CLINICAL DEPARTMENT

DIAPHRAGMATIC HERNIA IN A NEW-BORN

REPORT OF A CASE *

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Congenital diaphragmatic hernia, due to weakness or defect of one of the several fibrous portions of the diaphragm, is no longer considered as an extremely rare condition. Occasionally remaining symptomless throughout life, the condition has in several instances furnished a necropsy surprise and its recognition in infancy or later life has most often been due to the occurrence of chronic digestive disturbances or acute obstruction of some portion of the intestine.

In the case reported herewith, the circumstances that the infant was born in the hospital; that it was under observation throughout life; and that it was breast fed and at no time suffered any other illness, accident or disease, make the clinical features manifested as a result of the hernia unusually clean cut.

These are: (1) an acute and alarming respiratory syndrome due to the presence of almost all of the intestine in the left thorax, but with no gastro-intestinal symptoms; (2) subsequent anatomic alteration of the growing infantile thorax and abdomen in response to the altered location of viscera, and (3) the inclusion of the stomach in the hernia, with a high degree of obstruction at the cardia.

Figure 1, a schematic drawing of the diaphragm taken from an article by Keith,¹ who made an anatomic study of the specimens of diaphragmatic hernia in the British Medical Museum, shows the fibrous "weak spots" in the diaphragm, through which hernia of the abdominal contents into the thorax may take place. The number of cases in his series occurring through each of these potential openings is also indicated.

The physical and roentgenologic examinations made it reasonably certain in this case that the hernia took place through the "left pleuro-peritoneal passage," i. e., in the most common location.

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* From the Medical Department of Mt. Sinai Hospital.

1. Keith, A.: Remarks on Diaphragmatic Hernia, Brit. M. J. **2**:1297, 1912.

REPORT OF CASE

H. B., the second child of Russian Jewish parents, was born Nov. 30, 1920, at Mt. Sinai Hospital.

History.—There was no history of hernia or developmental defects among the immediate relatives. He was born at full term, weighed 4,120 gm., cried promptly after birth, had good color, and no abnormalities of any kind were noted. He nursed well, began to gain in weight on the fourth day; had no vomiting, jaundice, or bad stools, and until the eighth day, no cyanosis, pallor, or respiratory difficulty.

On the eighth day the infant had two transitory attacks of slight cyanosis with rapid breathing for which examination revealed no cause, the lungs and heart being found normal, and the heart in the normal left side position. The following morning, shortly after nursing, he suddenly became intensely cyanotic, with rapid, dyspneic respiration, and lay limply in the dorsal position, with an appearance of impending exitus. The cyanosis was somewhat lessened by removing a rather snug abdominal band, and much more by holding the child in a vertical position, but recurred promptly when the child was laid down.

Fig. 1.—Diagram (from Keith) to show the sites of diaphragmatic hernia. Upper, or thoracic, aspect of diaphragm represented. 1, Sternum; 2, pericardium; 3, inferior vena cava; 4, aorta; a, sternocostal site, 5 cases; b, esophageal orifice, 1 case; c, central site, 2 cases; d, left pleuroperitoneal passage, 17 cases; e, into pericardium, 3 cases; f, through right leaflet of diaphragm, 2 cases; g, right pleuroperitoneal passage, 4 cases.

Examination.—The respiration rate was from 96 to 100 per minute and in inspiration the upper portion of the anterior thorax was pushed forward and outward, especially on the right, while the lower part of the sternum and inner portion of the costal borders was retracted. There was no movement of the outer portion of either costal border. No cardiac impulse could be seen, but by palpation and auscultation the apex was found to be in the fourth right interspace, 1 cm. inside the nipple line, and percussion outlined a corresponding area of cardiac dullness. Except for this, the right thorax was everywhere hyperresonant, while the left side was tympanitic throughout, the tympany being of the highest pitch and most intense in the axilla. No breath sounds could be heard on auscultation of the left chest, except at the apex, where they were faint but vesicular.

The abdomen was fuller above the umbilicus than below, and without general or local rigidity or tenderness. There was a complete absence of the usual tympany except in the left hypochondrium. A small, smooth, ovoid, mass (kidney? spleen?), freely movable, could be palpated in this region.

Diagnosis.—A diagnosis of left diaphragmatic hernia, due to congenital defect of the diaphragm, was made, and from the absence of vomiting or other

Fig. 2.—Roentgenogram taken one and one-half hours after barium milk feeding.

gastro-intestinal symptoms it was thought that the stomach was not involved in the hernia and that there was no obstruction. This was confirmed by fluoroscopic and roentgenographic examination after an opaque meal, which showed the stomach to be normal in appearance and position while all of the intestine from the duodenum to the descending colon was above the diaphragm in the left chest and the heart was displaced into the right chest.

Treatment.—Since cyanosis and respiratory embarrassment were greatly relieved by holding the infant in a vertical position, it was fastened firmly to a board of proper size by means of bandages, and the board elevated at an angle of more than 45 degrees.

Relief by postural treatment was marked and immediate. The cyanosis promptly disappeared, but for several weeks recurred when the baby was put in a horizontal position. Nursing, stools and sleep were normal, as was also gain in weight, and he was discharged on the fifteenth day, operation at a later time in the nursing period having been advised.

Course.—During the next four months his gain in weight and his general condition were so satisfactory that his parents refused to permit operation. The process of anatomic adjustment to the unusual location of the intestines continued, the anteroposterior diameter of the chest increasing until the child had a veritable barrel chest, while a marked precordial bulging developed in the right thorax. The muscles of the lower abdomen became firmly contracted, increasing the scaphoid appearance of this region, while the outline of the lower border of the stomach could be seen from a distance of several feet. As the thorax enlarged, cyanosis in the recumbent position disappeared.

April 15, 1921, when 4½ months old, and following a period of several days when his mother, acting on her own initiative, had left him off the board and given him a small amount of bread and milk, the baby refused the breast at the noon feeding and, shortly after, vomited several times, the vomiting being projectile in character, but without bile or fecal matter, and accompanied by cyanosis, respiratory embarrassment and collapse. A large normal stool was said to have been passed about three hours before the onset of vomiting.

Second Examination.—Examination, three hours after onset of symptoms, showed the maximum apex impulse still farther to the right than had been noted at any previous examination (outside the right nipple line). No area of tympany corresponding to the stomach could be found, nor could the outline of the greater curvature of the stomach be seen on the abdominal wall, the abdomen being scaphoid throughout. These findings, with the history, seemed to point to the entrance of at least a major part of the stomach into the left thorax.

Course.—The infant refused everything by mouth and was admitted to the hospital the following morning. Moderate cyanosis and dyspnea were present, its pulse weak and rapid, its lips dry, and there was considerable loss of turgor. Two large normal stools were passed during the day and a daily stool thereafter. Vomiting of small amounts of breast milk occurred twice during the first two days after admission—after that there was no vomiting, the infant appearing nauseated but unable to vomit. Food was taken only in small amounts, with apparent difficulty, increase of cyanosis, some dysphagia, and no appetite, signs and symptoms pointing to partial obstruction at the cardia. This was apparently confirmed by a roentgenogram made after an attempt immediately after death to introduce a barium-milk mixture into the stomach.

Death occurred during the fourth week in the hospital, after rapid loss of weight in the third, with signs of bronchopneumonia.

Permission for operation or for necropsy could not be obtained.

Comment.—What portion, if any, of the intestine was in the thorax at the time of birth cannot be known, but the acuteness of the respiratory syndrome, the displacement of the heart occurring within twenty-four hours, and the permanent alteration in contour and physical signs

of the infant's abdomen, first evident coincidently with the onset of acute respiratory embarrassment, seem to indicate that the greater part of the intestine found above the diaphragm entered the thorax between the time of examination on the eighth day and the onset of severe symptoms on the ninth.