

Neonatal Colon Rupture

HIDEKI MORIMOTO,* YASUTSUGU TAKADA,* KAZUHIRO MARUHASHI,*
HIROSHI ISHIHARA,* YUKIO CHIBA*, NOBUHIKO TANIGAWA*,
RYUSUKE MURAOKA*, and YOJI URATA**

The 2nd Department of Surgery* and The Department of Central Laboratory,**
Fukui Medical School

Received for Publication, Apr. 8, 1985.

Neonatal colon perforation or rupture is a rare clinical entity and its prognosis is still poor. The authors salvaged a 2-day-old male neonate who had a sigmoid colon rupture and an imperforate anus with emergent operation, sufficient dose of antibiotics and intravenous fluid infusion. The defect of the muscular layer was proved in the ruptured wall of the sigmoid colon. The defect and other mechanical factors mainly concerned to the rupture in this patient.

Case Report

A 2-day-old 3,400 gm. male neonate was admitted with a 2-day history of vomiting and abdominal distension. He was born to a 29-year-old gravida 1, para 1 mother by spontaneous delivery with a birth weight of 3,600 gm. after 41-week gestation. His mother presented mild proteinuria and peripheral edema, but didn't have no other complication on her gravidal period. He cried spontaneously at birth, and required no resuscitation. His Apgar score was 10 at one minute and 10 at five. On the first day of life, he vomited when he took 10 ml of 5% glucose solution, and a recurrent episode of vomiting appeared when he took 10 ml of mother milk. On the second day, abdominal distension appeared, and so he consulted our hospital.

On admission, gross abdominal distension and decreased bowel sound were noted. His heart rate was 202/min. and his respiratory rate 70/min. His crying was weak but movement of his extremities was good. He had an imperforate anus with a very narrow perineal fistula, through which a little meconium has passed since birth. He had received little oral feeding.

Laboratory data presented mild hyponatremia and hypocalcemia, but no abnormal hematologic finding was found.

Roentgenographic investigation revealed a large amount of free air in the intraperitoneal space.

At laparotomy, massive greenish fluid was found in the abdominal cavity, and extensive faecal peritonitis existed. The longitudinal rupture 3.5 cm in length was detected in the distal one-third sigmoid colon along a taenia coli. Other adjacent segments of 1.5 cm proximal as well as distal to the rupture were in defect of the muscular layer. Also, the rectum and the sigmoid

Key words: Neonatal colon rupture (perforation), Congenital muscular layer defect, Mechanical factor.

索引語: 新生児結腸破裂(穿孔), 先天性筋層欠損, 機械的要因.

Address: The 2nd Department of Surgery and The Department of Central Laboratory, Fukui Medical School, Japan.

Table 1. Emergent laboratory data on admission

GOT	74 IU/l	RBC	501×10 ⁴ /ml
BUN	30 mg/dl	Hb	17.1 g/dl
creatinin	1.3 mg/dl	Ht	49.1 %
TP	5.4 g/dl	MCV	98.0 μml
T-Bil.	6.7 mg/dl	MCH	34.1 pg
		MCHC	34.8 g/dl
Na	131 mEq/l	WBC	8400 /ml
K	3.7 mEq/l	PLT	12.8×10 ⁴ /ml
Cl	101 mEq/l		
Ca	3.0 mEq/l		

colon anal to the rupture were dilated. No other anomaly was detected in the abdomen. A double barreled sigmoidostomy was performed, and the perforated lesion was primarily closed by Albert-Lembert suture after débridement.



Fig. 1. The longitudinal rupture 3.5 cm in length was detected in the distal one-third sigmoid colon (▲).

After the operation, enough amount of antibiotics was administrated. The postoperative course was uneventful except metabolic alkalosis, which was corrected by a careful intravenous fluid infusion therapy. A perineal fistula was treated with bougienage, and cut-back method was secondarily performed for an imperforate anus on the 45th day after birth. He was discharged at 3 months of age, in a good condition, weighing 5,800 gm.

Pathology

The mucosa of the bowel was well preserved, and the villi were short and covered by cylindrical epithelia. The submucosa was edematous and congested with cellular infiltration. The external and internal coats of the muscular layer at the site of the rupture showed an abrupt interruption, and replaced by a fibrous tissue strand. At this site, the bowel wall was composed of the mucosa, the submucosa and the serosa. The myenteric nerve plexus was preserved.

Discussion

Neonatal colon perforation or rupture is a rare but well-known clinical entity. Neonatal intestinal perforation is classified by its perforated site. The colon perforation is the most frequent next to the gastric perforation^{15).}



Fig. 2. The muscular layer showed an abrupt interruption (▲), and replaced by a fibrous tissue strand (▲▲). The mucosa was well preserved, and the submucosa was edematous and congested with cellular infiltration. Also, the myenteric nerve plexus was preserved. (original magnification: $\times 100$)

Etiology of this entity is unknown but several hyposyntheses have been proposed. They include the followings; 1° congenital defect of the muscular layer^{5,8)}, 2° elevated intraluminal pressure^{1,6,10)}, 3° local circulatory disturbance (ischemia, hypoxia^{9,12,14)}, 4° infection including necrotizing colitis^{4,6)}, 5° trauma and instrumentation^{2,16)} and so on.

Cause of colon perforation or rupture is not always one, and sometimes several factors concern to it¹⁰⁾. Colon perforation is observed more frequently in a small-for-date neonate⁹⁾. It occurs in the neonate who has a complicated disease such as imperforate anus and Hirschsprung's disease, too^{2,6)}.

In the patient, the existence of an imperforate anus with a very narrow perineal fistula and the dilated colon and rectum suspected the elevation of the intraluminal pressure. Moreover, a pathological examination revealed the defect of the muscular layer. This defect was a weak-point to an abnormal pressure. These facts indicate the concern of mechanical factors. There was no history of perinatal asphyxia and the colon mucosa, which is the weakest to ischemia, was intact. These facts may exclude the concern of a local circulatory disturbance (ischemic factors) at least in this patient.

The term of colon perforation and rupture has been used obscurely. Authors reported this case as "colon rupture" not "colon perforation" because mechanical factors contributed to the formation of this lesion. Generally, the lesion in colon rupture (mainly due to mechanical factors) is large and that in perforation (mainly due to ischemic factors) is small (sometimes pinhole sized) and often multiple.

Neonatal colon perforation or rupture was poor prognosis^{4,15)} and all cases were fatal in the era when SIMPSON¹³⁾ reported firstly in 1838, but some cases became rescue since surgery was indicated and antibiotics was used^{3,7,11)}. In the treatment of neonatal colon perforation or rupture, early diagnosis, prompt operation and administration of sufficient dose of antibiotics are required essentially. Surgical method includes the followings²⁾: 1° primary resection with anastomosis, 2° resection with a proximal colostomy, and 3° primary suture of the defect. Resection is necessary in the case in which ischemic factors are recognized.

References

- 1) Burt CAV: Pneumatic rupture of the intestinal canal. *Arch Surg* **22**: 875-902, 1931.
- 2) Cacioppo PL and Gau FC: Idiopathic perforation of the colon in a newborn. *Am J Surg* **132**: 392-393, 1976.
- 3) Doyle CR: Diagnosis and treatment of meconium peritonitis. *Southern Med J* **44**: 358-360, 1951.
- 4) George FM and Friedberg MJ: Neonatal perforation of the colon. *Am J Obstet Gynecol* **122**: 788-789, 1975.
- 5) Herbut PA: Congenital defect in the musculature of the stomach with rupture in a newborn infant. *Arch Path* **36**: 91-94, 1943.
- 6) Kubista TP, Lynn HB, et al: Spontaneous perforation of the colon in the newborn. *Mayo Clin Proc* **45**: 103-113, 1970.
- 7) Lee CM Jr and MacMillan BG: Rupture of the bowel in the newborn infant. *Surgery* **28**: 48-66, 1950.
- 8) Litwin A, Avidor I, et al: Neonatal intestinal perforation caused by congenital defects of the intestinal musculature. *A J C P*, **81**: 77-80, 1984.
- 9) Lloyd JR: The etiology of gastrointestinal perforations in the newborn. *J Pediatr Surg* **4**: 77-84, 1969.
- 10) Nixon GW, Condon VR, et al: Intestinal perforation as a complication of the neonatal small left colon syndrome. *Am J Roentgenol Radium Ther Nucl Med* **125**: 75-80, 1975.

- 11) Salbransky R: Perforation of the colon in a neonate who recovered JAMA: **175**: 619-620, 1961.
- 12) Scholander PF, Hammel HT, et al: Circulatory adjustment in pearl divers. J Appl Physiol: **17**: 184-190, 1962.
- 13) Simpson JN: Notices of cases of peritonitis in the foetus in utero. Edinburgh Med Surg J: **2**: 390, 1838. (quoted from literature 4)
- 14) Touloukian RJ, Posch JN, et al: The pathogenesis of ischemic gastroenterocolitis of the neonate. J Pediatr Surg: **7**: 194-205, 1972.
- 15) Tucker AS, Soine L, et al: Gastrointestinal perforations in infancy. Am J Roentgenol Radium Ther Nucl Med **123**: 755-763, 1975.
- 16) Zirković S, Milosević V, et al: Prenatal gunshot perforation of the colon. J Pediatr Surg: **11**: 591-592, 1976.

和文抄録

新生児結腸破裂の一治験例

福井医科大学第2外科（主任：村岡隆介教授）

森本 秀樹，高田 泰次，丸橋 和弘，石原 浩
千葉 幸夫，谷川 允彦，村岡 隆介

同 中央検査部

浦 田 洋 二

新生児の結腸破裂（穿孔）は希であり，その予後は
今なお芳しくない．著者らは，手術及び綿密な術後管
理によって救命し得た低位鎖肛を伴うS状結腸破裂の

新生児症例を経験した．本症例においては，病理学的
に腸管壁の筋層欠損を認め，これが結腸破裂の主因で
あったと考えられた．