and lesser omental sac. The second patient was one whose aneurysm eroded through the diaphragm with fatal rupture into the thoracic cavity. Our second patient, therefore, is only the second reported patient with rupture of a splenic artery aneurysm into the thorax and the only survivor of this rare entity. Success in this case is attributed to the early operative intervention which had been prompted by the rapidly accumulating hemothorax.

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Pulmonary Allergic Granulomatosis: A Possible Drug Reaction in a Patient Receiving Cromolyn Sodium*

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Cromolyn sodium (CS) is an effective antiasthmatic agent which is known to inhibit the release of vasoactive amines (histamine, slow reactive substance-anaphylaxis [SRS-A] and serotonin) following an allergic reaction. In our experience, as well as that of others, CS is well tolerated. The only reported untoward reactions have been a transient dry throat reported by some patients at the initiation of therapy, proliferation of arterial lesions in stumped tailed monkeys, and the presence of a pulmonary infiltrate with eosinophilia. Following is the report of a patient in whom pulmonary allergic granulomatosis was observed during supervised clinical trial with CS.

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CASE REPORT

The patient, a 33-year-old insurance salesman, was first diagnosed as having asthma at the age of 21. Prior therapy had been ineffective and consisted of hyposensitization treatment and bronchodilators. Significant past history included a childhood episode of rheumatic fever without known cardiac involvement. In August, 1970, the patient first participated in a doubleblind crossover clinical trial of CS. Because of clinical relief of symptoms experienced during the period while receiving the active drug, he readily accepted the opportunity to continue the agent in an open-trial study. During the first year of the second study he did well, but because of the absence of symptoms he subsequently began to take the medicine somewhat sporadically.

During the last two months of 1971, he took the drug rarely, if at all. In early January, 1972, because of an increase in symptoms, he resumed taking the drug, though still irregularly. During the next month of 1972, his sputum production increased, he noted fever, and complained of a burning sensation in his chest. He lost 15 pounds and his cough worsened. Expiratory flow rates were lower than those recorded at the time of entry into the study. He was admitted to the hospital on March 4, 1972, because of a continued deterioration of his condition. The CS was discontinued at this time. A chest roentgenogram revealed a diffusely mottled consolidation of both lungs (Fig. 1). Coarse inspiratory and expiratory rales were audible in the right base. A 10 percent peripheral eosinophilia and basal hypoxemia were present. Hemogram, alkaline phosphatase, urinalysis, complement fixation studies for fungi, and LE prep test were all negative. An open lingular biopsy was performed on March 27, 1972. Examination of the histologic section revealed a granulomatous inflammation involving not only the blood vessels, but also the bronchial walls and interstices. Multinucleated giant cells were evident through-

**Figure 1. Radiographic examination of March 8, 1972, reveals poorly margined patchy infiltrations scattered throughout the upper portions of the lung becoming more confluent in the subpleura.
out the specimen (Fig 2). Multiple sputum cultures were negative for fungi and pathogenic organisms. One culture grew *Mycobacterium kansasi*, but several others were negative for mycobacteria. Cultures of the lung tissue removed at surgery were negative for mycobacteria and fungi. Serum precipitins to *Aspergillus fumigatus* were not demonstrated.

The patient's peripheral eosinophil count rose to 42 percent and he was started on prednisone 60 mg a day. He gradually improved and prednisone was tapered to 20 mg every other day. By October, 1972, his chest roentgenogram had cleared and the pulmonary function returned to pre-study values. He is at the present time doing well on a low daily maintenance dose of corticosteroid, and has resumed hyposensitization therapy.

**DISCUSSION**

An asthmatic patient who exhibits pulmonary infiltrates radiographically, associated with an increase in symptoms and a peripheral eosinophilia, presents a difficult diagnostic problem. Scadding came to the conclusion that at least in Great Britain superinfection with and/or hypersensitivity to *Aspergillus fumigatus* was a common cause of this syndrome. Typically, a young male patient with extrinsic (atopic) asthma would develop a relatively sudden exacerbation of symptoms, eosinophilia, a pulmonary infiltration, and have a prompt and dramatic response to corticosteroids. The clinical picture was not unlike the case we are presenting. The radiographic findings differed in that they consisted of a segmental infiltrate as opposed to the bilateral, diffusely mottled consolidation present in our case.

Characteristically, aspergillosis may be demonstrated as a "fungus ball," a secondary invader of devitalized tissues or an opportunistic infection in a patient with compromised immunocompetence. All of these situations are rare in asthmatics and were not demonstrated in our case. More commonly, the syndrome is thought to represent a hypersensitivity to the fungus *per se* and the organism may be cultured from the sputum if multiple specimens are examined. Serum precipitins to aspergillus often develop. Cultures of both our patient's sputum and the tissue removed by lung biopsy were negative for fungi. Serum precipitins were not demonstrated. Our overall impression is that hypersensitivity to *Aspergillus fumigatus* was probably not responsible for the radiographic changes observed in our case.

The single isolation of *Mycobacterium kansasi* from our patient's sputum is difficult to interpret, but we do not believe it is of clinical significance. Several other cultures of the sputum were negative for mycobacteria. None was demonstrated to be present in the lung tissue removed at surgery either by special stains or culture and the patient improved while being treated with corticosteroids though he was never covered by antituberculosis chemotherapy.

Hypersensitivity reactions involving the lungs have been extensively reviewed. Liebow and Carrington have classified these reactions as exudative infiltrates, necrotizing bronchitis, asthma, pulmonary eosinophilia syndromes, vasculitis, collagen disease, sarcoid-like infiltrates, and miscellaneous types.

These types of findings may be seen with or without a known cause. Lung biopsy may be helpful, both to identify or exclude a specific cause and to determine whether the features often seen with allergy were found. These include an eosinophilic or plasmaeytic infiltration, angitis, or granulomatosis. Some of the causes of pulmonary eosinophilia syndrome developing in asthmatics have been reviewed by Ford and include parasites, and infections (fecal, etc). No evidence of parasitic, bacterial, or fungal infection and/or infestation was found in this case.

Necrotizing granulomata with vasculitis have been reported in several conditions. Wegener's granulomatosis limited to the lung has similar microscopic features, but is usually associated with lower lobe involvement, cavitation in one-third of the cases, and microscopic evidence of infarction. None of these findings was present in our case. The findings in the Churg and Strauss syndrome may include pulmonary granulomatosis and vasculitis, but this condition often exhibits findings in other organs. No evidence of extrapulmonary involvement was found in our case.

Drugs have been implicated as being associated with acquired pulmonary disease in otherwise healthy patients and asthmatics. Pulmonary granulomatosis with bronchiolitis obliterans was noted by Liebow and Carrington as complicating the course of an asthmatic, but the details of the case were not described. Presumably, it could have represented a hypersensitivity reaction. The same authors, however, refer to a previously reported case of a 59-year-old adult-onset asthmatic woman treated with intravenous sodium iodide who, for six months prior to her demise, experienced a relentless course of respiratory failure, eosinophilia, and segmental pulmonary infiltration. At autopsy, necrotizing vasculitis and granulomatosis were found. No cause was identified.

Proliferative arterial lesions have been found in some treated and untreated control macaque monkeys in four of seven toxicity studies with CS. In these four studies, the proliferative arterial lesion occurred predominantly in the kidney, but was also found in other organs. The most characteristic feature was the focal proliferation of cells in the tunica media.

In view of a recent report of a patient taking CS who responded to corticosteroid therapy but who did not
have the benefit of a lung biopsy, a hypersensitivity reaction to CS must be considered as a possible cause of our patient’s condition. This case emphasizes the need for close and continued monitoring of patients receiving this compound.

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Elimination of Diaphragmatic Contractions from Chronic Pacing Catheter Perforation of the Heart by Conversion to a Unipolar System*

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This report describes how simple conversion from a bipolar to unipolar pacing system eliminated bothersome diaphragmatic stimulation in a patient with chronic catheter perforation of the heart. This approach, when feasible, appears preferable to the insertion of a second pacing catheter.

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Myocardial perforation by endocardial electrodes remains a relatively uncommon but important complication of the percutaneous technique of cardiac pacing. Although perforation usually results in pacemaker failure or remains clinically unapparent, it may occasionally cause bothersome diaphragmatic contraction in the absence of pacemaker failure. This brief report describes how simple conversion from a bipolar to unipolar pacing system eliminated unrelenting diaphragmatic stimulation in a patient with chronic catheter perforation of the heart.

CASE REPORT

In 1967, a 71-year-old woman with Stokes-Adams attacks received a permanent transvenous bipolar pacemaker at another hospital. Twenty-four hours after implantation she developed uncomfortable “swishing” of the left upper abdominal area synchronous with the heart beat. Syncope did not recur but the annoying abdominal jerking continued, often awakening her at night. The pulse generator was replaced electively two and one-half years later.

We first saw the patient in July, 1971 when her primary concern was abdominal jerking. On examination, there was prominent left upper abdominal jerking synchronous with the pulse. Changes in posture produced no effect. Localized contraction of the intercostal muscles in the anterior axillary line in the sixth left intercostal space was clearly visible, and auscultation revealed a loud pacemaker sound confirmed by phonocardiography (Fig 1). The electrocardiogram showed regular ventricular capture, the paced beats exhibiting a left bundle branch block pattern of depolarization, with

Figure 1. (Upper Panel) Phonocardiogram showing recording of pacemaker sound (PS), carotid pulse and electrocardiogram. (Lower Panel) Recording of chest wall muscle contraction. Onset of pulsation is coincident with pacemaker sound and spike.