tients. This would direct most of the flow to the "healthy" lung. As noted previously, the nondependent lung receives higher regional ventilation in mechanically ventilated patients. Consequently, the lateral decubitus position with the "sick" lung in the dependent position would optimize ventilation to the well perfused, nondependent "healthy" lung and, hence, optimize gas exchange.

The relative contribution of mechanical ventilation to these positional changes in gas exchange is not clear. In fact, patients with unilateral pulmonary disease demonstrate the same positional changes whether they are spontaneously breathing or mechanically ventilated (ie, gas exchange improves when the "healthy" lung is down). However, our interpretation requires an interactive effect of mechanical ventilation with pulmonary vascular obstruction. Consequently, we cannot predict the positional changes in gas exchange in patients with unilateral massive pulmonary embolism who are not mechanically ventilated. Further studies are needed to determine the role of isolated unilateral pulmonary vascular obstruction on positional changes in gas exchange.

Two points in our report deserve further comment. First, the positional changes described in our report occurred despite the fact that patients are rarely turned to the complete lateral decubitus position during routine nursing care. We did not try to influence the timing or degree of turning patients among the three positions. Positional changes in gas exchange might have been more pronounced had we attempted to obtain the complete lateral decubitus position. Secondly, the diagnosis of pulmonary embolism was based on the prior probability for pulmonary embolism, clinical features, and high-probability perfusion scans. The response to treatment further supported the diagnosis. We believe that performing a pulmonary angiogram would have added very little to the diagnostic certainty, at a considerable risk for the patients.

To our knowledge, there have been no similar reports in the literature; however, improvement in gas exchange when the "sick" lung is dependent has been reported in experimental unilateral emphysema in an animal model, in infants with unilateral disease, and in one case of partially obstructing lung cancer. Awareness of this phenomenon is important in understanding fluctuations in oxygenation in these patients and in dictating modifications in positioning patients to minimize the duration or degree of hypoxemia.

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Bronchogenic Carcinoma in Situ on the Carina Eradicated by Endobronchial Biopsy*

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Squamous cell carcinoma in situ of the bronchus is a rare disorder in an isolated clinical setting. We present a case of carcinoma in situ located on the carina with excisional biopsy via a fiberoptic bronchoscope and no recurrence after five years. To our knowledge, this represents the only case of carcinoma in situ treated solely with excisional biopsy. This case further emphasizes the importance of securing biopsy specimens for all mucosal abnormalities and raises the possibility of limited excision as sole therapy for carcinoma in situ. (Chest 1990; 98:1516-17)

Squamous cell carcinoma in situ of the bronchus is a rare disorder in an isolated clinical setting. We present a patient who presented with pneumonia and hemoptysis and was found at bronchoscopy to have an unrelated lesion on

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the carina. Biopsy yielded the diagnosis of squamous cell carcinoma in situ. Because of its location and the patient's limited pulmonary reserve, no surgical resection was attempted. Follow-up over the next five years, including repeat bronchoscopy, has yielded no evidence of recurrent or residual disease. This case further emphasizes the importance of performing a biopsy on small mucosal abnormalities and suggests that carcinoma in situ may be cured without wide resection.

CASE REPORT

A 66-year-old woman presented to the emergency room at Abington Memorial Hospital following four days of increased coughing, sputum production, and fever to 38.8°C. In addition, she noted increased exertional dyspnea and some chest discomfort. Her past medical history was only remarkable for chronic obstructive pulmonary disease following 50 years of smoking one pack of cigarettes daily, and for hypertension. Her medications were hydrochlorothiazide triamterene and aminophylline.

Physical examination revealed blood pressure of 108/78 mm Hg with pulse 122 bpm and respirations 30 breaths per minute and labored. Temperature was 37.4°C. Head, eyes, ears, nose, and throat examination was normal. Neck examination revealed no venous distention or adenopathy. Examination of the chest revealed a prolonged expiratory phase with scattered ronchi and diminished breath sounds at the bases. The heart beat was regular with frequent premature beats noted. The abdomen was nontender without organomegaly. No peripheral edema or clubbing was present. A chest x-ray film was remarkable for an infiltrate at the right base consistent with pneumonia. Arterial blood gas values revealed pH of 7.51, Pco2 of 32 mm Hg, and of Po2, 59 mm Hg of room air. Laboratory studies were otherwise unremarkable.

The patient was admitted to the hospital and treated with oxygen, ampicillin, and bronchodilators. The patient improved clinically but developed hemoptysis. Bronchoscopy revealed purulent secretions with scattered blood in the right lower bronchial lobe. An incidental finding was a raised, friable area on the main carina which could not be washed or brushed away. This was completely removed with biopsy forceps, and subsequent review of this material yielded the diagnosis of squamous cell carcinoma in situ (Fig 1).

Following completion of therapy for pneumonia and for exacerbation of COPD, the patient was discharged from the hospital. Repeat bronchoscopy one month following the original biopsy of the carina revealed no mucosal abnormality, and repeat biopsy of the carina revealed normal respiratory epithelium with areas of squamous metaplasia. The CT of the thorax revealed no evidence of mediastinal disease. Spirometry revealed FEV1 of 1 L with severe reduction of flow rates.

 Bronchoscopy was again performed six months, one year, and two years following the initial diagnosis of carcinoma in situ. All studies were negative with no evidence of recurrent or new malignancy. The patient has subsequently been followed three additional years with no clinical evidence of thoracic malignancy and with a stable chest x-ray film.

DISCUSSION

Carcinoma in situ has been found at autopsy in a significant percentage of smokers and in surgical specimens following resection for another bronchogenic carcinoma. Very little is known about the natural history of carcinoma in situ of the bronchus. It is assumed to be a precursor for more invasive squamous cell carcinoma of the lung, but obviously no prospective studies exist. Several authors have reported their experience, and the standard recommendation has been to exclude more extensive carcinoma and then to resect widely with lobectomy or pneumonectomy. That approach was obviously not a consideration in our patient who presented with a lesion of the main carina.

Mason and Jordan1 have reviewed the prognosis of patients with early bronchogenic carcinoma. Serial sputum cytology has been recommended in the follow-up of early bronchogenic carcinoma. Our patient was unable to produce adequate material for cytology, but washings were obtained with bronchoscopy for the first two years following the initial diagnosis. Infeld et al8 report a similar clinical situation where endobronchial biopsy apparently resulted in eradication of a carcinoma in situ. Subsequent lobectomy in the area of the noted abnormality revealed no residual malignancy.

The survival of our patient five years following the recovery of carcinoma in situ suggests that she had been cured with endobronchial resection alone. To our knowledge, this represents the only report of cure resulting from endobronchial biopsy alone. Optimal therapy is still uncertain. In more peripheral lesions, wider resection has been more widely reported and therefore may remain the treatment of choice. Since the absence of clinical symptoms and a stable chest x-ray film do not exclude recurrent disease, optimal follow-up might include sputum cytology for an indefinite period. It is possible that in the future, early detection of lung cancer by means of hematoporphyrin derivative fluorescence and subsequent laser photoradiation may prove to be useful. Obviously, more information is required before such recommendations could be made.

The patient's survival for five years further emphasizes the need to perform a biopsy on all subtle mucosal abnormalities in patients at increased risk for bronchogenic carcinoma.

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