Survival of an Infant Following Massive Resection of the Small Intestine *

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THE SURVIVAL of infants and children following infarction of major segments of the small intestine is unusual. In many instances only diagnostic celiotomy has been performed.[1,8,10,11] The following case report suggests that a more aggressive approach in such situations may be of value.

Case Report

R. C. F., Jr. was born uneventfully on August 21, 1959 following a normal term pregnancy. He weighed 3,300 grams and was the second-born child. His parents brought him to the hospital at five weeks of age because the infant had become irritable and had vomited bile-stained material repeatedly during the previous 24 hours. The infant passed a small amount of blood-tinged stool following an enema given shortly before admission to the hospital. His heart rate was 180 per minute and the rectal temperature was 38 C. when he was admitted to the hospital. The hemoglobin concentration was 10.7 Gm.%, the hematocrit 30 volumes per cent, and the WBC was 10,500 with a shift to the left. He did not urinate preoperatively. The skin was diffusely mottled, the abdomen was moderately distended, and no bowel sounds were audible. Multiple fluid levels were seen on the x-ray examination of the abdomen. Light palpation of the abdomen caused severe discomfort. A moderate extracellular fluid volume deficit was demonstrated on the initial examination. Preoperative preparation consisted of continuous nasogastric suction, intravenous and subcutaneous replacement fluid and intravenous penicillin and tetracycline.

A laparotomy was performed four hours after admission to the hospital. The preoperative diagnosis was small intestinal obstruction and infarction. The infant was anesthetized with a nitrous oxide-oxygen-ether mixture, administered through an endotracheal catheter. A small amount of foul smelling fluid was encountered upon opening the peritoneum, but bacterial cultures made from the fluid were sterile. The entire jejunum and ileum were included in a volvulus which rotated 360° clockwise. The fixation and position of the colon were normal. A major portion of the small intestine was gangrenous and was resected along with its mesentery. The resection extended from 10 cm. distal to the ligament of Treitz to within 5.0 cm. of the ileocecal valve. The transected margins of the jejunum and ileum were dusky colored and did not bleed. A two-layer, interrupted silk, end-to-end anastomosis was performed and the rent in the mesentery was closed. The peritoneum and fascia of the abdomen were closed without drainage, using interrupted silk. The skin and subcutaneous tissues were packed open

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with moist fine mesh gauze. A small polyethylene catheter was placed in the extradural space and continuous extradural anesthesia of segments nine thoracic through two lumbar was maintained with 3.0 ml. of 0.25 per cent xylocaine hydrochloride anesthesia given every four hours for the first three days postoperatively.

The infant required only the usual care in the early postoperative period. Penicillin, streptomycin and chloromycetin were given intravenously and subcutaneously through October 5, 1959. Delayed primary closure of the wound was performed 48 hours postoperatively. Bowel movements began on the second postoperative day and the nasogastric tube was removed the following day. Oral feedings of 5.0 per cent dextrose in water, and dextrose-amigen-saline mixture were started on the fourth postoperative day, followed on the next day by one to two Nutramigen formula. Small whole blood and serum albumin transfusions were given at intervals as judged necessary by the pediatric staff. The preoperative weight of 3,300 grams fell rapidly in the early postoperative period to 3,100 grams. This was followed by a gradual decline to a low of 2,900 grams. The Nutramigen formula was strengthened and the volume was increased very slowly. A pathogenic strain of escherichia coli was found in the stool on October 13, 1959. Kaopectate and neomycin were then added to the formula.

The infant developed a severe respiratory infection on November 16, 1959. This was associated with nearly uncontrollable diarrhea and metabolic alkalosis. The mouth to anus transmit time was 12 minutes. Slow improvement followed oxygen, continuous intravenous electrolyte replacement and nasogastric tube feedings. The infant passed seven stools on December 29, 1959 and only four on January 11, 1960. He was discharged on January 19, 1960 weighing 4,500 grams and having three to five semi-formed stools a day. The infant developed varicella at five months of age. When six months old he weighed 5,300 grams and was on a normal diet for an infant of that age. At eight months of age, he weighed 7,100 grams and was having five semi-formed stools a day. He weighed 8,700 grams at one year of age, and when last seen at 18 months he weighed 11.8 kg. (26 lbs.—Fig. 1).

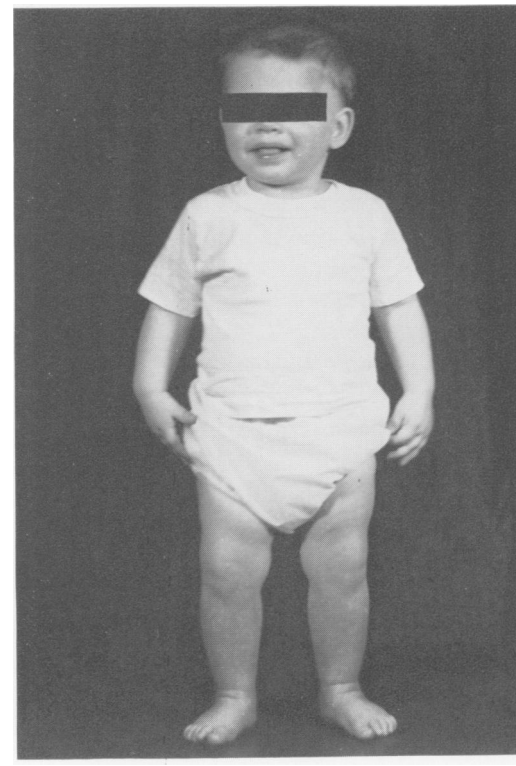

FIG. 1. Photograph of the patient taken at 18 months—weight 26 pounds.

Discussion

The greatest threat to life following extensive resections of small intestine in the infant, occurs during the early postoperative period. In many instances disruption of the intestinal anastomosis has caused fatal peritonitis.[2,4,10] The part and length of the intestine which is resected is of great importance in determining the subsequent nutritional state. While loss of the jejunum is relatively well tolerated, resec-

tions of the terminal ileum are very disabling, the more especially if the ileocecal valve is also removed.[5,6] The intestinal transit time is increased and the over-all disability of the patient is decreased if the ileocecal valve is preserved.[3,4,9]

Continuous extradural sympathetic blockade was used in the treatment of this patient in the hope that it would permit an increased rate of blood flow through the remaining ischemic segments of small intestine. Previous studies in our laboratory indicate that this procedure promotes the survival of dogs treated by ligation of the mesenteric arteries.[7]

Under the circumstances which were present in this infant, little can be lost from a very aggressive approach. The extensive resection was justified in this very ill infant, for not only did the infant recover from the operation, but he has grown in a normal way.

Summary

Massive infarction of the small intestine in a six week old infant was treated by resection of 80 to 85 per cent of the small intestine, primary anastomosis, and continuous extradural blockade. The infant survived and has grown at a normal rate without nutritional defects.

Bibliography

1. Aldrich, M., C. B. Morton and J. P. Baker: Intestinal Obstruction Resulting From Malrotation of the Intestines. Ann. Surg., **141**: 765, 1955.
2. Beattie, J. L.: The Embryologic Basis for the Clinical Manifestations of Midgut Volvulus. Am. J. of Surg., **94**:762, 1957.
3. Clatworthy, H. W., R. Saleeby and C. Lovingood: Extensive Small Bowel Resections in Young Dogs: Its Effect on Growth and Development. Surg., **32**:341, 1952.
4. Hartman, S. W., G. Donnell and H. S. Mooney: Massive Resection of the Small Bowel in Infancy. West. J. Surg., **65**:14, 1957.
5. Kalser, M. H., J. L. A. Roth, H. Timen and T. A. Johnson: Relation of Small Bowel Resection to Nutrition in Man. Gastroent., **38**:605, 1960.
6. Krenen, A. J., J. H. Linner and C. H. Nelson: An Experimental Evaluation of the Nutritional Importance of Proximal and Distal Small Intestines. Ann. Surg., **140**:439, 1954.
7. Liang, H., H. R. Bernard and R. Dodd: A. M. A. Arch. Surg.: **83**:409, 1961.
8. Mersheimer, W. L., J. M. Winfield and R. L. Frankhauser: Mesenteric Vascular Occlusion. A. M. A. Arch. Surg., **66**:752, 1953.
9. Pietz, D. G.: Nutritional and Electrolyte Evaluation in Massive Bowel Resection. Gastroent., **31**:56, 1956.
10. Saltz, H. J. and E. Luttwok: Volvulus of the Midbowel and Its Resulting Intestinal Obstruction. A. M. A. Surg., **76**:633, 1958.
11. Santulli, T. V.: Intestinal Obstruction in the Newborn Infant. J. Ped., **44**:317, 1954.