



## *Surgical Treatment in Second Lung Cancer after Pneumonectomy*

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### Abstract

*Metachronous lung cancer is a well-known entity in patients having undergone successful lung resection. Anatomical resection with removal of regional lymph nodes is the recommended surgical procedure of metachronous lung cancer but sublobar non-anatomic resections should be considered for patients who have inadequate pulmonary capacity.*

*Although pulmonary resection for a second lung cancer after pneumonectomy is generally considered to be at prohibitive risk it is feasible and worldwide procedure especially in highly selected patients. We present the case of patient who undergone right pulmonary wedge resection for metachronous lung cancer after left pneumonectomy.*

*Keywords: Metachronous lung cancer; Pneumonectomy; Wedge resection*

### Introduction

Metachronous lung cancer is a well-known entity in patients having undergone successful lung resection. Advances in cancer treatment and the widespread use of early diagnostic methods have positive effect on survival rates. Therefore, patients with lung cancer tend to survive long enough to develop second and third primary lung cancers. The risk of a development second lung cancer in patients who undergone successful resection of non-small cell lung cancer (NSCLC) is approximately 1% to 7% per patient per year [1].

Anatomical resection with removal of regional lymph nodes is the recommended surgical procedure of metachronous lung cancer but sublobar resections should be considered for patients who have inadequate pulmonary capacity. Pulmonary resection for a second lung cancer after pneumonectomy is generally considered to be at prohibitive risk.

Lobectomy and segmentectomy have been reported previously in patients with single lung but single sublobar non-anatomic resections considered “gold standard” approach [2-4]. We present the case of patient

who undergone right pulmonary wedge resection for metachronous lung cancer after left pneumonectomy.

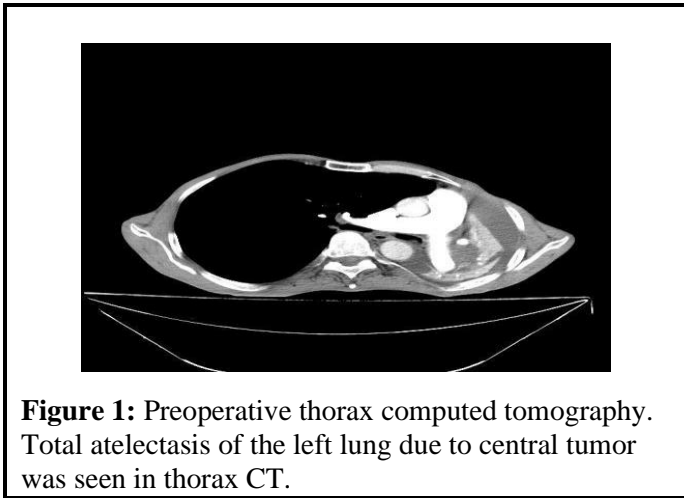
### Case Report

A 58-year-old man underwent a left pneumonectomy in 2013 for well-differentiated squamous cell carcinoma. Postoperative period was uneventful, and patient staged as T2aN0M0 (Figures 1 and 2). Adjuvant chemotherapy was suggested but patient refused therefore routine oncologic follow-up program was organized.

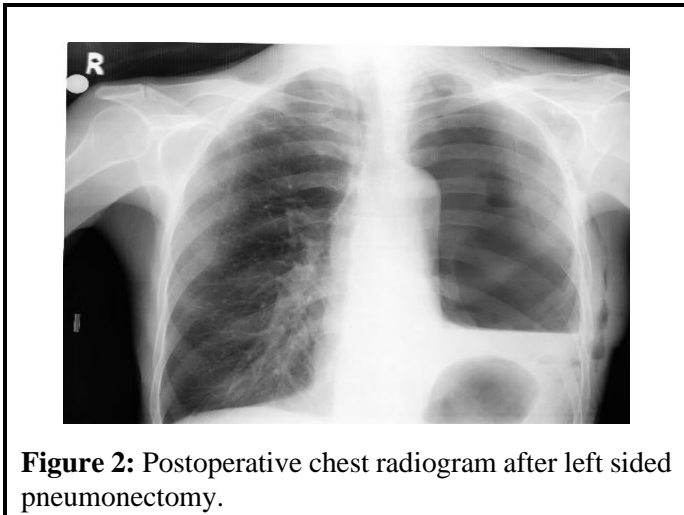
In follow-up, solid parenchymal nodule was detected in right upper lobe. It was 0.4 cm in diameter and located peripheral in the parenchyma. Full-body PET-CT revealed an intense uptake in the right pulmonary nodule with no additional pathological uptake (Figures 3a and 3b). Fiberoptic bronchoscopy was performed and endobronchial lesion wasn't seen.

The patient was asymptomatic, active and deemed to be in good physical condition. He didn't have any additional disease in his medical history. He was an ex-

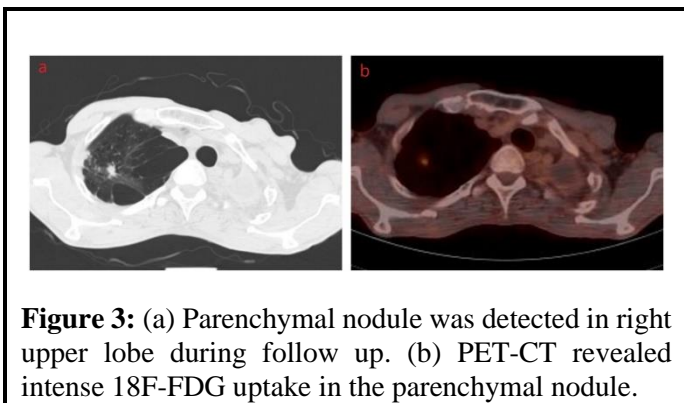
smoker and he had a history of 50 pack-year smoking. Pulmonary function test was applied.



**Figure 1:** Preoperative thorax computed tomography. Total atelectasis of the left lung due to central tumor was seen in thorax CT.



**Figure 2:** Postoperative chest radiogram after left sided pneumonectomy.



**Figure 3:** (a) Parenchymal nodule was detected in right upper lobe during follow up. (b) PET-CT revealed intense 18F-FDG uptake in the parenchymal nodule.

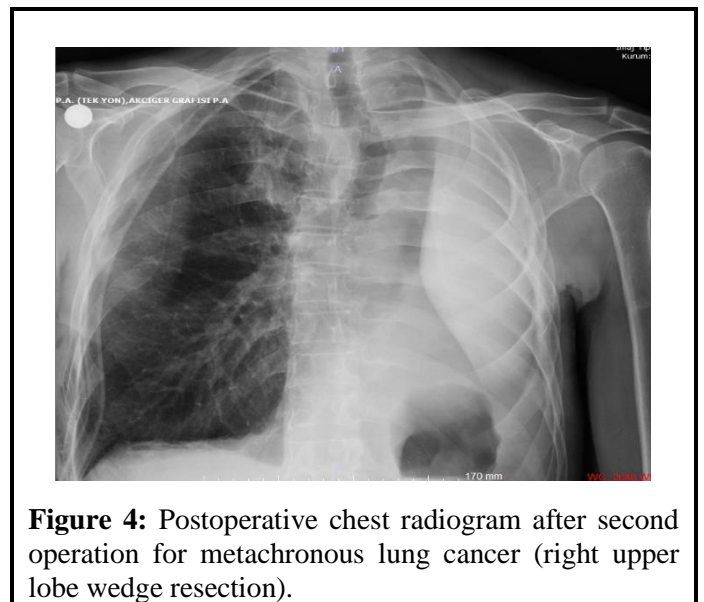
FEV1 (predicted) was 54%, FVC (pred.) was 57% and FEV1/FVC was 76% (Table 1). Because of the bulla formation near the nodule, stereotactic body radiation therapy (SBRT) was considered inappropriate due to the risk of pneumothorax. Under these conditions surgical resection was planned.

**Table 1:** Results of respiratory function test; before the first operation, after the first operation and after the second operation.

	FEV1(lt/%pred)	FEVC(lt/%pred)	FEV1/FVC (%)
Pre-operative	2.14/61	2.49/57	86
Before the second operation	1.80/54	2.37/57	76
After the second operation	1.54/46	2.20/52	70

Right lateral muscle sparing thoracotomy was performed. Pleural adhesions were dissected. Multiple parenchymal bullae and blebs were seen in upper lobe especially in apical segment and parenchymal nodule was seen in neighborhood of these bullous emphysema. The lung was kept in a semi-inflated position and wedge resection was performed with including nodule and bulla together.

Frozen section of the nodule was reported as squamous cell carcinoma. Therefore, mediastinal lymph node dissection was performed. A single drain was placed from 7<sup>th</sup> intercostal place. Patients was extubated at the operating theatre and followed in intensive care.



**Figure 4:** Postoperative chest radiogram after second operation for metachronous lung cancer (right upper lobe wedge resection).

Postoperative follow-up was uneventful. Chest drain was removed on postoperative day 3 and patient was discharged on postoperative day 4 (Figure 4). Patient staged as T1aN0M0 and oncological follow-up was planned. Patient is in his third year of follow-up and no recurrence or metastasis was detected.

**Discussion**

Martini and Melamed defined clinicopathological criteria for the diagnosis of multiple independent primary lung tumors in 1975 [5]. According to these criteria to be able to call the histologically identical tumour as “metachronous” instead of “metastasis” at least 1 of the following conditions should be met; development of the new neoplasm from an in-situ carcinoma, intervals between cancers at least 2 years, occurrence of the second tumour in a different lobe or lung without extrapulmonary metastases and lymphatic involvement common in both tumours. The management of patients with metachronous lung cancer remains controversial. Surgery is recommended in patients with sufficient cardiopulmonary reserve. The selection of surgical procedure depends on size and location of the tumor and the patient’s performance status. Because of the high risk of postoperative respiratory failure, patients with pneumonectomy rarely considered for resection of metachronous cancer in the remaining lung. However, surgical option should not be a priori excluded. In patients with acceptable lung function and without evidence of loco regional spreading, sublober lung resections must be considered. Wedge resection, segmentectomy and even lobectomy in remaining lung after pneumonectomy have been reported in literature, but single sublober non-anatomic resection is suggested based on a better oncological outcome. Vaaler et al. reported three cases of left pneumonectomy after a previous right upper lobectomy in 1995, but the longest survival of the patients was 15 months [2]. Donnington et al. reported a 24 cases of lung resection (20 wedge, 3 segmentectomy and 1 lobectomy) with 40% 5-year survival rate [3]. Terzi et al. reported a case series of 14 patients who underwent lung resection (12 wedge, 2 segmentectomy) in remaining lung after pneumonectomy [4]. All these authors agree that major resections like lobectomy contraindicated in most cases due to the excessive risk of respiratory failure. They also suggest that these kinds of resections should be performed only in carefully selected patients. Stereotactic Ablative Radiotherapy (SABR) can also be used for malignant nodule in the contralateral lung after pneumonectomy. Satisfactory

survival outcomes with low grade of toxicity have been reported in the literature [6,7].

### Conclusion

In conclusion, lung resection for metachronous lung cancer in remaining lung after pneumonectomy is feasible and worldwide procedure especially in highly selected patients. Beside surgery SABR can also be used in patients not eligible for lung resection.

### Conflict of Interest

None declared.

### Funding

None declared.

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