NEEDLE BIOPSY OF THE PLEURA IN BANTU MINEWORKERS*

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Needle biopsy of the pleura is still an easy method of diagnosis in the presence of effusion due to tuberculosis or other conditions but, as pointed out by Dancaster,[1] the incidence of positive histological proof is extremely variable.

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In the series of cases under review, proof of aetiology of the effusion was essential, as the majority of patients fell within the provisions of the Pneumoconiosis Act, and were entitled to compensation in terms of the Act if the effusions were tuberculous. All employees underwent a radiological examination on engagement, thereafter twice

a year and again on discharge from the mines. This periodical examination has shown a mean annual incidence of pulmonary tuberculosis of 6 per 1,000.

Two hundred and seven biopsies were done on 198 patients admitted to hospital during the 6-year period ending in August 1968; in 81 patients the diagnosis of pleural effusion was made following routine X-ray of the chest of employees currently at work, and 117 had already been admitted to hospital because of symptoms referable to the respiratory tract, usually cough and pyrexia and occasionally dyspnoea or loss of weight. No patient was included if there was a history of blunt or penetrating trauma to the thorax, or evidence of congestive cardiac failure, glomerulonephritis, pulmonary infarction, rheumatoid arthritis, or tuberculosis of the thoracic spine. It was quite remarkable, as the investigation progressed, that the essential feature was an effusion only, with no clinical evidence of prior pulmonary consolidation or haemoptysis.

METHODS AND MATERIAL

Investigation of an effusion followed a standard routine, viz.: a broad-spectrum antibiotic was administered for 7 - 10 days, during which period analysis of the urine, full blood count and erythrocyte sedimentation rate, Mantoux test and direct examination of the sputum for acid-alcohol-fast bacilli were done, together with other investigations where applicable. No effusion was aspirated before the seventh day unless respiratory embarrassment was present, and all effusions where aspiration was delayed increased in size during the waiting period.

The instrument used was the Ramel pleural biopsy needle as originally described by Cope,[2] with which adequate specimens of tissue have been obtained. Instead of the original technique described, I have found it simpler to use the instrument as a curette, by turning the shaft of the needle at 45° to the plane of the chest wall after entering the pleural cavity in the normal way at a right-angle to the skin.

After obtaining the specimen the effusion was aspirated completely, followed by an X-ray examination to determine the presence of apical or parenchymal lesions. Subsequent morbidity was minimal, being a pneumothorax in 7 patients, most of which resolved without further treatment. A single patient needed a decortication of the lung because of failure to expand.

All the patients in the survey were adult Bantu males between the ages of 19 and 56 years. Most came from the area south of latitude 20° South, and a small group of 10 came from the tropical areas north of this latitude. The lowest incidence of tuberculous pleurisy, and incidentally of overt pulmonary tuberculosis as such, was found in the latter group. This was in accordance with the lower incidence of tuberculosis present in tropical recruits to the mines on initial X-ray at the Wenela Hospital in Johannesburg.

RESULTS

In 128 patients (64%) the diagnosis of tuberculosis was made after histological examination of the biopsy specimen. The true incidence of infection was probably higher, as it has been shown by Fleishman *et al.*[3] that if specimens were taken at thoracotomy only 1 cm. away from areas of obvious tubercles, the report was given as non-specific pleuritis. With this in mind an additional biopsy was done on 9 patients where the initial report reflected a non-specific pleuritis; in each case the original diagnosis was confirmed, and repeat biopsies were thereafter discontinued. It was also found that at the second attempt it was not as easy to obtain pleural tissue, especially if the lung had expanded fully, and there was little or no residual fluid.

In 52 patients (26%) the biopsy result showed a chronic non-specific pleurisy, and in 10 others (5·5%) the result was dense connective tissue. In the final group of 8 patients (4%) 1 case of a secondary carcinomatous deposit from carcinoma of the underlying lung was found; 1 case of sarcoma secondary to malignant disease of the femur; and 2 cases of amoebic disease following extension from an undiagnosed amoebic abscess of the medial lobe of the liver, both of these effusions being in the left pleural cavity.

The remainder in this group were reported as having fibrosis with dense haemosiderin deposit. All had heavily blood-stained effusions, and before aspiration were considered to be suffering from scurvy. Estimation of the plasma vitamin-C concentration showed them all to be below 0·2 mg./100 ml., and the biopsy findings were attributed to this disease. No failures in obtaining pleural tissue occurred and no specimens of histologically normal pleura were obtained.

Other investigations were not conclusive. In the histologically positive group, all had a marked predominance of lymphocytes in a stained specimen of fluid, and over four-fifths of the histologically negative group had the same feature, including the patient with carcinoma of the lung underlying the effusion. The mean total protein content of the fluid was 5·5 G/100 ml. in the positive group and 5·6 G/100 ml. in the negative group.

Full blood count was unrewarding except where secondary anaemia was present, and all patients in both groups had a raised erythrocyte sedimentation rate, but a white cell count below 10,000/cu.mm. Only 2 Mantoux-negative reactors were found, 1 being a patient diagnosed as having scurvy and the other a patient on whom 2 biopsies had proved negative. It was established that none had undergone a BCG vaccination. Inspection of the fluid with the naked eye showed that three-quarters of the positive group had a straw-coloured fluid, the balance showing the presence of blood which varied from a mere tinting to gross contamination. In the negative group the numbers with clear fluid and those with some admixture of blood were nearly equal.

During the second and third years of the investigation, in an unselected group of 60 patients, estimation of the plasma chloride and glucose with concurrent analysis of the pleural fluid chloride and glucose was done. Only minor variations between the 2 sets of values in each patient, whether histologically positive or negative, were present, so that no conclusions could be drawn. Sochocky[4] did a similar investigation and found that the pleural fluid glucose was low in the tuberculous group.

During the last 9 months of the survey the cultural test for mycobacteria was done on the fluid from an unselected group of approximately 10% of the total number. Only 2 positive cultures have been obtained, and both were in patients with a positive biopsy. No acid-alcohol-

fast bacilli have been found on direct examination of the fluid or sputa, nor in any of the biopsy specimens.

No apical or parenchymal lesions were present on X-ray at any time in any patient with a positive biopsy, although it must be acknowledged that small parenchymal lesions could easily have been masked by the presence of the residual pleural reaction following aspiration. None of the effusions reaccumulated to such degree that second aspiration was needed, and the mean time required in the positive group for the pleural reaction to disappear—except for obliteration of the costophrenic angle—was 6 weeks, the longest time being 10 weeks. Over half the group with negative biopsies showed persistent, and sometimes fairly extensive, pleural thickening to be present over the same period, and 1 patient has had unchanged X-ray appearances for over a year.

Treatment with daily streptomycin, para-aminosalicylic acid and isoniazid was given to 190 patients. No steroids were used, as it was felt that although the effusion might initially have represented an allergic response of the pleura, the disease was in fact an active and widespread tuberculosis of the pleural surfaces. Treatment was thus specific for the positive group and was regarded as a therapeutic trial for the remainder in whom no specific diagnosis was made and of whom an unknown percentage was probably suffering from tuberculosis.

Comparison of the average weight gain, settling of pyrexia and ESR, but excluding X-ray appearances, showed that both groups responded equally to treatment, and it was not possible, on the evidence already cited, to distinguish the tuberculous from the non-tuberculous when histological proof was lacking in the latter.

Follow-up of patients has been frustrated by the fact that they are part of an essentially migrant population, and the majority, on release from hospital, were repatriated and have not been seen again. Approximately 10% have elected to return to work and have been watched for periods varying from less than a year to just over 4 years, the group comprising 10 patients with a positive biopsy and 8 in whom no specific diagnosis was made.

Treatment of these 18 patients after discharge has been identical and consisted of 1 G streptomycin twice weekly and 600 mg. isoniazid daily for 6 months, followed by isoniazid alone in the same dosage for another 6 months, giving a total period under treatment of 15 months. To date no patients have shown any evidence of developing overt tuberculosis, and only 1 has been readmitted to hospital because of reaccumulation of fluid while on out-patient treatment. This occurred early in the series and by coincidence in a patient from whom 2 negative biopsies had been obtained while under investigation initially; his treatment had unknowingly been omitted for 3 weeks but was then continued for another year. Six months have now elapsed and no breakdown has taken place.

SUMMARY

Using the Ramel pleural biopsy needle, 207 biopsies were done on 198 patients, resulting in the histological diagnosis of tuberculosis in 128 (64%), chronic non-specific pleuritis in 52 others (26%), and dense collagenous tissue with no obvious aetiology in 10 patients (5·5%). Effusion due to underlying carcinoma of the lung was present in 1 patient, to infiltration of the lung secondary to sarcoma of the femur in another, to extension of amoebic disease from the liver in 2 others, and to scurvy in 4 other patients. A combination of diagnostic methods, including cytology of the fluid, estimation of fluid glucose and chloride, and cultural test, was not specific in the diagnosis of tuberculosis.

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