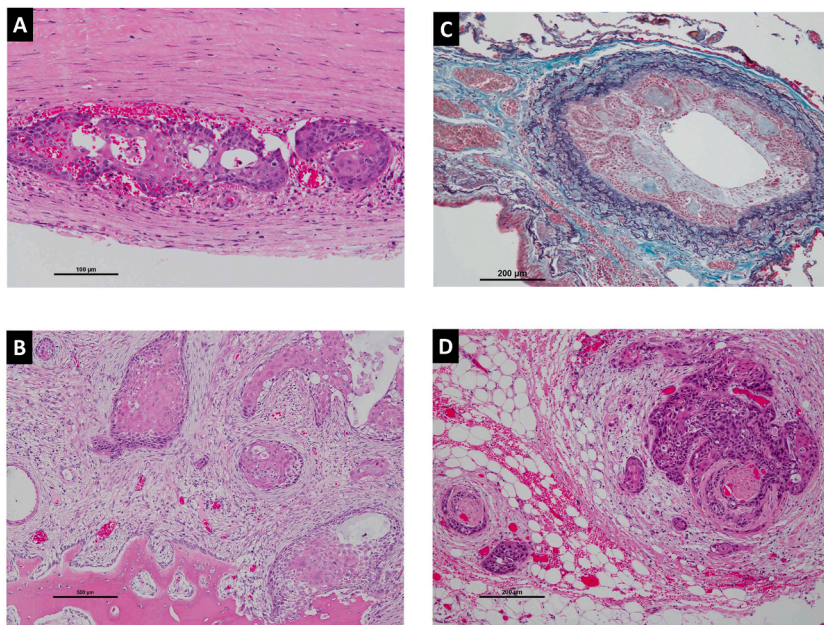


Fig. 4. Histopathological findings showing lung carcinoma infiltrating chest wall.
 A: Parietal pleural invasion of squamous cell carcinoma (Hematoxylin-Eosin [HE] stain; high power view. Bar: 100 μ m)
 B: The tumor invaded the bone marrow of the ribs. (HE stain; low power view. Bar: 500 μ m)
 C: Tumor infiltration revealed between the intima and media of the pulmonary artery. (Elastica-Masson stain; middle power view. Bar: 200 μ m)
 D: Perineural invasion. (HE stain; middle power view. Bar: 200 μ m).

for metastasis and the patient underwent postoperative adjuvant chemotherapy with albumin-bound paclitaxel in combination with carboplatin. Five months after the surgery, positron emission tomography revealed metastasis of the right hilar lymph nodes and left upper mediastinal lymph nodes. Therefore, carboplatin plus concurrent radiotherapy followed by durvalumab consolidation therapy was performed. However, the patient developed pneumonia repeatedly because of cancer progression and his general condition gradually deteriorated. The patient died 16 months after surgery because of respiratory failure.

3. Discussion

Chest wall invasion has been often shown in large-sized tumor. According to some retrospective studies, the minimal size of such tumor is reported to be 0.5–2cm. Visceral pleural invasion is indicated in only 10–20% of lung cancer sized smaller than 3cm, and involvement of ribs is considered to be even rarer [1,2,10,11]. The relationship between the depth of invasion and the prognosis of lung cancer with chest wall infiltration remains unclear [1–6]. Several studies have reported that complete tumor resection leads to a good prognosis.

In this case, small-sized peripheral lung cancer showed aggressive progression towards the chest wall rather than the lung parenchyma and infiltrated the adjacent ribs. Vascular invasion was also remarkable. Right upper lobectomy with an en bloc chest wall resection was performed and the surgical margins were negative for tumor cells. However, the patient developed early postoperative recurrence in the hilar and mediastinal lymph nodes and died of tumor progression 16 months after the surgery.

Several reports of lung cancer associated with cystic airspaces have presented exophytic development of poorly differentiated tumors that do not infiltrate the adjacent cyst or cystic wall [7,8]. In this case, it was moderately differentiated and invasive, and marked emphysematous changes were observed around the tumor. Therefore, it is possible that similar development was promoted by the intervention of airspace. Moreover, lymph node progression might also be one of the characteristic features of peripheral lung cancer, as shown in this case. It was previously reported that among patients who underwent a complete resection for a peripheral non-small cell lung cancer of 2 cm or less in diameter, the lymph node metastasis significantly increased with pleural invasion by the primary lesion [9]. Visceral pleural invasion might be associated with lymph node metastasis via subpleural lymph flow [10,11].

4. Conclusion

We report on a rare case of small peripheral squamous cell lung carcinoma with infiltration of the chest wall. Peripheral lung tumors adjacent to the intrapulmonary airspace are more likely to show exophytic development and chest wall infiltration, even if the tumor size is relatively small. The risk of lymph node metastasis and pleural dissemination might be higher, leading to a poor prognosis. Therefore, it is necessary to survey many more cases to elucidate the mechanism of tumor infiltration and effective treatment for this type of peripheral lung cancer.

Authorship statement

All authors meet the ICMJE authorship criteria.

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Declaration of competing interest

None.

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