DUODENAL ILEUS IN THE NEWBORN

BY

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Duodenal obstruction in the newborn may be associated with a complete atresia or with stenosis caused either by narrowing of the bowel wall or by partial obliteration of the lumen by a membrane. It is, however, with duodenal ileus due primarily to external pressure that we are dealing in this paper.

In 1930, and later, Miller and Gage (1930, 1932, 1935a, 1935b) published a series of papers under the headings "Gastromegaly and Chronic Duodenal Ileus in Childhood" and "Chronic Duodenal Ileus in Infancy and Childhood," describing cases of obstruction to the second and third parts of the duodenum. They considered that there were two separate mechanical factors at work in producing ileus: first, a congenital anatomical factor, where a band of mesentery, usually associated with the superior mesenteric artery, was stretched across in front of the duodenum, causing some degree of compression; and, secondly, the vicious circle likely to be set up by this. They showed how the proximal duodenum tended to become distended and how this, in turn, caused ptosis and kinking over the band, so making the ileus more severe. They stressed the great importance of the latter factor in the causation of symptoms, and showed that if it could be overcome by medical treatment the baby would thrive even though the anatomical factor remained.

Ladd and Gross (1941) gave an excellent description of a further group of cases together with a bibliography. In this group, volvulus of the midgut was superimposed upon a high intestinal obstruction caused by external pressure on the duodenum. They gave a clear description of the embryological basis for the condition. Between the 6th and the 10th week of foetal life the intestinal tract grows more rapidly than the abdominal cavity, and the midgut passes out into the base of the umbilical cord. When, later, the relative rate of growth changes once more, the gut returns to the abdomen and, in the process, it rotates. It follows that the caecum at one stage comes to lie high up on the left and only later passes across to the right upper abdomen and finally to its adult position. When the process is complete the caecum has its peritoneal attachment in the right iliac fossa, while the small intestine is anchored by a diagonal attachment on the posterior abdominal wall extending from the duodeno-jejunal junction above to the caecum below. The normal process may become arrested at any stage. If the caecum has not reached its final position it may lie across the duodenum, high up and to the right, so that its peritoneal attachment may cause duodenal obstruction. Associated with this, the fixation of the small intestine is likely to be abnormal and volvulus of the mobile midgut may occur.

Symptoms and Signs

Vomiting is usually the predominant symptom in any form of duodenal obstruction; it is generally forcible, occurring immediately after each feed, and the vomit is often bile-stained. When present this last sign is of great value in diagnosis. Miller and Gage have noted the fact that anorexia is usually pronounced and that if the baby is not forced to take more than it wants its intake is so small that duodenal distension and the onset of vomiting may be delayed. Constipation may be very severe owing to starvation, but the stools, when passed, show no evidence of digestive upset. In the first days of life, when the differential diagnosis from duodenal atresia may be difficult, the identification of cornified epithelium in the meconium may be a valuable finding, proving that obstruction to ingested material has not been complete. Wasting and dehydration vary in degree according to the severity of the case. Distension is limited to the upper abdomen in simple cases; when it becomes more severe the complication of volvulus is to be feared. Visible peristalsis of the stomach may be seen, though not as marked as in pyloric stenosis; duodenal peristalsis, passing downwards on the right, has also been noted.

On palpation of the abdomen, failure to find the characteristic firm pyloric tumour is an important point in the differential diagnosis between duodenal ileus and pyloric stenosis, though it is possible to mistake the duodenum, if distended and filled with curd, for the pylorus. The general examination of the baby includes inspection of the limbs and fontanelle in a search for any evidence of a cerebral cause for vomiting, and also the elimination of any possibility of parenteral infection in the ears, urine, chest, and elsewhere. A straight x-ray film may be sufficient to show fluid levels in both stomach and duodenum, together with gross distension of the latter. Ladd and Gross give a warning against barium meals in these cases, as they believe that the barium may become inspissated. With care there should be very little danger, and the results may be of great value in diagnosis.

Case I

First seen Dec. 31, 1940, at the age of 3 weeks. A first child, born 2 weeks before term after a normal labour, the baby had appeared healthy at birth and had weighed 7 lb. 12 oz. Vomiting started "directly the milk came in," usually occurring immediately each feed had been taken, though it might be delayed for an hour. The vomit was greenish yellow in colour, and "sometimes he seemed to pump up more than he had taken." Constipation was severe; the baby had had only 4 stools during the 3 weeks of life, and 2 had followed soap enemata. There was nothing relevant in the family history.

On examination the baby was very thin, weighing 1 lb. 4½ oz. less than its birth weight. In spite of this the general condition was reasonably good, and the infant looked starved rather than ill; there was no gross dehydration. Seen at a feed, there was no visible peristalsis, though slight distension was observed in the upper abdomen; no tumour was palpable and the hernial orifices were normal. There was no evidence of disease elsewhere. In view of the history of persistent forcible vomiting of bile-stained fluid associated with severe constipation a partial obstruction could be

Barium-meal examination of Case I. Radiograph showing dilatation of the first and second parts of the duodenum.

visualized, situated distal to the entrance of the common bile duct but at a point high up in the intestine, since there was no generalized distension. A tentative diagnosis was made of duodenal ileus due to compression of the third part by mesentery.

Treatment.—The baby was admitted to hospital. After gastric lavage a barium meal (see Fig.) was given; the report read: "Oesophagus normal. Stomach normal in situation. Emptying occurred readily. The first and second parts of the duodenum are grossly dilated. There is vigorous peristalsis in this area. The site of the obstruction is at the junction of the descending and ascending portions. The obstruction is only partial and may settle down." The aim of medical treatment was to empty the stomach and duodenum completely twice a day so as to enable them to regain their tone and prevent the vicious circle produced by distension and kinking. With the same end in view, feeds were small and frequent. Gastric lavage was continued twice daily for the first week; the intervals were then gradually increased till a clear result was obtained after four days without treatment. Feeds at first were given at 2-hourly intervals, with 10 feeds in the 24 hours; the intervals were then increased to 2½ hours on the 3rd day and 3 hours on the 9th day. By the 16th day the infant was able to take 3 oz. every 3 hours. On this treatment vomiting ceased almost at once and there was only very occasional sickness after the first 24 hours. The bowels moved normally on the 2nd day and caused no further trouble. There was an improvement in weight, and the baby gained steadily. He was discharged after 24 days in hospital, having gained 25 oz. and being free of all symptoms.

Barium Meal, Jan. 15, 1941.—"Repeat examination. Stomach emptied quite well. There was no hold-up in the duodenum. Stenosis can still be recognized, however."

The child was seen again on Nov. 7, 1944, at the age of 3 years and 11 months. He was well developed and in excellent health. He had been free from symptoms since leaving hospital. A barium meal showed no abnormality of the stomach or duodenum.

Case II

This patient was first seen on Dec. 10 at the age of 15 days. He was a first child, born at full term after a rapid normal labour: birth weight 7 lb. 10 oz. He appeared normal at birth. Vomiting began directly feeds were taken, and persisted for 3 days, occurring after practically every feed. The vomiting had then ceased suddenly and completely, and for the 5 subsequent days the baby took well from the breast and gained weight. Sickness returned on the 8th day and was very severe; it was frequently projectile and the fluid was usually bile-stained. The family doctor had seen peristalsis and palpated a tumour. There had been no bowel action for 4 days. Since the return of the sickness the breast milk had been expressed and given at half strength. The family history showed nothing relevant.

On examination the baby's weight was 6 lb. 9½ oz. He was thin, but, considering the history, the general condition was fairly good and dehydration was only of moderate degree. Seen at a feed, there was some distension in the upper abdomen, but no peristalsis was visible and no tumour could be palpated. A projectile bile-stained vomit occurred immediately after the feed. Except for slight umbilical discharge nothing abnormal was found elsewhere, and a normal stool was passed. Consideration of the history and physical signs suggested that we were dealing with a case similar to the one already described, and the same provisional diagnosis was made. The obvious difference between the two cases lay in the fact that in Case II there had been one complete spontaneous remission between the 3rd and 8th days of life. Mother and baby were admitted to hospital. In view of the fact that the family doctor had seen peristalsis and palpated a tumour, eumydrine was given for 36 hours, although it was felt that bile-stained vomit should rule out the possibility of pyloric stenosis. The drug had no influence on the vomiting, and was discontinued. In spite of treatment on the same lines as Case I there was no improvement. The baby was therefore put into the Trendelenburg position and the duodenum aspirated with a Ryle's tube; continuous duodenal drainage was kept up for some hours and subsequently repeated at frequent intervals. Additional fluid was given by the subcutaneous route and by continuous rectal drip; half-strength saline, followed by tap-water and glucose, was absorbed extremely well from the rectum. Since there was no fault in digestion and the baby took well, the caloric value of the feed was increased by the addition of 1 dr. of half-cream dried milk powder to each 4 oz. of breast milk. After a day of this treatment the baby for more than 24 hours did not vomit and the bowels opened normally. Unfortunately the sickness returned and persisted with far greater intensity in spite of continued treatment, so that the infant went downhill rapidly and died 2½ days later, 8 days after admission to hospital.

When the vomiting returned, after the short interval of freedom, the question arose whether laparotomy was advisable. Various factors had to be considered. The infant was in poor condition; there had been two remissions, and a third might possibly occur. Looking back, in view of the post-mortem findings (see below) it is just possible that surgery might have been successful even two days before death. We can only make a conjecture as to the sequence of events inside the abdomen. It seems probable that the partial

obstruction had been caused in the first place by pressure on the duodenum, either from malposition of the caecum or from the primitive mesentery around the superior mesenteric artery. Then, with the onset of continuous sickness 2½ days before death, a volvulus of the midgut had been superimposed. The volvulus might easily have been relieved surgically, and Ladd and Gross describe a simple operative procedure by which they free the caecum from its attachment high up on the right and allow it to fall across to the left of the abdomen, in which position it can no longer obstruct the duodenum.

Post-mortem Report.—The relevant extract from the report reads as follows: "The body of a small, rather wasted male infant. The head appeared rather large, the fontanelles were a little depressed. The skin was loose. The upper part of the abdomen was somewhat full, though the lower part was insunken. . . . **Abdomen:**—Peritoneal cavity: The stomach was rather large and distended. The duodenum was grossly distended, being almost as large as the stomach. The distension stopped abruptly at about the mid-point of the third part of the duodenum. At this point the duodenum was involved in a volvulus which had occurred at the root of a primitive mesentery around the superior mesenteric artery. The volvulus was left-handed. It was not so tight as to have interfered with the blood supply of the small gut, though tight enough to have prevented the passage of intestinal contents beyond the point of volvulus. The descending and transverse colons were in the normal situation, but the caecum lay on the anterior aspect of the immensely distended second part of the duodenum. The long appendix passed medially over the distended third part of the duodenum. The absence of the caecum from the right iliac fossa, and the drawing up of the small intestine by the volvulus, accounted for the fallen appearance of the lower abdomen. There were no further abnormalities in the abdominal cavity." The body was otherwise natural except for a very few pericardial haemorrhages and a fairly severe tear of the upper leaf of the tentorium on the left, which had healed over, though there was some extravasation of blood into the substance of the tentorium.

Summary

Two cases of duodenal obstruction in the newborn are described. They illustrate two types of case. The first resembled those described by Miller and Gage and responded rapidly to medical treatment. The second probably began in a somewhat similar way, but volvulus was superimposed and caused the infant's death.

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BURNS AND THEIR TREATMENT AMONG E.M.S. HOSPITAL IN-PATIENTS

BY

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Examination of the records of the E.M.S. Statistical Branch at Norcross shows that of the total injuries for which Service patients were admitted to the E.M.S. hospitals, burns caused among men about 3% in 1942 and 4% in 1943, and among women about 10% in each year (Stocks and Brooke, 1944). At Norcross every fifth record of admission for in-patient treatment is selected, and the primary, secondary, and complicating causes of admission are coded by means of the Medical Research Council's Classification of Diseases and Injuries. In the code numbering for burns the third digit indicates the agent causing the disability and the fourth digit the part of the body affected. A random sample of 400 of the cases admitted on account of burns during 1943 and the first half of 1944 has been examined in detail, and an analysis of the distribution according to age and site is given in Table I.

Six males and one female died—a proportion of 1.75%. Five deaths of men were due to extensive burns caused by aeroplane crashes. In each case the patient was very shocked