

PEPTIC ULCER IN MECKEL'S DIVERTICULUM

Report of a Case

H. M. MESSENGER, M.D., and E. N. COLLINS, M.D.

Section on Gastrointestinal Disease

Intestinal hemorrhage constitutes the essential symptom of peptic ulcer in Meckel's diverticulum. The blood is usually passed as fresh blood or clots from the rectum, but at times the stools may be tarry. Hemorrhage may occur suddenly and be the only symptom, or it may be preceded or followed by abdominal pain. Pain is the only other symptom in this condition. However, unless the inflammatory changes about a chronic ulcer have reached the visceral peritoneum, there is no pain, rigidity, or tenderness, but there may be a colic-like distress variously described as vague, cramp-like, or gnawing. It usually bears no relation to meals but often may be referred to the umbilicus.

Nine cases of bleeding from the bowel proved at operation to be due to a Meckel's diverticulum have been seen at Cleveland Clinic in the past fifteen years (table). All but 1 patient had bleeding from the rectum. This was a 4½-month-old baby boy who had bloody fecal drainage from a fistula at the umbilicus. Four patients complained of pain, varying from mild abdominal distress in the region of the umbilicus to cramps in the lower part of the abdomen with nausea and vomiting. Seven patients were male. Six patients were under 25 years of age, the average in this series being 21.3 years. Although peptic ulcer of Meckel's diverticulum is said to be an affliction of childhood, no age group is immune.

The following is a detailed report of our most recent typical case.

Case Report

A boy, aged 4½ years, was admitted on April 1, 1947. He had been well until five days prior to admission, when at his normal habit time in the evening he had had a bowel movement which contained a considerable amount of bright red blood. On the following evening he had a large black tarry stool and two days later had several tarry stools. There had been no pain or other associated symptoms. The parents had noted his increasing pallor after the appearance of the tarry stools.

Physical examination revealed a well developed boy of 4½ years with pronounced pallor. The remainder of the physical examination was essentially normal. There were no petechial spots. Examination of the abdomen revealed no tenderness or rigidity, and digital rectal examination was negative. Special blood studies showed a decided secondary anemia with 1,990,000 red blood cells and 33 per cent hemoglobin. The white blood count was 9450, and the differential count was normal. The icteric index, platelet count, bleeding, and clotting times were normal. Proctoscopic examination for 12 cm. revealed normal findings. However, the stool coming from above was tarry black.

The patient was given six small whole-blood transfusions of 125 to 200 cc. each. On the fourth hospital day a laparotomy was performed, and a Meckel's diverticulum was found 3 feet above the ileocecal valve. The diverticulum measured 3 inches in length and contained a fresh globular blood clot about 1.5 cm. in diameter. On microscopic section gastric mucosa was noted in the tip, and a small ulcer was identified at the border of the gastric and intestinal mucosa. The patient was discharged on the seventh postoperative day.

TABLE

Case	Age	Sex	Symptoms	X-Ray	Surgery	Pathology
1	39 yrs.	M	Recurrent dark red blood from rectum—4 years	G.I. series neg.	Meckel's diverticulum 36" above ileocecal valve	Ileal and gastric mucosa. <i>Ulcer identified</i>
2	4½ yrs.	M	Recurrent dark red and tarry stools—5 days	None	Meckel's diverticulum 36" above ileocecal valve	Ileal and gastric mucosa. <i>Ulcer identified</i>
3	3½ yrs.	F	Recurrent umbilical cramp-like pain with nausea and vomiting. Recurrent bright blood in stools—2 years	G.I. series neg.	Meckel's diverticulum 8" above ileocecal valve	Normal ileal mucosa. <i>Ulcer identified</i>
4	4½ mos.	M	Fistula at umbilicus with bloody fecal drainage since birth. Some nausea and vomiting	Fistula to small bowel	Patent duct leading to a Meckel's diverticulum	No report
5	3 yrs.	F	Recurrent abdominal pain, nausea and vomiting, bright blood in stools—2 years	None	Meckel's diverticulum 21" above ileocecal valve	Ileal mucosa and gastric mucosa. Pancreatic tissue also
6	38 yrs.	M	Recurrent pain in left side—16 years. Recurrent blood in stools—5 months	G.I. series neg.	Meckel's diverticulum 36" above ileocecal valve	Ileal and gastric mucosa
7	25 yrs.	M	Recurring hemorrhages of bright red and dark clotted blood from rectum—5 years	None	Meckel's diverticulum 30" from ileocecal valve	Normal ileal mucosa

PEPTIC ULCER IN MECKEL'S DIVERTICULUM

TABLE — Continued

Case	Age	Sex	Symptoms	X-Ray	Surgery	Pathology
8	17 yrs.	M	Recurring pain in lower abdomen with several silent rectal hemorrhages of bright red blood—5 years	G.I. series neg.	Meckel's diverticulum 18" above ileocecal valve attached to umbilicus	Normal ileal mucosa with gastric and duodenal mucosa
9	60 yrs.	M	Recurrent dark red blood from rectum—2 weeks	G.I. series neg.	Meckel's diverticulum 18" above ileocecal valve	No report

In those cases in which an ulcer crater was not found serial sections of the diverticulum were not made. None of the patients have had a recurrence of symptoms.

Meckel's diverticulum represents a remnant of the intestinal end of the omphalomesenteric duct. In the embryo, after differentiation of the primary alimentary canal from the yolk sac, the intestinal canal is blind at the cephalic and caudal ends, but the midgut portion is continuous with the yolk sac. The opening into the yolk sac gradually narrows as the anterior abdominal wall closes in, but the midgut retains a connection with the diminishing sac by a slender tube, the yolk stalk, also known as the vitellointestinal or omphalomesenteric duct. As the yolk sac degenerates, the stalk exerts traction on the midgut at the point of attachment, drawing a loop of bowel out of the body cavity into the umbilical cord. Normally the bowel returns to the abdomen by the tenth week of intra-uterine life, and the umbilicus is the last point in the abdominal wall to close. According to Meckel, an arrest in the development of the small intestine when it is still in connection with the umbilical vesicle may give rise to several grades of maldevelopment. In the most severe grade a fissure remains in the abdominal wall below the umbilicus, through which the ileum opens. The lower part of the bowel may be very narrow or closed, and feces may pass through the opening at the umbilicus. In the next grade the abdominal fissure persists, with the ileum in direct communication with the opening at the umbilicus by means of a patent ductus omphalomesentericus. However, the small intestine is well developed, and feces pass on into the colon (case 4). In the next grade the ventral fissure is closed, but a blind process of the

ileum is present, united to the umbilicus by the obliterated duct, which is represented as a solid fibrous cord (case 8). In the next grade the omphalomesenteric duct remains as a free diverticulum from the ileum.

Meckel's diverticula vary greatly in length and shape. A mesentery similar to that of the appendix is usually present. The diverticulum is ordinarily located in the ileum between 30 and 90 cm. from the ileocecal junction and usually projects from the free border of the ileum.

A Meckel's diverticulum occurs without complication in from 1.5 to 3 per cent of all persons. It occurs most often (75 per cent) in the male sex. Fortunately, symptoms are rarely caused by this vestigial remnant, but it may be associated with complications which may prove serious. A perforation may result from impaction of a foreign body within the pouch. The diverticulum may be the seat of volvulus and gangrene. The diverticulum may form a noose or knot or become adherent within a hernial sac. Tumors of various types have been reported in the diverticula. The diverticulum may invaginate and cause intussusception. Harkins believes that about 17 per cent of Meckel's diverticula causing symptoms do so by producing an intussusception.

One of the most interesting features of Meckel's diverticulum is the frequent presence of heterotopic tissue in the diverticulum. This occurs in about 25 per cent of all Meckel's diverticula. The heterotopic tissue usually is gastric mucosa histologically analogous to the mucosa of the fundus and may, in addition, contain duodenal mucosa and/or pancreatic tissue. These diverticula which contain heterotopic gastric mucosa possess the potentiality of ulceration.

Numerous theories have been proposed to explain the presence of such aberrant elements in the diverticulum. The earliest and most commonly accepted theory is that of Albrecht (cited by Matt and Timpone), who maintains that the entoderm lining the primitive intestinal tube possesses the potentiality of developing into any of the glandular components of the fully developed gastrointestinal tract.

That these dystopic portions of mucous membrane in Meckel's diverticula do not merely resemble the mucosa of the fundus morphologically but are also functionally active has been amply demonstrated by analyses of their secretions in cases of open umbilical fistula. Both pepsin and hydrochloric acid have been detected by various observers. Furthermore, this secretion clearly begins or increases synchronously with the activity of the stomach and occurs at a time during which the small bowel is empty and when there is no neutralization by food and intestinal juice. Such a condition is especially favorable for the generation of peptic lesions.

Ordinarily the ulcer is situated within the area of the intestinal mucosa and relatively close to the boundary of the heterotopic gastric mucosa. The macroscopic and microscopic appearance of the ulcer closely resembles that of the typical gastric and duodenal types.

As previously mentioned, intestinal hemorrhage is the most constant symptom of an ulcer in Meckel's diverticulum. Usually the patient gives a history of previous massive intestinal hemorrhages followed by a period of months or years before recurrence. In a few instances only slight bloody or tarry stools are passed. The bloody stool may vary from bright red to black, although it is usually of a dark red color and may be fluid or partly clotted. The hemorrhage is not mixed with mucus, as in the dysenteries, nor does it have the raspberry jam appearance of intussusception. Collapse may result from a single massive hemorrhage, or a succession of lesser hemorrhages may reduce the patient within a few days or weeks to a state of extreme anemia. If the patient does not develop a perforation, he is likely to recover and then after a lapse of weeks, months, or years suffer a recurrence of the hemorrhages. This tendency to recurrence is a striking characteristic of this condition.

Next to hemorrhage the most frequent complication is perforation. When perforation occurs the symptoms and signs are those of a diffuse peritonitis, namely vomiting, abdominal pain, distention, collapse, generalized abdominal tenderness, and rigidity. Prior to perforation symptoms other than intestinal hemorrhage are generally lacking.

In the differential diagnosis the blood dyscrasias are easily eliminated. The bleeding time and clotting time are normal. The blood findings are those of secondary anemia. The cases of perforation present the picture of an acute surgical condition within the abdomen with an accompanying leukocytosis. An intussusception may be ruled out by the lack of obstructive signs, the lack of intense colic, the absence of a palpable mass, and the absence of mucus in the bloody stool. Bleeding duodenal or gastric ulcers are eliminated usually by the absence of epigastric digestive symptoms which respond to the effects of antacids and by a negative roentgenologic study. A Meckel's diverticulum can not ordinarily be demonstrated by x-ray examination. A rectal polyp may bleed profusely, but the history of tenesmus and examination with a proctoscope may prove the absence of this mass. Ruptured rectal varicosities may also cause sudden massive hemorrhage similar to the bleeding diverticula, but here again the proctoscope affords a means of differentiation.

Obviously the only treatment of Meckel's diverticulum is surgical.

Conclusions

1. A review of 9 cases of hemorrhage from the bowel due to Meckel's diverticulum has been presented.
2. Recurrent intestinal hemorrhage is the most constant symptom of peptic ulcer in Meckel's diverticulum.
3. This condition occurs most commonly before the age of 25 years, although no age group is immune.
4. The treatment is surgical.

Bibliography

1. Bockus, H. L., et al.: *Gastro-Enterology. Volume II: The Small and Large Intestine and Peritoneum: Diagnosis and Treatment of Disorders of the Small Intestine, Colon, Peritoneum, Mesentery and Omentum* (Philadelphia: W. B. Saunders Co., 1944).
2. Greenwald, H. M., and Steiner, M.: Meckel's diverticulum in infancy and in childhood. *Am. J. Dis. Child* **42**:1176-1197 (Nov.) 1931.
3. Harkins, H. N.: Intussusception due to invaginated Meckel's diverticulum; report of 2 cases with study of 160 cases collected from literature. *Ann. Surg.* **98**:1070-1095 (Dec.) 1933.
4. Johnston, L. B., and Renner, G., Jr.: Peptic ulcer of Meckel's diverticulum; report of 2 cases and review of literature. *Surg., Gynec. & Obst.* **59**:198-209 (Aug.) 1934.
5. Lindau, A., and Wulff, H.: Peptic genesis of gastric and duodenal ulcer; especially in light of ulcers in Meckel's diverticulum and postoperative ulcers in jejunum. *Surg., Gynec. & Obst.* **53**:621-634 (Nov.) 1931.
6. Lower, W. E.: Intussusception in adults due to invagination of a Meckel's diverticulum. *Ann. Surg.* **82**:436-440 (Sept.) 1925.
7. Matt, J. G., and Timpone, P. J.: Peptic ulcer of Meckel's diverticulum; case report and review of literature. *Am. J. Surg.* **47**:612-623 (March) 1940.