DIVERTICULA OF THE SMALL INTESTINE

ESSAY

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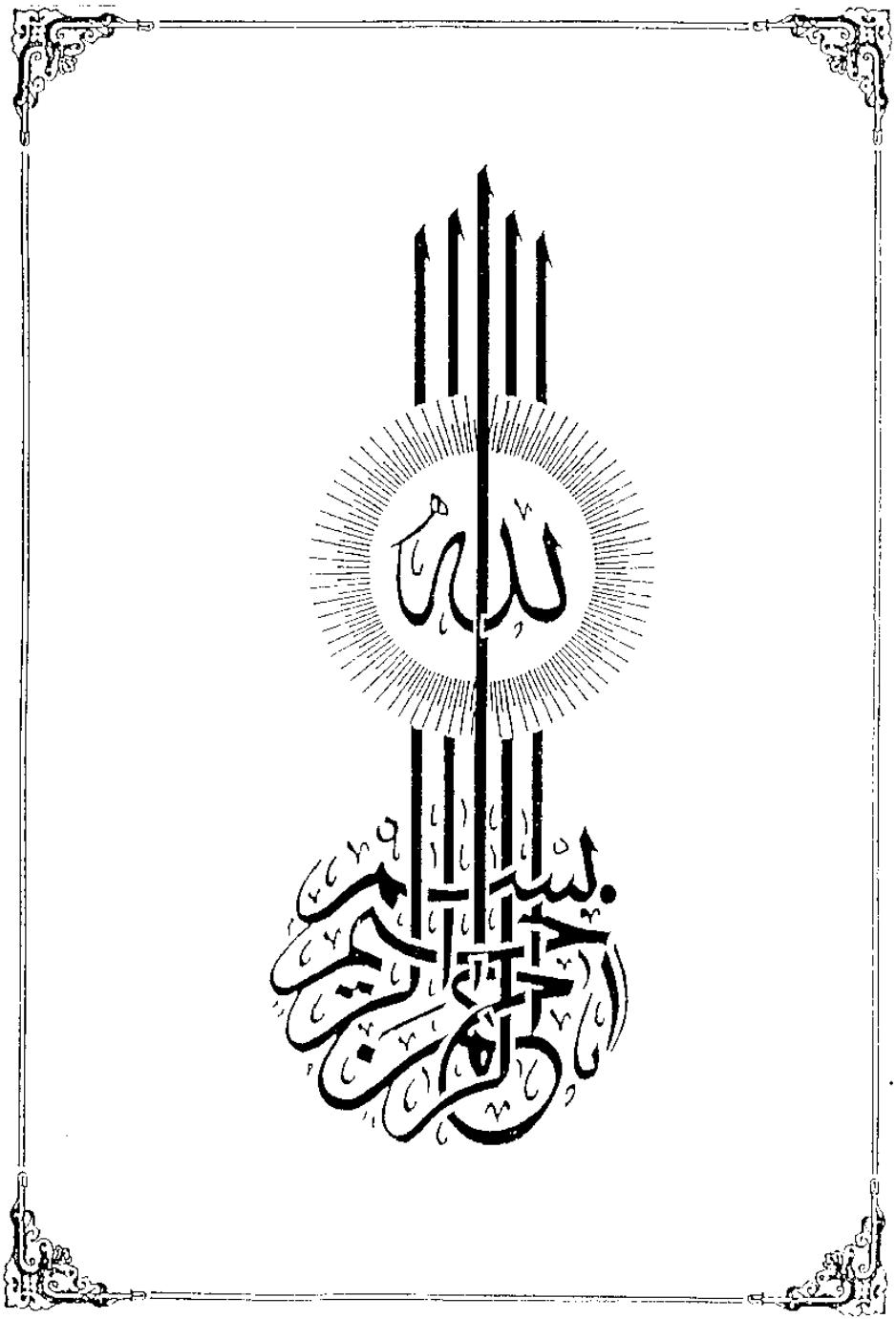

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INTRODUCTION

A diverticulum is a small offshoot or sidetrack from a hollow viscus. Diverticula may be present in great numbers, a condition of diverticulosis.

With lengthening of the life span, diverticulosis has come to occupy a more important role in clinical gastroenterology.

The colon is the most common site of affection in the alimentary canal, followed in order of frequency by the duodenum, jejunum, ileum and stomach. When Meckel's diverticulum is taken in consideration, the ileum will follow the colon in frequency.

Diverticula may be true (congenital) or false (traction) They give rise, in majority of instance, to few symptoms, although complications may arise from them which are of the gravest significance.

As a possible cause of acute or chronic gastrointestinal symptoms, the condition is often overlooked by clinicans and missed by radiologists. Symptoms associated with diverticula are determined by their site, size, content and secondary phenomena such as inflammation, haemorrhage, or perforation.

Diverticulosis of the small bowel is much less frequent and give rise to much less trouble than those of the colon. No typical chain of symptoms can be ascribed to this type of diverticulosis. In unexplained abdominal complaints diverticulosis must be thought of and ruled out. A careful medical managment seems to be the best procedure usually, although occasionally surgical intervention seems warranted. If a larg section of the bowel is involved, or complications arise, surgery must be considered.

The present work represent an essay to out line the different aspects of diverticula of the small intestine.

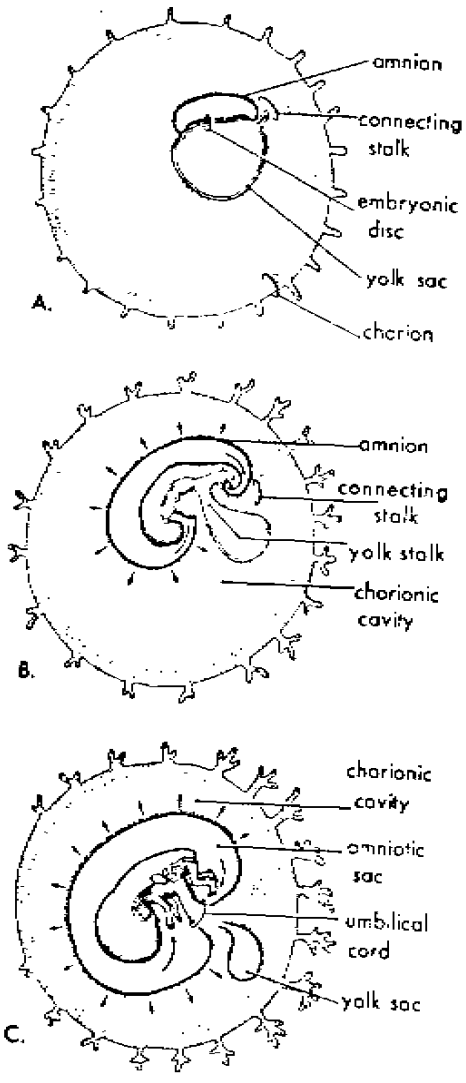
Chapter 1

EMBRYOLOGICAL AND ANATOMICAL BASIS OF DIVERTICULA OF SMALL INTESTINE

EMBRYOLOGICAL DEVELOPMENT OF THE SMALL INTESTINE

The primitive gut is formed during the fourth week of the embryonic life as the head, tail and lateral folds incorporate the dorsal part of the yolk sac into the embryo. The yolk sac is one of the true foetal membrane (Moore, 1974).

It begins as a primary yolk sac in the second week of embryonic life; where its roof is formed of a layer of embryonic endoderm and lined with primary mesoderm. Later on; the primary yolk sac gets smaller and is called yolk sac which is smaller than amniotic cavity. The yolk sac with enlargement of the amniotic cavity is removed from the body wall and is usually found at the placental end of umbilical cord between the chorion and amnion. The allantois developes from the dorsicaudal part of the yolk sac (Mahran et al., 1970 Moore, 1974). Folding of the embryo results in the division of the yolk sac found in the embryo into three parts: fore, mid, and hind gut. The mid gut communicates freely with the yolk sac through the yolk stalk. With the growth of embryo and intestinal tract there



FiG(1) Drawings illustrating how the yolk sac is partially incorporated into the embryo as the primitive gut. A, three weeks. B, Four weeks. C, 10 weeks.

is a reduction in the size of communication between the midgut and yolk sac which is called then the vitello-intestinal duct or vitellin duct after the first month of the life of the embryo is narrowed then obliterated and lodged in the umbilical cord (Moore, 1974).

The duodenum develops from the most caudal part of the foregut and the most cranial part of the midgut. These parts grows rapidly and form C-shaped loop that project venterally. The junction of the foregut and the midgut is at the apex of the duodenal loop and is indicated by the biliary orifice. Because of its derivation from both the foregut and midgut the duodenum is supplied by branches of the coeliac and superior mesenteric arteries. During the second month of embryo life the lumen of the duodenum is obliterated by epithelial cell, but it recanalize by the end of the embryonic period (Moore, 1974).

Rotation of the stomach and the duodenum cause the duodenum and the pancrease to fall to the right and to become pressed against the dorsal abdominal wall. The adjacent layers of peritoneum fuse and subsequently disappear, consequentely most of the duodenum and head of the pancrease become retro peritoneal except the first inch of the first part of the duodenum (Mahran, et al., 1970, Moore, 1974).

The jeiunum and ileum develop from the midgut and are supplied by the superior mesenteric artery; the artery of midgut.

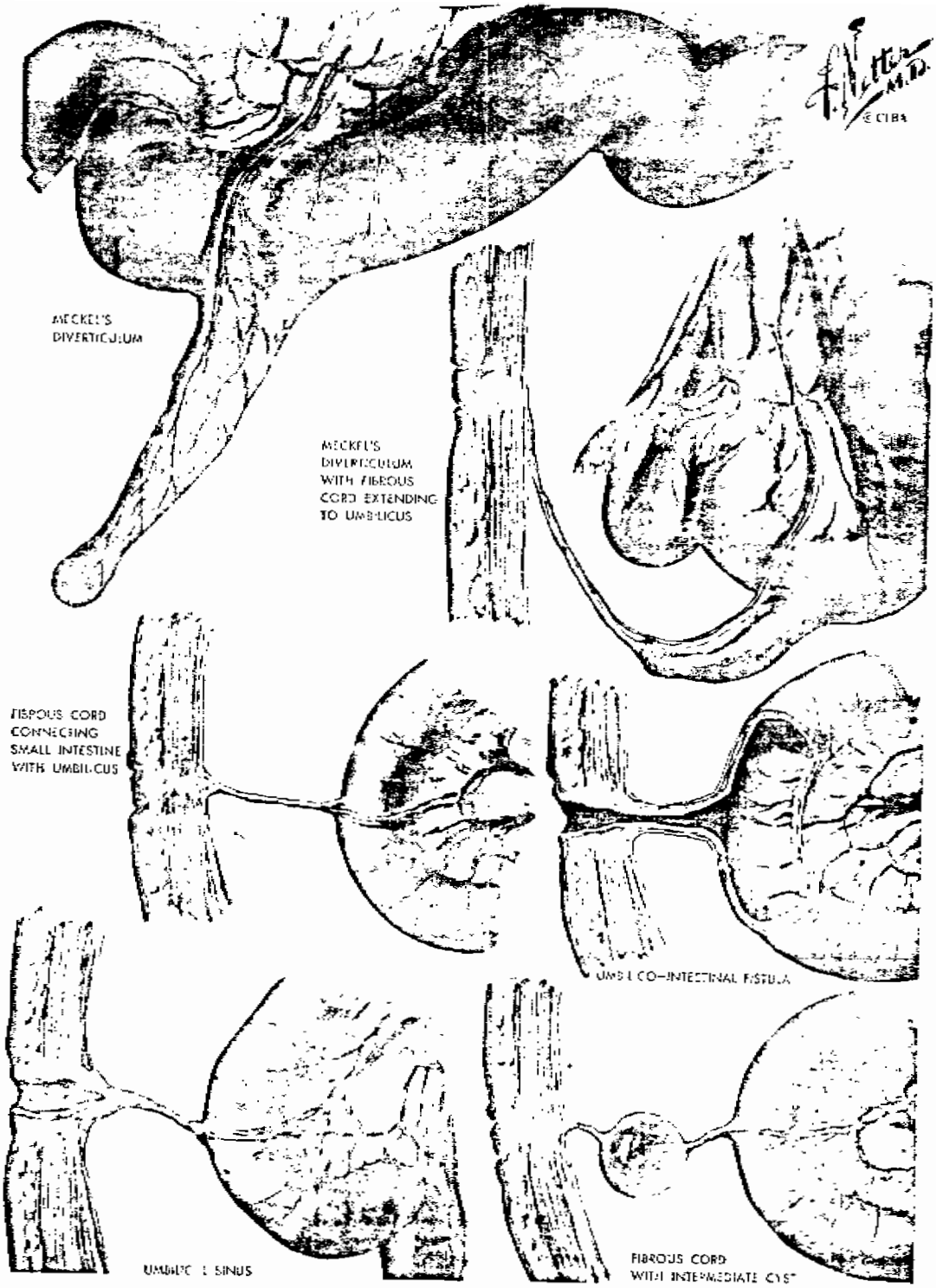
Rotation and fixation of midgut :

Initially, the midgut is suspended from the dorsal abdominal wall by a short mesentery. This mesentery elongates rapidly. At first the midgut communicates widely with the yolk sac but this connection becomes reduced to narrow yolk stalk or vitellin duct. As the mid gut elongates, it forms a venteral U-shaped intestinal loop which projects into the umbilical cord. This herniation is a normal migration of the intestine into the extraembryonic coelom which occurs oecause there is not enough room in the abdomen. The midgut loop has two limbs,proximal or crainal limb, and a distal or caudal limb. The yolk stalk is attached to the apex of the loop at the junction of the two limbs.The proximal limb grows rapidly and forms intestinal coils, but the caudal limb undergoes very little change except for development of the caecal diverticulum. Within the umbilical cord, the midgut loop rotates 90 degrees counter clockwise around the axis of the superior mesenteric artery, this bring the proximal limb of the midgut loop to the right and the distal limb to the left. During the tenth

week the intestine return to the abdomen, this is called reduction of the midgut hernia. The small intestine returns first and passes behind the superior mesenteric artery. As the intestine return, they undergo a further 180 degrees counter clockwise rotation, making a total of 270 degrees (Moore, 1974). Lenthening of the proximal part of the colon results in dessending of the caecum and appendix to the right lower quadrant of the abdomen. As the intestines assume their final positions their, mesenteries are pressed against the posterior abdominal wall of the abdominal cavity. The mesentery of the jejunum and ileum is at first attached to the midline of the posterior abdominal wall. During rotation of midgut this mesentery twists around the origin of the superior mesenteric artery. When the mesentery of the ascending colon disappears, the mesentery of the small intestine acquires a new line of attachement which passes from the duodenojejunal junction downward to the ileocaecal valve (Moore, 1974).

The small intestine is subiected to varitey of developmental abnormalites, one of them is the failure of all or portion of the vitellin duct to become oblitrated, this accounts for various forms of anomaly (Maingot, 1980). The most common of which presents itself as a sacculation

or pouch attached to the ileum and is best known as Meckel's diverticulum. It is typical of the majority of individuals with Meckel's diverticulum that the rest of the former vitellin duct has become obliterated, so that no trace of its existance can be found,but in some cases a non patent, fibrous cord may have remained, which connects the blind end of the diverticulum to the umbilicus (Fig 2). Occasionally the diverticulum or the fibrous cord may be fixed to another intestinal loop or to another viscus. It may also happen that a rudiment of the vitellin duct remains permanently in the form of a solid fibrous cord without development of a diverticulum, resulting in fixation of an ileal loop to the umbilicus. The persistance of the entire vitellin duct as a permanent tube leads to an umbilico-intestinal fistula, which should be easily discovered soon after birth. The vitellin duct may also remain open only at its outer portion results in an umbilical sinus. The more proximal part of the duct in such instance usually have become transformed into a fibrous cord attached on one end to the sinus and on the other to the ileum. Finally the vitellin duct may undergoe fibrosis on the outer as well as on the inner ends, while a central portion persists as a patent part, which develops into a cyst (Netter et al., 1962). The table (1) shows the incidence of these anatomical types, and are show in (fig 2).



FiG(2) Anomalies of the omphalomesenteric duct

DUODENAL DIVERTICULA :

May be intraluminal or extraluminal. Intraluminal duodenal diverticulum is a rare developmental anomaly located in the second part of the duodenum, within the lumen, and it is lined with epithelium in both surfaces. One case reported to arise from the third part and extend to the ligament of Treitz (Economides, 1977).The most tenable theory to explain its origin is that in the five-weeks embryo, the primitive duodenal lumen becomes obliterated by epithelial cell proliferation, then recanalization occurs. In cases of faulty recanalization, a diaphragm results, which may vary from a complete obstructing imperforate web to a small membrane attached only along short portion of the duodenal circumferance, when this small membrane is subjected to peristalisis it may be flatten out against the duodenal wall or elongate and produce diverticulum (Yang et al., 1974).

Extraluminal duodenal diverticula : Several theories were proposed to explain their origin. Boyd (1947) thought that the formation of the duodenal diverticula was similar, at least in part , to the production of an aneurysm (Boyd, 1947). If areas of localized lower resistance, at points of penetration of the blood vesseles, nerves or duct are

Table [1 3

Omphalo mesenteric duct remenants

Anatomical type	%
Meckel's diverticulum	82
Meckel's diverticulum with omphalodiverticular band	10
Diverticulum with mesodiverticular band	5
Umbilical sinus or fistula	3