A retrospective study of children after pneumonia

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Summary
Sixteen Black children were examined 5 years after hospitalization for pneumonia. Sixty-three per cent had had recurring symptoms since that time. Of this group 60% had physical signs present although they were reportedly symptom-free at the time of examination. A family history of asthma was common in the symptom-free group and in the group with intermittent symptoms, but in only 1 child could a minor degree of exercise-induced bronchospasm be produced. Airway obstruction was detected in 19% of the children using peak expiratory flow rate measurements. Only 1 child had a completely normal chest radiograph at the follow-up examination. In this retrospective study long-term sequelae of pneumonia in early childhood were common and should be considered in the assessment of children with recurrent symptoms and signs and/or persistent radiographic changes.

Long-term sequelae of lower respiratory tract infection in childhood are more and more often described. These may consist of persistent clinical features or abnormalities of lung function.1-3 In South African Black children a prolonged pulmonary syndrome commonly follows pneumonia associated with measles and other causes. In this small retrospective study children were re-examined 5 years after a hospital stay for pneumonia.

Patients and methods
In 1981 hospital records of 50 Black children who had been admitted with pneumonia 5 years earlier were obtained. They were selected for inclusion in this study if their previous chest radiographs were available and if they had given an urban township address. Letters were sent to the parents requesting that the child be brought to the hospital for a follow-up examination; they would be financially reimbursed. Sixteen parents (32%) responded to the request.

A history of respiratory symptoms was taken and a physical examination carried out. Chest radiographs and peak expiratory flow rate (PEFR) measurements were obtained. If possible, tests for exercise-induced bronchospasm were also carried out. The original chest radiographs were reviewed to confirm the presence of pneumonia 5 years previously. The follow-up radiographs were examined for the following abnormalities:6,7 (i) confluent pneumonia: shadowing with air bronchogram(s); (ii) patchy pulmonary air-space disease: areas of pulmonary opacification measuring 3 - 6 mm with poorly defined margins; (iii) bronchial, peribronchial and bronchiolar disease: bronchial wall thickness more than 1 mm; three or more bronchi seen end-on near the hilum or any seen more than 1.5 cm from the hilum; parallel tramlines of thickened walls seen en face (Fig. 1); and (iv) pulmonary overinflation suggested by seeing six or more anterior ribs above the diaphragm with or without flattened diaphragms (lateral radiographs were not available).

Results
Sixteen children were studied; the median age at the time of the original illness was 10 months, with a range of 1 month - 5 years 11 months. Ten children were under 1 year and 14 under 2 years old. In 3 cases the original infection had been measles.

On follow-up 5 years later 6 children (37%) had no complaints and the physical examination was negative (Table I). In all 6 the chest radiograph at follow-up was abnormal: 3 had thickened bronchi, 1 with over-inflation, and 2 had confluent and 1 patchy pneumonia. In 2 children the PEFR was less than normal; 1 of these had a positive family history of asthma. A further 2 children had relatives with asthma.

Ten children (63%) had recurrent symptoms but were well at the time of follow-up examination. In 2 cough was the only complaint and in 8 intermittent dyspnoea and wheezing occurred. In 4 (all wheezers) rhonchi were present and in 2 of these coarse crepitations were also heard.

The follow-up chest radiographs in 9 cases were abnormal. Patchy air-space disease was present in 2, confluent pneumonia in 3, and thickened bronchi in 4; 1 of the children with thickened bronchi also had lung overexpansion.
TABLE I. CHARACTERISTICS OF CHILDREN 5 YEARS AFTER PNEUMONIA

| No. of Symptoms | | |
|-----------------|-----------------|
| symptoms        | Symptoms        |
| Positive physical examination | 6 | 10 |
| Positive family history of asthma | 3 | 8 |
| Chest radiograph abnormal | 6 | 9 |
| PEFR reduced | 2 | 1 |
| Exercise-induced asthma | 0 | 1 |

In 8 cases there was a positive family history of asthma; 1 child had reduced PEFR. In the 8 who underwent exercise testing results were normal except in 1 whose PEFR fell slightly (by 17%).

Discussion

More than 50% of the children had had symptoms — intermittent wheezing and/or recurrent cough — during the 5-year period. While 80% of those with symptoms had a family history positive for asthma, only 1 child had a slightly abnormal fall in PEFR induced by exercise, a reliable test for the presence of asthma. Thus a previous lower respiratory tract infection should be recognized as an important cause of wheezing in this community.

Previous studies with sophisticated lung function tests identified a high incidence of obstruction of the small airways after lower respiratory tract infections. Measurements of forced expiratory volume in the 1st second and forced vital capacity by Simihäll et al. indicated restrictive lung disease in the majority of their cases at follow-up. In the present series, the small number with abnormal PEFR may reflect the relative insensitivity of the method in detecting restrictive disease or small-airway obstruction.

The high incidence (94%) of abnormal chest radiographs 5-6 years after the acute infection is most striking. Confluent pneumonia, patchy air-space disease, thickened bronchi and air trapping were carefully sought. It has been noted that these features persist years after an episode of lower respiratory tract infection in children, particularly following adenoviral pneumonia. The radiographic sign of thickened bronchi probably indicates inflammatory and fibrotic change in the larger bronchi. Longstanding pneumonic shadows are thought to represent atelectasis and bronchial crowding or interstitial healing by fibrosis. Radiographic air trapping is seen after obliterative bronchiolitis.

Chest radiographs of such children, especially if they have symptoms of coughing or wheezing, can be misinterpreted as representing acute inflammation. Antibiotics are not indicated and therapy which has been helpful is chest physiotherapy and bronchodilator administration.

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REFERENCES