Meckel's Diverticulum

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DISCUSSION

The congenital malformation of the intestine described by J. F. Meckel in 1808, Meckel's diverticulum, occurs in approximately 2 percent of the population.25

Embryology

How do you explain embryologically the presence of this diverticulum? During the fourth week of development (Fig. 31), the midgut is in free communication with the definitive yolk sac through the vitellointestinal duct (omphaloenteric, omphalomesenteric). Growth of the midgut during the fifth week of development (Fig. 31 inset) forms a simple U-shaped loop with the narrowed vitellointestinal duct entering at the loop's apex and dividing the midgut into a cranial and a caudal portion. The cranial portion gives rise to the duodenum caudal to the entrance of the common bile duct, the jejunum, and the first two thirds of the ileum, while the caudal portion gives rise to the remainder of

Fig. 31 Developing gastrointestinal system in 4-week-old embryo. Inset: Vitellointestinal duct relationships in 5-week-old embryo.

Fig. 32 Developing gastrointestinal system in 7-week-old embryo.
he ileum, cecum, appendix, ascending colon, and the proximal two
birds of the transverse colon. Herniation of the midgut into the um-
bilical coelom, with accompanying elongation and partial rotation,
occurs during the sixth to seventh weeks (Fig. 32). While the midgut
lies in the umbilical coelom, the vitellintestinal duct normally atrophies
and disappears. The continuation of the intra-abdominal portion of the
vitellintestinal duct, due to arrested development and lack of resorp-
tion, once the midgut has returned to the abdominal cavity in the tenth
week, constitutes Meckel's diverticulum. Although Meckel's diverti-
culum is the most common malformation of the vitellintestinal duct,
failure of obliteration of this duct may also result in: (1) fistulas;
(2) enterocysts; (3) fibrous bands extending from the small intestine
to the umbilicus; (4) mucosal polyps; and (5) sinusces.20

Appearance

What characteristics verify the presence of Meckel's diverticulum?
Three distinguishing features of the diverticulum are: (1) the same
structural composition (mucosa, submucosa, muscularis, serosa) as the
wall of the small bowel; (2) an antimesenteric position on the distal
part of the ileum; and (3) an independent blood supply from the su-
perior mesenteric artery. How do you explain a lack of mesentery on
the diverticulum? The ventral aspect of the gut, where the divertic-
culum, if present, is located, lacks a ventral mesentery even as a transi-
tory feature. In contrast, the dorsal aspect of the gut developmentally
and definitively is suspended by a mesentery throughout most of its
length.

Mucosal Lining

What is the clinical significance of the heterotopic tissue some-
times found in the diverticulum? Patches of gastric and/or pancreatic
epithelium are more frequently encountered in a pathologic Meckel's
diverticulum than in one incidentally detected. This ectopic lining is
subject to ulceration and bleeding, the source of which normally can-
ot be established by barium enema or proctosigmoidoscopy. Infr-
frequently, duodenal and colonic epithelium have been identified.

Associated Malformations

What malformations5,9,29 are most frequently associated with
Meckel's diverticulum? The most common malformations are related to

the digestive system: (1) gut malrotation; (2) umbilical hernia; (3)
omphalocele; (4) volvulus; (5) esophageal atresia; and (6) cleft palate.
Hereditary factors resulting in a Meckel's diverticulum are unknown
at present.