

Diagnosis and Treatment of Connatal Tuberculosis

A Review of Healed Cases

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Connatal (congenital) tuberculosis was of primarily anatomical interest until the discovery of streptomycin. Therapeutic success depended on (i) the age of the infected foetus, (ii) the gravity of the infection, (iii) its duration before the institution of treatment, (iv) the therapeutical method, (v) the resistance of the organism.

The term "congenital" [12] and "connatal" [4] are used alternately; the term "aspiratory type" is employed by many authors in connexion with infections contracted during delivery, although tuberculosis may be acquired by intrauterine aspiration as well. Connatal tuberculosis is here understood to mean tuberculous infection contracted before and during birth. Only 15 healed cases of the condition have been reported until this year. These will be reviewed and commented upon in the present paper, with the exception of the cases reported by KÖTTER [8] and RIORDAN [14] whose studies have not been available.

I. LESNÉ et al. [11] were the first to describe a case of successful treatment. Tuberculous meningitis was diagnosed in a pregnant woman 38 days before delivery, but treatment with streptomycin

was started 8 days later only. The idea of a connexion between premature delivery and a possible tuberculous infection did not arise. Treatment of the mother was continued after delivery. The baby's infection had become evident only on the 30th day of life, when fever, emesis and a positive intradermal test was observed. In spite of the test's positivity, streptomycin treatment was started on the 35th day only, and was continued for 9 months. The CSF contained tubercle bacilli after a treatment of 3 months; tuberculous meningitis did not develop.

Comment. According to present knowledge, it was a mistake not to treat the newborn at once, in spite of the lack of symptoms of infection. It is highly probable that the foetus of a mother suffering from tuberculous meningitis and miliary tuberculosis becomes infected through the blood paths or by the aspiration of infected amniotic fluid. Such infants may remain free from symptoms for some time and their body weight may even increase. The symptoms of the disease will, however, appear after a few days or weeks and may lead to an early fatal end.

Conclusions. Not only the mother who is suffering from tuberculous meningitis but also her baby has to

be treated adequately. Its separation from the mother is an elementary precaution. Prognosis in the given case was improved by the intrauterine streptomycin treatment.

II. AMICK et al. [1] reported on the case of a 17-year old coloured girl in whom pulmonary tuberculosis had been found before delivery. After delivery this turned into a miliary process and was immediately treated with streptomycin. The baby weighed 1284 g at birth, and the intradermal test became positive on the 21st day already. Miliary tuberculosis was diagnosed, and on the 72nd day the gastric juice contained tuberculosis bacilli. It was then that streptomycin treatment of the baby was instituted with 240 mg daily for 4 months, when X-rays showed complete healing. However, temperatures, ear infection, hepatosplenomegaly persisted for long and at the age of 2 years the child was mentally retarded.

Comment. Despite the mother's miliary tuberculosis and the early positivity of the intradermal test, the infant's treatment was delayed until a doubtless diagnosis had been established. The premature baby survived in spite of its low birth weight and the short therapy. Mental retardation is frequent in such cases; its mechanism is not clear.

III. In the second case of AMICK et al. [1], tuberculous tracheobronchitis was diagnosed in a woman just before delivery. After delivery she was treated with streptomycin and, on account of abdominal complaints, operated upon on the 28th day. At operation, genital tuberculosis was discovered. The baby was prematurely born with a body weight of 1770 g; it had fever, otitis, swollen cervical lymph nodes and then developed facial paresis on the 56th day. All these symptoms were

regarded as insufficient for the institution of specific therapy; treatment with streptomycin, 1 g daily, was started only on the 71st day when antrotoomy revealed a caseous substance containing tuberculosis bacilli. At the age of 18 months the child weighed 10.2 kg.

Comment. The diagnostic and therapeutic mistakes committed in this case need not be pointed out. It is emphasized by the authors themselves that they postponed treatment because they hesitated to set up a definitive diagnosis without satisfying the criteria established by BEITZKE [2], and admit that it would have been better to begin treatment earlier.

IV. STEINER's [18] case has raised a number of diagnostic and therapeutical problems and throws a light on the shortcomings of antenatal paediatrics. A female university student 25 years of age had had repeated episodes of pleurisy and pneumonia. The possibility of their tuberculous origin was not considered, although the failure of penicillin therapy and the success of treating the "pneumonia" with streptomycin might have raised the suspicion of such a possibility. The baby was born before term, with a weight of 1250 g, and soon developed extensively swollen subauricular and retroauricular lymph nodes. The aetiology of this was first obscure; the preauricular gland was not enlarged, although this is a characteristic symptom of connatal otogenic tuberculosis. Correct diagnosis was delayed by the fact that the paediatric department was not notified of the mother's tuberculous endometritis discovered 6 weeks after delivery. It was in the 4th month only that mastoidectomy revealed the presence of tuberculosis in the infant, who then was treated with streptomycin for 12 months.

Author	Mother		I n f a n t										Notes		
	Before delivery	After delivery	Premature =+weight/g	First symptom	Weight	Fever	Lungs	Liver	Spleen	Cerebral symptoms	Special tests	X-rays		Treatment	
1. LESNÉ et al. 1950.	21 years of age; tuberculous meningitis 38 days before delivery. Treatment, with streptomycin, total dose, 60 g in 30 days.	Streptomycin; total dose, 60 g in 7 months. Died.	+ 2.360	Fever on 30th day; repeated vomiting.	Increase for 30 days.	On 30th day.					7th week: slight tension of fontanel, CSF cell count 17.5, protein 48 mg per 100 ml, lymphocytes 98%, bacteriology negative. In 4th month, CSF culture negative, 10th month: CSF culture negative.	30th day intradermal test positive. 4th month: gastric contents positive.	On 38th day positive.	Streptomycin, 0.2—0.3 g daily started on 35th day. Total dose in 9 months, 35 g.	ESR 54 mm at 1 month, increased at 7 months WBC 15800, RBC 2870000
2. AMICK et al. 1950.	17 years old. Vaginal haemorrhage in 7th month of pregnancy. X-rays positive.	Miliary tuberculosis on 21st day. Treatment: Streptomycin 3 g daily dose for 47 days. Tuberculous salpingitis in 5th month.	+ 1.284	Intradermal test positive on 21st day.	Increase.	On 72nd day.	Respiratory infection on 72nd day.	Enlargement from 56th day to 5th month.	Enlargement from 56th day to 5th month.	Mentally retarded at the age of 2 years.	Intradermal test positive on 21st, gastric contents on 72nd day.	Miliary tuberculosis from 72nd day. Pulmonary X-rays negative after 4 months.	Streptomycin 240 mg daily, from 72nd day for 4 months.	Otitis from 72nd day. Weight at 2 years: 11.1 kg.	
3. AMICK et al. 1950.	22 years. 8th month of pregnancy diarrhoea, fever, tuberculous tracheobronchitis.	Placenta negative. Fever. Genital tuberculosis. Streptomycin 2 g daily dose, 6 weeks. Pulmonary tuberculosis in 18th month.	+ 1.770	Swelling of cervical lymph node from 23rd day.	Increase from 23rd day.	From 23rd day.		Norm.	Norm.	Mentally retarded.	Intradermal test negative on and after 23rd day. Cervical lymph node, ear discharge, bone marrow, positive on 56th day.		Streptomycin 1 g daily from 71st day, for 124 days. Pulmonary X-rays negative at age of 18 months.	Otitis from 24th day. Facial paresis from 56th day. Weight at 18 months, 10.2 kg.	
4. STEINER 1953.	25 years. 5th month of pregnancy pleurisy. Pleuropneumonia in 7th month. Penicillin ineffective. Streptomycin during 10 days. Discharged as cured.	Tuberculous endometritis in 6th week.	+ 1.250	Otitis, lymphadenitis in 2nd month, mastoiditis in 3rd month, lymphadenitis coli.	Unsatisfactory growth.		Negative.			None.	Intradermal test 1:100 negative until 4th month, 1:100 positive in 7th month. 9 years later, 1:100,000 hyperergic.	Negative during 4 months. Wide hilar shadow, glands with indistinct borders in 7th month. 9 years later, nut sized shadow in left upper lung field.	Antrotomy, pus Koch positive biopsy of cervical lymph node Koch positive, shows tubercle. Streptomycin from age of 4 months.	Present age, 13 years.	
5. SCHMIDT ROHR 1953.	Age unknown. 8th month of pregnancy. Miliary tuberculosis, tuberculous meningitis.		+ 2.400	Hilar enlargement on 32nd day.	Increase.			Enlargement on 39th day.	Enlargement on 39th day.		Intradermal test positive in 6th month. Animal inoculation positive in 15th week.	Hilar enlargement on 32nd day. Shadow in left lower lobe on 42nd day. Tumour-like hilar shadow in 19th week.	From 56th day streptomycin 0.6 g twice weekly for 11 weeks, followed by PAS, 0.8 to 1.6 g daily.		
6. ROSSIER 1953.	21 years. Repeated shaking chills before delivery.	Miliary tuberculosis, tuberculous meningitis on 34th day. Healed.	+ 1.400	Subcostal retraction, periodic respiration on 8th day.	Fall during 8 days followed by rise.		Respiratory rate 100, permanent crepitation on 22nd day.	Enlargement on 34th day.	Enlargement on 34th day.	CSF: protein 1.2 g per 100 ml, cell count 7—8, no bacilli.	Gastric contents positive on 37th day. Intradermal test negative in 4th, positive in 5th month.	Positive on 34th day. No change at 9 months.	Penicillin + streptomycin from 22nd day on, INH + streptomycin from 35th day on. Streptomycin was given for 4 1/2, INH for 6 months.		
7. WEINGARTEN 1953.	20 years. X-rays negative in 4th and 5th months. Pleurisy, then miliary tuberculosis in 6th month.	Died.	+ 1.640	Aspiration, tachypnoea (80), periodic respiration, intercostal and epigastric retraction on first day.	Increase.		Bilateral crepitation on first day.				Intradermal test 1:100, weakly positive on 31st day. Gastric contents negative.	Slight bilateral shadow in upper lobes. Infiltration on 63rd day. Deterioration of X-ray signs; atelectasis in 5th month.	Streptomycin 0.25 g/kg daily for 8 weeks from 5th month on.	Complete recovery despite delayed and short treatment.	
8. HUDSON 1956.	Fifth month of pregnancy pleurisy. X-rays, basal thickening of pleura. Age unknown.	Fever after one week, miliary tuberculosis after 3 weeks.	+ 2.632	Bronchopneumonia on 18th day (X-ray)	Increase during 18 days, then decrease.	Slight.	Bronchitis on 18th day, bronchopneumonia on 21st day. Severely ill during 3—4 weeks, with dyspnoea and intercostal retraction.		Considerably enlarged on 30th day.	Lethargy on 18th day.	Gastric contents positive from 19th day until 5th month. Intradermal test negative in 7th month.	Bronchopneumonia on 18th day.	Chloramphenicol from 21st day. Streptomycin and INH from 22nd day for 3 months, then 2 months' interval followed by streptomycin and INH for 3 months.	Otitis at age 1 to 3 months. Inguinal abscess Koch positive at 6 months. The child weighed 9.2 kg and was healthy at 1 1/2 years.	
9. DAVIS et al. 1960.	22 years of age.	Fever of unknown origin on 8th day. Miliary tuberculosis on 24th day.	+ 1.700	Restlessness, anorexia on 8th day.	On 9th and 17th day, then from 22nd to 48th day.	Negative.	Enlargement on 22nd day. Calcification in 4th month.	Enlargement on 22nd day. Calcification in 4th month.	Enlargement on 22nd day. Calcification in 4th month.	CSF negative on 33rd day.	Intradermal test negative on 24th day and in 4th month. Bone marrow and cervical lymph node Koch positive on 33rd day.	X-rays constantly negative.	Penicillin + streptomycin on 17th day. Chloramphenicol on 22nd day. Streptomycin + INH from 24th day for 74 days.	Haematocrit 23 on 33rd day. Thrombocytopenia on 33rd day. Leukocytosis on 16th day. At the age of 12 months the child was alive.	
10. SALVIOLI SILANOS 1960.	Age unknown. Grave caseous tuberculosis.	Died.	+ 1.660	Enlargement of liver in first week.	Increase during 45 days followed by decrease.	On 45th day.	Bronchial breathing, rales, in 5th month.	Enlargement to navel on 45th day, followed by decrease.	Reaching the navel in 5th month.	Moderately tense fontanel, dermatography in 5th month. CSF: protein 66 mg per 100 ml, cell count 30, sugar normal. Lymphocytes in smear.	Cervical gland Koch positive on 45th day; intradermal test hyperergic. CSF Koch positive.	Miliary tuberculosis on 45th day. X-rays: negative from 10th month.	Streptomycin + INH from 45th day to 5 months. Streptomycin, INH, prednisolone for 12 months. Intrathecal streptomycin, INH. Vitamin P+B ₁₂	Swollen cervical lymph nodes at 1 1/2 months. Nut sized cervical nodes in 5th month.	
11. KRÄUBIG I. 1961.	32 years of age. Intradermal test negative.	Endometritis in 8th week. Pulmonary X-rays negative.	+ 2.000	Subfebrility, enteritis; on 50th day tachypnoea.	Increase.			Slight enlargement on 70th day.	Slight enlargement on 70th day.		Intradermal test and gastric content Koch positive on 70th day.	Miliary tuberculosis on 70th day.	Streptomycin from 70th day.	Healthy at age of 4 years. Had otogenic meningitis in the meantime.	
12. KRÄUBIG II. 1961.	Age 30 years; 4th month of pregnancy erythema exud. multiforme. 8th month of pregnancy exudative pleurisy.	Bronchopneumonia in first week. Tuberculous endometritis in 9th week. X-rays: miliary tuberculosis, tuberculous meningitis.	+ 1.370	Subfebrile in 4th week.	Increase.	In 4th week.		Enlarged.	Enlarged.		Dermal test positive in 9th week.	Negative in 4th week. Miliary tuberculosis in 9th week.	From 9th week streptomycin, INH, penicillin.	Healthy at age of 3 years. Began to walk tardily.	
13. IMMERSLUND et al. 1962.	Age unknown. Unrecognized vertebral tuberculosis; pulmonary congestion. ESR 74 mm/h.	Pulmonary infiltration (specific?). Tuberculous spondylitis.	+ 2.200	Fever on 41st day. (Necropsy of twin revealed miliary tuberculosis on 30th day.)	Increase.	On 41st day.	Bronchitis on 41st day. Tachypnoea 54/min. Intercostal retraction.	Enlargement on 41st day.	Enlargement on 41st day.		Gastric contents Koch positive on 41st day.	Pulmonary infiltration on 41st day; progression at 13 months.	Streptomycin, INH, PAS from 47th day until 6th month. Interval of 5 1/2 months with relapse. Resumption of INH + PAS.	At 13 months the child was alive.	

Comment. Although treatment was finally successful, a number of diagnostic and therapeutic mistakes had been made in this instructive case which shows that it is imperative to consider the possibility of tuberculosis if a young pregnant female has repeated episodes of pleurisy and "pneumonia", and that treatment of the newborn should be started even if tuberculosis is only suspected. The pulmonary radiographs of the baby were negative since the case was one of connatal otogenic tuberculosis contracted by aspiration. The intradermal test remained negative for several months, a warning that it is not always reliable in the case of infants. The baby survived in spite of its low birth weight and the considerable delay in beginning treatment. The child is now 13 years old and mentally retarded, he contracted a pulmonary infection at the age of 9 years. The case will be reported in another paper.

V. In SCHMIDT-ROHR's case [17], all the mistakes referred to in the foregoing were repeated. Although in the mother miliary tuberculosis and meningitis had been diagnosed in the 8th month of pregnancy, the "asymptomatic" baby was left untreated. The first suspicious sign in the infant was observed on the 32nd day, the intradermal test became positive on the 42nd day. In spite of this, treatment was not started until the 57th day.

Comment. It happens rarely that a baby, treated tardily and — according to present knowledge — insufficiently, manages to survive as it did in the present case. We have ample proof to show that it is danger-

ous and in most instances fatal to wait with treatment until the diagnosis of tuberculosis can be based on clinically unfallible symptoms.

This was another case to prove that the tuberculous infant may well gain weight during the first month, and delayed appearance of clinical symptoms may lead to an erroneous diagnosis.

VI. ROSSIER and ROUSSEL [15] described a case in which the cause of a pregnant woman's shaking chills was not ascertained. The premature baby developed respiratory disturbances on the 8th day, but the possibility of their tuberculous origin was disregarded. Not even the occurrence of a pneumonia, diagnosed on the 22nd day, aroused the suspicion of tuberculosis but in view of the acute condition the baby was, routinely and in this case luckily, given streptomycin in addition to penicillin. It was only on the 34th day after delivery that miliary tuberculosis was diagnosed in the mother; at the same time, the X-ray revealed tuberculosis in the infant.

Comment. This is another case to show that the possibility of tuberculosis is not always considered in connection with a febrile disease in young pregnant and that, in consequence, both their and their baby's treatment is unduly delayed. Treatment with streptomycin for 4 1/2 months and INH for 6 months sufficed to make the pulmonary changes to disappear.

VII. In WEINGARTEN's case [19], the pregnant patient had been suffering from pleurisy then miliary tuberculosis, and died after delivery. Aspiration was diagnosed in the newborn on the first day of life; a pulmonary radiograph made on the 5th

day showed suspicious signs; an intradermal test (1:100) on the 31st day was weakly positive; yet, treatment was not begun until the 5th month.

Comment. Several diagnostic and therapeutic mistakes were made. It is past comprehension why therapy was not instituted until the 5th month. Still the child recovered in spite of the delay and the short duration (8 weeks) of streptomycin treatment.

VIII. In HUDSON's case [5] a pregnant woman developed pleurisy, and miliary tuberculosis was diagnosed 2 weeks after delivery. The first suspicious symptoms in the baby were discovered at 18 days, and tubercle bacilli were found in the gastric contents at 19 days. Treatment with streptomycin and INH was started on the 22nd day. Therapy was interrupted after 3 months and, after an interval of 8 weeks, continued for another 3 months.

Comment. The mother's pleurisy was not treated. This may have contributed to the development of miliary tuberculosis and was probably responsible for the baby's infection. It was certainly a mistake not to begin treatment as soon as the suspicion of tuberculosis had arisen and to delay its beginning for several days even after the correct diagnosis had been established. There was no justification for the interruption after 3 months, and this the less so as tubercle bacilli were demonstrated in the gastric contents until the 6th month. Uninterrupted treatment would have checked (perhaps even prevented) the abdominal tuberculosis.

IX. In DAVIS's case [3] the mother had fever from the 8th puerperal day on. Miliary tuberculosis was diagnosed 16 days later. Restlessness, anorexia, loss of weight and temperatures observed in the newborn on the 8th day of life were regarded as signs of some banal disease. Not even the enlargement of liver and spleen was estimated correctly, presumably because of the negative result of the intradermal test. Treatment with streptomycin and INH was started as soon as the mother's miliary tuberculosis was discovered. Treatment of the infant lasted only 74 days, although the presence of tuberculosis bacilli in the bone marrow and the cervical lymph nodes was demonstrated on the 33rd day. The infant was alive at the age of 12 months. The pulmonary radiograph was negative throughout.

Comment. This case had a happy ending despite insufficient treatment. Relapses have to be reckoned with in such cases.

X. The case of SALVIOLI and SILANOS [16] makes it evident that a woman with serious pulmonary tuberculosis may give birth to an infected baby. The enlargement of the infant's liver, observed in the first postnatal week, was not interpreted correctly. Enlargement of the liver and the spleen extending to the navel, temperatures, and swollen cervical lymph nodes necessitated detailed examinations which retarded the diagnosis. X-rays on the 45th day revealed miliary tuberculosis and tuberculosis bacilli were found in the cervical lymph node on the same day. Treatment with streptomycin and INH was started after the 6th week, but remained unsuccessful until the 5th month when tubercle bacilli were found in the cerebrospinal fluid. Intrathecal streptomycin and INH treatment and oral administration of prednisolone then brought sudden improvement. The combined treatment lasted 7 months.

Comment. The possibility of a tuberculous infection of the newborn should always be considered if the mother is suffering from grave pulmonary tuberculosis. The correct diagnosis could have been made and suitable treatment started earlier had the prodromal symptoms been regarded in this light and the gastric contents been tested for tuberculosis bacilli. The case is instructive by showing that routine treatment with streptomycin and INH is not always sufficient, and that its supplementation with prednisolone may become necessary. It is not possible to tell retrospectively whether and to what extent the intrathecal streptomycin and INH in addition to prednisolone therapy had contributed to improvement.

A hyperergic intradermal test is an exceptional phenomenon; in view of it the possibility of an exogenous infection had to be excluded. It is noteworthy that, while tuberculosis bacilli were present in the cerebrospinal fluid, its protein content and cell count increased but slightly, and the sugar level remained normal. It was fortunate that the assumed meningeal tuberculosis was not followed by tuberculous meningitis.

XI. In KRÄUBIG's first case [9] a pregnant woman 32 years of age had been examined for tuberculosis with a negative result. The premature infant therefore was not separated from the mother. Tuberculous endometritis was diagnosed 8 weeks after delivery, X-rays of the mother's thorax were negative. Tuberculosis in the baby was diagnosed on the 70th day when

treatment with streptomycin and INH was started immediately.

Comment. The finding of a tuberculous endometritis was unexpected since the pulmonary X-rays were negative. The possibility of the baby being infected was neglected, otherwise its treatment would have been started earlier. Fortunately the patient recovered in spite of the delay and even survived a subsequent episode of otogenic meningitis.

XII. In KRÄUBIG's second case [9], exudative pleurisy was diagnosed in the 8th month of pregnancy. The pulmonary shadow found in the first puerperal week was not considered specific, and it was only in the 9th week after delivery that tuberculous endometritis, miliary tuberculosis and meningitis were diagnosed.

Temperatures, enlargement of the liver and spleen, observed in the premature baby in the 4th week of life were likewise regarded as aspecific, so that miliary tuberculosis was diagnosed in the 9th week only. Treatment with INH and streptomycin was successful.

Comment. This is one more case to show that the possibly tuberculous nature of exudative pleurisy during pregnancy is not sufficiently taken into account and the possibility of the tuberculous origin of the newborn's symptoms is not duly investigated. Vigorous treatment of the pleurisy would probably have prevented the development of miliary tuberculosis in the mother. The weak baby, born with a body weight of 1370 g, responded to treatment surprisingly well.

XIII. In the case described by IMMERSLUND et al. [7] a pregnant woman had been suffering from a vertebral disease the

tuberculous nature of which was not recognized before delivery. Therefore, no tuberculous infection was suspected in the premature baby (a twin), born with a body weight of 2200 g. Although the other twin developed fever, tachypnoea and liver enlargement on the 14th day, and in spite of a leukocyte count of 20,300 and a positive pulmonary radiograph taken on the 20th day, no treatment was started because the intradermal test continued to be negative even on the 30th day.

The other twin died on the 31st day of life and necropsy revealed congenital tuberculosis. This notwithstanding, it was only 16 days later, at the age of 1 1/2 months, that specific treatment of the surviving baby was started with streptomycin, INH and PAS. This was continued until the 6th month and then resumed after an interval of 5 1/2 months. The baby was alive at the age of 13 months.

Comment. The first mistake consisted in the misinterpretation of the mother's spondylitis. The second mistake was to neglect the baby's treatment when his twin partner's congenital tuberculosis had been recognized. On the 41st day, the presence of tuberculosis bacilli in the gastric contents was revealed and treatment was nevertheless delayed until the 47th day. The interruption of treatment occurred too early.

Relevant data concerning the cases discussed in the foregoing are assembled in Table I.

DISCUSSION

It is obvious that both diagnosis and treatment were belated in every one of the cases discussed in the foregoing. This is a depressing fact and shows that the interpretation

of symptoms is not satisfactory. Besides, the protection of babies who display no pathological symptoms but are nevertheless gravely endangered seems to be neglected. Another highly unsatisfactory phenomenon is the deficient co-operation between obstetricians and paediatricians, with the result that pathological symptoms are frequently interpreted without sufficient foundation, in the history. Interpretation of pathologic symptoms in the newborn should rely on a combined examination of the mother, the placenta and the infant itself. Usually, no data regarding the placenta are available. The newborn's history has to be pieced together from the history of the pregnancy. The histories in the material of the present study were mostly incomplete and often misinterpreted. The major part of the errors was made in connexion with the maternal tuberculosis.

The gravity of maternal tuberculosis is, according to the textbooks, in direct proportion to the danger threatening the newborn. Recent investigations have modified this notion. RATNER et al. [13] found between 1933 and 1945, *i. e.* prior to the introduction of streptomycin, no congenital tuberculosis in any of 260 babies delivered by women with grave tuberculosis. It has, on the other hand, been observed that mothers suffering from miliary tuberculosis or tuberculous meningitis often infect their offspring in *utero* or *sub partu*. Tuberculosis is serious in all of these forms; while the material of RATNER et al. mostly con-

sisted of patients with chronic tuberculosis, the infection is usually fresh, frequently not more than some months old, in cases with miliary tuberculosis and tuberculous meningitis. The material discussed in the present paper shows that the incidence of congenital tuberculosis is higher in the offspring of freshly infected mothers. The symptoms of an acute tuberculous infection (initial fever, erythema nodosum, pleurisy) are often misinterpreted and the possibility of such an infection is disregarded if the symptoms are not conspicuous and the pulmonary radiograph is negative.

The change of the initially negative intradermal test into a positive one in the course of gestation, a seldom examined occurrence, is a reliable sign of acute infection. A spreading of fresh infections should always be taken into account; they are frequently transmitted to the genital organs. When recording the history, the patient should be questioned with due emphasis about the possibility of a recent tuberculous infection.

It is evident that in the majority of the above cases no antituberculous treatment of the pregnant woman was started although dependable signs of fresh infection had been demonstrated.

Before, a diagnosis of connatal tuberculosis was not made or accepted unless all the criteria postulated by BEITZKE [2] were satisfied. This procedure was justified as long as there was no suitable treatment of these cases. To-day the aim must be to recognize the connatal tuberculosis at a

time when the chances of healing are most promising. It follows that treatment should be started as soon as a justified suspicion of connatal tuberculosis arises.

It is wholly erroneous to treat the mother suffering from tuberculous meningitis and wait for infallible symptoms in the newborn before starting its therapy. Such a procedure may mean a death sentence for the baby. If the pregnant woman is treated for miliary tuberculosis, it is only logical to treat also her infant, and it is a mistake to stop the usually unduly short therapy after delivery.

The symptoms of connatal tuberculosis are extremely variable. High fever, signs of bronchitis or bronchopneumonia may be present right from the outset, growth is slow, early enlargement of liver and spleen is frequent. The intradermal test may be positive on the 16th day already [20]. In some cases however, the baby may remain free from symptoms for 42 days [6]. It is gaining weight, repeated examinations reveal no pathologic symptoms, the intradermal test is negative, and then suddenly the baby dies of tuberculosis immediately after the discovery of the first symptoms.

In order to obtain better results, it is necessary to scrutinize the history of pregnant women for signs of tuberculosis, for those of acute infection in particular, and, if found, these signs should be estimated in respect of their significance for the unborn or newly-born child.

Infants born with tuberculosis are usually premature or of very small body weight, so that such babies should be considered especially suspicious of tuberculous infection. It is advisable to avail oneself of the possibilities offered by antenatal paediatrics and to subject all acutely infected mothers to antituberculous treatment even if the pulmonary radiograph is negative. It was suggested by us as far back as 1952 [18] that no mother suffering from active tuberculosis should be allowed to deliver her child without antituberculous protection.

If the suspicion of connatal tuberculosis arises, antituberculous treatment should be accompanied by serial bacteriological examination of throat swabs and the gastric contents. The obstetrical department should immediately notify the paediatric department of the mother's tuberculous infection. In the case of LÁSZLÓ and WERMER [10], miliary tuberculosis was diagnosed in the mother on the 13th day after delivery, and her baby was transferred to the paediatric ward on the 16th day without any information concerning the mother's disease. Delays of even 5 months occurred in other cases.

It must be clear from the foregoing that the gravity of maternal tuberculosis and the degree of the imperilment of the newborn need not be in direct relationship. It is further evident that connatal tuberculosis is less malignant than generally supposed. We have seen that most of the cases recovered in spite of retarded

and insufficient treatment. HUGHES-DON's patient [6], though born with connatal tuberculosis, lived 2 1/2 years without any treatment. It would be of advantage if follow-up data regarding patients born with connatal tuberculosis and reported as healed were available. It is known of STEINER's patient [18] that at the age of 13 years she was completely free from tuberculosis.

There is no universally accepted view regarding the treatment of connatal tuberculosis. As soon as its suspicion arises, treatment with INH (10 mg per kg, daily) and streptomycin (25 to 40 mg/kg daily) should be started. If the diagnosis turns out to have been erroneous, treatment is discontinued. If the suspicion was well founded, treatment is continued, but streptomycin is administered every third day only.

The treatment of connatal tuberculosis is the same as that of miliary tuberculosis; most authors recommend to pursue therapy for several months [4, 12.] Each case should be treated individually; apart from treating the existing disease, efforts should be made to prevent relapses. For this reason, treatment should be continued for two months after complete recovery.

SUMMARY

Thirteen cases of cured connatal tuberculosis reported in the literature are discussed. Diagnosis was retarded and the beginning of treatment unduly delayed in every case. Treatment was inadequate in most cases.

The incidence of connatal tuberculosis is much higher in babies of freshly infected mothers than in the offspring of women with grave tuberculosis. It is therefore imperative that the diagnostics of acute infection of pregnant be improved, and that treatment should start earlier than at present. Treatment of the infant must be started as soon as the suspicion of connatal tuberculosis arises.

A closer co-operation between obstetricians and paediatricians is advocated.

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