

Whole Lung Irradiation for Metastatic Lung Malignancy

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전이성 폐암의 전폐 방사선치료

고신의대 치료방사선과교실

정 태 수

1983년 9월부터 1984년 4월 사이에 고신의대 치료방사선과교실에서 방사선치료를 받은 609명의 환자중 4명의 전이성폐암 환자가 전폐 방사선조사를 받았다. 이들 4명의 환자 전원이 방사선치료후 흉부 X선 상에 종괴의 축소를 가져왔고 전이성 폐암으로 인한 증상을 나타낸 2명의 환자에서 지대한 증상의 경감을 가져왔다. 저자의 이번 연구결과 및 문헌조사에 의하면 다발 전이성 폐암의 경우 대부분이 전신에 전이된 종양으로 간주하여 전신화학요법을 하는 것이 대부분이지만 경우에 따라서는 전폐 방사선조사로도 좋은 Palliative 효과를 가져올 수 있다고 하겠다.

INTRODUCTION

The lung is the 3rd most common site of distant metastasis from various malignant tumors in autopsy series¹⁾.

Approximately 30% of patients with malignant disease will have pulmonary metastases at some time during the clinical course of their disease and almost 20% of patients dying with pulmonary metastases have no other foci of disease detectable at autopsy²⁾.

It is the commonest site of distant metastasis from head and neck tumors, Wilms' tumor, Ewing's sarcoma and uterine cervical carcinoma^{2,3)}.

If lung metastasis is solitary and was discovered a long time after control of primary tumor from rectal, urethral, cervical or testicular, wedge resection can give some long term survivors⁵⁾.

However, when it is multiple and involves both lungs, the disease is considered as systemic and the management is difficult problem. The author

treated four patients with multiple lung metastases by means of whole lung irradiation for palliation and reports short term results of the treated patients.

MATERIALS AND METHODS

Since september 1983 four patients with multiple lung metastases were irradiated whole lung by the author for palliation at Kosin Medical College and Gospel Hospital.

These 4 patients' charts and X-rays were reviewed, analysed and clinical summaries are reported along with review of literature.

Case #1.

BSP (Chart #3043)

This 49 years old male was admitted to other hospital in May, 1983 with generalized lymphadenopathy.

Work up including biopsy of left inguinal lymph node confirmed the diagnosis as malignant lymph

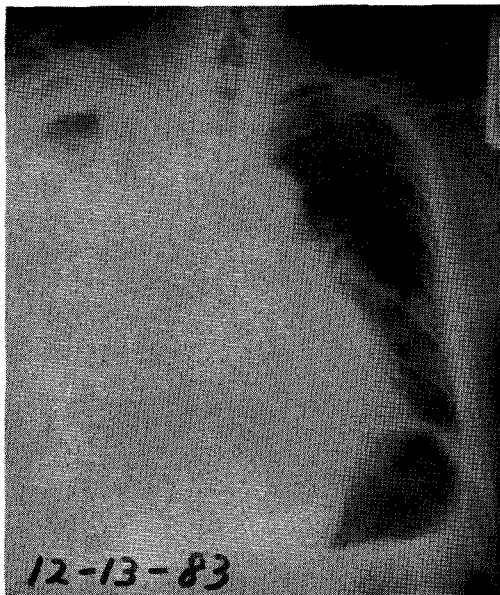


Fig. 1. Pre-radiation chest X-ray of Case 1 shows pulmonary infiltration of lymphoma with right pleural effusion.

homa, lymphocytic poorly differentiated, clinically Stage IIIa.

The patient received combination chemotherapy with BACOP between May 18 and June 14, 1983 with complete response. The patient did not report for continuous chemotherapy since then until early September 1983 when the patient experienced right hemiplegia for 10 days.

CT scan of brain revealed "left posterolateral thalamic mass extending to left cerebral peduncle and mid-brain consistent of brain metastasis". At this time the patient was referred to our hospital for radiation therapy.

Radiation treatment was started on 9-8-83 and given 3,000 rad in 10 fractions (TDF 62) to whole brain with complete relief of right side paralysis.

In December 1983 the patient presented with 3 days history of progressive dyspnea and chest X-ray on 12-8-84 (Fig. 1) showed pulmonary infiltration of lymphoma with right pleural effusion. The patient was markedly dyspneic, unable to breathe without oxygen and completely confined to the bed. Palliative radiation therapy was given to



Fig. 2. Post-radiation chest X-ray of case 1 shows some residual pulmonary infiltrates at right upper lung.

the right hemithorax including mediastinum delivering 1,300 rad (without lung correction) in 13 fractions. (TDP 15). The patient had dramatic relief of dyspnea and became ambulatory without oxygen. Repeat chest X-ray (Fig. 2) showed marked resolution of pneumonic infiltration and right pleural effusion. However the patient expired on 3-10-84 with disseminated disease.

Case #2.

KJK (Chart #3244)

This 50 years old female was referred from other hospital for radiation therapy on 12-1-83 with proven diagnosis of squamous cell carcinoma of uterine cervix with bilateral supraclavicular lymph nodes and multiple lung metastases.

Physical examination at radiation therapy department showed exophytic, easily bleeding mass covering entire uterine cervix with bilateral parametrial extension reaching pelvic wall on right side. There were bilateral hard fixed nodes at supraclavicular area. Chest Xray (Fig. 3, 4) revealed "multiple variable sized nodular densities throughout both lung fields suggestive of metastatic lung cancer with superimposed bronchopneumonia".

Palliative radiation therapy was given to the pelvis delivering 6,040 rad in 33 fractions (TDF 96) and bilateral supraclavicular nodes with 6,000 rad in 30 fractions (TDF 99). During the course

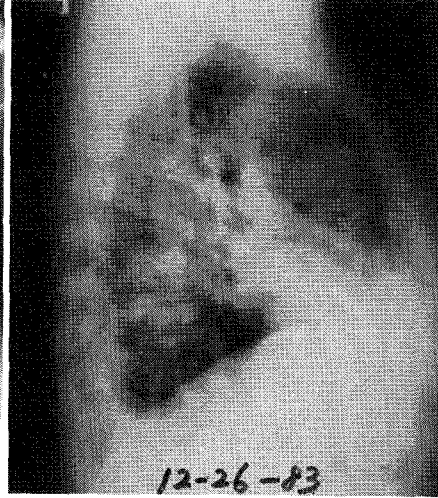
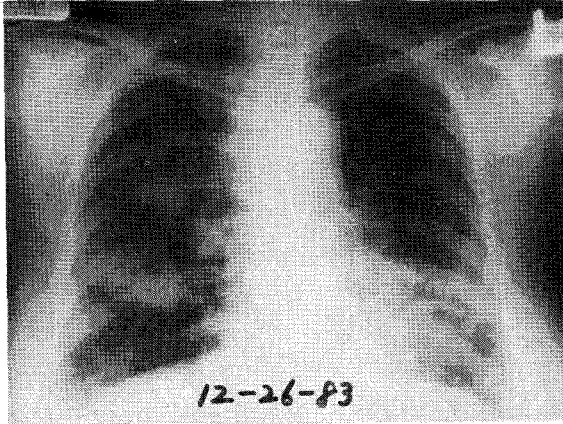


Fig. 3,4. Pre-radiation X-rays of case 2 show multiple variable sized nodular densities throughout both lung fields.

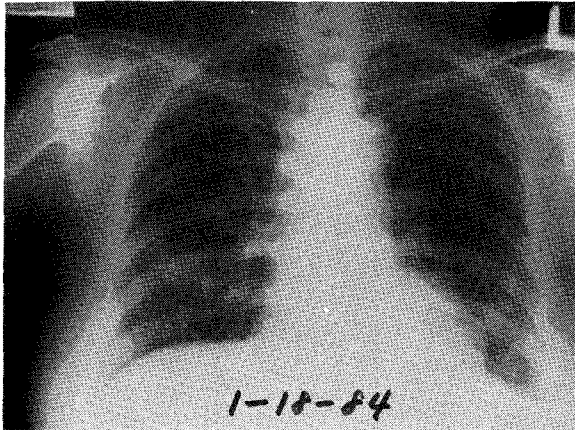


Fig. 5,6. Post-radiation X-rays of case 2 shows marked regression of metastatic nodules.

of radiation treatment the patient became symptomatic such as complaining of marked dyspnea and cough from lung metastases and whole thorax irradiation was begun on 12-29-83 and received 1,400 rad (without lung correction) in 14 fractions (TDF 16).

At the end of radiation therapy there were complete regression of bleeding cervical lesion and marked regression of bilateral supraclavicular lymph nodes.

Dyspnea and cough had been relieved more than 90% according to the patient.

Repeated chest X-ray (Fig. 5,6) showed marked regression of metastatic nodules and pneumonic

infiltration. However the patient developed bone metastasis at lumbar spine and expired from disseminated disease on 3-10-84, 2 months after completion of radiation.

Case #3.

SBH (Chart #2592)

This 58 years old female who had total abdominal hysterectomy with bilateral salpingoophorectomy for squamous cell carcinoma of uterine cervix in 1981 at other hospital was referred for radiation therapy in January 1983 with recurrent tumor.

The patient received split course of radiation

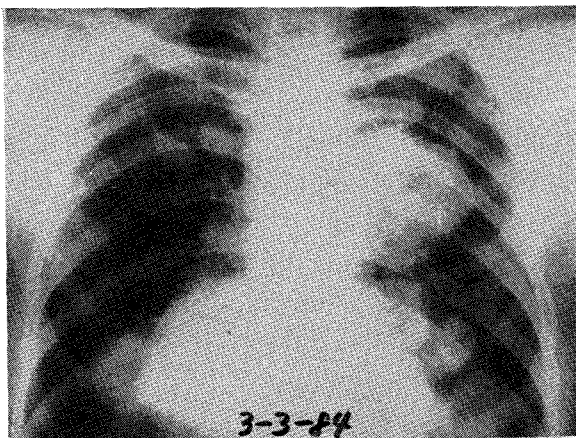


Fig. 7,8. Pre-radiation X-rays of case 4 show multiple variable sized metastases throughout both lung field.

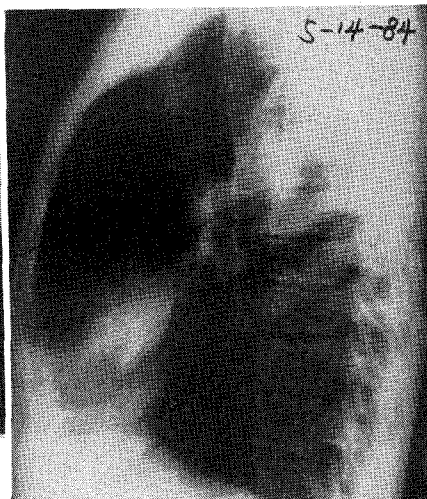
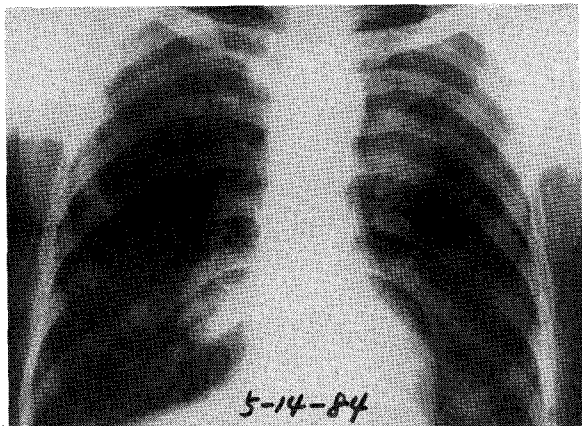


Fig. 9,10. Post radiation X-rays of case 4 show marked regression.

with 5,000 rad in 20 fractions to the whole pelvis with 2 weeks interval in between followed by a booster dose of 2,000 rad in 10 fractions to the vaginal vault. Since then the patient had been doing well on periodic follow up examination until 2-6-84 when the patient presented with one month history of left supraclavicular mass. Physical examination revealed a 2.5×2.5 cm hard mobile mass at left supraclavicular area.

Pelvic examination showed no evidence of disease at vaginal vault or bilateral parametria.

Chest X-ray on 2-6-84 revealed multiple bilateral lung metastases.

Palliative radiation therapy was given to the left

neck node with 8,600 rad in 32 fractions (TDF 169) and whole thorax with 1,500 rad (without lung correction) in 15 fractions (TDF 17).

At the end of radiation therapy, left supraclavicular node was still palpable however repeat chest X-ray showed complete regression of metastatic nodules over bilateral lung fields.

The patient is still alive and asymptomatic.

Case #4.

BHP (Chart # 3486)

This 42 years old male presented to other hospital on 2-24-84 with 1 year history of growing left neck mass. Biopsy of the left neck mass was

Table 1. Results of Whole Lung Irradiation for Metastatic Lung Tumor

Case No.	Age	Sex	Primary site	Histology	Total Dose	TD F	Pretreatment symptoms	Response		Present Status (month after RT)
								Subjective	Objective	
1	49	M	Lymphoma	Lymphocytic	1,300 rad	15	Dyspnea Orthopnea	Complete	Partial	Died 2 month
2	50	F	Cervix	Squamous	1,400 rad	16	Dyspnea Cough	90%	Partial	Died 2½ month
3	58	F	Cervix	Squamous	1,500 rad	17	None	None	Complete	alive asymptomatic 1 month
4	42	M	Submandibular Salivary gland	Adenoid cystic	1,900 rad	21.5	None	None	Partial	alive asymptomatic 1 month

adenoid cystic carcinoma of left submandibular gland. Chest X-ray revealed bilateral multiple metastases. However the patient denied pulmonary symptoms.

Then the patient was referred to our hospital on 3-6-84 for further management. Physical examination showed multiple enlarged lymph nodes at left upper and lower neck with the sizes between 3.5 cm and 2 cm diameter. The rest of the physical examination was unremarkable.

CBC and liver function test were within normal limit. Chest X-ray on 3-3-84 showed "multiple large variable sized nodular densities over both lung field, suggestive of metastases". (Fig. 7,8).

The patient was staged as T2, N1, M1, stage IV (AJC 1983) and had palliative radiation therapy to the entire neck receiving 5,750 rad in 25 fractions (TDF 103) over 38 days and to the whole thorax with 1,900 rad (without lung correction) in 19 fractions (TDF 21.5) over 29 days using 4 Mev Linear Accelerator.

The patient tolerated the treatment well without significant complication. At the end of radiation therapy, neck nodes regressed to more than 90% of original size and repeat chest X-ray showed marked regression of the metastatic nodules. Examination one month after completion of radiation therapy revealed 3 small nodes (less than 1 cm diameter) palpable at left upper neck and the patient was asymptomatic.

Follow up chest X-ray on 5-14-84 (Fig. 9,10)

showed marked regression of metastatic pulmonary nodules.

The patient is still alive and asymptomatic.

RESULTS

As shown in Table 1 two of 4 patients (cases 2 & 3) had metastases from squamous cell carcinoma of uterine cervix, one (case 4) from adenoid cystic carcinoma of left submandibular gland and the other one (case 1) from lymphoma. Whole lung was irradiated using 4 MV Linear Accelerator with daily mid-thoracic dose of 100 rad.

None of the four patient received chemotherapy except for one patient (case 1) who had combination chemotherapy 6 months prior to whole lung irradiation.

All four patients tolerated the treatment well without complications.

Two patients (cases 1 & 2) who had symptoms from lung metastases had excellent subjective response and all four patients had complete or marked objective regression of metastatic pulmonary nodules by the treatment.

DISCUSSION

Whole lung irradiation alone or combined with chemotherapy for radiosensitive tumors such as Wilms' tumor, Ewing's sarcoma, Hodgkin's disease and testicular tumor achieved a few long term

survivors⁶⁾.

However whole lung radiation for multiple pulmonary metastases from epithelial tumors has shown discouraging results⁷⁻¹²⁾ except for one report.¹³⁾ The main problem of whole lung radiation is that one cannot deliver enough radiation to eradicate multiple metastatic deposits because normal lung tolerance to radiation is low. The tolerance dose of the whole lung is 2,500 rad in four weeks and 1,500 and in three weeks when Actinomycin D is given either before, during or after irradiation.⁹⁾

However, to achieve palliation of symptoms, It is not always necessary to have complete local control of tumor.

Present study especially in case 1 & 2 clearly supports that there is a role for whole lung irradiation in multiple lung metastases in selected cases. Certainly systemic chemotherapy should be considered as main treatment modality for this kind of disseminated disease.

SUMMARY

The author reviewed four cases of multiple lung metastases who were treated by whole lung irradiation alone for palliation. All patients tolerated the treatment well without complication.

Two patients who had symptoms from pulmonary metastases had subjective relief of symptoms and all four patients had objective regression of lung metastases on repeat chest X-rays. Present report and review of literature support that some selected patients with multiple lung metastases can be benefited by whole lung irradiation. However, systemic chemotherapy should be main modality of treatment for this kind of disseminated disease whenever possible.

REFERENCES

1. Abrams HL, Spiro R, Goldstein N: *Metastases in carcinoma-analysis of 1,000 autopsied cases.* *Cancer* 74-85, January 1970.
2. Chung T, Stefani, S: *Distant metastases of carcinoma of tonsillar region. A study of 475 patients.* *J Surg Oncol* 14:59, 1980.
3. Merino OL, Lindberg RD, Fletcher GH: *An analysis of distant metastases from squamous cell carcinoma of the upper respiratory and digestive tracts.* *Cancer* 40:145-151, 1977.
4. Malaise EP, Chavandra N, Courd A, et al: *Tumor growth rate and pulmonary metastasis. In Pulmonary Metastases, Boston, GK Hall and Co, 1978.*
5. Choksi L, Takita H, Vincent R: *The surgical management of solitary pulmonary metastasis.* *Surg Gynecol & Obstet* 134:479-482, 1972.
6. Flye MW: *Treatment of metastatic cancer to lung. In Cancer, Principles and Practice of Oncology, Lippincott 1982, 1539-1552.*
7. Cacelen A, Zaharia M, Caceres E, et al: *Pulmonary function tests during adjuvant lung irradiation for osteogenic sarcoma.* *Cancer Treat Rep* 64:4-5, 701-703, 1980.
8. Cox J, Gingerelli F, Ream N, Maier J: *Total pulmonary irradiation for metastases from testicular carcinoma.* *Radiology* 105:163-167, 1972.
9. Margolis L, Phillips T: *Whole lung irradiation for metastatic tumor.* *Radiology* 93:1173-1179, 1969.
10. Mincer E, Botstein C, Schwarz G, et al: *Moving strip irradiation in the treatment of extensive neoplastic disease in the chest.* *Am J Roentgenol* 108:2, 278-283, 1970.
11. Newton K, Spittle M: *An analysis of 40 cases treated by total thoracic irradiation.* *Clin Radiol* 20:19-22, 1969.
12. Newton K: *Total thoracic irradiation combined with intravenous injection of autogenous marrow.* *Clin Radiol* 11:14-21, 1960.
13. Chung TS: *Bilateral whole thorax irradiation for metastatic tonsillar carcinoma. Ill Med J* 193-194, Sept 1983.