Tuberculosis in Children*

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A review of 234 cases admitted to the Dunham Hospital between the years 1942-1947 inclusive.

There has been growing controversy in recent years as to the proper care of the child with a primary tuberculous infection. Some observers (Wallgren¹ and Pottenger²), feel that rest in bed is the indicated treatment during the active stage of the disease; whereas others (Myers³ and Levine⁴), state that prolonged bed rest and hospitalization have no effect on the eventual outcome of a primary infection.

Because of the diverse opinions which still exist regarding the proper management of this disease, it was felt that a review of the cases admitted to this hospital might be of some value in attempting to decide this point.

There were 234 cases admitted to the Children's Ward between January 1, 1942 and December 31, 1947. The ages ranged from five months to thirteen years. The criteria for admission to the hospital were: (1) a positive reaction to the tuberculin test, and (2) x-ray evidence of an active pulmonary or tracheo-bronchial lymph node lesion. A definite history of contact was obtained in the majority of the patients admitted, but this was not considered an absolute criteria for admission. There were 118 white children, and 116 negroes, of which 122 were females, and 112 were males. The age incidence can be seen in table 1.

Of the 234 cases admitted in this six year period, 186 (79.5 per cent), were diagnosed on admission as having primary tuberculosis. The admission diagnoses of the remaining forty-eight cases (20.5 per cent) can be seen in table 2. Five children (2.0 per cent) were diagnosed as non-tuberculous after admission to the hospital.

There were twelve deaths (5.1 per cent) in this six year period. Nine of these deaths were ascribed to miliary tuberculosis with or without meningitis. Eight of these patients had miliary tuberculosis at the time of admission, while one patient was admitted with a diagnosis of an active primary infection, and two weeks after admission to the hospital, he became acutely ill and died on the sixty-ninth hospital day of miliary tuberculosis with meningitis. One seven month old white male died of far advanced pulmonary

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tuberculosis with cavitation. One death was attributed to sickle-cell anemia, and one patient died of transverse myelitis of undetermined etiology.

All of the patients admitted were evaluated on the basis of the following criteria:

1) History of contact.
2) Reaction to the tuberculin test (intra-dermal).
3) Clinical symptoms on admission (asymptomatic, chronically ill, or acutely ill).
4) Temperature on admission.
5) Examination of the gastric washings for the presence of acid-fast bacilli. (This includes smear, culture, and guinea pig inoculation).
6) The development of tuberculous complications after admission to the hospital.
7) Re-admissions to the hospital with tuberculous complications.

The results of this study are given in table 3.

As demonstrated in table 3, out of the 186 children admitted with a diagnosis of a primary infection, 167 (89.8 per cent) were asymptomatic, and 166 (89.3 per cent) were afebrile on admission to the hospital. Seventeen children (9.1 per cent) were considered chronically ill on admission. Eight of the chronically ill patients had a serious nontuberculous complication at the time of admission which was contributing to their illnesses. Two patients (1.1 per cent) were admitted acutely ill; one had acute tonsillitis which

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<thead>
<tr>
<th>TABLE I</th>
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<tbody>
<tr>
<td>Age in Years</td>
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<td>No. of Cases</td>
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<td>Age in Years</td>
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<td>No. of Cases</td>
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<table>
<thead>
<tr>
<th>TABLE 2</th>
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<tbody>
<tr>
<td>No. of Cases</td>
</tr>
<tr>
<td>Primary tuberculosis</td>
</tr>
<tr>
<td>Pleurisy with effusion</td>
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<tr>
<td>Miliary tuberculosis</td>
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<tr>
<td>Re-infection tuberculosis (Adult Type)</td>
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<tr>
<td>Nontuberculous</td>
</tr>
<tr>
<td>Tuberculous meningitis (with no demonstrable pulmonary lesion)</td>
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<td>TOTAL</td>
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responded promptly to sulfadiazine therapy, the other had sickle-cell anemia in a hemolytic crisis. Twenty patients (10.7 per cent) were febrile on admission, five of whom presented no other signs or symptoms of illness other than temperature elevation.

Acid-fast bacilli were demonstrated in thirty-eight patients (20.4 per cent) of the group admitted with primary tuberculosis. Thirty-four of these were positive on guinea pig inoculation only and four were positive on culture as well as guinea pig inoculation. Prior to January 1, 1946, each guinea pig was inoculated with one gastric washing. Twelve of the thirty-eight positive results were obtained prior to 1946. However, starting in January 1946, each guinea pig was inoculated with three gastric washings and twenty-six positives were reported in two years as compared with twelve positives in four years prior to January 1946.

Six patients (3.3 per cent) developed tuberculous complications after admission to the hospital, out of the group admitted with a primary infection. Of these, three patients developed pleurisy with effusion, and there was one case each of miliary tuberculosis, tuberculosis of the spine, and a post-primary spread of the infection. Abstracts of these cases are presented below.

Case 1: A five year old colored male was admitted to the hospital in March 1942. He had a definite history of contact and a positive reaction to the tuberculin test. He was afebrile and asymptomatic on admission. Physical examination revealed no abnormal findings and chest x-ray film showed a primary infection. Gastric washings were negative for acid-fast bacilli. The patient developed acute tonsillitis after four weeks in the hospital, and this was followed by pleurisy with effusion on the left. The patient recovered with no further complications, and was discharged after 620 days in the hospital.

Case 2: A nine year old colored female was admitted in June 1942. There was a definite history of contact, and the tuberculin test was positive. The patient was chronically ill, and ran a persistent low grade fever. Physical examination was non-contributory except for moderate malnutrition. Chest x-ray film on admission was interpreted as a retrogressive primary infection. The patient, however, did not respond well to routine care, and developed pleurisy with effusion after several months of hospitalization. This ultimately cleared, and she was discharged after 747 days in the hospital.

She was not seen again until June 1945, when at the age of twelve years she was admitted with a diagnosis of moderately advanced pulmonary tuberculosis. The patient again was chronically ill, and ran persistent low grade fever. Gastric washings were positive for acid-fast bacilli on guinea pig inoculation. The lesion responded well to bed rest, and the patient was discharged on the 235th hospital day.

Her final admission was in August 1946. At this time the patient was acutely and seriously ill, with a spiking fever to 106 degrees F. Admission chest x-ray film revealed hematogenous dissemination of the disease, and the patient died on the forty-seventh hospital day of tuberculous meningitis.
TABLE 3

<table>
<thead>
<tr>
<th>Admission Diagnosis</th>
<th>Primary Tuberculous Infection</th>
<th>Plural with Effusion</th>
<th>Military Tuberculosis</th>
<th>Re-Infection Tuberculosis</th>
<th>Non-tuberculous</th>
<th>Tuberculous Meningitis</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>History of Contact</td>
<td>186</td>
<td>128</td>
<td>167</td>
<td>17</td>
<td>21</td>
<td>15</td>
<td>23</td>
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<td>Asymptomatic</td>
<td>21</td>
<td>11</td>
<td>15</td>
<td>5</td>
<td>1</td>
<td>18</td>
<td>20</td>
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<td>7</td>
<td>6</td>
<td>6</td>
<td>8</td>
<td>9</td>
<td>32</td>
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<tr>
<td>Non-infectious</td>
<td>7</td>
<td>6</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>10</td>
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<tr>
<td>Re-infection</td>
<td>7</td>
<td>6</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
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<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Tuberculosis Meningitis</td>
<td>154</td>
<td>104</td>
<td>130</td>
<td>13</td>
<td>13</td>
<td>13</td>
<td>127</td>
</tr>
<tr>
<td>TOTAL</td>
<td>234</td>
<td>165</td>
<td>194</td>
<td>195</td>
<td>39</td>
<td>201</td>
<td>57</td>
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</table>
Case 3: A six year old colored girl was admitted in May 1942. The tuberculin test was positive and a definite history of contact was obtained. The patient was afebrile and symptom free on admission, and physical examination revealed no abnormal findings. Chest x-ray film revealed an active primary infection. Tubercle bacilli were demonstrated on guinea pig inoculation. Shortly after admission the patient became acutely ill, and a repeat chest x-ray examination showed a miliary dissemination of the disease and the patient developed signs and symptoms of meningitis. The patient died on the sixty-ninth hospital day of tuberculous meningitis.

Case 4: A seven year old colored male was admitted in July 1943 with a history of contact. The tuberculin test was positive. The patient ran a persistent low grade fever, but otherwise did not appear ill. Admission chest x-ray film revealed an active primary infection. Physical examination revealed no abnormal findings. Gastric washings were positive for acid-fast bacilli on guinea pig inoculation. The patient developed right pleurisy with effusion four weeks after admission. This gradually cleared without further complications and the patient was discharged after 338 days in the hospital.

Case 5: A five year old colored boy was admitted in April 1943 with sickle-cell anemia and primary tuberculosis. He had a definite history of contact, and the tuberculin test was positive. The patient was acutely ill on admission and ran a persistent spiking fever. He required frequent blood transfusions for his severe anemia. The patient ultimately developed tuberculosis of the spine. Gastric washings were negative for acid-fast bacilli. The patient died of sickle-cell anemia after 1,416 days in the hospital.

Case 6: An eighteen month old white male was admitted in August 1947. No history of contact was obtained, but the tuberculin test was positive. The patient was chronically ill, listless and ran a persistent fever as high as 102 degrees F. Admission chest x-ray film revealed an active primary infection, with a large patch of parenchymal infiltrate on the right. Although all signs and symptoms abated and the temperature returned to normal, a repeat chest x-ray examination showed a definite spread of the initial pulmonary lesion. Gastric washings were positive for acid-fast bacilli on guinea pig inoculation. Serial x-ray examinations showed gradual clearing of the pulmonary lesion without further complications.

Three patients (1.1 per cent) were re-admitted to the hospital for tuberculous complications which developed after discharge. One was the nine year old colored girl who ultimately died of tuberculous meningitis. The other two were children who were discharged with a diagnosis of a retrogressive primary infection, both of whom were re-admitted within thirty days after discharge with pleurisy and effusion. Both patients recovered without further complications.

To summarize then, there were nine children (4.4 per cent) who developed tuberculous complications out of the group of 186 patients originally admitted with a diagnosis of primary tuber-
culosis. Six of these complications developed while the patients were still in the hospital, and three patients developed complications after medical discharge from the hospital which were severe enough to require re-admission. There was a definite history of contact in eight of the nine patients, and acid-fast bacilli were demonstrated in six out of the nine cases. The tuberculin test was positive in all nine patients. Six of the children were febrile or presented symptoms of illness on admission to the hospital, while three were entirely afebrile and symptom-free on admission.

There were twenty-eight children (11.9 per cent) who developed non-tuberculous complications after admission to the hospital. Twenty-six of these were acute contagious diseases, there was one patient who developed a non-specific corneal ulcer, and one patient fractured his arm falling out of bed.

The hospital stay in days for children with a primary infection ranged from a minimum of twelve days to a maximum of 1,416 days, with an average of 250 days per patient. Treatment on the children's ward consists of general supportive care. The children are kept in bed at all times. When they become too active in the judgment of the nurses on the floor, restraining jackets are used. Those children who are of school age go to and from the classroom on the ward in a wheel-chair, and attend classes for one hour daily. All of the children take a two and a half hour nap daily. They receive a 2000-2200 calorie diet and are given cod-liver oil and Feosol daily. None of the patients with a primary infection have received specific therapy in any form. Streptomycin has not been used at this hospital for the treatment of primary tuberculosis. Serial chest x-rays are taken every two months routinely. Children are usually not considered ready for discharge until there has taken place complete absorption of the parenchymal lesion, and contraction or calcification in the regional lymph nodes. All cases for discharge are presented before the entire hospital staff in a manner similar to the routine with adult patients.

Comment

From this study, it is evident that the overwhelming majority of children with a primary infection do well with no specific therapy. The trend in recent years has definitely been away from the special care which these patients formerly received. In the final analysis, hospitalization of these patients offers just one advantage, and that is the opportunity to diagnose a tuberculous complication in its early stages. With the clinic care which is now available, this responsibility could be taken over by the clinics. Then too, the emotional stress which is placed both upon the
parents and the child by long term hospitalization is sufficient in itself to contra-indicate this type of care unless absolutely necessary.

A more critical evaluation of patients with a primary infection seems indicated with respect to long term hospitalization. Assuming that only those children with a positive tuberculin test and chest x-ray evidence of an active primary infection would be candidates for hospitalization, admissions should be limited to those patients who satisfy the following criteria.

1) A definite history of contact, preferably in the immediate family group, where the exposure is intimate.
2) The presence of acid-fast bacilli in the gastric washings on repeated examinations at monthly intervals.
3) Clinical symptoms of illness and fever.
4) Definite progression of the pulmonary lesion on chest x-ray examination.
5) The development of tuberculous complications, either pulmonary or extrapulmonary.

SUMMARY

1) There were 234 patients admitted to the hospital between January 1, 1942, and December 31, 1947. There was no significant variation in the age, race, or sex of the patients admitted.

2) One hundred and eighty-six (79.5 per cent) of the patients were diagnosed on admission as having primary tuberculosis. Of this group, 167 (89.8 per cent) were asymptomatic, and 166 (89.3 per cent) were afebrile on admission. Acid-fast bacilli were demonstrated in 38 patients (20.4 per cent).

3) Six children (3.3 per cent) admitted with a primary infection developed tuberculous complications after admission to the hospital. Three children (1.1 per cent) required readmission to the hospital, after medical discharge for tuberculous complications. Eight of these patients had a definite history of contact, and tubercle bacilli were demonstrated in six of these patients. Six children had clinical symptoms of illness or fever, while three were afebrile and asymptomatic, prior to the development of their tuberculous complications.

4) Treatment consisted of bed rest and an adequate diet. No specific therapy was instituted in any case with a primary infection. The average hospital stay for patients with a primary infection was 250 days.

RESUMEN

1) Se admitieron a 234 pacientes al hospital desde el 1o. de enero de 1942 al 31 de diciembre de 1947. No hubo variación significativa en la edad, raza o sexo de los pacientes admitidos.
2) Se hizo el diagnóstico de tuberculosis primaria en 186 (79.5 por ciento) de los pacientes admitidos. De este grupo, 167 (89.8 por ciento) eran asintomáticos y 166 (89.3 por ciento) no tenían fiebre cuando fueron admitidos. Se demostraron bacilos ácido-rresistentes en 38 pacientes (20.4 por ciento).

3) Seis niños (3.3 por ciento) admitidos con una infección primaria desarrollaron complicaciones tuberculosas después de haber sido admitidos al hospital. Tres niños (1.1 por ciento) necesitaron readmisión al hospital debido a complicaciones tuberculosas después de haber sido dados de alta. Ocho de esos pacientes presentaron una historia de contacto bien definido y se demostraron bacilos tuberculosos en seis de ellos. Seis niños tenían signos clínicos de enfermedad o fiebre, mientras que tres no tenían fiebre u otro síntoma, con anterioridad al desarrollo de las complicaciones tuberculosas.

4) El tratamiento consistió de reposo en cama y dieta adecuada. No se empleó terapia específica en ningún caso de infección primaria. El promedio de la estadía en el hospital de los pacientes con la infección primaria fue 250 días.

REFERENCES