Further reading

Two useful books can all be obtained from Age Concern England, Astral House, 1268 London Road, London SW16 4ER:

Bookbinder D. *Housing options for older people*. (1991.)

A buyer's guide to sheltered housing. (1995.)

Age Concern also produces a series of numbered factsheets, of which the following relate to housing:

- (1) Help with heating
- (2) Sheltered housing for sale
- (8) Rented accommodation for older people
- (10) Local authority charging procedures for residential and nursing home care
- (11) Preserved rights to income support for residential homes and nursing homes
- (13) Older home owners—financial help with repairs
- (29) Finding residential and nursing home accommodation

Useful addresses

Care and Repair Ltd, Castle House, Kirtley Drive, Nottingham NG7 1LD (tel 0115 979 9091) Royal Association for Disability and Rehabilitation (RADAR), Unit 12, City Forum, 250 City Road, London EC1V 8AF (tel 0171 250 3222)

Abbeyfield Society, 186-92 Darkes Lane, Potters Bar, Hertfordshire EN6 1AB (tel 01707 651774)

Almshouse Association, Billingbear Lodge, Wokingham, Berkshire RG11 5RU (tel 01344 52922)

RNIB Housing Service, Garrow House, 190 Kensal Road, London W10 5BT (tel 0181 969 2380)

Housing Corporation, Head Office, 149 Tottenham Court Road, London W1P 0BN (tel 0171 387 9466)

1 *Care of elderly people, market survey 1992/3*. London: Laing and Buisson, 1993.

2 Department of the Environment. *English house condition survey 1991*. London: HMSO, 1993.

3 British Geriatrics Society. *Policy statement no 4: private and voluntary homes*. London: British Geriatric Society, 1990.

4 Davies K. Emergency alarms. In: Mulley G, ed. *More everyday aids and appliances*. London: BMJ Publications, 1991:39-45.

Lesson of the Week

Pitfalls in contact tracing and early diagnosis of childhood tuberculosis

Julia E Clark, Andrew J Cant

Tuberculosis is easily missed in children; a combination of contact history, tuberculin testing, and radiology aid diagnosis

The incidence of tuberculosis in Western countries has steadily declined, but this trend is reversing.¹ Effective contact tracing and screening remain essential to prevent secondary cases and are especially important for child contacts, given their greater susceptibility to disseminated disease and the difficulty in diagnosis in this age group.

We describe three cases of serious tuberculous disease in children that illustrate their vulnerability to this infection and the problems that can be encountered with apparently straightforward contact tracing procedures.

Case 1

A 5 month old Asian girl who had not been vaccinated for tuberculosis was seen as a contact of her grandmother, who had fully sensitive pulmonary tuberculosis. She was well at this time and after one negative result on Heaf testing (grade 0) was given a BCG vaccination and discharged.

Six weeks later she presented to her general practitioner with fever, poor feeding, and vomiting. She was referred to hospital. On examination she was pale and unwell and tachypnoeic, with widespread crepitations on auscultation, but no hepatosplenomegaly. A chest x ray film showed extensive miliary shadowing, with a small opacity in the right mid zone. Miliary tuberculosis was diagnosed. A nine month course of triple antituberculous chemotherapy produced a full recovery.

Case 2

A 6 year old white girl was screened as a contact of an aunt who had fully sensitive smear positive pulmonary tuberculosis. Two Heaf tests six weeks apart gave negative results, and she was given a BCG vaccination. Two weeks later she presented at her local hospital with a history of cough, headaches, weight loss, and fever. A chest x ray film showed right middle lobe consolidation.

The family history of tuberculosis was not volunteered or asked for; an initial diagnosis of bacterial pneumonia was made, and antibiotics were started. She was no better when reviewed at two weeks; a further chest x ray picture showed right hilar lymphadenopathy, with right middle and lower lobe consolidation. The family history was then ascertained; rifampicin and isoniazid, 10 mg/kg of each daily, were prescribed by her local hospital. She relapsed after one month of treatment, with complete right middle and lower lobe collapse on chest x ray film, and was referred to this centre for further investigation and management. A Mantoux test (10 U) was positive at 10 × 25 mm induration, and broncho-alveolar lavage fluid showed plentiful acid fast bacilli. Pyrazinamide 25 mg/kg and prednisolone 2 mg/kg were added and intensive physiotherapy started. There was re-expansion of both affected lobes, although clinical and radiological evidence of bronchiectasis remained two years later, at the time of writing.

Case 3

Both an uncle and a grandmother of this 10 month old white boy had fully sensitive smear positive pulmonary tuberculosis, and all were living in the same house. On screening, the child's Heaf test and chest x ray picture were negative. Two further Heaf tests—one after eight weeks, followed by a BCG vaccination, the second another eight weeks after this—also had negative results. Prophylactic isoniazid (10 mg/kg) was taken for 4.5 months.

The child remained well until 13 months later, when he developed a painless limp. Hip radiographs showed a lytic lesion in the neck of the right femur from which sterile pus was drained. Culture for mycobacteria was not requested and the family history of tuberculosis not ascertained. He remained in a hip spiker and receiving flucloxacillin for three months, but an x ray film showed that the lesion had worsened. At this time a Mantoux test (10 U) produced a positive result of 17 × 17 mm induration and he was referred to this centre. Chest

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BMJ 1996;313:221-2

radiography and a renal ultrasound scan showed no abnormalities; a bone scan showed no other lesions.

Tuberculosis was diagnosed from the contact history, the clinical findings, and the positive tuberculin test. He was given triple treatment and, despite initial concerns about compliance, had completed one year of effective treatment with excellent results at the time of writing. He is now fully active with no limp and normal limb growth. Radiological evidence shows resolution of the lytic lesion, and he remains under orthopaedic review.

Discussion

Serious, damaging tuberculosis developed in all three children despite screening. This reflects the extreme vulnerability of the young child, the great difficulty frequently encountered in diagnosing tuberculosis in children, and the problems which may be encountered when following contact tracing guidelines.

In contrast to adults, tuberculosis is usually a primary disease in children, and dissemination of the infection with its attendant increased risk of mortality can be rapid.² Early diagnosis is therefore very important, but unfortunately difficult, and, at best, only 30-50% of cases of tuberculosis in children are confirmed by culture.² Conventionally, two of the following five criteria are required to make a diagnosis: a positive tuberculin test; positive radiology; a history of contact with tuberculosis; compatible clinical symptoms; positive histology or culture.³ The tuberculin test and contact history therefore have a more fundamental role in the diagnosis of tuberculosis in children than in adults. Contact tracing identifies individuals infected from index cases, and the guidelines issued by the British Thoracic Society for screening contacts of tuberculosis are widely used.⁴ These recommend one Heaf test only—unless the person has not received a BCG vaccination and is a contact of a smear positive index case, when a second Heaf test is advised. Chest radiography is suggested only for those with a positive Heaf test (grades III-IV with previous BCG, grades II-IV without); and although radiography is not done in those with negative Heaf test results, they may be followed up. Close contacts of smear positive cases, aged under 2 (previously 5) years old, receive prophylaxis with isoniazid for six months irrespective of the Heaf test result. Shorter courses of monotherapy seem to be less effective.⁵

In case 1 the guidelines were not followed; this baby did not receive a second Heaf test, nor isoniazid prophylaxis, despite clear indications for both. The single, negative, Heaf test result was falsely reassuring and so delayed the diagnosis. In case 2 active tuberculosis was not identified despite having followed the guidelines. Given the extent of disease when the patient was first seen two weeks after screening, it is highly likely that x ray changes would have been present when her contacts were traced and she was given a tuberculin test. If a chest radiograph had been taken at that time the diagnosis could have been made much sooner, perhaps then avoiding the permanent lung damage she sustained. Both cases 1 and 2 are a reminder that a negative tuberculin test is not uncommon in childhood tuberculosis and can be falsely reassuring.

In case 2 the diagnosis was further delayed because a contact history of tuberculosis was not volunteered or asked about directly, nor was it considered when there was suggestive radiological evidence. Finally, initial

treatment by the referring hospital comprised only rifampicin and isoniazid; her deterioration when taking these drugs illustrates the problem of enlarging hilar lymphadenopathy after starting treatment and the importance of pyrazinamide in mycobacterial killing when there is extensive disease. Contact tracing guidelines were also followed in case 3, but suboptimal chemoprophylaxis of less than six months' duration may have contributed to the later onset of bony tuberculosis. Again diagnosis was delayed by failure to consider or ask about a family history of tuberculosis.

All the cases highlight the difficulties in diagnosing tuberculosis in children, in whom symptoms are often non-specific, especially in the very young; and they show that minor deviations from well established contact tracing guidelines can have far reaching consequences. No guidelines are infallible, but we feel that the present guidelines place too great a reliance on the tuberculin test, which must be positive before a chest radiography is requested. Young children may not give a tuberculin response at all, or take longer than expected to do so, as seen in cases 1 and 2, where the tuberculin tests were negative initially.^{2,6}

Recommendations from North America are that every child in sufficient contact with suspected pulmonary tuberculosis should be examined and have a Mantoux test and chest radiography.² Because children with active disease may be tuberculin negative, our practice is to take at least one chest x ray picture when screening all child contacts.

The incidence of tuberculosis is rising and continued vigilance is essential. As childhood disease presents differently from that in adults, to avoid the problems we have described children should be treated by doctors with experience of childhood tuberculosis, who are aware of these differences and of the diagnostic criteria for this age group. We support screening as recommended by the British Thoracic Society guidelines, but suggest that in addition *all* children in contact with tuberculosis should have chest radiography, regardless of the result of the first tuberculin test.

- 1 Hayward AC, Watson JM. Tuberculosis in England and Wales 1982-1993: notifications exceeded predictions. *CDR Review* 1995;5:R29-32.
- 2 Starke JR, Correa AG. Management of mycobacterial infection and disease in children. *Pediatr Infect Dis J* 1995;14:455-70.
- 3 Smith MHD, Starke JR, Marquis JR. Tuberculosis and opportunistic mycobacterial infections. In: Feigin RD, Cherry JD, eds. *Textbook of pediatric infectious diseases*. Philadelphia: Saunders, 1990:1344.
- 4 Joint Tuberculosis Committee of the British Thoracic Society. Control and prevention of tuberculosis in the UK: code of practice 1994. *Thorax* 1994;49:1193-200.
- 5 Snider DE Jr, Caras KJ, Kaplan JP. Preventive therapy with isoniazid: cost effectiveness of different durations of therapy. *JAMA* 1986;255:1579-83.
- 6 Steiner P, Rao M, Victoria MS, Jabber H, Steiner M. Persistently negative tuberculin reactions; their presence among children culture positive for *Mycobacterium tuberculosis*. *Am J Dis Child* 1980;134:747-50.

(Accepted 6 February 1996)

Correction

Strength and importance of the relation of dietary salt to blood pressure

An authors' error occurred in this commentary by Dyer *et al* (29 June pp 1661-4). Point (7) of the box should read "Prospective data on the long term influences of salt on blood pressure are lacking as Intersalt is a cross sectional study" [the word "prospective" was omitted].