

: CT 1

2.

CT

CT

82

CT

가

CT

23

CT

CT

CT

(thickening)

가

(effusion)

CT

가

가

가

: 23

3 (13.0%),

8 (34.8%)

11 (47.8%)

9 (39.1%),

3 (13.0%)

12 (52.2%)

가

가

7 (30.4%)

가

가

CT

가

(69.6%)

CT가

(1).

가

(1).

가

CT

(2-8)

CT

CT

(Computed Tomography, CT)

1

2

:
 7 GE 9800 Quick scanner (General Electrics, Milwaukee, U.S.A.) 1
 10 mm (140 kVp, 140 mA, 2)
 가 CT 82 82
 CT 23
 가 CT 23
 6MeV X-ray 가 (Siemens, U.S.A.) 150 - 200 cGy 3,060 - 6,750 cGy 17 - 41
 34 57 ,
 57 418 .
 3,000 cGy 3,600 cGy /
 2,860 - 5742 cGy,
 2,600 - 6000 cGy가 20 MEP(mito-mycin, etoposide, cisplatin), VIP(vincristine, ifosfamide, cisplatin), FP(5 - FU, cisplatin)
 23 12 [
 7 , 3 , 1 , -
 (adenos - quamous carcinoma) 1], 11 (
 11)
 58 (, 42 - 76) 22 , 1
 CT 39 GE Hispeed Advantage (General Electrics, Milwaukee, U.S.A.) 7 mm , 1.3:1 pitch CT (170 kVp, 220 mA, 1)
 가 (effusion) , 가
 (thickening)
 가 1 cm , 1 - 2 cm, 2 - 3 cm
 CT 가
 CT 가 (K.S.J, S.K.S)가
 가 가 , ,
 가 가 5,000 cGy , 가 가
 3 , 30
 Fisher '

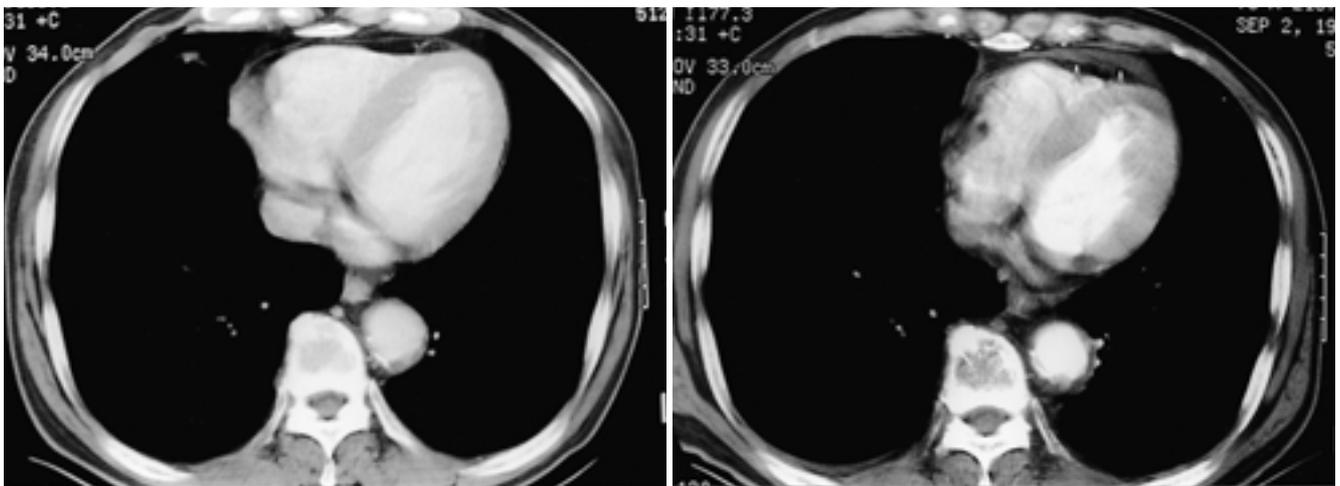


Fig. 1. 70-year-old man with non-small cell lung cancer at right lower lobe.
A. Pre-radiotherapy. CT scan shows normal pericardium and pleura.
B. Post-radiotherapy. CT scan obtained shows small amount of pericardial effusion (arrows) and pleural effusion at right hemithorax. However, thickening or contrast enhancement of pericardium or pleura is not seen.

s exact test

(8.3%)

가

9 가

(Fig. 1, 2, 4, 5).

23 7 (30.4%)

5,580 - 6,750 cGy 5,000 cGy

2 14 9

23 16 (69.6%)

12 4 (33.3%),

11

7 (63.6%)

11 (47.8%)

8 가

. 7

가

4 가

(Fig. 3).

11 3 (27.3%), 1 cm

가 8 (72.7%) 1 cm

(Fig. 1, 2).

12 7 (58.3%),

11

(Table 1, 2, 3, 4, 5).

5 (45.4%)

12 (52.2%)

(n=7)

가

6

(85.7%),

가 1 (14.3%)

(n=5)

(100%)

가

가 (Fig. 5),

12 1 cm

가

가

가

가 7 (58.3%) 가

가 3 (25.0%), 1 - 2 cm

가 1 (8.3%), 2 cm

가 1

Stewart (9)

48.1%, Martin (2)

29.6%

Table 1. Incidence of Intrathoracic Extrapulmonary (ITEP) Changes after Radiation Therapy Related to Concurrent Chemotherapy

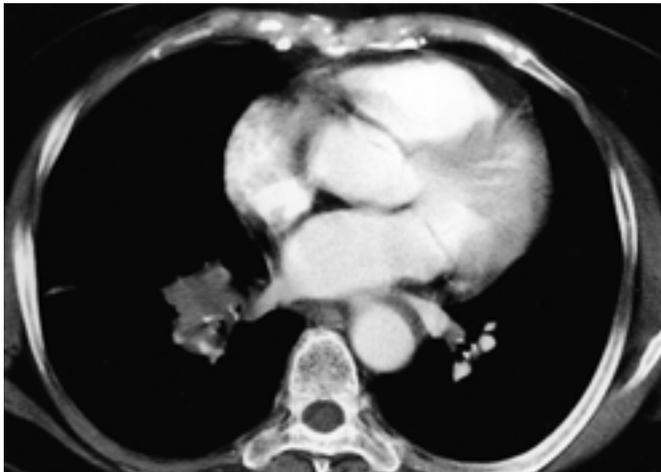
Chemotherapy	ITEP changes		No. of patients
	Yes	No	
Yes	17	3	20
No	1	2	3
Total	18	5	23

$p = 0.107$ by Fisher's exact test

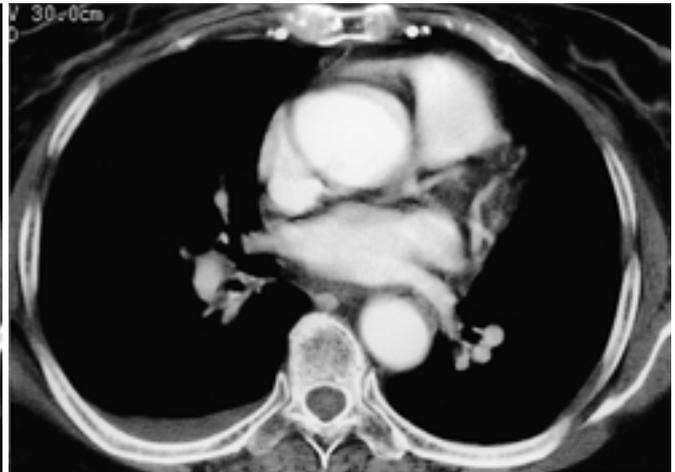
Table 2. Incidence of Intrathoracic Extrapulmonary (ITEP) Changes after Radiation Therapy According to Total Radiation Dose

Total dose (cGy)	ITEP changes		No. of patients
	Yes	No	
< 5000	4	1	5
> 5000	14	4	18
Total	18	5	23

$p = 1.000$ by Fisher's exact test



A



B

Fig. 2. 69-years-old man with small cell lung cancer at right hilar area.

A. Pre-radiotherapy. CT scan at the level of left atrium shows normal pleura.

B. Post-radiotherapy. CT scan at the same level shows small amount of pleural effusion without pleural thickening and enhancement.

가 (9).
 Martel (3) 8.8%, Farago (4) 16.7%, Stewart (9) 47.8%
 Stewart (9) 가 1971
 1990 Martel 가 Farago 가 CT
 1-2 가

Table 3. Incidence of Intrathoracic Extrapulmonary(IITEP) Changes after Radiation Therapy According to Time Interval

Time interval (month)	IITEP changes		No. of patients
	Yes	No	
< 3 month	9	1	10
> 3 month	9	4	13
Total	18	5	23

$p = 0.339$ by Fisher's exact test

(5). 가
 (6, 7). 가
 가 (8).
 23 12 (52.2%)
 가
 가

Table 4. Incidence of Intrathoracic Extrapulmonary(IITEP) Changes after Radiation Therapy According to Primary Tumor

Primary tumor	IITEP changes		No. of patients
	Yes	No	
Lung cancer	8	4	12
Esophageal cancer	10	1	11
Total	18	5	23

$p = 0.317$ by Fisher's exact test

Table 5. Incidence of Intrathoracic Extrapulmonary(IITEP) Changes after Radiation Therapy According to Radiation Dose Fractionation

Radiation dose fractionation	IITEP changes		No. of patients
	Yes	No	
< 30	5	2	7
> 30	13	3	16
Total	18	5	23

$p = 0.621$ by Fisher's exact test

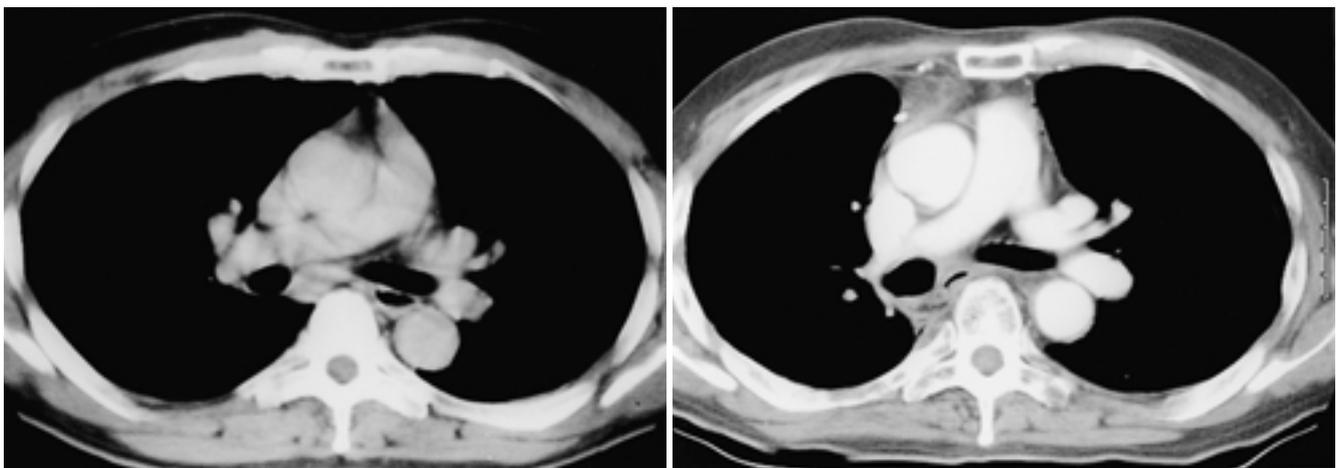
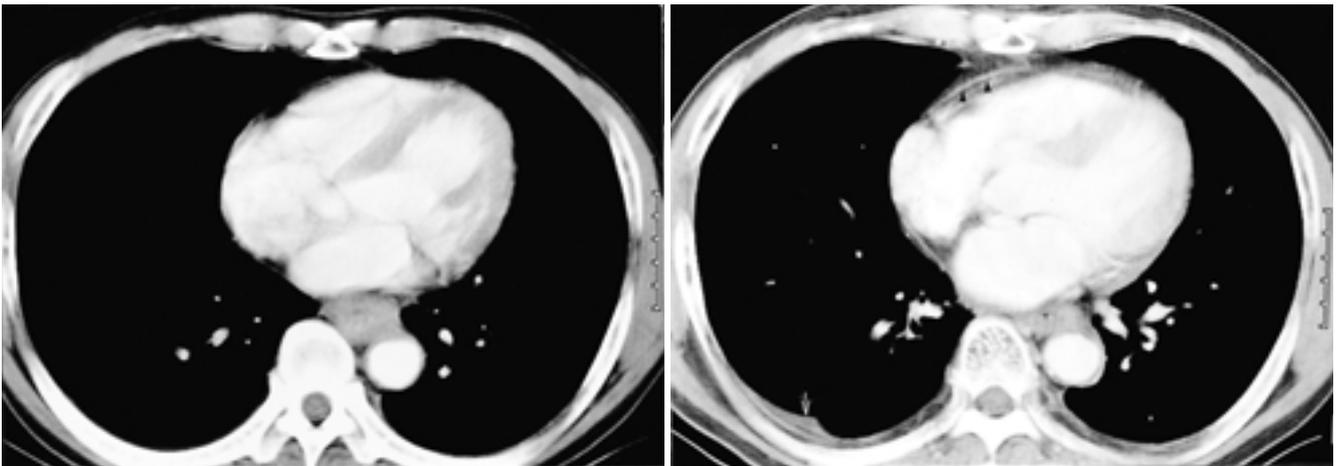
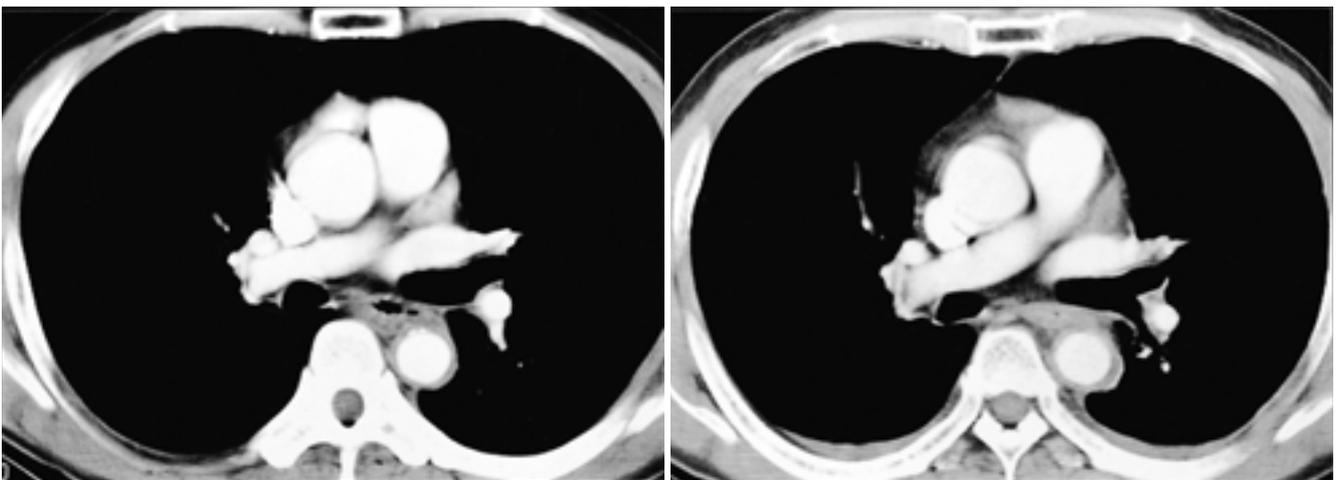


Fig. 3. 58-year-old man with non-small cell lung cancer at right lower lobe.
A. Pre-radiotherapy. CT scan at the level of right pulmonary artery shows normal anterior mediastinum.
B. Post-radiotherapy. CT scan at the same level shows irregular soft tissue strands within the anterior mediastinal fat that is increase in amount.



A **B**
Fig. 4. 56-year-old man with esophageal cancer.
A. Pre-radiotherapy CT scan at the level of aortic root shows normal pericardium and pleura.
B. Post-radiotherapy CT scan at the same level shows pericardial thickening (arrow heads) and small amount of pleural effusion (arrow) at right hemithorax.



A **B**
Fig. 5. 63-year-old man with esophageal cancer.
A. Pre-radiotherapy CT scan at the level of right pulmonary artery shows normal pleura.
B. Post-radiotherapy CT scan at the same level shows small amount of pleural effusion at both hemithorax without pleural thickening and enhancement.

가
 1 cm
 가 12
 10 (83.3%)
 가 (11)
 가
 가
 가 3,600 cGy
 가
 가 가 7 (30.4%) (Fig. 3)
 가 (7, 10).
 4 가

Changes of Intrathoracic Extrapulmonary Organs after Radiation Therapy for Lung and Esophageal Cancer: CT Findings¹

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Purpose: To evaluate the CT findings and incidence of complications occurring in intrathoracic extrapulmonary organs due to radiation therapy.

Materials and Methods: Among 82 patients who underwent chest CT before and after radiation therapy, 23, in whom the procedure provided no evidence of pericardial invasion or pleural effusion before radiation therapy, nor of significant improvement in the tumor after this therapy, were evaluated. Changes in the pericardium, pleura and mediastinal fat were retrospectively assessed. In comparing the CT findings obtained before radiation therapy with those obtained afterwards, changes in the pericardium and pleura were classified as effusion where low density fluid was present and as thickening where there was no fluid. If an increased abundance of soft tissue strands was seen within mediastinal fat, changes in this fat were deemed to have occurred.

Results: Among the 23 patients evaluated, changes in the pericardium [thickening (n = 3 ; 13.0%) ; effusion (n = 8 ; 34.8%)] were found in 11 patients (47.8%), and changes in the pleura [thickening (n = 3 ; 13.1%); effusion (n = 9 ; 39.1%)] in 12 (52.2%). In no patient with pericardial or pleural effusion was thickening or contrast enhancement of the pericardium or pleura evident. In seven cases (30.4%), soft tissue strands within mediastinal fat had become more abundant.

Conclusion: The CT findings which demonstrated complications resulting from radiation therapy were pericardial or pleural thickening or effusion and an increased abundance of soft tissue strands within mediastinal fat. In contrast to previous reports, pericardial and pleural change after radiation therapy was a common finding in our study, occurring in 69.6% of cases.

Index words : Therapeutic radiology
Thorax, CT
Mediastinum, CT

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5th Refresher Course on Obstetric Sonography
- Fetal Echocardiography -

- 8:00 - 9:00 Registration
- 9:00 - 9:40 Applied cardiovascular anatomy for fetal echocardiography
- 9:40 - 10:10 Normal fetal circulation
- 10:10 - 10:40 DDx of Rt.atrial and ventricular dominance in the fetus
Coffee break
- 11:10 - 12:00 Sequential segmental approach to fetal congenital heart disease
- 12:00 - 12:30 Fetal cardiac tumors
Lunch
- 13:50 - 14:20 Fetal myocardial abnormalities
- 14:20 - 14:50 Fetal dysrhythmias
- 14:50 - 15:20 Maternal diseases affecting fetal cardiac anatomy and function
Tea break
- 15:40 - 16:10 Extracardiac anomalies in fetuses with congenital heart disease
- 16:10 - 16:40 Chromosome studies for fetuses with congenital heart disease
- 16:40 - 17:10 Long-term prognosis of congenital heart disease after treatment

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(15,000 가 가 .)

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