

## Combined Bilateral Lung Resections and Off-pump Coronary Artery Bypass Grafting

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**We report herein a 74 year old man with angina who had an abnormal chest roentgenogram. Computed tomography of the chest showed a solitary 1.0-cm peripheral, noncalcified lesion in the apical segment of the left lower lobe and a 1.5-cm peripheral lesion in the posterior basal segment of the right lower lobe. Coronary angiography revealed the left anterior descending coronary artery to have a long 90% stenosis. We report here a case of a combined bilateral lung resection and off-pump coronary surgery through a midline sternotomy in a compromised lung function patient with both severe coronary artery disease and bilateral synchronous primary lung cancer. (Ann Thorac Cardiovasc Surg 2002; 8: 393–5)**

**Key words:** lung cancer, ischemic heart disease, lung resection, off-pump coronary artery bypass grafting (CABG)

### Introduction

Lung malignancy concomitant with severe ischemic heart disease is uncommon.<sup>1)</sup> Surgical management of patients with simultaneous resectable lung lesion and critical cardiac disease is controversial. We report here a case of combined bilateral lung resections and off-pump coronary artery bypass grafting (CABG) through midline sternotomy in a compromised lung function patient with both severe coronary artery disease and bilateral synchronous primary lung cancers.

### Case Report

A 74-year-old man with angina (Canadian Cardiovascular Society class III) was found at the time of a medical examination to have an abnormal chest roentgenogram.

Chest roentgenography showed a 1.0-cm peripheral

mass in the left lung field (Fig. 1). Computed tomography (CT) of the chest showed a solitary 1.0-cm peripheral, noncalcified lesion in the apical segment of the left lower lobe and a 1.5-cm peripheral lesion in the posterior basal segment of the right lower lobe without hilar or mediastinal adenopathy (Fig. 2). Serum tumor markers were normal. Regarding pulmonary function, a forced expiratory volume in one second was 52% and forced vital capacity 76% of predicted value. Functional respiratory tests showed an obstructive pattern. Thallium-201 SPECT images showed decreased uptake in the septal and apical walls before exercise training, and improvement of uptake after. Coronary angiography showed the left anterior descending coronary artery to have a long 90% stenosis at segment 8 (Fig. 3). Preoperative histological examinations were both conducted by transbronchial lung biopsy and percutaneous CT-guided needle biopsy showed only normal adipose tissues, with no malignant cells. Preoperative histological diagnosis in a solitary lesion in the apical segment of the left lower lobe was not determined clearly but a malignant tumor was suspected.

Lung biopsy revealed that the left lung nodule was a papillary adenocarcinoma. It is possible in the chest CT that the peripheral right lung mass was double primary lung cancer, pulmonary metastasis, or benign disease.

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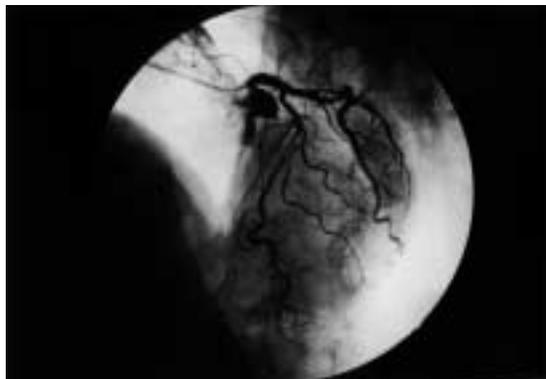
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**Fig. 1.** Initial chest roentgenogram showing a solitary 1.0-cm left lung lesion.



**Fig. 3.** Cineangiogram in the left anterior oblique projection showing the left anterior descending coronary artery had a long 90% stenosis.

We chose to resect the peripheral right lung mass because of concern over possible malignancy and to combine off-pump CABG and bilateral lung resections through midline sternotomy.

We carried out surgery, under general anesthesia with one lung ventilation. First, the right lower lobe lesion was



**Fig. 2.** A: Chest computed tomography through the level of the lesion demonstrating a peripheral, noncalcified lesion in the left lower lobe apical segment. B: A 1.5-cm peripheral lesion in the right lower lobe posterior basal segment.

A  
B

removed in a wedge fashion. Intraoperative pathologic evaluation found a benign lesion initially thought to be an adenoma.

After harvesting the right internal mammary artery (RIMA), we were able to perform bilateral superior mediastinal lymph node dissection. Separating the superior vena cava and the ascending aorta, the right main pulmonary artery was retracted inferiorly and the subcarinal lymph node simply sampled without formal dissection. The inferior mediastinal compartments were not removed. Next, the heart rate was slowed from the previous  $\beta$ blockade, ranging between 50 and 55 beats per minute, using an Octopus Tissue Stabilizer (Medtronic, Minneapolis, MN), and the RIMA was anastomosed to the left anterior descending artery. Finally, through the same surgical access, apical segmentectomy of the left lower lobe

was performed with hilar lymph node dissection.

Final pathological results revealed that whereas the right lung nodule was a bronchiolo-alveolar adenocarcinoma, the left lung nodule had a different pattern indicating a papillary adenocarcinoma. The patient was diagnosed as pT1N0M0, stage IA. The postoperative course was uncomplicated. Postoperatively, he received no adjuvant irradiation or chemotherapy and is currently well and disease-free one year after surgery. He has been followed with CT.

## Discussion

The simultaneous discovery of two pulmonary masses in different lobes or lungs raises the clinical dilemma of whether these lesions represent metastases or primary synchronous lung cancers (PSLC).<sup>2,3</sup> Because of the difficulties in defining multiple primary lung cancer, the prevalence of PSLC is determined accurately. Rosengart and associates examined 111 patients who had multiple primary lung cancer (MPLC). Patients with MPLC surviving treatment of primary lung cancers require lifelong screening for MPLC, and complete resection is recommended whenever possible.<sup>4</sup> If the patient has adequate pulmonary reserve, pulmonary resection remains the most effective treatment.<sup>5</sup>

On the other hand, in lung cancer patients with ischemic heart disease (IHD), particularly those with severe coronary artery disease (CAD), it is sometimes inevitable that combined operation be performed in order to avoid perioperative ischemic events where simultaneous operation for lung cancer and CAD is indicated, the surgical technique should be selected with reference to both the infiltration and location of the lung cancer, and the seriousness of the CAD. Therefore, the assessment of patients with PSLC or concomitant CAD and lung malignancy requires careful attention to resectability and fitness for operation.

Midline sternotomy is employed in the majority of lung cancer patients with severe coronary artery disease as it allows the cardiac and pulmonary surgery to be performed with a single incision.<sup>6,7</sup> When a combined procedure is planned, midline sternotomy should be considered when pulmonary function is a limiting factor in performed staged thoracotomies. However, resection of the left lower lobe is extremely cumbersome through median sternotomy.<sup>8-10</sup> Therefore, in a combined procedure, if patients are selected for simultaneous operation who had coro-

nary artery stenosis limited to one coronary distribution and had resectable bilateral lung lesions, the skeletonized RIMA which is particularly long, is the graft of choice in a resection of the left lower lobe because the left internal mammary artery obstructs the operative fields.<sup>11</sup>

In conclusion, we believe that an aggressive surgical approach is safe and justified in compromised lung function patients with both PSLC and CAD.

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