Recurrent Spontaneous Pneumothorax after Radiation Therapy to the Thorax*

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Two patients who received radiation therapy to the thorax and who developed recurrent spontaneous pneumothoraces are presented. Patients with recurrent pneumothoraces secondary to radiation have not been described previously. Pleural changes secondary to radiation may contribute significantly to the complicated clinical course of these patients.

Recurrent spontaneous pneumothorax is a complication of several diseases1-3 and can occur in young patients with pulmonary apical disease.4 We have recently seen recurrent spontaneous pneumothoraces complicating radiation-induced pulmonary disease in two patients with Hodgkin's disease. In both instances, interventional care was required. Radiation-induced changes in both the pleura and pulmonary parenchyma may be responsible for these patients' recurrent pneumothoraces and their complicated clinical courses.

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Case Reports

Case 1

A 13-year-old white boy presented in October, 1969 with right inguinal adenopathy and was found to have nodular sclerosing Hodgkin's disease, stage 3-A. Initial chest radiograph (Fig 1A) revealed a lobulated middle mediastinal mass with hilar adenopathy more prominent on the right. Lymphangiography revealed abnormal nodes in the right external iliac region.

He received two courses of MOPP (metotrexate, vincristine, Oncovin, prednisone, procarbazine) from September 25, 1969 to October 23, 1969. Radiotherapy with 60Co began December 1, 1969 with 3,000 rads to the pelvic area in four weeks followed by 3,000 rads to the upper abdomen over four weeks. In May, 1970, he received 3,500 rads in a mantle-shaped portal to the thorax (mediastinum, axillae, supraclavicular areas and neck) in 17 treatments over 23 days.

Clinically, the patient did well until March 16, 1972 when a small right apical pneumothorax was found on routine followup chest film (Fig 1B). Over the next four and one-

Figure 1A (left). Posteroanterior chest x-ray film (Case 1) in September, 1969, demonstrates a lobulated mediastinal mass, more prominent at the right. Figure 1B (middle). Small right apical pneumothorax (arrows) in March, 1972. Figure 1C (right). Large left pneumothorax with apical pleural thickening in July, 1976.

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half years, recurrent right pneumothoraces and one left pneumothorax (Fig 1C) were documented by chest radiograph. Chest tubes were used for re-expansion with limited success. Because of the persistence and frequent recurrence of the right pneumothorax, a pleural sclerosing agent (quinacrine hydrochloride [Atabrine]) was instilled in the right hemithorax in May, 1976. He has had no further pneumothorax documented to date.

Case 2
A 30-year-old white man presented on October 24, 1974, with a two-year history of vague symptoms and an anterior mediastinal mass projecting into the left upper thorax. Initial physical examination revealed left supraclavicular adenopathy which on biopsy proved to be Hodgkin's disease of unclassified subtype. Lymphangiography and liver biopsy gave normal findings. Radiotherapy with 60Co began on November 21, 1974 with 31 treatments over 49 days. The mediastinum received 5,975 rads, the left supraclavicular area 5,820 rads and the neck 3,936 rads.

He tolerated the treatment well and staging laparotomy on February 13, 1975 revealed no tumor. Over the next four months he did well, but on June 3, 1975 he began complaining of left-sided chest pain and mild shortness of breath. On chest x-ray examination he was found to have a left apical pneumothorax. Six weeks later, the pneumothorax was improved but still persisted. He was asymptomatic until April 6, 1976 when he developed a recurrent spontaneous left pneumothorax which required tube thoracostomy for several days with very limited success in re-expansion. The pneumothorax persisted for six weeks. At present, the patient is asymptomatic and without documented recurrent pneumothorax.

Discussion
Spontaneous pneumothorax secondary to radiation fibrosis has recently been reported.5,6 Three patients have been described with pneumothorax occurring from two to seven months following completion of therapy; there was uneventful recovery in all. One patient had received IPPB treatments. Rupture of subpleural blebs secondary to radiation fibrosis is the proposed mechanism for spontaneous pneumothorax in these patients.5

Pulmonary changes caused by radiotherapy to the thorax include acute radiation pneumonitis approximately 8-12 weeks following completion of therapy, with gradual progression to radiation fibrosis 9 to 12 months following completion of therapy.7 Radiographic changes of radiation fibrosis include apical pleural thickening, elevation of the hemidiaphragm and loss of volume secondary to contraction of fibrotic areas.7

Pleural changes (eg, thickening) may influence the clinical course considerably in patients with spontaneous pneumothorax resulting from radiation fibrosis. The three patients previously described5,6 and the two patients described in this report all demonstrated apical pleural thickening and at least four of the total of five patients had received supraclavicular radiotherapy to the involved side.

Although rupture of subpleural blebs may be the mechanism of pneumothorax, fibrotic, inelastic visceral pleura, particularly in the apical regions, or inadequately sealing air leaks may be responsible for the persistence and recurrence of pneumothorax in patients previously treated with thoracic radiation.

References
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