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Congenital Tuberculosis

— Report of an Autopsy Case —

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An autopsy case of congenital tuberculosis is described in a 41-day-old female infant who was born to a mother having active pulmonary tuberculosis.

The primary complex was seen in the liver and portal lymph nodes, and there was a generalized miliary dissemination including lung, liver, spleen, pancreas, adrenals, thyroid, thymus, kidneys, brain, and bowel. The organism was confirmed to be Mycobacterium tuberculosis. The tubercles were histopathologically of various chronicity and characterized by massive caseation and fairly poor peripheral lymphohistiocytic reaction. Giant cell response was also minimal.

It should be stressed that although rare, tuberculosis is still an important disease in Korea that can involve fetus or newborn infants if pregnant women are untreated or unnoticed for her tuberculosis.

Key Words: *Congenital infection, Tuberculosis, Newborn, Fetus*

INTRODUCTION

Tuberculosis is still an important infectious disease in Korea. The morbidity of tuberculosis in Korea is 2.2% of general population (Ministry of Health and Social Affairs, 1985). However, cases with active tuberculosis has been drastically decreased over last decade.

When pregnant women are infected by tuberculosis, it can affect the fetus or newborn in several ways. The most common complication is low birth weight. Other adverse effects have been documented (Ratner et al., 1951). However, these features are not related to actual fetal infection by tuberculosis. Accordingly actual congenital tuberculosis is fairly rare, and even if it occurs, it is difficult to diagnose unless the fetus die in utero or in neonatal period and postmortem examination is performed.

Recently we have experienced a case of tuberculosis in a newborn, which was most probably infected through the route of fetal circulation.

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CASE REPORT

This one-month-old girl was admitted to Sowha Children's Hospital in Seoul because of fever, poor sucking, and abdominal distension for two weeks on July 17, 1989. She was born by Cesarian section to a 26-year-old primigravid mother who had double vagina after 37 weeks of gestation on June 6, 1989. The mother experienced dyspnea during the last trimester, for which chest X-ray was taken to show pleural effusion and haziness in the left lower lobe. Unfortunately, the mother did not take antituberculous regimen that was prescribed to her. At birth, the baby weighed 3100g and showed no gross abnormality. She was kept with mother. She was doing relatively well until 2 weeks before admission, when failure to thrive and fever developed. Over the ensuing few days, she developed abdominal distension. On admission, physical examination showed that body weight was 2760g, body temperature was 38.5℃, and pulse rate was 140 per minute. She was weak and emaciated. A mild chest retraction was noticed. Breathing sounds were coarse with rhonchi in both lungs. The abdomen was distended markedly. The liver was palpated nodular 3 cm below the right costal margin. The spleen was palpated 2cm below the left costal margin. Laboratory data were as follows; CBC revealed Hb 7.2gm/dl, Hct 20%, and WBC count 5,600/cmm (band 3%, seg

42%, lym 52%, mono 2%, eos 1%). Platelet count was 45,000/cmm. C-reactive protein was positive. Blood glucose was 35mg/dl. Serum total protein and albumin were 5.3gm/dl and 2.6g/dl, respectively. SGOT and SGPT were 272U and 152U, respectively. CSF examination was normal. Chest X-ray film showed multifocal patchy consolidations throughout the lung fields. Cultures of blood, stool, endotracheal secretion, and CSF were all negative.

Because of dyspnea, she was placed in oxygen hood. Mefoxin and Neticin were placed to combat possible bacterial infections. On the second hospital day, abdominal distension became worse. Abdominal plain X-ray film showed scanty abdominal gas and diffuse hazy densities in the abdominal cavity. Platelet count was 40,000/cmm. Prothrombin time was 28sec. Fibrin degradation product was positive by 1:320. Fibrinogen was 82mg/dl. On the third day, endotracheal intubation was done because of aggravated dyspnea. Paracentesis revealed xanthochromic fluid. Culture of the peritoneal fluid showed no microbial growth. At night, gastrointestinal bleeding was noticed. Heparinization was started. The blood gas analysis revealed pH 6.960, pC02 92.4 mmHg, p02 19.2mmHg, HC03 20.8mEq/1, and BE-11.7mEq/1. The blood pressure was 51/31 mmHg. Dopamin was injected continuously, and intermittent positive pressure ventilation was performed. However, the patient did not respond to management and expired on the fourth hospital day.

Postmortem Findings

Postmortem examination revealed a cachetic child with abdominal distension. The skin showed no petechiae. The umbilicus was dry. Internal examination showed pleural and abdominal effusions. There were numerous disseminated yellow nodules of varying size involving several organs and tissues (Fig. 1). The chest cavity was filled with diffusely consolidated lungs, and abdominal cavity showed enlarged liver and spleen. The mesentery and omentum were studded with innumerable yellowish nodules. Yellowish nodules were found in the liver, spleen, lung, pancreas, thyroid, thymus, both kidneys, both adrenals, serosa of the stomach and small intestine, and meninges. Lymph nodes around the trachea and aorta were enlarged. The lungs were heavy (left 41g/right 46g) and showed diffuse pneumonic consolidation with innumerable yellow nodules measuring 2.5mm in average diameter (Fig. 2). The liver was enlarged and weighed 208g (normal; 127g). Enlarged lymph nodes, measuring up to 3cm in diameter, were found in the porta hepatis (Fig. 3). External surface and cut sections of the liver showed diffusely scattered yellow nodules that were relatively uniform in size averaging 1-2mm. No conglomerate mass was seen. The spleen was also enlarged and weighed 46g (normal; 9g). About one half of the spleen was replaced by bean-sized yellow nodules (Fig. 4). When the size of tubercles was compared, it were portal lymph nodes, spleen, lung, and liver in decreasing order (Fig. 5). The stomach showed a round ulcer with eroded blood vessel on the base in the midbody and a fresh blood clot was also seen in the lumen.

Microscopically nearly all the nodules were composed of central caseous necrosis with surrounding scanty epithelioid cells and lymphocytes. Langhans giant cells were seldom found. In the liver, caseation necrosis was seen in the lobules and portal spaces. Liver cell plates were disarrayed, and sinusoids were congested. Numerous nuclear debris and a few lymphocytes were present in the periphery of caseation necrosis. The sections of the lung showed numerous poorly formed granulomas with caseation necrosis. The bronchial wall was focally eroded by caseation necrosis, and the lumina were filled with caseous

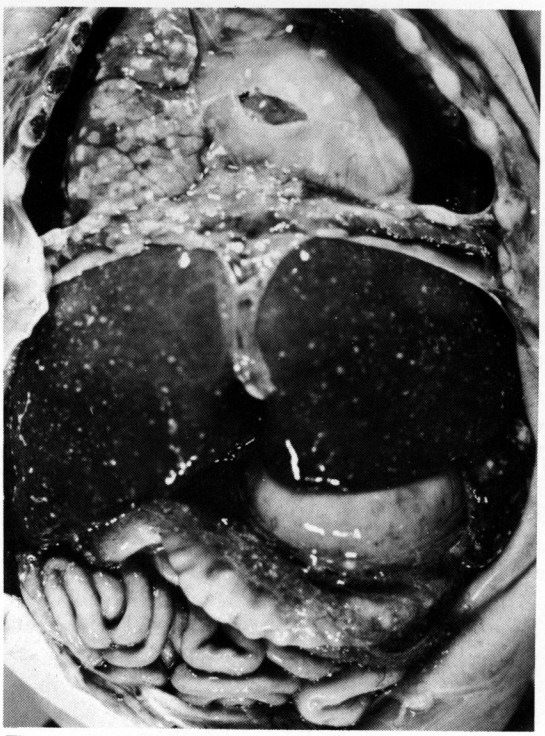

Fig. 1. In situ view of the viscera showing disseminated tubercles in the lungs, liver, spleen, and peritoneum. The liver is markedly enlarged.

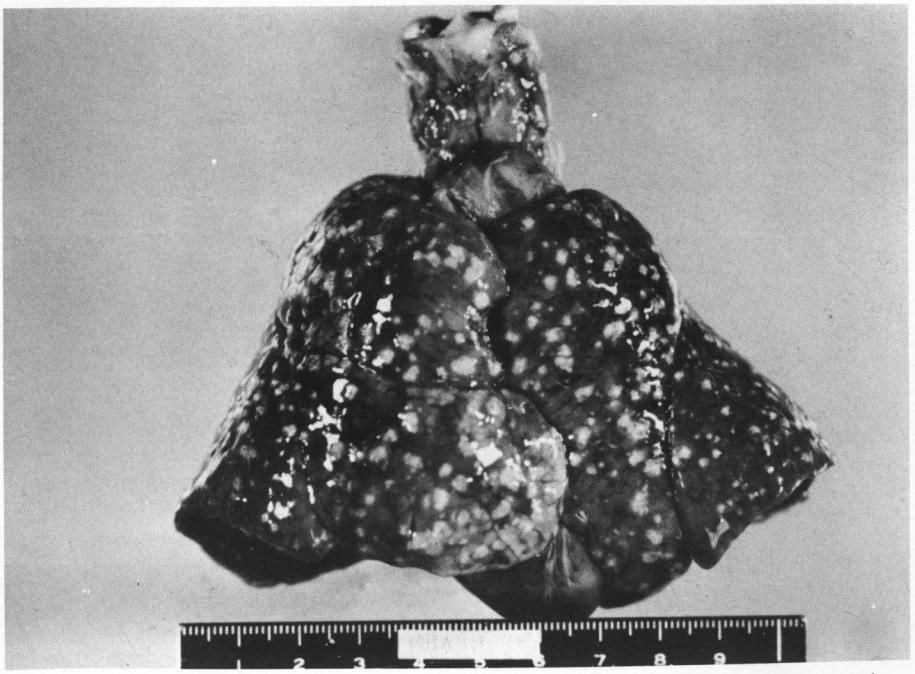

Fig. 2. Anterior view of the thoracic organs. Numerous whitish nodules are seen on the lung surface.

Fig. 3. Inferior aspect of the liver shows a large conglomerated lymph nodes in the porta hepatis (arrow) and diffusely scattered innumerable tubercles that are relatively uniform in size. The gallbladder is cut across and seen below the enlarged nodes.

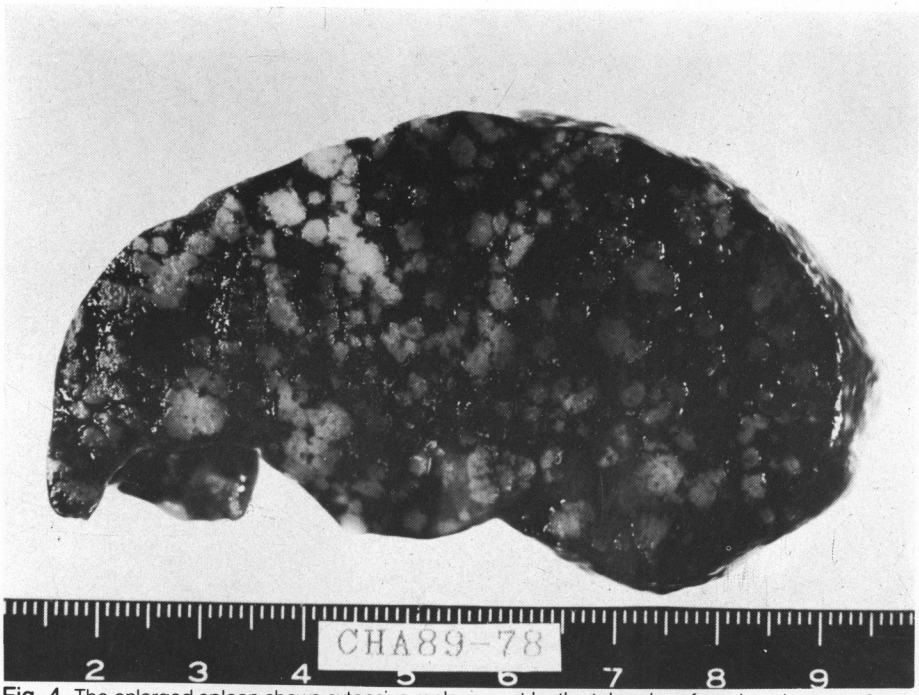

Fig. 4. The enlarged spleen shows extensive replacement by the tubercles of varying size up to 8mm in size.

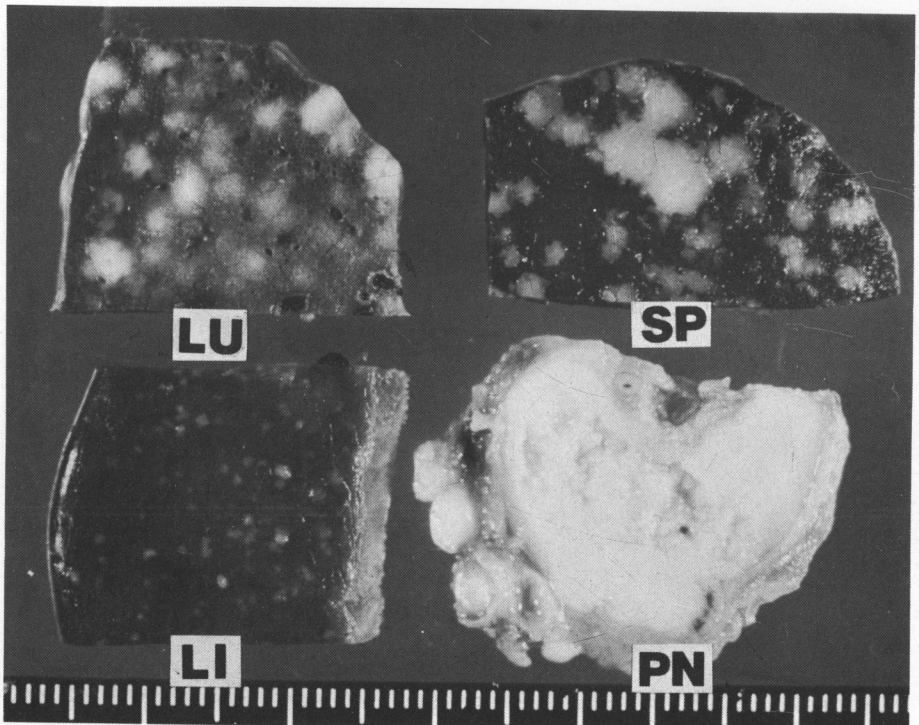

Fig. 5. Cross sections of various organs involved by the tuberculosis in this case. Note the difference of size of tubercles. The portal lymph nodes are either individually enlarged or conglomerated to form a large mass of 2.5cm in cross. LU:Lung, LI:Liver, SP:Spleen, PN:Portal lymph nodes.

material. Some blood vessels were found to contain tuberculous process in the wall associated with a few inflammatory cells. The remaining alveoli were filled with fibrinous exudate, alveolar macrophages, and some leukocytes. The sections of the spleen showed large geographic areas of massive caseation with a narrow rim of poorly formed granulomatous process. Through microscopic examination, the brain, bone marrow, uterus, ovaries, and salpinges were found to contain tubercles of various sizes. Ziehl-Neelson staining for acid fast bacilli revealed numerous microorganisms in all tissues. They were particularly prominent in the liver, lungs, spleen and lymph nodes, and were mainly located in the peripheral portion of the tubercles although sparsely seen in the caseation necrotic foci as well.

Blood culture taken from the right ventricle at the time of autopsy grew Mycobacterium, and it was confirmed to be M. tuberculosis by radioisotope growth detection method.

DISCUSSION

Congenital tuberculosis should be diagnosed with caution, because the time of infection could sometimes be difficult to trace. Therefore, when the congenital tuberculosis is diagnosed clinically, it should fullfil certain cirteria. Beitzke (1935) proposed the criteria of; 1. The tuberculous nature of the lesion in the infant must be proved. 2. The infant has a primary complex in the liver. 3. If there is no primary complex in the liver, the infection is congenital only (a) if tuberculous changes are found in the patient in utero, at birth, or within a few days after birth, and (b) in a child who lives longer than a few days if extrauterine infection can be excluded with certainty and if the child is immediately separated from the mother and kept in an environment free from tuberculosis. In the present case, the tuberculous nature of the lesion was confirmed by tissue AFB stain as well as blood culture. And the primary complex was found in the liver and porta hepatis lymph nodes. The only reserve would be that there was disseminated tubercles instead of a main lesion in the liver. However, in the review of 38 cases of congenital tuberculosis, Siegel (1934) found that 13 cases showed predominant involvement of the portal lymph nodes along with generalized disseminated tuberculosis. Notably, in 3 cases, primary liver lesion was not demonstrated. Therefore, our case could be reasonably diagnosed to be congenital tubercuilosis.

Congenital tuberculosis is usually presented clinically with abdominal distension and fever, and has a peak onset three to four weeks after birth (Hageman et al. ,1980). Our case had its onset during the fourth week of his life and started as fever and abdominal distension. However, in the present case, the baby was not separated after birth from the mother who still had active tuberculosis. This fact suggests a possibility of superimposed postnatal infection. Furthermore postmortem examination revealed variation in the size of the tubercles depending on the organs and tissues. Portal lymph nodes, spleen, lung, and liver contained larger tubercles that became smaller in size in decreasing order. This fact suggests that the involvement of the organs and tissue might have been different in time, and raise a possibility of repeated infections after the baby was born with congenital infection. Congenital hematogenous infection of tuberculosis is characteristically manifested by enlargement and caseation of the lymph nodes at the porta hepatis plus disseminated tubercles throughout the liver, comprising the primary complex (Siegel, 1934; Remington & Klein, 1983). The 3cm caseation mass in porta hepatis and disseminated lesions in the liver in our case indicate strongly that this infection took place through hematogenous route from the infected placenta via the umbilical vein and ductus venosus, amongst other ways of acquisition of tuberculosis in the fetus. When the lesions are most prominent in the lungs and a primary complex cannot be found in and about the liver, it is possible that the infection originated from inhalation of infected amniotic or vaginal contents. The placenta was not examined in our case.

It was noteworthy in this case histopathologically that although caseation necroses were seen in nearly all the nodules irrespective of size and site, epithelioid and lymphoid cell reaction was poor. These tubercles belong to Rich's category of soft tubercles showing local necrosis with little cellular reaction, indicative of overwhelming infection with little host resistance. Several investigators demonstrated the importance of macrophage function against intracellular pathogens including M. tuberculosis (Lurie, 1964). Moreover, recent in vitro studies by Wilson et al (1986) indicated that lymphocytes from human neonates produce less migration inhibition factor, macrophage activation factor, and interferon than do adult cells. Therefore poor epithelioid and lymphoid cell reaction in this case might also have some relationship with immature T cell function and septic condition.

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REFERENCES

Beitzke H: *Uber die angeborene tuberkulose infektion. Ergb Ges Tuberk Forsch 7:1-30, 1935.*

Hageman J, Shulman S, Schreiber M et al: *Congenital tuberculosis: Critical reappraisal of clinical findings and diagnostic procedures. Pediatrics 66:980-984, 1980.*

Lurie MD: *Resistance to tuberculosis: Experimental studies in native and acquired defense mechanisms. Havard University Press, Cambridge, Massachusetts. 1964.*

Ratner B, Rostler AE, Salgado PS: *Care, feeding and fate of premature and fullterm infant born of tuberclous mothers. Am J Ds Child 81:471-482, 1951.*

Remington JS, Klein JO, ed. 2nd ed: *Infectious Diseases of the Fetus and Newborn Infant. WB Saunders, Philadelphia 1983. p570.*

Siegel M: *Pathological finding and pathogenesis of congenital tuberculosis. Am Rev Tuberc 29:297-309, 1934.*

Wilson CB: *Immunologic basis for increased susceptibility of the neonate to infection. J Pediatr 108:1-12, 1986.*

Status of Tuberculosis in Korea (1985). Yearbook of health and social statistics Vol. 33. Ministry of Health and Social Affairs, Republic of Korea.