

APPENDICITIS IN THE NEWBORN

CASE REPORT*

STEPHEN C. MEIGHER, M.D.

SCHENECTADY, N. Y.

AND

ALFRED W. LUCAS, CAPTAIN, M.C., U.S.A.R.

CAMP GORDON, GA.

FROM THE DEPARTMENT OF SURGERY, ELLIS HOSPITAL, SCHENECTADY

APPENDICITIS remains a very common disease entity in adults; nevertheless it often presents itself under bizarre clinical circumstances. In infants and children the disease presents an even greater incongruity between clinical changes and pathologic anatomy. In fact, the absence of an adequate clinical history, the lack of co-operation on the part of the patient, the difficulty encountered on physical examination and the very different mode of reaction of infantile tissue to spillage of appendiceal contents outside physiologic bounds all emphasize the need to recognize how special is the study of appendicitis of the very young.

This article presents a case with some features that differ from most cases described in the literature to this point. It is felt that the lesson gained from the management here will serve to help keep us aware of the possibility of lesions requiring surgical intervention in the newborn.

Case Report. J. M. DeL., the last among triplets to arrive, was born on October 30, 1950, as a footling breech. She was placed at once in an incubator. Birth weight was 4 lbs., 5 ozs. Frequent feedings were started and were taken well until November 9, 1950. She shortly developed abdominal distention and cried out frequently in a shrill manner. On many occasions the skin appeared generally cyanotic to a moderate degree;

icterus (icterus neonatorum?) also appeared to a slight extent. There was then a tendency toward looseness of stools. On November 10, 1950, a Levine tube was passed into the stomach and a large quantity of clear fluid containing shreds of mucus was removed. At the same time the temperature rose to 38.1° C. A roentgenogram of the abdomen on November 10 showed a moderate amount of air in the stomach and in the colon, with no further evidence of obstruction. There was marked dehydration and the baby was obviously in a great deal of pain. There was no rigidity and no masses could be felt. Peristalsis was normal.

It was felt that this child had abdominal changes warranting surgical exploration. Accordingly, 1/1000 gr. of atropine sulphate was given subcutaneously, and one-half hour later, under general anesthesia, a right rectus muscle-splitting incision was made. As the peritoneal cavity was entered, small and large intestine pushed out of the wound. Further investigation revealed an acutely inflamed appendix, the distal 1 cm. of which was covered by a plastic exudate. On examining the ileum, a Meckel's diverticulum was discovered approximately 1 meter from the ileocecal junction. Its base measured 2 cm. across and consisted of an imperfect triangle. The height of the diverticulum was 2 cm. Surgery consisted of amputation of the diverticulum, and appendectomy. A Cushing type of continuous suture of chromic catgut reinforced with interrupted 000 silk was employed in closing the diverticulum wound, while the base of the appendix was doubly tied with chromic catgut and was not inverted, but was sewn over with a pad of omentum. The peritoneum was closed with interrupted vertical mattress sutures of 0000 silk.

* Submitted for publication March, 1952.

Following surgery the patient was given 50 ml. of 2% per cent glucose in saline subcutaneously, alternating with 50 ml. of 5 per cent glucose in distilled water. Aqueous procaine penicillin in the amount of 50,000 units were given intramuscularly once daily. Two days after operation glucose and saline were given by mouth and were retained. Olac was started on November 13 and was retained.

The pathologic report on the Meckel's diverticulum was: "Acute peri-inflammation. The appendix was 3.4 cm. long and 4 mm. in diameter and presented abundant polymorphonuclear leukocytes in all layers, especially in the mucosa. The diagnosis was acute suppurative inflammation of the appendix."

On November 13, serosanguinous drainage was noted on the dressing. In addition, the abdomen was more distended and the baby began to exhibit restlessness. On November 14, a skin separation was noted involving the upper portion of the wound. On the next day an evisceration was seen, whereupon a second operation was carried out, this time for closure of the dehiscence with through-and-through silver wire only.

The second postoperative course was satisfactory for 3 days. The baby was given transfusions of 50 ml. of whole blood on each of these days; she received 50 mg. of aureomycin in her formula of Olac, the former every 8 hours; and, finally, she was given 1000 mg. of ascorbic acid orally.

On November 18 the wound presented a complete slough, with loosening of all wires. Close scrutiny revealed that the fascia was holding, at least well enough to prevent frank evisceration. The overall picture was one of a mixed aerobic-anaerobic infection (*Staphylococcus aureus*; *B. subtilis*; and a rare gram negative rod). Meanwhile, the infant took its feedings satisfactorily and vital signs were all within normal values. Treatment of the slough consisted of bathing the wound with 5 per cent sulfamylon-streptomycin solution through a catheter placed into the dressing. Over this latter was put adhesive pulled tight to avoid further wound separation.

The highest temperature during the hospital stay was 38.7° C, on the day before the wound slough; thereafter the temperature leveled off and remained normal throughout the balance of the hospital stay. On December 15 it was noted that a herniation had occurred within the wound, but this was not accompanied by any degree of evisceration. On January 2, 1951, the baby was discharged weighing 7 pounds, its all-time high up to that day. When last seen on February 21, 1952, the child was in excellent health but exhibited a small incisional hernia 3 cm. in length and one and 0.5 cm. in width.

INCIDENCE

Cases of appendicitis of the newborn or of the early weeks of life are described infrequently in the literature. Norris,⁶ in a study of 1000 cases of appendicitis in children, found the average age to be eight years and the youngest patient was four months old. Landaas⁴ has found that out of 3145 cases of acute appendicitis treated in the decade from 1936 to 1946 at the Aker Hospital in Oslo, 50 were in children under five years of age, and none was under one year. For years the very low incidence of appendicitis in infants has been recognized, having been pointed out by Abt¹ in 1917. Wilson,⁷ in 500 cases, found only one under two years of age.

DIAGNOSIS

In Landaas' report it is interesting to observe that almost all mothers early recognized that the child had abdominal pain. Most surgeons, the author reminds us, are unsure of the location of the pain when they examine the child. Landaas adds that for him, a tip-off as to the location of pain appears when a change in the facial expression can be perceived as the abdomen is palpated.

An interesting account comes out of Czechoslovakia, where Cakl² restates the signposts to the diagnosis of appendicitis in children under three years of age:

"1. If a child says he has pain, or indicates this somehow, trust him completely; but a child may have appendicitis without displaying pain. Children are said to be more stoical than adults. Of course, evidence of pain is ever so much more difficult to discern in the newborn.

"2. Vomiting, especially that which persists, must be observed seriously.

"3. In acute appendicitis and in other lesions that cause abdominal pain, the child keeps the household up all night, whereas in pneumonia he is more likely to sleep."

Although many surgeons are interested in the leukocyte count to help them in the

diagnosis, few are unaware of the fact that not infrequently a low count accompanies a ruptured appendix. Conversely, some so-called catarrhal appendices will exhibit very high white counts.

ANATOMY AND PATHOLOGIC PHYSIOLOGY

Every pediatrician and surgeon should recognize that the lesion here discussed is entirely different from inflammation of the same organ in the adult. This is caused by the anatomical differences, largely, but, in addition, by different physiologic reactions. Some of these are:

A. *Anatomical*. 1. In children the appendix has a thinner wall than in adults. This is quite definitely a contributing factor in the higher incidence of rupture of an infantile appendix.

2. A smaller and thinner omentum obviously does not afford as good an envelope for the escaping material.

3. The peritoneal cavity is a whole lot smaller so that the farthest recesses are reached more quickly by escaped contaminants.

4. The hollow viscera are attached by relatively longer mesenteries which therefore have less tendency to block the spread of fluid.

5. The cecum is relatively smaller and less distensible, so as to thrust a greater intraluminal pressure more rapidly upon the appendix.

B. *Physiologic*. 1. The peritoneum in children probably absorbs toxins more rapidly than in adults.

2. The problem of fluid and electrolyte balance is even more serious in children. Neumann and Chassin⁵ have recently pointed out that a 7-Kg. infant has a daily water output of one-half its entire extracellular fluid volume, whereas a 70 Kg. man exhibits a fluid loss each 24 hours of only one-seventh of this compartment volume. These relatively large fluid and metabolite variations may soon alter the electrolyte status. Chassin³ has reiterated that adults

require 30 to 45 ml. of water per kilogram of body weight per day while children require 45 to 100 ml. and infants 100 to 165 ml. Seventy kilograms of infant body weight, to put it another way, are seen to require the tremendous amount of just under ten liters of water for basic metabolism! Pathologic needs would of course create even higher figures.

3. Adverse metabolic processes in infants are indicated by Norris, who noted that 53 per cent of his cases exhibited acetonuria.

CONCLUSIONS AND SUMMARY

A case is presented of appendicitis in a ten-day-old infant girl, one of triplets, who also had a Meckel's diverticulum. She was operated upon, suffered an evisceration and then a wound dehiscence and finally recovered, and has stimulated a search through some literature for statistics on similar cases. The principal interest in this case resides in the successful management of the tremendous postoperative problems which have heretofore been almost invariably fatal. Of nearly as much interest, and certainly of as much importance, was the need for prompt diagnosis.

We must be constantly reminded of the differences between appendicitis in infants and in adults. The mechanism of this disease in the very young differs from that in adults because the infant peritoneal cavity is so constructed as to allow free spread of fecal material, once this latter has made its way through the thinner appendix wall, and physiologic differences also are present. In addition, the difficulty in making a diagnosis contributes to the serious problem handed to the pediatrician and surgeon.

The doctor managing the case must recognize that what lies within the peritoneal cavity may have exposive consequences, although the external manifestations are misleading and sometimes even apparently negligible. While he may be accustomed to decide on one visit as to whether he must

operate in the case of an adult, he should never be satisfied with a single cursory examination in an infant. Our policy is to make repeated examinations at something like half-hour intervals in these cases. Then, after a reasonable period of watchful waiting, and in order to execute a mental graph of the trend, we sit down and put together all the facts and come to a fairly definite conclusion.

At least one characteristic is common to both infants and adults: the more auspicious recovery index brought about by improvements in surgery, anesthesia, antibiotics and the newer concepts of fluid and electrolyte balance.

BIBLIOGRAPHY

- ¹ Abt, I. A.: Appendicitis in Infants. *Arch. Pediat.*, **34**: 641, 1917.
- ² Cakl, Z.: Nase Zkusenosti s appendicitidou u deti do 3 let. *Lek. Listy*, **1**: 169, 1946.
- ³ Chassin, J. L.: Postgraduate lecture, New York Univ. Postgrad. Med. School, September, 1951.
- ⁴ Landaas, B.: Diagnosis of Appendicitis in Young Children. *Tidsskr. norske laegefor.*, **68**: 335, 1948.
- ⁵ Neumann, C. G., and J. L. Chassin: Pre- and Postoperative Management in Children. *New York State J. Med.*, **50**: 2933, 1950.
- ⁶ Norris, W. J.: Appendicitis in Children. *Western J. Surg., Obst. & Gynec.*, **54**: 183, 1946.
- ⁷ Wilson, W. E.: Appendicitis in The Newborn: Report on Case 16 Days Old. *Proc. Roy. Soc. Med.*, **38**: 186, 1945.