Mycobacterium tuberculosis: a continuing cause of sudden and unexpected death in west London

R C Chapman, S M Claydon

Abstract

Aims: To describe the pathological and background features of several cases of tuberculosis diagnosed at post mortem examinations and performed on behalf of HM Coroner over a three year period in west London.

Methods: Postmortem examinations were carried out by two pathologists working at hospital and public mortuaries in west London. Cases of tuberculosis were provisionally diagnosed on gross examination and the diagnosis confirmed on haematoxylin and eosin and Ziehl-Neelsen staining of retained tissues. The background information was obtained by scrutinising hospital records and by direct enquiry to general practitioners by coroners' officers.

Results: Thirteen cases of pulmonary tuberculosis were diagnosed during the period. No other cause of death was found. The incidence of fatal pulmonary tuberculosis was 0.28% of coroners' necropsies in the study region. Cases had been referred to the coroner because death had occurred unexpectedly, or because no recent medical attention had been sought. Most cases arose among the elderly Asian immigrant population or the homeless or the alcoholic, or both. In 10 cases the macroscopic findings strongly indicated pulmonary tuberculosis and in the other three the diagnosis was considered to be a differential diagnosis.

Conclusions: These findings have important health implications for those carrying out post mortem examinations from these groups as well as for those involved with the continuing care of immigrant or vagrant populations.

Methods

We examined the 13 cases while working at Ealing Hospital, Charing Cross Hospital, and Fulham public mortuaries between September 1987 and August 1990. The total number of coroners' necropsies in those mortuaries over that period was 4600, this being about one third of the total number of deaths in that area over that period. The geographical area covered was most of north west London and Middlesex (figure).

Routine necropsies were performed. There was a history of tuberculosis in only four cases and these lungs were placed in formalin immediately after careful evisceration. The other nine cases were eviscerated by unsuspecting mortuary technicians and the lungs were subsequently opened by pathologists, tuberculosis being diagnosed after dissection and examination of the internal macroscopic appearances of the lung tissue. In 10 cases these appearances strongly indicated active pulmonary tuberculosis and in the other three they suggested tuberculosis as a differential diagnosis. Lung sections in each case were stained with haematoxylin and eosin and Ziehl-Neelsen stains.

Results

Over three years the 13 cases gave an incidence of tuberculosis among the coroners' necropsies for the area of 0.28%. Details of the 13 cases are listed in table 1. Six were from the Indian subcontinent; six were indigenous caucasians; one was Afro-Caribbean.

Of the six Indians, all were elderly first generation immigrants living with large families. The three men had all received recent medical treatment for non-related conditions; the three women had received no medical treatment and had never visited their family doctors, who indeed had no information about them on file.

Of the six caucasians, three were semi-vagrant alcoholic men, two were elderly men living alone and known to drink and smoke heavily. The last was an elderly woman who lived a hermit-like existence. She had no known family or friends.

The black man was the only case under 50 years of age. He was schizophrenic and had lived in various hostels. His medical follow up was erratic due to frequent non-attendance at outpatient clinics.
Table 1  Social, racial and medical characteristics

<table>
<thead>
<tr>
<th>Case No</th>
<th>Age</th>
<th>Sex</th>
<th>Ethnic origin</th>
<th>Other factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>59</td>
<td>M</td>
<td>White</td>
<td>Alcoholic, hostel dweller. Known TB in past.</td>
</tr>
<tr>
<td>2</td>
<td>50</td>
<td>M</td>
<td>White</td>
<td>Alcoholic, squatter/semi-vagrant.</td>
</tr>
<tr>
<td>3</td>
<td>52</td>
<td>F</td>
<td>Indian subcontinent</td>
<td>First generation immigrant, living with large family.</td>
</tr>
<tr>
<td>4</td>
<td>76</td>
<td>F</td>
<td>White</td>
<td>Recluse, living alone.</td>
</tr>
<tr>
<td>5</td>
<td>64</td>
<td>M</td>
<td>White</td>
<td>Recluse, living alone. Died 2 days after hospital admission. Sputum positive for AAFB.Heavy drinker and smoker.</td>
</tr>
<tr>
<td>6</td>
<td>50</td>
<td>M</td>
<td>White</td>
<td>Alcoholic, vagrant, one leg amputated.</td>
</tr>
<tr>
<td>7</td>
<td>46</td>
<td>M</td>
<td>Afro-Caribbean</td>
<td>Schizophrenic. Sometime hostel dweller.</td>
</tr>
<tr>
<td>9</td>
<td>76</td>
<td>F</td>
<td>Indian subcontinent</td>
<td>First generation immigrant living with large family.</td>
</tr>
<tr>
<td>10</td>
<td>75</td>
<td>M</td>
<td>Indian subcontinent</td>
<td>First generation immigrant. Transurethral resection of prostate 1987. Tuberculous meningitis diagnosed 3 weeks previously.</td>
</tr>
<tr>
<td>12</td>
<td>84</td>
<td>F</td>
<td>Indian subcontinent</td>
<td>First generation immigrant living with large family.</td>
</tr>
<tr>
<td>13</td>
<td>60</td>
<td>M</td>
<td>White</td>
<td>Heavy smoker and drinker. Lived alone. Chronic obstructive airways disease.</td>
</tr>
</tbody>
</table>

Four of the patients died in hospital, the rest died at home, or in hostels or squats. In six cases death occurred at the end of a period of known ill health. In the remaining cases there was no history of precipitating illness. In most of these cases death seemed to have occurred within 24 hours of their last appearing well or of their condition causing concern.

The macroscopic findings are detailed in table 2.

The microscopic findings showed classic features of pulmonary tuberculosis in each of the 13 cases. Ziehl-Neelsen staining showed acid-alcohol fast bacilli in all but case 8.

Discussion

The finding of an incidence of tuberculosis of 0.28% in coroners’ post mortem examinations is similar to that of Whittington in Birmingham (1977–81), who described an incidence of 0.3%. These 13 deaths were referred to the coroner because death was sudden and unexpected. The cause was not expected to be pulmonary tuberculosis even in the recently diagnosed cases. In each case no one was aware of the severity of the underlying pathology.

Kantor et al described nosocomial transmission of tuberculosis from unsuspected disease, with nine out of 56 hospital staff (16%) developing pulmonary tuberculosis, from a patient with undetected generalised tuberculosis. Only three out of 333 (0.9%) of staff not exposed to this patient but otherwise of similar risk developed tuberculosis (p < 0.0001). Lundgren et al described the infection in three medical students and one technician after exposure to a case of pulmonary tuberculosis discovered for the first time at necropsy.

The pathological findings indicate that the fatal pathology in each case was tuberculous pneumonia. In six cases this clearly arose as a result of well documented chronic ill health, and the disease had been successfully diagnosed in four. In the remainder, however, there was no history of preceding illness because of the vagrant or hermit-like existence of the deceased. In most of these death occurred within 24 hours of their last appearing well. In three elderly Asians (cases 3, 9, and 11) with documented histories, death occurred due to sudden collapse and within 12 hours of their condition causing concern to relatives. In case 13 death occurred within hours of appearing well to a number of witnesses in the street.

Our findings highlight two groups who are particularly at risk of dying from pulmonary tuberculosis even in an environment where adequate care is available: elderly Asian immigrants and older vagrant or alcoholic men.

Preventive methods require that these groups regularly attend medical check ups but compliance is unlikely for varying reasons. This lack of compliance gives the disease opportunity to attack not only the individuals concerned but also those living with them and those in the post mortem room who attend the subsequent necropsy. It is therefore important that those caring for the groups at risk and those involved with post mortem work are aware of the possibility of active pulmonary tuberculosis in these people even though the incidence is low.

The pathological findings in the 13 cases described in this report were all typical for cases of active pulmonary tuberculosis. However, Anderson et al have shown that the accuracy of clinical diagnosis of pulmonary tuberculosis has declined over the past 50 years. Katz et al described 82 cases of active tuberculosis in inpatients only diagnosed at...
necropsy over a 21 year period (1960–1980). Seventy five per cent of these patients were over 50 years of age and many were immunosuppressed due to disease or drugs. Diagnostic measures for tuberculosis were not performed in 25% of these cases. In those investigated, smear tests were negative in 75% and the others were borderline cases in whom the diagnosis of tuberculosis could not be confirmed.

Robbins et al comment on the incidence of tuberculosis, stating that although now treatable and preventable, it is still the single most important bacterial infection worldwide. Its true incidence cannot be determined because: (1) Only a fraction of persons with M tuberculosis manifest clinical disease at any one time; (2) all infected persons remain indefinitely at risk of developing active disease; (3) case reporting is usually incomplete.

In 1974 the WHO estimated 7 million cases of active disease with great worldwide variety and stated "tuberculosis flourishes wherever there is poverty, malnourishment, and lack of adequate medical care . . . no racial or economic group has proved resistant to sustained exposure, although susceptibility clearly differs among individuals."\(^\text{17}\)

Citron described the epidemiology of tuberculosis, stating that it was on the increase in developing countries as their population had doubled in the past three decades and control measures were inadequate.\(^\text{18}\) He estimated that at least 10 million people worldwide developed tuberculosis each year and that at least 3 million died of it, mainly in developing countries. Citron's report showed that in Britain tuberculosis was now relatively rare in the young, and he identified two high risk groups: (1) elderly white men, the main source of infection in this country; (2) immigrants from Asia and other countries of high prevalence.

The Medical Research Council Tuberculosis and Chest Diseases Unit estimated the annual notification rates for London in 1983 as follows: per 100 000 population: 13·1 (16·3 in 1979) for indigenous caucasians and 204 (353 in 1979) for those from the Indian subcontinent.\(^\text{19}\)

The report found that Indians born in the United Kingdom had a much lower incidence of infection than those born abroad and that recent immigrants had the highest incidence of all. In their opinion the high tuberculous Indian:white ratio is due to overcrowding and poorer housing, and the association between high incidence and poor socioeconomic conditions is a major factor in explaining the differences in the incidence of tuberculosis (per 100 000 caucasian population) which ranged from 37·0 in Tower Hamlets to 4·1 in Bromley.

Other authors have confirmed the increased incidence of tuberculosis in alcoholicics, vagrants, hostel dwellers, and in those who are mentally ill. Capewell et al described a high prevalence of the disease in male hostel dwellers over 50 years old.\(^\text{10}\) They noted poor treatment compliance and poor attendance at follow up. Ramsden et al noted an increased incidence of tuberculosis in alcohol misusing homeless men than in non-alcohol-misusing homeless and also noticed problems of compliance with long term treatment.\(^\text{11}\) In the USA McAdam et al stated that 4·3% of hostel dwellers have active tuberculosis.\(^\text{12}\) Ohta et al provided data that the incidence of tuberculosis was significantly higher than that of the general population for both male and female schizophrenic patients.\(^\text{13}\)

Other predisposing factors include diabetes and partial gastrectomy, with Chanarin and Stephenson describing the higher incidence of tuberculosis in strict vegetarians, noting dietary deficiencies of iron and cobalamin in these individuals.\(^\text{14}\)

The incidence of tuberculosis will continue to decline but large groups of third world immigrants will present problems, especially if from areas where there is a high incidence of primary drug resistant strains.\(^\text{15}\) Capewell et al noted to elderly men also have an increased incidence. It would be premature to abandon Bacille bilié de Calmette–Guérin immunisation: "in some areas the disease has become so uncommon that the skills of prevention, diagnosis, treatment, and control may no longer be adequate . . . the fact that there is a significant continuing mortality from what should be an eminently treatable condition must create some anxiety."\(^\text{16}\)

The importance of adequate diagnosis is essential when "patients still die of tuberculosis in the era of effective anti-tuberculous therapy."\(^\text{17}\)

We thank Dr J D K Burton, HM Coroner for the western district of Greater London, for permission to use these cases. We also thank Dr P Vanetz, reader in forensic medicine and head of the department of forensic medicine and toxicology at the Charing Cross and Westminster Medical School, for his help and encouragement.