lated great vessels is extremely uncommon. In 10 of the collected 13 case reports a patent ductus arteriosus was present, but in the remaining 3 cases the nature of the shunt was not specified.

The present case illustrates a type of anomaly rare in itself and to our knowledge, not previously described in patients with combined tricuspid and pulmonary valve atresia surviving beyond infancy. It is likely that a left-to-right shunt through the fistula was a significant source of pulmonary flow and, therefore, of the prolonged survival. The functional significance of such a fistula is comparable to patent ductus.

The question arose whether bronchial-arterial collateral flow contributed significantly to the patient’s survival. Gross examination failed to reveal any sizeable bronchopleural arterial connection in the hilar- mediastinal region. Only in the thoracotomy scar were such vessels demonstrated histologically. Although the fistula measured 4 mm in internal diameter in the postmortem state, in life its functional diameter was certainly larger. We concluded that pulmonary blood flow was maintained principally through the fistula, with the broncho-pulmonary contribution playing a minor role.

Because of its location at the root of the aorta, its dimensions, gross and histologic features, we favor a coronary arterial origin for the fistula. In support of this view is a comment by Edwards7 on anomalies of coronary arteries in which an accessory coronary artery is mentioned as a rare form of connection of the ascending aorta with the pulmonary trunk.

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Reversible Interstitial Pneumonitis
Associated with Low Dose Bleomycin*

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A patient with nodular histiocytic lymphoma was treated with bleomycin; she later developed interstitial pneumonitis documented by lung biopsy. The dose of bleomycin producing this complication was lower than previously reported, and the pulmonary toxicity was apparently completely reversible.

The antineoplastic agent bleomycin, first isolated by Umazawa et al1 in 1966, has been reported to be an effective therapeutic agent in the following neoplasms: squamous cell carcinoma of various anatomic sites, lymphomas and testicular carcinomas.1–3 The first large clinical review of bleomycin therapy has recently appeared.4 Bleomycin has relatively little myelosuppressive or immunosuppressive toxicity, and its major toxicities seem to parallel the tissue areas of highest concentration, that is, the skin and the lung.5–6 Overall, the most significant toxicity has been pulmonary.7 To the best of our knowledge, a well-documented case of reversible low dose bleomycin pulmonary toxicity has not been previously reported.

CASE REPORT

An asymptomatic, 62-year-old Caucasian woman was noted to have a lower abdominal mass on routine physical examination. Laparotomy was performed, and a diagnosis of nodular histiocytic lymphoma was established. She was initially treated with cyclophosphamide, vincristine and prednisone with a favorable response for 20 months. At that time she developed progressive axillary and cervical lymphadenopathy. Thorough reevaluation did not reveal extension of disease beyond the axillary and cervical lymph nodes, and the patient was treated with 60cobalt irradiation to an upper mantle field to a total dose of 3483 rads. This regimen produced transient remission. Seven months later, the disease progressed most notably in the abdomen. She was readmitted to the hospital and reevaluated. Treatment was initiated with a combination of adriamycin and bleomycin. Chest x-ray film and pulmonary function tests were obtained prior to the initiation of bleomycin therapy. The pretreatment chest x-ray examination was within normal limits. The pulmonary function tests revealed a vital capacity of 3.73 L (120 percent of predicted), and an expiratory reserve volume of 1.43 L (150 percent of predicted). Arterial blood gases: Po2 82 mm Hg

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(96 percent saturation), Pco₂ 29 mm Hg, and an arterial pH of 7.45. There was no evidence of a restrictive defect, and airflow studies indicated the presence of a moderate obstructive defect \( (FEV₁ = 65 \text{ percent } FVC) \) which was felt to be compatible with the patient's history of chronic obstructive pulmonary disease secondary to smoking two to three packs of cigarettes per day for 40 years.

The patient was given bleomycin 5 mg IV on days 1, 4, 8 and 11 of each 21 day cycle. The adriamycin dose was 60 mg IV on day 1 of each 21 day cycle. She tolerated the therapy well and attained clinical remission of her disease. Although the patient's auscultatory findings were reviewed weekly, after five months of bleomycin therapy and a total dose of only 133 mg, she was found to have extensive subcrepitant râles at both lung bases on auscultation. Radiographic findings at that time (Fig 1), demonstrated extensive, progressive interstitial pneumonitis. The etiology of the interstitial pneumonitis could not be established by noninvasive means, and open lung biopsy was performed. Routine, mycobacterial, and fungal cultures were negative, as were methenamine silver stains for *Pneumocystis carinii*. Biopsy findings revealed an intraalveolar accumulation of proteinaceous material with variable numbers of desquamated mononuclear cells resembling either macrophages or type 2 pneumocytes. Some of the intra-alveolar material was partially organized, and the alveolar septa were thickened with extremely prominent alveolar lining cells (Fig 2). These biopsy findings are identical to those presented by Luna et al.\(^7\) During this period of hospitalization, she was in moderate to severe respiratory distress; however, at no time did she require mechanical ventilation or a supplemental oxygen concentration greater than 40 percent. Prednisone therapy (60 mg per day) was initiated and bleomycin terminated. Over the course of the next few weeks, the patient improved remarkably. At discharge from the hospital, she did not experience shortness of breath with her usual activity, and her pulmonary function tests and arterial blood gases were virtually identical to those performed prior to bleomycin therapy. The chest x-ray film at the time of discharge from the hospital (Fig 3) demonstrates dramatic clearing of the interstitial disease.

**Comment**

The occurrence of apparent bleomycin pulmonary toxicity in this patient at a total dose of 133 mg is surprising in light of the currently published experience with this drug. In the review of bleomycin by Blum et al.,\(^4\) of 808 patients at risk, only 86 developed signs of

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**Figure 1.** Chest x-ray picture after five months of bleomycin therapy reveals extensive interstitial pneumonitis.

**Figure 2.** Photomicrograph (100 X) of lung biopsy obtained at thoracotomy.

**Figure 3.** Chest x-ray film at time of discharge from hospital reveals clearing of interstitial disease.
pulmonary toxicity even when pulmonary toxicity was defined as liberally as the finding of dry bibasilar rales on auscultation. 4 This represents an incidence of pulmonary morbidity of approximately 11 percent. Although clinical evidence of pulmonary toxicity, as evidenced by bibasilar rales, was found in some patients at all dose levels, in no case was life-threatening interstitial pneumonitis found at a dose below 150 mg. The overall mortality to bleomycin in the series by Blum and colleagues was less than .1 percent, and appeared to be dose-related with eight of the nine tissue-documented cases of bleomycin pulmonary toxicity having involved a total dose exceeding 200 mg. These results reported by Blum et al are in keeping with those reported by Luna et al. 7 Adriamycin has no significant pulmonary toxicity. 8-10 The role of 20 months of cyclophosphamide therapy in possibly predisposing our patient to the cytotoxic effects of bleomycin is unknown. We suggest that clinicians be alert to the possibility of synergism between these two drugs in future cases.

Whether the dramatic improvement in our patient was due to, or in spite of, the prednisone therapy is moot. Certainly, the use of corticosteroids in bleomycin pneumonitis is controversial; however, it is our opinion that they were of benefit. To our knowledge, survival in tissue documented bleomycin pulmonary toxicity with apparent complete reversal of findings has not previously been reported with a total bleomycin dose of less than 180 mg. 11

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DIFFERENTIATION BETWEEN HYDROPNEUMOTHORAX AND DESTROYED LUNG BY THORACOSCOPY WITH A FIBEROPTIC BRONCHOSCOPE

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In a 39-year-old man radiologic examination could not distinguish definitely between a hydropneumothorax and total destruction of one lung. Introduction of a fiberoptic bronchoscope through the opening for the chest drainage tube permitted direct inspection of the air space. A definite diagnosis of a destroyed lung was made, permitting appropriate modification of the treatment.

In a recent report on the destroyed tuberculous lung, it was pointed out that it is often difficult to distinguish between a destroyed lung and a large chronic pneumothorax with a bronchopleural fistula. 1 In both conditions the chest films show a large air space with fibrous bands and frequently a basal fluid level. When progressive excavation of the lung can be followed by serial roentgenograms, the distinction between the two conditions can be made readily. When no previous films are available for comparison, this distinction may not be possible.

The differential diagnosis is important, however, since the treatment of the two conditions is usually quite different. A chronic hydropneumothorax with bronchopleural fistula requires surgical drainage and frequently a definite major surgical procedure at a later date. In a destroyed tuberculous lung surgical drainage is rarely indicated, and medical management is feasible in cases where pneumonec tony is considered to be a great risk. 1

Any procedure that may assist in the differential diagnosis between these two conditions is, therefore, helpful in the management of such cases. The fiberoptic bronchoscope has been used successfully for pleuroscopy and pleural biopsy. 2 In the following case the fiberoptic bronchoscope, used by the transthoracic approach, enabled us to distinguish between a chronic hydropneu mothorax and a destroyed lung and led to appropriate modification of treatment.

CASE REPORT

A 39-year-old man was admitted to another hospital with a history of progressive weakness and weight loss on November 21, 1973. Physical examination revealed dullness over the lower third of the left lung posteriorly, diminished breath sounds over the left upper lung fields anteriorly and posteriorly, and amorphic breath sounds in the left axillary region.

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