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Total Vertebrectomy for Non-Small Cell Lung Cancer

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Key Words

Lung cancer · T4 tumor · Invasion of the thoracic vertebra

Abstract

We present a case who had left upper lobectomy with total vertebrectomy after arterial embolization in preparation for intraoperative bleeding. A 35-year-old man complained of left back pain. Chest CT revealed a tumor in S1+2 of the left lung, invading the third thoracic vertebra. As no nodal or distant metastasis was detected, we performed left upper lobectomy and lymph node dissection (ND2a-2) after embolization of the vessels feeding the tumor in order to reduce intraoperative bleeding. In addition, the team of orthopedics performed en bloc resection of the third thoracic vertebra and parts of the left third and fourth ribs. Histological examination of the tumor revealed pleomorphic carcinoma (pT4N0M0, stage IIIA).

Introduction

Among stage IIIA non-small cell lung cancer patients, T4N0-1 cases can be good candidates for surgery and have a relatively favorable postoperative prognosis [1, 2]. However, most T4 cases with thoracic vertebral invasion may not be operated as complete resection with vertebrectomy is challenging [2].

We report the case of a male patient with primary lung pleomorphic carcinoma invading the thoracic vertebra who underwent complete resection with en bloc total vertebrectomy after embolization of the tumor-feeding vessels.

Case Presentation

A 35-year-old Japanese man presented with a 6-month history of left back pain. Chest X-ray and CT revealed that a tumor (43 × 34 mm) in S1+2 of the left lung had invaded the third thoracic vertebra (fig. 1a, b). An MRI revealed that the tumor had invaded the third thoracic vertebra and the third rib (fig. 1c). As no nodal or distant metastasis was identified by whole-body CT and bone scintigram, we planned a primary surgery with a clinical diagnosis of lung cancer invading thoracic vertebrae (cT4N0M0, stage IIIA).

To prevent massive bleeding during resection of the tumor with vertebral invasion, arterial embolization was performed prior to surgery, and the first, second, and third intercostal arteries feeding the tumor (fig. 2a, b) were embolized with gelform particles. We performed a complete resection consisting of left upper lobe lobectomy and lymph node resection (ND2a-2), partial resection of the second and third ribs, and total en bloc spondylectomy of the third thoracic vertebra.

Pathological examination showed that all resection margins were free from malignant cells, and the final pathological diagnosis was pleomorphic carcinoma of the lung (pT4N0M0, stage IIIA). We conducted 3 cycles of adjuvant chemotherapy (cisplatin, 80 mg/m²; docetaxel, 60 mg/m²) [3] followed by oral administration of S-1 [4, 5] and radiation to the primary tumor field. The patient is alive at 14 months after surgery and without any evidence of tumor recurrence.

Discussion

Patients with primary lung cancer invading the vertebral column are rarely operated [6, 7] as the postoperative survival is poor (5-year survival rates, 16–20%) [6, 8]. However, when complete resection is achieved, favorable prognosis might be expected for such patients [6, 7]. Thus, complete resection with vertebrectomy, especially total vertebrectomy, is challenging in the field of lung cancer surgery. In the present case, we adopted surgical treatment for the following reasons: (1) no nodal or distant metastasis was identified by whole-body CT and bone scintigram, and (2) complete en bloc tumor resection can be expected by total vertebrectomy of the third thoracic vertebra. Prior to surgery, we performed embolization of the tumor-feeding arteries to prevent possible uncontrollable bleeding during vertebrectomy.

We performed surgery first because complete resection is expected by this technique without preoperative induction therapy. In addition, life-threatening or extremely unpleasant spinal cord invasion and/or meningitis may occur when chemoradiation therapy does not result in tumor shrinkage. Accordingly, we conducted adjuvant chemotherapy and radiation after surgery. As summarized, a careful preoperative evaluation is essential to determine surgical indication, surgical approach, and sequence of multimodality therapy for T4 tumor with vertebral invasion.

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Fig. 1. **a, b** CT reveals a mass in S1+2 of the left lung, invading the third thoracic vertebra (84 × 43 mm). **c** MRI shows that the mass destroyed the left side of the third thoracic vertebra as it adheres strongly to the left side of the third thoracic vertebra.

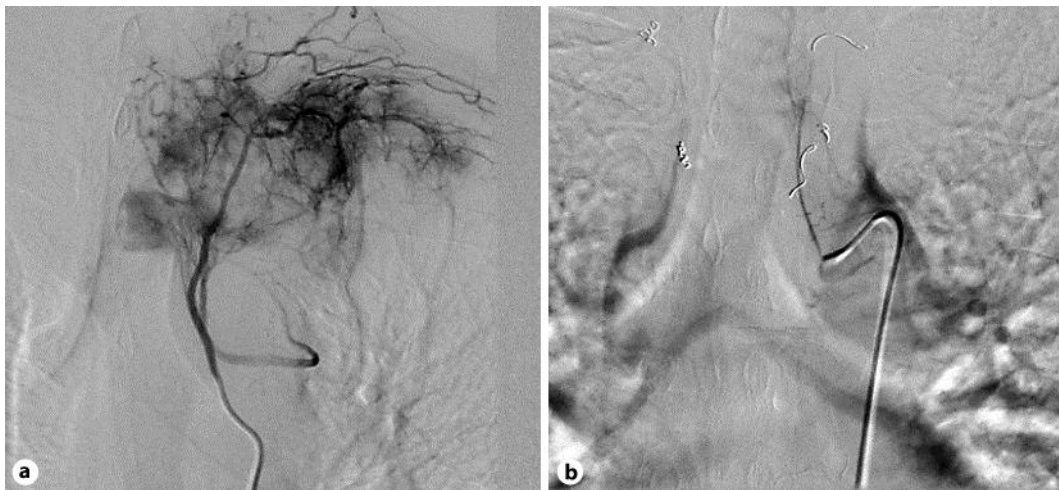


Fig. 2. **a** Angiography shows that the vessels feeding the tumor were the first, second, and third intercostal arteries. **b** The vessels were embolized with gelform particles. Moreover, the first and second left intercostal artery branch to the vertebra was set in vortex coils and, in order to mark up, the right intercostal artery was set in vortex coils.

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