CONGENITAL DIAPHRAGMATIC HERNIA IN THE NEWBORN

REVIEW OF THE LITERATURE AND REPORT OF A CASE*

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IN 1935, TRUESDALE[21] published a complete review of the literature on the subject of congenital diaphragmatic hernia in children and stated, "Operations undertaken for the cure of diaphragmatic hernia in children are rare." He quoted Vannesson as saying in 1912, "Prognosis was very grave and treatment nil." Truesdale collected 44 operated cases from the literature with a mortality of 45.5 per cent. He added ten cases of his own with a mortality of 36.6 per cent. Of the successfully operated cases in these groups, only nine were under one year of age and the youngest was 41½ hours old.

Orr and Neff[15] in 1936 stated, "Clinical recognition of diaphragmatic hernia in the newborn and early infancy is quite unusual." They added 17 operative cases to the literature, with eight deaths; the patients ranging in age from 41½ hours to nine months. In their description of the clinical appearance of infants with diaphragmatic hernia, they made the following observation which deserves special emphasis, "The sunken abdomen gave the appearance of unnatural emptiness."

Since that time, numerous articles have appeared attesting to the increasing frequency of the recognition of this condition, and to operative attempts at its correction. Miller[14] and co-workers in 1939 reported two cases with one death. Dorsey[4] in 1943 reported a successful operation on a four-year-old girl. Probestein and Diamond[16] in 1944 reported a successful operation on an eight-month-old female, and Rosenblatt and Bilderback,[17] in the same year, reported a successful operation on a two-month-old male. In 1945, Donovan[3] added 17 cases with four deaths, and Wilson and Trueman[24] added one case with recovery. In 1946, Gross[6] reported seven successful cases in an excellent clinical article, and stated that it was "possible to correct the deformity regardless of the small size of the subject." His youngest case, operated upon at 22 hours, developed a recurrence. In the same year, McDowell and Toudra[12] reported one case of a right-sided hernia with death. In 1947, individual successful cases were added by Sawyer[18] and by Urban.[22] In 1948, the case of a seven-week-old male operated upon with recovery was reported by Thorek.[20] In 1948 Swan[19] added a single successfully operated case to the literature. In 1950, Baumgartner and Scott[1] reported 13 cases, only seven of which were operated upon, with four operative deaths. In the same year Zeller[25] reported nine cases with five deaths. Also in that same year individual successfully operated cases were reported by Gardiner,[5] Howard[11] and van der Linden.[23] In 1951, Blackwell[2] reported a case successfully op-

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erated upon in a six-day-old infant, and noted "the abdomen was very small for a full-term baby."

Harrington[10] in 1951, in the most recent of his many articles on this subject, reviewed his 534 cases of diaphragmatic hernia. Twenty-five of these cases were type occurring in the new-born, that is either congenital absence of a portion of the diaphragm, or a hernia through the pleuroperitoneal hiatus (Foramen of Bochdalek). He reported seven deaths in this group of 25 cases.

The embryology and anatomy of the diaphragm, together with classifications of diaphragmatic hernia have been thoroughly given by Harrington,[7, 8, 9] Meyer[13] and many others of the above quoted authors.

To the above 75 successfully operated cases in children under one year of age collected from all the literature, the following case is added.

CASE REPORT

Baby S., white female, born October 31, 1950, at 8:21 p.m., at the Naval Hospital, Portsmouth, Virginia. She weighed 6 pounds 8½ ounces at birth, and her condition was described as "a little sleepy, but good." The day following the birth of the child, she was seen for the first time by the senior pediatrician, Captain John Flannery. He was impressed by the fact that the child showed a slight cyanosis, together with a markedly scaphoid abdomen. His physical examination revealed absence of breath sounds in the left chest, together with shift of the heart to the right. A diagnosis of congenital diaphragmatic hernia was made. This was confirmed by roentgenograms which showed loops of small bowel in the left chest (Fig. 1).

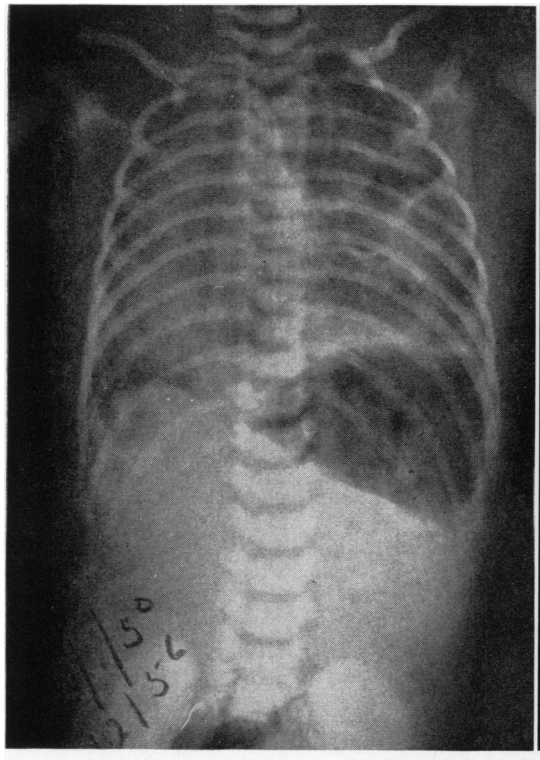


FIG. 1

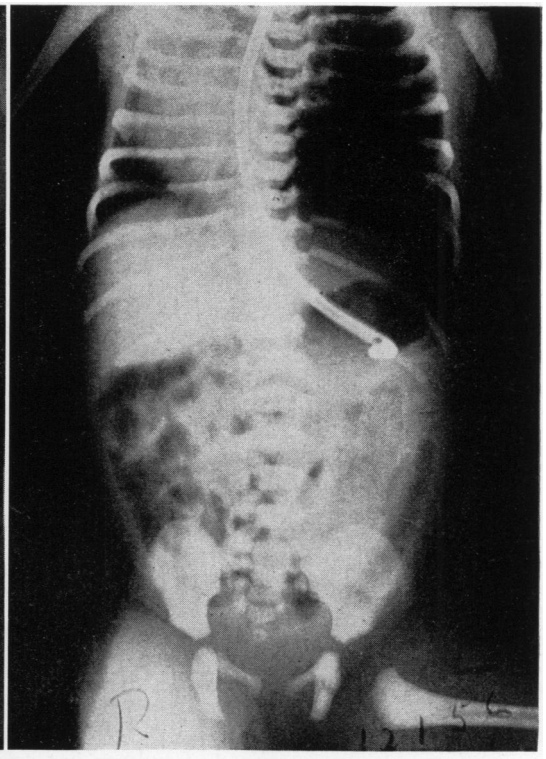


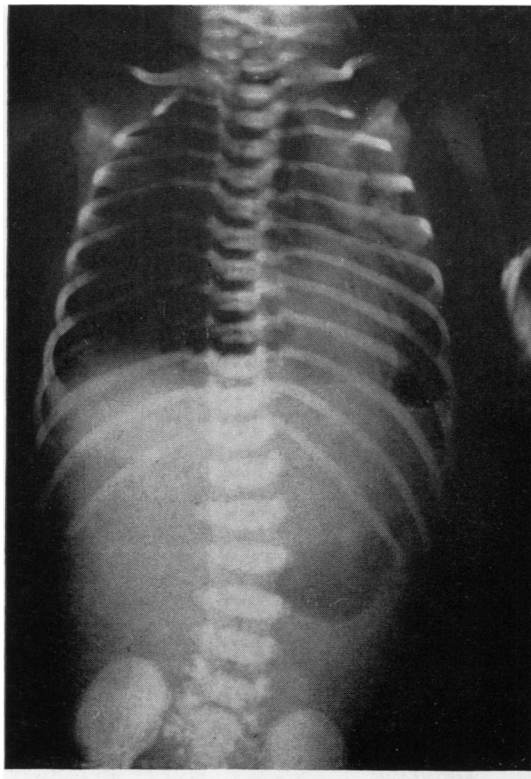
FIG. 2

FIG. 1.—Immediate preoperative roentgenogram showing loops of bowel filling left chest.
FIG. 2.—Immediate postoperative roentgenogram showing complete left pneumothorax.

Preparations were immediately made for operation. A fine polyethylene tube was inserted into the vein in the right antecubital fossa. Through this tube, 75 cc. of whole blood and 75 cc. of 5

per cent glucose in water was given just before and during the operation. General anesthesia was given, using a combination of cyclopropane, nitrous oxide and oxygen through a small face mask which afforded a partially closed system, and permitted positive pressure. Operation was begun when the child was 22 hours old.

with interrupted mattress sutures of black silk in a double overlapping row. The peritoneum and fascia layers were closed together with through and through interrupted black silk sutures. The moderate difficulty in closing the abdominal wall after replacing the abdominal organs was overcome by the expedient of placing the sutures alter-



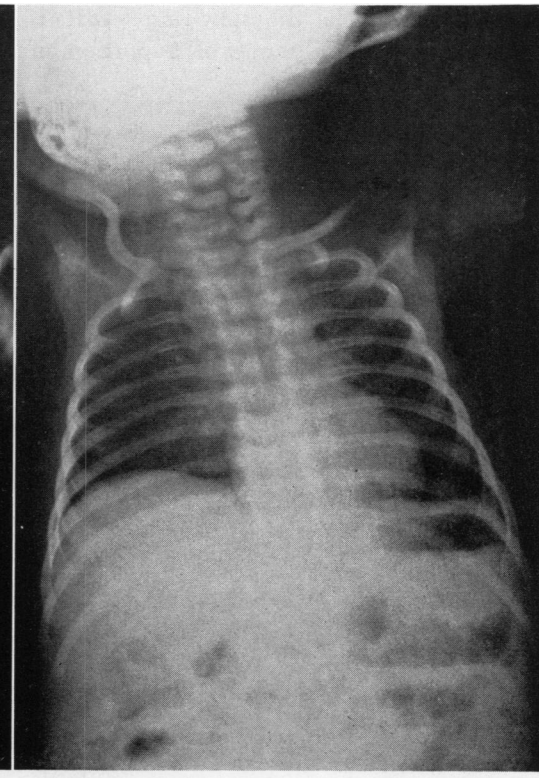


FIG. 3 FIG. 4

FIG. 3.—Atelectasis on the sixth postoperative day.
FIG. 4.—Condition just prior to discharge.

A left upper paramedian incision was used. Upon opening the abdomen, the only viscera found in their proper situations were the liver and the descending and sigmoid colons. The stomach, spleen, entire small bowel, cecum, ascending and transverse colons and the splenic flexure were in the left pleural space. There was non-fusion along the posterior diaphragmatic attachment (foramen of Bochdalek). There was a small ridge of diaphragmatic muscular tissue along the posterior abdominal wall, approximately 8 mm. high. The defect was almost the entire length of the left diaphragmatic leaf. The abdominal organs were reduced and replaced in their proper relations in the abdominal cavity. The edges of the defect in the diaphragm were freshened, and then closed nately from each end toward the middle of the incision. The skin was then closed with interrupted black silk sutures. A small gastric tube was placed into the stomach. The entire operation consumed one hour and 15 minutes.

In spite of attempts to reinflate the left lung, immediate postoperative roentgenogram revealed a complete pneumothorax on the left side (Fig. 2). A chest tap was immediately performed and about 50 cc. of air and several cc. of serosanguineous fluid were removed. Oxygen was given through a nasal catheter, and the child was placed in an incubator. Color and general condition at the end of the operation were good. Twenty-four hours postoperative, the nasal catheter and Levin tubes were removed and feedings were begun.

On the fifth postoperative day, the infant's general condition appeared slightly deteriorated; the color was poor, and the first temperature rise since operation was noticed. Streptomycin and chloromycetin therapy was begun and fluids maintained by clysis. The infant's condition became worse in the next 24 hours; the temperature rose to 103.4, and physical examination revealed a shift of the heart to the left. A roentgenogram confirmed the diagnosis of massive atelectasis of the left lung (Fig. 3). On the sixth postoperative day, the infant was aspirated through a catheter under direct laryngoscopy by the anesthesiologist. A moderate amount of thick mucus was removed, and the color of the child immediately improved. Roentgenograms in the following days showed gradual return of the heart to normal position, with gradual clearing of the left lung field. Temperature was normal on the ninth postoperative day, and remained so throughout the hospital stay. The infant took its formula and feedings well and had daily normal bowel movements. Roentgenograms taken on December 4, 1950, 33 days after operation, showed clear lung fields. The heart was in its normal position. There were good diaphragmatic shadows and normal gas patterns in the abdomen (Fig. 4). The child was discharged from the hospital on December 9, 1950.

Follow-up of the child's development revealed that she weighed 27 pounds at the age of 18 months. She started sitting up at the age of six months, crawled at 7½ months and walked at one year. According to the mother, the baby is very active and her development was identical in every way with that of an older sister. A roentgenogram made when the child was 19 months of age revealed no abnormalities.

COMMENT

It is commonly agreed that most infants with diaphragmatic hernia die in the first few days of cardiac or respiratory difficulty. Therefore, immediate operation is advocated. This necessitates early diagnosis. A newborn infant with a sunken abdomen should arouse suspicion as to the possible presence of diaphragmatic hernia. This suspicion should be confirmed by roentgenogram examination. The use of barium is very rarely necessary, and according to Gross, will make the surgery more difficult. Cyanosis should not be a deterrent to operation. A closed anesthesia system without intratracheal tube is advocated by most authors. Zeller, however, advocates the use of a polyethylene intratracheal tube, which, he claims, does not cause edema of the larynx. The operative approach should be through the abdomen. Swan points out that 58 per cent of the cases had malrotation of the intestines. Phrenic crush is not considered necessary. The difficulty in replacing the intestines to the abdominal cavity, which caused Gross to devise his two-stage operation, may be overcome, as in this case, by the use of interrupted silk sutures through all layers, placing them alternately from each end towards the middle of the incision.

SUMMARY

1. A review of the literature is given.

2. A successfully operated case of diaphragmatic hernia in a 22-hour-old newborn is described.

3. The importance of the appearance of the newborn with diaphragmatic hernia is emphasized.

4. Immediate operation through an abdominal incision is advocated.

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