

# INTUSSUSCEPTION IN THE NEWBORN

BY

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Intussusception is a rare condition during the neonatal period. Isolated cases have been mentioned in many of the large series reported from various centres, but only a few cases are described in detail. The purpose of this paper is to describe one such case, report nine new cases and review the literature on this subject.

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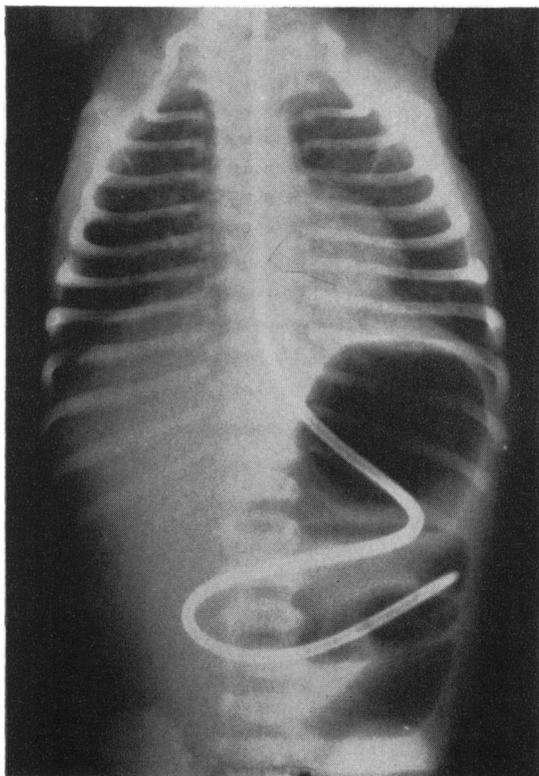


FIG. 1.—Antero-posterior view of the abdomen after the injection of 40 ml. of air into the stomach.

## Case Report

This female infant, the second child of normal parents, was born on January 4, 1960, weighing 7 lb. 10 oz. (3.46 kg.). She started vomiting bile-stained fluid from the first day, some of these vomits being projectile. Meconium was passed on January 7, for the first time. She was admitted to the hospital on January 9. On examination there was some epigastric distension, but no masses were palpable. There was a large gush of soft, jelly-like dark-red meconium after a rectal examination. Plain radiographs of the abdomen showed a small quantity of gas in the stomach and the duodenum. There was no gas anywhere else in the abdominal cavity. As the appearances were not typical of any common form of intestinal obstruction, it was felt that further investigations were justified. A tube was passed into the stomach and 40 ml. of air was injected. Another series of plain films revealed that the gas passed round the duodenum into the upper jejunum. The terminal part of the gas shadow tapered down into a cone (Fig. 1). Although this appearance was not typical of small bowel atresia, it was obvious that some form of intestinal obstruction was present and laparotomy was performed on the same day. There was an irreducible intussusception about 15 cm. from the duodeno-jejunal flexure. This was resected and an end-to-end anastomosis performed. The baby made an uneventful recovery and was discharged home on January 18. Histological examination showed (Fig. 2) that the apex of the intussusception was formed by an adenomatous polyp about 2 cm. in length. There was necrosis of the muscle

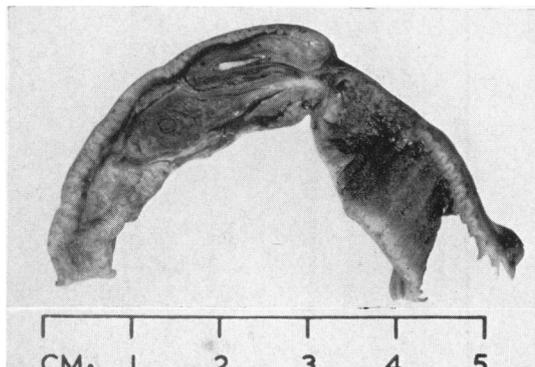


FIG. 2.—Resected specimen of jejunal intussusception, showing a polyp at the apex.

TABLE 1

Source	Symptoms	Treatment	Outcome
Tweedy (1906)	Haemorrhage from the bowel at age of 2 days	Died on 3rd day	Autopsy: intussusception
Dowd (1913)	Screaming, vomiting, bloody stools and mass in abdomen and per rectum at age of 3 days	Laparotomy at 5 days; resection of colon from mid-transverse to upper sigmoid; lateral anastomosis	Recovered; no mention of underlying pathology
Gelston and Sappington (1930)	Old clotted blood per rectum on 2nd day; vomited bile and passed bright red stool on 3rd day; thought to be haemorrhagic disease; given blood by intramuscular injection	—	Autopsy: ileo-caecal intussusception 10 cm long; no polyps
Mayo and Phillips (1933)	Symptoms for 36 hours; child > 3 weeks old	Ileo-caecal intussusception 15.2 cm. long; resection and lateral anastomosis	Died next day
Adamson and Hild (1939)	Vomiting at 36 hours; jelly-like substance with blood in enema returns; hard and distended abdomen with visible peristalsis	Laparotomy at 38 hours; last inch of ileum was in caecum; reduced with difficulty. Terminal 45.7 cm. of ileum dilated by putty-like meconium, impossible to remove; ileostomy	Died at 59 hours; was thought to have meconium ileus and intussusception
Lewis (1939)	Bile vomit from birth; tarry stools; inconstant mass in left upper quadrant; obstruction at pylorus shown on barium meal	Laparotomy on 5th day showed 2 intussusceptions: (1) 5 cm. from D.J.* flexure occupying 10 cm. of bowel; gangrenous; resection and gastrojejunostomy; (2) 15.2 cm. distally reduced	Died 42 hours after operation; no cause for intussusception
Scott (1943)	6 weeks premature; caesarian section for toxæmia; vomiting bile at 32 hours; bloody stool 83 hours	Laparotomy at 6 days; jejunal intussusception 5 cm. in length; gangrenous; resection and lateral anastomosis	Died on 7th day after operation
Jeffrey (1946)	Caesarian section for uterine inertia at 8 months gestation; vomiting at 22 hours, later bile stained; passed meconium—later bloody stools	Laparotomy at 28 hours; intussusception at ileo-caecal valve, 6.4 cm. in length; reduced easily	Died 58 hours after operation; no mention of cause of intussusception on autopsy
Prouty, Bruskevitz and Schwei (1949)	Bleeding per rectum, from 2nd day; vomiting was bile stained later; proctoscopy showed bluish congested mass at 10 cm.	Laparotomy on 4th day; perforation of sigmoid flexure; ascending colon, caecum and 10 cm. of ileum were gangrenous; resection and anastomosis done at both sites	Died just after operation
Åkerrén and Pettersson (1954)	Bright red blood per rectum on 2nd day; no vomiting or pain; barium enema showed intussusception	Laparotomy showed large intussusception from ileum to mid-transverse colon; perforation at splenic flexure by barium enema; resection anastomosis; no tumour	Died 10 hours after operation
Åkerrén and Pettersson (1954)	Screaming at 1½ days; later vomiting, dark stools; two days later radiograph showed obstruction	Laparotomy; intussusception at middle of small intestine with infarction; resection anastomosis	Recovered; apex formed by tumour, size of French bean
Feggetter (1954)	Melaena at 30 hours; green vomit at 48 hours; petechial haemorrhages noticed at 60 hours; fresh blood in stools; obstruction at duodenum on radiographs	Laparotomy at 77 hours; intussusception 25.4 cm. from D.J. flexure, 30.5 cm. in length; resection and side-to-side anastomosis	Recovered; 18 cm. of haemorrhagic and gangrenous bowel
Swain and France (1954)	Developed obstruction on 11th day; rectal bleeding; no colic; mass palpable	Laparotomy on 12th day; ileo-colic intussusception reduced; ileo-colostomy performed	Recovered

Lannin, Leven and Tongen (1955)	Tear in right scrotum with bile discharge at birth; large left inguinal hernia	Both herniae repaired and laparotomy done at 12 hours; intussusception apparently several weeks old. 3.8 cm. of bowel resected and anastomosis done	Recovered; mummified intussusception
Shnitka and Sherbaniuk (1956)	Born 2 months premature; large protuberant abdomen	Died in three minutes	Ileal intussusception 8 cm. from I.C.† valve; perforation of anterior surface; no cause; estimated to be week old
Noel and Beasley (1957)	Bile-stained vomit at 48 hours; mild epigastric distension 3rd day; barium meal showed obstruction	Laparotomy on 5th day; intussusception 25.4 cm. from D.J. flexure; resection anastomosis; another laparotomy on 24th day; adhesiotomy for obstruction; old anastomosis appeared like normal bowel	Recovered; partially gangrenous polyp
From Alder Hey Children's Hospital (1953)	Diaphragmatic hernia repaired on 2nd day; well until 7th day, when vomited feed with bile; passed tarry stools next day; plain radiograph showed obstruction	Laparotomy on 8th day; ileal intussusception between the upper and middle third of ileum; reduced without difficulty	Recovered; no mention of underlying pathology
From Alder Hey Children's Hospital (1954a)	Red currant stools and bile vomit on 2nd day; ladder pattern and abdominal distension noted next day; plain radiograph showed obstruction; no masses felt	Laparotomy on 4th day; ileo-caecal intussusception 7.6 cm. in length; reduced with difficulty; caecum was opened to remove a mucosa-covered sessile cyst, attached to the ileo-caecal valve	Recovered; cyst lined by columnar mucus-secreting cells and wall contained muscle
From Alder Hey Children's Hospital (1954b)	Vomiting after each feed on 20th day; later bile stained and then faecal; stools scanty but normal; crying; no mass felt; tense, tympanitic abdomen; no bowel sounds; plain radiograph showed obstruction	Laparotomy on 25th day; small intussusception in terminal ileum; reduced easily	Recovered; no other pathology noticed
From Alder Hey Children's Hospital (1961)	Exomphalos repaired by primary closure within a few hours after birth; developed intestinal obstruction at age of 3 days	Laparotomy; jejunal intussusception 3.8 cm. in length; reduced easily	Recovered; no underlying pathology evident
From Royal Hospital for Sick Children, Glasgow (1953)	Well until age of 12 days; began to cry and draw up legs; blood on rectal examination; mass in abdomen felt only under anaesthetic.	Laparotomy showed ileo-caecal intussusception; reduced with ease	Recovered; no mention about underlying pathology
From Royal Hospital for Sick Children, Glasgow (1956)	Screaming attack with loss of colour and drawing up of legs at age of 5 days; no mass felt	Laparotomy; ileo-colic intussusception; reduced without difficulty	Recovered; readmitted at 4 months; similar intussusception reduced with some difficulty; recovered; no mention about underlying pathology
From Royal Hospital for Sick Children, Glasgow (1961)	Bile-stained vomiting from birth; plain radiograph showed jejunal obstruction	Laparotomy at 21 hours; jejunal intussusception; resection and anastomosis	Died 24 hours later; autopsy showed large cerebral haemorrhage; polyp at apex of intussusception; histology of hamartoma
From The Hospital for Sick Children, London (1944)	Convulsions and circulatory failure on 3rd day; blood-stained stools and vomit later; no pain; no mass; generalized rigidity of abdomen; increased bowel sounds	Not operated; died soon after admission; death occurred 19 hours after the first symptom	Autopsy: punctate haemorrhage all over; ileo-caecal intussusception with valve as tip, measuring 3.8 cm.; no underlying pathology
From The Hospital for Sick Children, London (1947)	Copious bile-stained vomit from first day; meconium passed, later stools scanty	Laparotomy on 6th day; jejunal intussusception reduced; intestine opened to remove a cyst from the site of the apex	Died on 11th day; cyst wall contained muscle and was lined by mucosa of small intestine

\* D.J. = duodeno-jejunal.

† I.C. = ileo-caecal

coat in the covering layer of the intussusception and atrophy of the mucosa at one point.

**Review of Literature**

A search through the literature up to the end of 1960 was made. Only those cases in which the diagnosis was confirmed either at operation or at autopsy were selected for review, though a few cases which did not qualify are mentioned separately as they are of some interest. With these criteria, a total of 16 cases was found. In addition the records of three British hospitals provided nine further cases, none of which had been reported. These, together with the case described in this paper, provide 26 cases for analysis. The most recent review of the subject was by Rachelson, Jernigan and Jackson (1955). All their cases could not be included in the present review as sufficient information was not available in every case (Table 1).

**Symptoms.** Vomiting and blood in the stools were almost invariably present (Table 2). Evidence of abdominal pain and the palpation of an abdominal or rectal mass seem to be uncommon findings.

TABLE 2

Symptom	Recorded	Not Present	No Mention
Vomiting .. .. .	20	2	1
As first symptom .. .. .	14		
Bile staining .. .. .	9		
Blood in stools .. .. .	17	2	4
As first symptom .. .. .	11		
Screaming .. .. .	5		
As first symptom .. .. .	4		
As only symptom .. .. .	1		
Mass felt per rectum .. .. .	2		
Mass felt abdominally .. .. .	4		

Symptoms have not been recorded in three cases.

Many cases presented with blood in the stools as one of the first symptoms. In the three cases in which vomiting was either absent or not recorded, blood in the stools was the first symptom. In one of these it was the only symptom, and diagnosis was made only at autopsy. In another, although blood in the stools was the only symptom, a diagnosis was made by the help of barium enema. In the third case, all other clinical features were present and a clinical diagnosis was made.

Many infants exhibited symptoms soon after birth (Table 3). Three of these were said to be premature. One of them was said to be two months premature and died soon after birth. Autopsy findings suggested that the intestinal obstruction

TABLE 3

Age at First Symptom	Number
Up to 48 hours .. .. .	15
Up to 1 week .. .. .	5
Up to 1 month .. .. .	4
Total .. .. .	24
Died soon after birth .. .. .	1
Unusual presentation .. .. .	1

was of about one week's duration. The intussusception had obviously occurred *in utero*. All the six cases in which a causative lesion was present showed first symptoms within the first 48 hours.

**Diagnosis.** A pre-operative clinical diagnosis of intussusception was made in six cases; four of these had a palpable mass. In 13 cases the abdomen was opened with the diagnosis of obstruction made on clinical grounds either with or without the help of plain radiographs. In two cases a barium meal examination was undertaken to diagnose obstruction. In one case a barium enema demonstrated an intussusception, but the barium also succeeded in reaching the peritoneal cavity through a perforation in the splenic flexure near the apex of the intussusception. Diagnosis of intussusception was made at autopsy in four instances.

**Treatment.** Apart from the four cases diagnosed after death all others were operated on (Table 4).

TABLE 4

	Total	Alive	Dead
Resection .. .. .	12	6	6
Reduction .. .. .	10	7	3

Simple reduction was done in nine cases. One of these recurred four months later at the same site and was treated again by simple operative reduction. Reduction and ileo-colostomy were done in one instance. Out of the 12 cases which needed resection of bowel, one needed another laparotomy for lysis of adhesions three weeks later.

**Pathology.** The commonest site of intussusception was in the ileo-caecal region (Table 5). The proportion of cases with jejunal intussusception, however, is much higher than would be expected in a series of older infants. The incidence of underlying pathology is also higher in the jejunal group. Out of the eight cases of jejunal intussusception, six were treated by resection. In one case in which

TABLE 5

Type of Intussusception	Number	Method of Treatment			Causative Lesion
		Reduction	Resection	None	
Ileo-caecal .. .. .	12	6	3	3	1
Jejunal .. .. .	8	2	6	—	4
Ileal .. .. .	3	—	1	—	1
Colic .. .. .	1	—	1	—	—
Site not mentioned .. .. .	2	—	—	—	—

simple reduction was successful, enterotomy had to be done to remove an 'enteric cyst'. Three cases showed interesting associated lesions. Meconium ileus was present in one, diaphragmatic hernia in another and an exomphalos in a third. The last two had the corrective operations for their lesions six days and three days previously. Whether the resulting increase in the abdominal contents and pressure had any relation to the aetiology of the intussusception is open to speculation.

**Other Reported Cases.** Three other cases are reported in considerable detail in the literature. These could not be included in the review as the diagnosis was not confirmed at operation or at autopsy. However, the histories of these cases are so suggestive of intussusception that it was decided to mention these.

Becker's (1955) patient started vomiting at 10 days. He continued to vomit and to pass small amounts of stool until the seventeenth day, when a mass was felt in the right lower quadrant of the abdomen. Blood was noted on rectal examination. Surgery was refused and the baby's condition continued to deteriorate until the twenty-fourth day when the mass was still palpable. On the twenty-fifth day the mass disappeared and some slimy necrotic material was passed with a little blood per rectum. This was followed by a rapid recovery.

Schiavone's (1936) case presented with screaming, constipation, bile vomiting, and a mass was felt in the left flank. Blood and mucus were found on rectal examination. A clinical diagnosis of intussusception was made, but operation was refused. The patient died two days later aged 10 days. Autopsy was not allowed.

Perhaps the most interesting case was that reported by Rachelson *et al.* (1955). The baby passed normal meconium at the age of 12 hours. At the age of 30 hours she passed a segment of gangrenous tissue per rectum. Histology showed that this was a segment of small intestine turned inside out. Plain radiographs taken soon after birth had shown no evidence of intestinal obstruction. Eight hours later she developed intestinal

obstruction. Laparotomy at 56 hours showed a distended ileum ending in a bulbous pouch which was sealed off. There was a V-shaped defect in the mesentery. An end-to-end anastomosis was performed, and the patient recovered. The sketch of the operative findings is typical of intestinal atresia. Although the two radiographs are not published, nor is the histology of the intestinal segment, it seems reasonable to assume that this baby was born normally, developed an intussusception at the age of 1 day, was cured by passing the segment of gangrenous bowel, but was left with a gap in the small intestine. It is remarkable that both bowel ends were sealed off in 26 hours.

### Discussion

Although intussusception is rare in the newborn, one may come across a case occasionally in centres dealing with many cases of neonatal intestinal obstruction. The four cases in Liverpool and the three in Glasgow were seen in the past eight years. In the same period only one case was seen at Great Ormond Street. Vomiting, often bile stained, and blood in the stool are the commonest symptoms. When vomiting is present it usually leads to the diagnosis of intestinal obstruction, but if blood-stained stools are the presenting symptom the diagnosis is likely to be delayed. Evidence of abdominal pain and a palpable mass are uncommon features, but when these are present a diagnosis of intussusception can be made with confidence. Plain radiographs of the abdomen will demonstrate intestinal obstruction and the use of opaque media is not necessary. When blood in the stools is the predominant symptom and there is nothing else to suggest the presence of obstruction a barium enema may help. It should be performed cautiously because there is a risk of perforating the colon. In most cases the final diagnosis of intussusception will be made only at laparotomy.

Laparotomy should be performed in all cases. Reduction by enema is not advisable. Simple reduction should be attempted, though if there is any difficulty in reducing the intussusception or if

there is any doubt about the viability of the gut the intussusception should be resected. Most of the jejunal intussusceptions seemed to require this, a fact which may be related to the high incidence of a causative lesion in this group. End-to-end anastomosis should be performed to restore continuity. Blood loss from the intussusception may be large enough to need replacement in an occasional case.

**Relation to Intestinal Atresia.** Prenatal intussusception has been suggested as one of the causes of intestinal atresia (Parkkulainen, 1958). Though this theory lacks convincing proof, there is enough evidence to suggest such a possibility. It seems certain that intussusception can occur during intrauterine life. If this is so, it is conceivable that the blood supply of the gut may be injured. Since this is known to cause intestinal atresia, prenatal intussusception may well be the aetiological factor in some of the cases of intestinal atresia. The sequence of events described by Rachelson *et al.* (1955) appears to provide clinical evidence to support this theory.

#### Summary

A case of intussusception in the newborn is described. A description of this condition as a clinical entity is attempted from the analysis of 26 cases. The possible relation to intestinal atresia is mentioned.

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