INTESTINAL OBSTRUCTION IN NEONATAL, INFANCY AND CHILDHOOD PERIODS

ESSAY

Submitted in Partial Fulfilment for the Master Degree « General Surgery »

By

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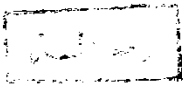

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A C K N O W L E D G M E N T

" FIRST AND FOREMOST, THANKS ARE DUE TO GOD "

The credit of bringing this work to light goes to Prof. Dr. HAMDY M. ABDALLA, Professor of Surgery, Faculty of Medicine, Ain Shams University, who encouraged me too much. He suggested the subject, set up the plan and offered brilliant ideas from the start to the end. I wish to express a particular gratitude to his sincere guidance. I will always remain deeply indebted to him.

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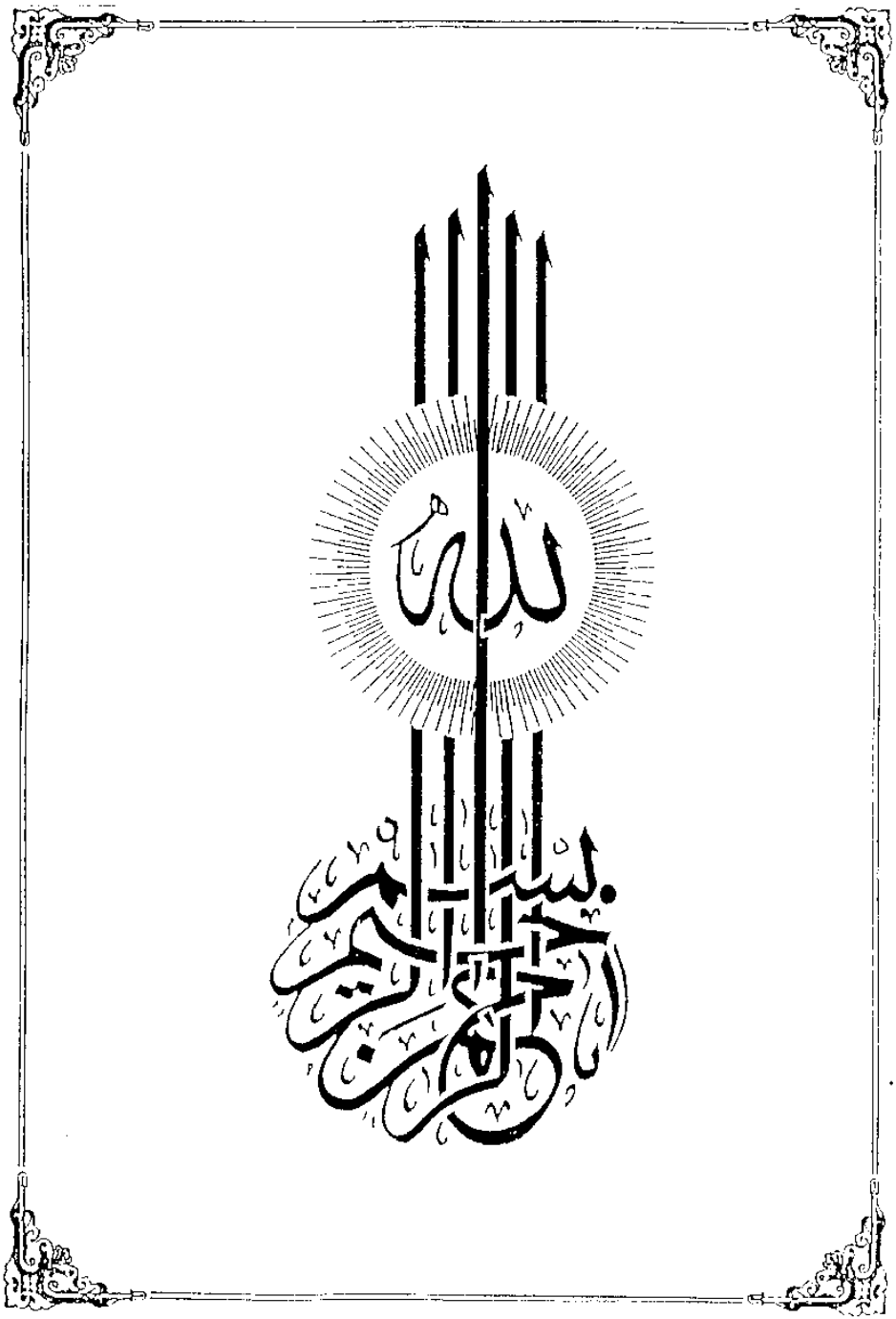


INTRODUCTION

About 20% of surgical admissions for acute abdominal conditions are for intestinal obstruction (Schwartz, 1974). Intestinal obstruction may occur in any age. The most common causes vary widely at each age group. In the neonate, we must consider congenital atresia and stenosis, volvulus neonatorum, meconium ileus, meconium peritonitis, Hirschsprung's disease and imperforate anus. In infants, we must consider intussusception, strangulated hernia, obstruction due to Meckel's diverticulum and Hirschsprung's disease. In children, we must consider strangulated hernia, Hirschsprung's disease and obstruction due to Meckel's diverticulum. There are other rare causes of intestinal obstruction like duplications of the alimentary tract, segmental dilatation of the gut, neonatal small left colon syndrome, meconium plug syndrome, milk bolus syndrome and functional intestinal obstruction. Other rare causes of intestinal obstruction include transmesenteric herniation of intestine through a congenital defect, compression, volvulus about congenital or acquired intra-abdominal bands, primary or metastatic tumours and postoperative obstruction due to adhesions.

The aim of the work is to clarify the aetiogenesis and management of intestinal obstruction in neonatal, infancy and childhood periods.

The proper election of the time of the operation and the technique of surgical interference is very essential in saving many patients from deterioration.

EMBRYOLOGY AND ANATOMY OF THE GUT

* Duodenum : It is 25 cm.long. It makes a C-shaped bend which embraces the head of the pancreas. It consists of three parts. The first part extends up backwards and to the right to the level of the upper border of the 1st lumbar vertebra. It is 5 cm. long. The second part extends downwards to the level of the lower border of the 3rd lumbar vertebra. It is 7.5 cm. long. The third part extends to the left,then upwards to the level of the left side of the 2nd lumbar vertebra. It is 12.5 cm. long.

* Relations :

First part :

Anterior : Quadrate lobe of the liver.

Posterior:Portal vein,gastroduodenal artery, and bile-duct. The vena cava is behind them.

Superior : Epiploic foramen and hepatic artery (horizontal part).

Inferior : Head of the pancreas.

Second part :

Anterior : Gall bladder, transverse colon, and small gut.

Posterior : Renal vessels, the pelvis of the kidney, and the kidney.

Right : Hepatic flexure of the colon.

Left : Head of pancreas. It is pierced about the middle by the bile and pancreatic ducts.

Third part :

Anterior : Superior mesenteric vessels, the root of the mesentery, the transverse colon and mesocolon.

Posterior: Inferior vena cava, aorta, spermatic vessels of both sides, the left sympathetic trunk, and the left psoas.

Superior : Head of the pancreas.

Inferior : Small gut

Peritoneal relations : In general the C which this part of the gut makes is covered anteriorly and on its convexity by the peritonium except where the transverse colon crosses the second part and holds the peritonium away . The posterior surface and concavity of the C are devoid of peritoneum. The first 2.5 cm. of the first part is entirely covered by peritoneum except for a small part above and behind.

In the region where the bile duct enters the second part, a diverticulum of the duodenum may

occur.It owes its existence to the fact that at a very early developmental stage more than one outgrowth from the gut takes place to form the liver. Usually all except one (the permanent bile duct) disappear. Parts of a second outgrowth may remain, forming a blind protrusion from the bowel. Such a diverticulum is devoid of peritoneal covering.This is of surgical importance, as its removal would be attended by grave risks of peritonitis because the retroperitoneal tissues have little resistance to infection.

* Duodenojejunal flexure : The duodenojejunal flexure is at the left side of the 2nd lumbar vertebra just below the pancreas. It is a fixed part of the gut and easily found. It is supported by a ligament containing unstriped muscle which passes to it from the region of the left crus of the diaphragm and the tissue about the coeliac plexus. This is the suspensory ligament of the duodenum (ligament of Treitz).

* Small intestine (jejunum and ileum): The average length of this part of the intestine is 7 m. The upper two-fifths are jejunum, the lower three fifths are ileum. It is entirely surrounded by peritoneum.

surgeon who wants to be sure at a glance if a part of the gut is upper or lower small gut. This distinction depends on the blood-supply. Jejunum has one or two arterial arcades in the mesentery with parallel vessels 3.7 cm. long going to the gut. Ileum has two or three arterial arcades in the mesentery with parallel vessels 1.2 cm. long going to the gut.

A diverticulum-Meckel's-may be found on the antimesenteric border of the ileum in cases where the vitello-intestinal duct partly persists. It occurs 61 cm. from the ileocaecal valve, is found in 2 per cent of persons, and is 5 cm. or more in length. It has the calibre of the ileum.

* Large intestine: The large intestine is 1.8 m.long. Its longitudinal muscle coat is arranged round it in three bands, the taeniae coli. These bands are 1.2 m. long. It is therefore gathered by the muscle to form characteristic sacculations. Its two terminations, rectum and appendix, are completely surrounded by muscle. These two portions are therefore not sacculated.

* Peritoneal relations: Those parts with mesenteries-transverse colon,pelvic colon, and appendix-are completely surrounded by peritoneum except for a narrow

band between the two layers of the mesenteric attachment. The other parts are devoid of peritonium posteriorly. The caecum and the rectum have special relations.

The caecum is completely surrounded by peritoneum, except a small part posteriorly and superiorly.

The rectum is divided into three parts. The first third is covered anteriorly and at the sides by peritoneum, the second third is covered anteriorly only by peritoneum, the third has no relation to peritoneum.

* Blood supply of the gut : The primitive gut is divisible into fore-, mid-, and hindgut. The foregut ends and the midgut begins where the bile-duct enters the second part of the duodenum. The midgut ends and the hindgut begins at the junction of the left with the middle third of the transverse colon. Each portion of the gut has its own artery. The artery of the foregut is the coeliac. The artery of the midgut is the superior mesenteric. The artery of the hindgut is the inferior mesenteric .

* Blood-supply of small bowel : There is no collateral circulation beyond the terminal arcades in the small gut. There is thus no communication between the vasa recta or between the branches they give off to bowel

wall, but there is a rich submucosal anastomosis which ensures an adequate blood-supply after small bowel anastomosis, provided that the vasa recta are not damaged too extensively.

Blood supply of large bowel:- It consists of the appendicular artery and marginal artery. The appendicular artery is a branch of the ileocolic which runs behind the terminal ileum to reach the appendix, and is accompanied in this course by the lymphatics of the appendix. The marginal artery passes along the concavity of the three-sides square made by the large gut. It is an artery made up by anastomotic vessels from the different main vessels going to the large intestine (Fig. 1).

The marginal artery is capable of supplying the gut through these anastomoses even though one of the large feeding trunks be severed. This artery can maintain the vitality of the left colon even after the inferior mesenteric has been ligatured at its origin. It is however, never wise to assume this during operations on the colon. It has been shown for example by Singleton that the anastomosis between the left and middle colic arteries is absent in 5 per cent of cases (Singleton, 1943).

Ligature of one of these vessels would thus jeopardize the blood supply of the splenic flexure region of the colon. The only safe procedure is to inspect the colonic blood supply in planning resections. After mobilization, the vessels can usually be seen through the peritoneal attachment if the bowel is held up to display them. It is wrong to delay bowel section until a late stage in operations on the gut, as by that time colour changes may indicate vascular inadequacies and indicate the site of safe section (Du Plessis, 1975).

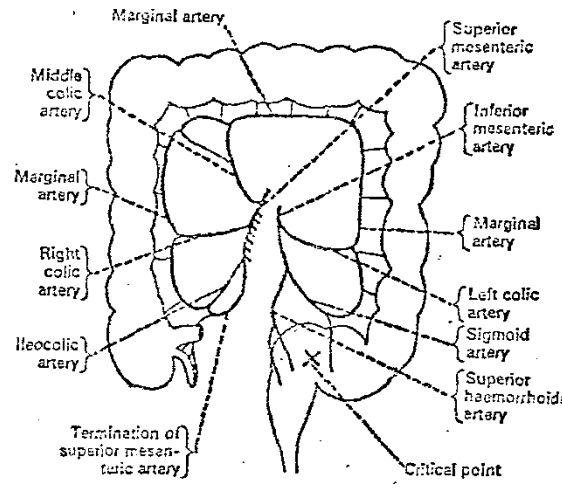
* Venous drainage of the large bowel :

The venous drainage corresponds to the arterial supply, with a marginal anastomosis joining the ileocolic, right colic, mid colic and left colic veins. However, in 20 per cent of persons, there is a defective marginal anastomosis between the major veins of the right and transverse portions of the colon.This is the cause of colonic venous infarction after surgical interruption of one of the main veins. On the left side, however, there is always an excellent marginal vein and the left colon is recommended for oesophageal replacement in preference to the right to avoid venous infarction of the bowel (Nicks,1967).

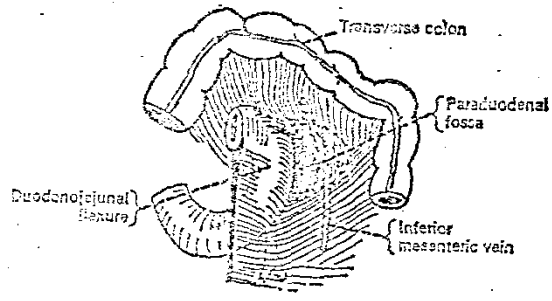
* Lymph drainage of the intestine:

The glands are arranged on a plan common to all parts of the large and small intestine. They are very numerous and arranged in three groups called proximal, intermediate and distal groups.

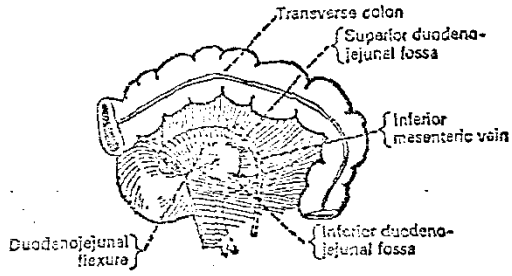
The proximal glands are situated on the main blood vessels to the gut,i.e.,superior mesenteric, ileocolic, right colic, left colic, middle colic,inferior mesenteric, superior haemorrhoidal and sigmoid. The intermediate glands are situated along the large branches of the above-named vessels. The distal glands are situated near the gut between the numerous small vessels entering the gut. Some of these glands lie on the gut. The lymph goes for the most part from the gut to the distal glands and thence to the intermediate glands. It is, however, of the first importance to realize that lymph from the gut may miss the distal set and go directly to the intermediate or even to the proximal set. This plan is the same throughout the large and small intestines. The lymph drainage is divided up into areas corresponding to the main arteries.



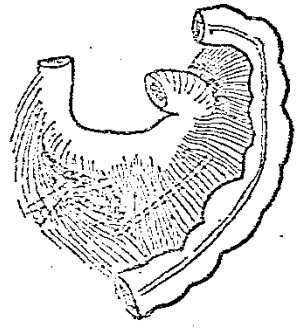
(Fig.I) Blood Supply of the Colon (Quoted from Du Plesis, I975) .



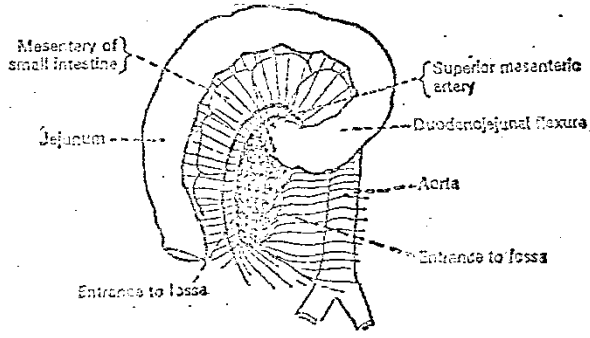
(Fig. 2) The Paraduodenal Fossa(Quoted from Du Plesis, I975) .



(Fig.3) The Superior and Inferior Duodenojejunal Fossae (Quoted from Du Plesis,1975) .



(Fig.4) The Inferior Duodenal Fossa(Quoted from Du Plesis, 1975) .



(Fig.5) The Mesenterico - parietal Fossa of Waldeyer (Quoted from Du Plesis,1975) .