

1993 10 1997 4
 (46.7%) 56 (53.3%) 49
 105
 CT 90
 24 87
 15 62.3
 가 . 1 3
 가 . 4
 (Group A)
 (Group B)
 가 105 27
 CT
 56
 49 8
 1 4

56 (Group 가)
 A, 53.3%)
 (41, 73.2%), 가 (12, 29.3%)
 가 (3, 5.4%)가 (Table 1).
 가 41 25
 (70.7%), 12 (29.3%) . 3, 1
 (15 , 10), 가 (Table 2)
 (Fig. 1) 가 가
 15 , 10 , 4
 7 , 2 ,
 2 , 1 가 가
 (Table 2) 6 , 5 ,
 1 가 7
 (Fig. 2)가 4 가 가
 6 , 4 , 1 ,

Table 1. Causes of Delayed Detection of Lung Cancer

Missed (n= 56)		Misinterpreted (n= 49)	
Hidden by superimposed structure	41	Combined disease	16
Overlaped by combined disease	12	Obstructive pneumonia without central mass	15
Subtle nodule	3	Consolidation	7
		Cavity	7
		Double lesion	2
		Young age	2

Table 2. Superimposed Structures in Missed Lung Cancer

Central type (n= 29)		Peripheral type (n= 12)	
Left hilum	15	Rib	7
Right hilum	10	Heart	2
Heart	3	Diaphragm	2
Rib	1	Left hilum	1

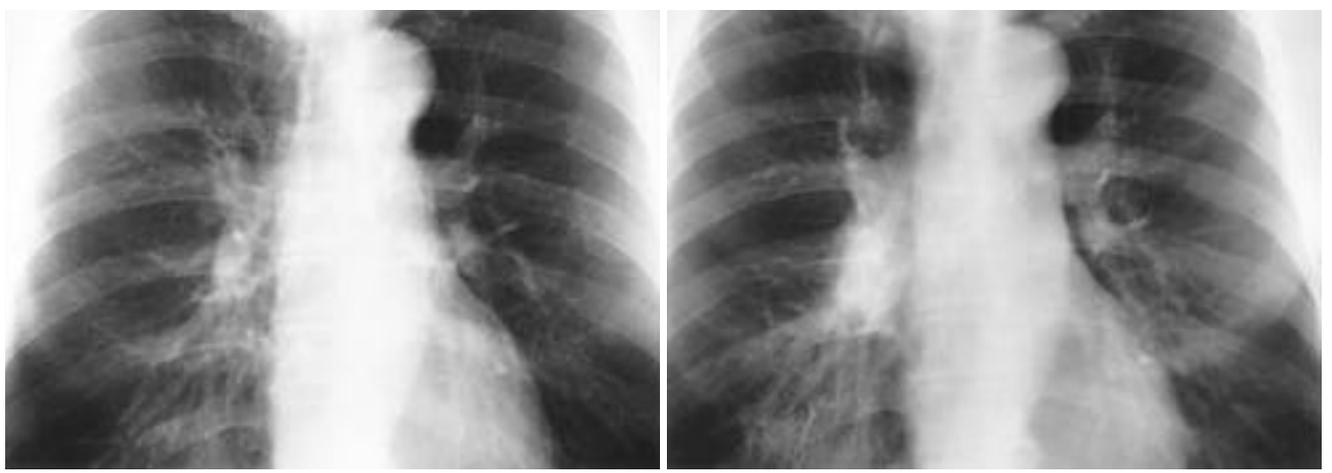


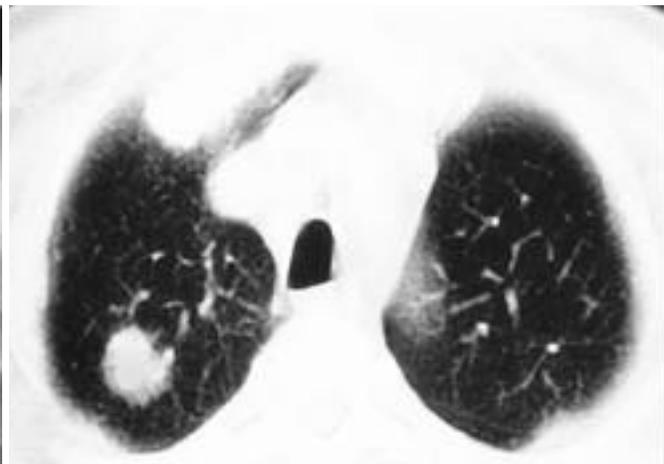
Fig. 1. A 60-year-old male with squamous cell carcinoma hidden by hilum.
 A. Subtle asymmetric opacity is seen at the right hilum on initial film.
 B. One year later, the right hilar mass is enlarged.

1 가 (Table 3)
 9, 3
 가 3
 1.2-1.6 cm 1.4 cm
 , , 1
 49 (Group B, 46.7%)
 (16,
 (15,
 32.6%), 가
 30.6%), (7, 14.3%), (7, 14.3%),
 (2, 4.1%), 26 (2, 4.1%)가
 (Table 1). 16

14 (Fig. 3), 2 가
 (Table 3). 가

Table 3. Combined Diseases in Missed or Misinterpreted Lung Cancer

Missed cases (n= 12)	Misinterpreted case (n= 16)
Pulmonary tuberculosis 6	Pulmonary tuberculosis 14
Pleural effusion 4	Pleural disease 2
Congestive heart failure 1	
Diffuse interstitial lung disease 1	



A B
 Fig. 2. A 72-year-old male with squamous cell carcinoma hidden by rib.
 A. Asymmetrically increased opacity is suspected in the right upper lung zone comparing with the left upper lung zone on initial film.
 B. Three months later, CT scan was performed for the evaluation of sustained asymmetric opacity on follow up chest radiograph. CT scan shows a nodule in the apical segment of right upper lobe behind right second rib and first costochondral junction.



A B
 Fig. 3. A 44-year-old male with squamous cell carcinoma which misinterpreted as pulmonary tuberculosis due to combined active pulmonary tuberculosis.
 A. Right upper lobe consolidation and increased right hilar opacity are noted in a patient with positive sputum smear for AFB.
 B. The right hilar mass is markedly enlarged on follow up film after antituberculous medication.

15 (Fig. 4) 10 가 ,
 3 , 2 가 .
 7 5 , 2
 2 가 (Fig. 5) 7
 5 가 4-15 mm ,
 , 2 가 4 mm
 (Fig. 6)
 6 가 , 1 가
 2 24 26 가
 가 6
 14

가 5 ,
 가 11 , 4

31.5, 8.0 가 가 1
 100,000
 (1). 가 2 cm
 5
 80%

15% ,
 ,
 가 ,
 가 5 10-13%
 (3). CT (MR)

20-50%

(4). Woodring (5)

(6)

98



Fig. 4. A 66-year-old male with squamous cell carcinoma presented as obstructive pneumonia without definite central mass. Air space consolidation is noted in right lower lobe and there is no demonstrable central mass on plain chest radiograph.



Fig. 5. A 67-year-old male with bronchioloalveolar cell carcinoma mimicking pneumonic consolidation.

A. Air space consolidation is seen on initial film.

B. Contrast-enhanced CT scan shows consolidation with volume expansion in the left lower lobe. Enhanced pulmonary vessels and multiple cysts containing air are seen within the consolidation.

가 가 , 가 가 (18)

가 가 , 가 가 15 CT , 가 가 1 cm 2-3

Muhm (13)

2.4 cm, 3 cm , CT

65% 90% 가 가 , 가

가 가 3

가 가 1.4cm .

가 가 mm 95% , 4-15 mm 가 15 50%

가 가 , 4 mm 92%

가 (19).

가 . Claudhuri (20) 가 Tellis (21)

가 가 7 가 , 5 가 4-15 mm , 2 가 4 mm

가 3 CT

가 CT

가 (6) 가 가

62 15 가 가

105 49 가 가 2% (22)

16 가 가 2

16 가 가 26

가 8 3 가 가

(1.5-6.5%)

가 (14) 30% (15) 1, 2

가 (16).

CT 가 가 105 27

(17) 가 16

가 가 1

7

6 , 1 , 2 2

5 , 2

Radiographic Findings of Primary Lung Cancer with Delayed Detection on Chest Radiographs¹

Young Min Kim, M.D., Jin Hwan Kim, M.D., Chang Kyu Yang, M.D.²,
Bin Young Jung, M.D., Kwang Jin Jun, M.D., Ki Ho Jeong, M.D.,
Ju Ok Kim, M.D.³, Sun Young Kim, M.D.³

¹Department of Diagnostic Radiology, Chungnam National University College of Medicine

²Department of Radiology, Taejon Sun General Hospital

³Department of Internal Medicine, Chungnam National University College of Medicine

Purpose: To analyze the causes of delayed detection of lung cancer on chest radiographs.

Materials and Methods: We retrospectively reviewed 105 cases in which an initial diagnosis of lung cancer, based on an examination of plain radiographs, had been missed or misinterpreted. All occurred between October 1993 and April 1997. We reviewed the initial chest radiographs and compared the features noted with those seen on later chest radiographs and computed tomographic (CT) images.

Results: Undetected lung cancer was identified in 56 patients (56/105, 53.3%). It had been hidden by superimposed structures (41, 73.2%), overlapped by combined benign diseases (12, 21.4%), or the nodules were subtle (3, 5.4%). Of the 41 lung cancers hidden by a superimposed structure, the central type accounted for 29 (70.7%) and the peripheral type for 12 (29.3%). The 29 central type had been hidden by the left hilum (n= 15), the right hilum (n= 10), the heart (n= 3), or a rib (n= 1). The twelve peripheral type were hidden by a rib (n= 7), the heart (n= 2), the diaphragm (n= 2), or the left hilum (n= 1). Of the 12 lung cancers overlapped by combined benign diseases, pulmonary tuberculosis (n= 6), pleural effusion (n= 4), congestive heart failure (n= 1), and diffuse interstitial lung disease (n= 1) were present at the time of interpretation. The misinterpreted lung cancers were identified in 49 patients (49/105, 46.7%) and were seen to be combined with benign disease (16, 32.6%), or as obstructive pneumonia without a central mass (15, 30.6%), air-space consolidation (7, 14.3%), cavity (7, 14.3%), double lesion (2, 4.1%), or young age below 26 years (2, 4.1%). Of the 16 lung cancers misinterpreted as combined disease, pulmonary tuberculosis (n= 14) and pleural disease (n= 2) had been initially diagnosed.

Conclusion: Most commonly, lung cancer was missed or misinterpreted because it was hidden by a normal structure or combined with a benign disease. Perceptual errors can be reduced by appropriate techniques and the scrutiny of trouble spots such as the parahilar, retrocardiac, retrodiaphragmatic and costal regions. Errors in the analysis of lung cancer can be reduced by increased awareness of growth patterns and uncommon manifestations of the disease.

Index words : Lung neoplasms, diagnosis
Lung, radiography

Address reprint requests to: Jin Hwan Kim, Department of Diagnostic Radiology, Chungnam National University Hospital.

640, Daesa-Dong, Jung-Ku, Taejon 301-040, Korea.

Tel. 82-42-220-7333, Fax. 82-42-253-0061