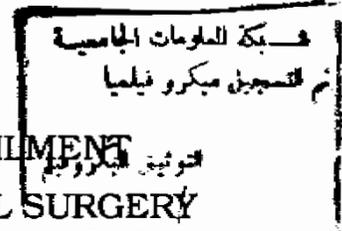


*MANAGEMENT OF ACUTE INTESTINAL
OBSTRUCTION*

ESSAY

SUBMITTED IN PARTIAL FULFILMENT
FOR MASTER DEGREE IN GENERAL SURGERY



SUBMITTED BY

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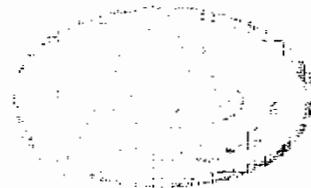
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To my parents
who sacrificed a lot
during the preparation
of this work



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Introduction

Acute intestinal obstruction is one of the most common surgical emergency facing the surgeon in the emergency room , probably about 20 percent of surgical admissions for acute abdominal conditions are for intestinal obstruction (**Schwartz , 1989**) .

Acute intestinal obstruction can affect the human-being from the early hours of life till advanced age , and the order of frequency differs for different age groups . Because of the serious nature of acute intestinal obstruction it demands early diagnosis and speedy relief .

The aim of this work is to evaluate the problem of acute intestinal obstruction according to the most recent studies , concerning the different methods of diagnosis and treatment in different age groups .

HISTORY

HISTORY

HISTORICAL ASPECTS OF THE MANAGEMENT OF ACUTE INTESTINAL OBSTRUCTION

CONSERVATIVE MEASURES :

The conventional procrastinating treatments were posture , opium , purgation , administration of metallic mercury , electricity , enemas and inflation of the bowel with water , air and other gases . Also , puncturing the bowel with a fine needle or trochar and enterocentesis , in which the trochar or needle is left in the bowel for varying periods of time for temporary decompression or with the hope of establishing an external fistula . When the patients did poorly , it was Dupuytren's practice to apply 60 - 80 leeches over the lower abdomen and about the anal canal ! (Wangensteen , 1969) .

EARLY SURGERY FOR INTESTINAL OBSTRUCTION AND HERNIAS

Bowel obstruction and its poor outlook were known to the Ancients . Persistent vomiting accompanied by pain and abdominal distension were treated by Hippocrates with enemas and inflation of the rectum by means of a bladder attached to a pipe . Probably the earliest reasonably authentic report of operation for intestinal obstruction is that of Praxagoras (300 - 400 BC) who , in extreme cases of the "Iliac Passion " , made an incision over the swelling of a strangulated hernia in the inguinal area , freed the gut , and cut into the large bowel to establish an artificial anus . In the 5 th century texts of Sushruta Samhita , strangulated hernia was considered incurable . Application of the cautery over the swelling was advised to encourage cicatrization and to prevent recurrent hernia . Before operative approaches were standardized , incarcerated hernias were treated also by a variety of methods , including bloodletting , purging , rectal tube insertion , applications of heat or cold , use of Trendelenburg's position , and administration of antispasmodics . Saliceto (13 th century) was among the first of the Italian surgeons to restore use of the knife in surgery as a substitute for the cautery . The first operation for strangulated hernias took place in 1561 by Frano who made an incision over the

swelling and divided the constricting band . Pigary of Rouen (1615) described how he operated for strangulated hernia : the incision was made over the swelling ; the peritoneum was deliberately opened and a finger inserted into the wound as a guide in the division of the constricting band over the intestine . It was Pigray's practice to smear his finger with fresh butter or oil of sweet almonds to facilitate its introduction into the wound . If the strangulated intestine was not readily released from the constricting band , he advised tapping the distended bowel with a needle to permit escape of gas : an intestinal wound , he concluded , heals like any wound of the abdominal wall . In the early 19 th century , nonstrangulated hernias were treated with trusses because of the dangers of operation (**Wangensteen , 1969**) .

The most rapid advances in hernial operations , which formed the basis for modern treatment , took place between 1870 and 1900 . For inguinal hernias , new techniques such as high ligation of the sac or reconstruction of the internal and external rings were emphasized . Imported contributions to reconstruction of the inguinal floor were made latter by authors such as Mac Ewen (1886) , Bassini (1890), Marcy (1892) , Ruggi (1892) , Halsted (1903) , Zimmerman (1937) , McVay (1949) , and Shearburn (1969) . In the late 1950's , Usher and co-workers established the use of Marlex mesh to repair hernial defects when fascial structures were inadequate (**Welch , 1990**) .

PROXIMAL DRAINAGE :- COLOSTOMY AND ENTEROSTOMY

Emphasis in the surgical management of intestinal obstruction up until the mid-19 th century had been largely upon the strangulated types . Littre (1710) had suggested , without performing the procedure , opening the colon in the lower left quadrant for imperforate anus , an operation which Duret of Brest performed successfully in 1793 . In 1800 Callisen of Copenhagen suggested that the colostomy for imperforate anus be performed extraperitoneally in the lumbar area . The operation maintained its popularity for almost fifty years , until Bryant (1885) , reverted to the intraperitoneal maneuver to achieve decompression of the distended and obstructed colon .

French surgeons of the mid-18 th century excised segments of devitalized small intestine for strangulated hernia , drawing the orifices of the proximal and distal ends of the bowel into the wound , creating an artificial anus . In 1839 , N'elaton fixed a distended loop of bowel , proximal to the obstruction , in the wound by a number of sutures that penetrated into the lumen . He concluded the procedure by

incising the exposed bowel . It is of considerable interest that this type of enterostomy was depicted and employed by Kocher (1911) and Bonney (1916) (Wangensteen , 1969).

EARLY TECHNIQUES OF INTESTINAL ANASTOMOSIS

Allusion has already been made to the use of animal trachea by Italian Four Masters of the 3rd century in re-establishing intestinal continuity after excision of gangrenous bowel . Duverger (1747) excised several inches of gangrenous small intestine and its mesentery and reunited the ends with a few sutures over a piece of animal trachea . The trachea was expelled in the stool on the twenty first postoperative day and the patient convalesced satisfactory . Ramdohr (1727) excised two feet of gangrenous small bowel and its mesentery , invaginating the proximal end of the bowel into the lumen of the distal segment , fixing it with a few sutures . Jobert (1824) effected an end. to side anastomosis employing this technique in dogs and cats . He employed a continuous waxed suture which was left untied with one end protruding through the wound . On the fifth postoperative day , the suture was withdrawn by gentle traction .

Lembert (1826) described a technique of intestinal suture which is still in vogue and which bears his name . He employed interrupted sutures placed 6-8 mm apart . No suture were tied until all had been placed . The manner of placement of the sutures provided for serosal inversion . Lembert observed that such sutures were extruded into the lumen of the bowel . Lembert's suture is in fact a good description of a one-layer anastomosis . In 1887 Halsted established that the submucosa had significant strength in a one-layer anastomosis . Connel introduced his well-known suture technique in 1892 . Closed or aseptic methods of anastomosis were popular because of the fear of postoperative peritonitis (Wangensteen , 1969) .

Adjuncts to intestinal sutures , several types of intraluminal stents have been used , to achieve adequate patency , such as : reed pipes , hollow cylinders of elder wood , dried goose trachea , cylinders of fish glue and India rubber tube . In this century , Richards and thomas described a wax ring which disintegrated 48 hours after its insertion (Fraster , 1982) .

EMBRYOLOGY

EMBRYOLOGY

Intestinal obstruction may arise from anomalous development of the intestines and therefore an appreciation of gut embryology and its aberrations is useful in the understanding of many of the causes of intestinal obstruction, which may present in the early years of life and even into late adulthood (Skandalakis & Gray, 1987).

At an early stage of development the alimentary canal is represented by a tube suspended in the midline of the abdominal cavity by a ventral and dorsal mesentery. It consists of three portions, each of which has its own artery, and each of which is destined for a specific function: (Table 1).

Name	Extent	Artery	Function
Foregut	Stomach and duodenum as far as the entry of the bile duct.	Coeliac axis	Digestive
Midgut	From the ampulla of Vater to the junction of the middle with the left third of the transverse colon.	Superior mesenteric	Absorptive
Hind gut	the left colon.	Inferior mesenteric	Excretory

Table 1 (Decker & Plessis, 1986).

The absorptive surface area of the gut must be very large because of the large quantities of nutrients and water necessary for survival. In man, it is increased some eleven times by folds and finger-like processes or villi. However, the area is also increased by growth, particularly in length, as a result of which, there will be not enough room in the peritoneal cavity for it and the relatively large liver and kidneys which are developing there. As a result the midgut loop is extruded into the base of the umbilical cord and forms the so-called physiological hernia. As the relative size of the liver and kidneys decreases and the size of the cavity grows, the hernia is reduced and the midgut loop returns to the abdomen. In the process the gut twists around and the order of return to the abdomen is responsible for the final layout of

the large and small intestines (Smith et al. , 1987) .

CHRONOLOGY OF ROTATION OF THE MIDGUT LOOP

Errors in the location of the alimentary canal are almost entirely confined to the midgut loop because of the extreme complexity attending its development . Before rotation commences the midgut forms a loop convex forward its artery runs from the aorta to the apex of the loop .The part of the loop in front of the artery is the pre-arterial segment , and the part behind the artery is the post-arterial segment . During the fifth week the bud for the caecum and appendix appears on the post - arterial segment and rotation which takes place in three stages is about to begin :-

First stage of rotation :

This occurs while the loop lies in the umbilical cord, between the fifth and the tenth weeks . It is largely brought about by the development of the liver . The growth of the right lobe of the liver carries this organ downward and to the right , taking the left umbilical vein " future ligamentum teres " with it . This exerts pressure on the base of the pre-arterial segment , so that it is pushed down and to the right . As the pre-and post- arterial segments lie side by side within the narrow confines of the umbilical hernia , the movement of the pre-arterial portion down and to the right forces the post-arterial segment upwards and to the left.The first stage of rotation is complete when the midgut loop has rotated through 90 degrees in an anticlockwise direction (Decker & du Plessis , 1986) .

Second stage of rotation

This occurs at the tenth to eleventh week . About the beginning of the tenth week the midgut loop returns to the abdominal cavity from the umbilical cord . The gut being too bulky to be returned 'en masse', it retreats in a definite order . The pre-arterial portion returns first , commencing with its proximal portion . While the pre-arterial segment is returning , the superior mesenteric artery is firmly fixed to the umbilicus by its termination (at the former site of the vitello-intestinal duct) and is therefore stretched like a cord from commencement to termination . The returning small gut enters the abdomen to the right of the artery , but the space here being too limited , the coils first reduced are pushed to the left behind the taut artery

by those following on . By their passage to the left they displace the dorsal mesentery of the hind gut (which occupies the midline) before them , so that the descending colon comes to occupy the left flank and the colic angle is pushed up to form the future splenic flexure . The last coil of the ileum carries the superior mesenteric artery with it as it is reduced .

The caecum still lies in the umbilical cord on a plane anterior to the small intestine and its artery . The caecum and right half of the colon now reduce , passing upward and to the right , the colon crossing the pedicle of the small gut at the point of origin of the superior mesenteric artery from the aorta , and the caecum comes to lie under the liver . The subsequent growth elongation of the colon pushes the caecum into the right loin .

Now the second stage of rotation is complete ; the duodenum crosses behind the upper part of the superior mesenteric artery , the transverse colon crosses in front of the same part of this vessel , the descending colon has been pushed into the left flank , the caecum is in the right loin , and the coils of the small gut range from left upper to right lower segments of the abdomen (**Decker & du Plessis , 1986**) .

Third stage of rotation :-

This occurs between the eleventh week and shortly after birth . During this stage:-

- 1 - The caecum descends further , reaching the right iliac fossa .
- 2 - Certain parts of the gut become fixed to the posterior abdominal wall by fusion of their primitive mesenteries with the posterior parietal peritoneum .
- 3 - The mesentery of the small gut becomes adherent to the posterior abdominal wall .
- 4 - The post-arterial mesentery of the transverse colon persists as the transverse mesocolon .
- 5 - The mesentery of the caecum , ascending colon , hepatic flexure , and hindgut becomes completely obliterated by fusion with posterior parietal peritoneum, excepting in the case of the pelvic colon , where the mesentery persists as the future

mesocolon (Decker & du Plessis , 1986) .

ERRORS IN ROTATION OF THE GUT

Abnormalities of intestinal rotation and fixation occur from an interruption in the normal events of development .

The embryology of intestinal rotation was first described in 1898 by Mall based on his studies with the embryologist His . The clinical significance of malrotation was first suggested by Waugh in 1911 in a description of three boys with intussusception and primitive fixation of the gut . In 1923 Dott clearly described the clinical manifestations of malrotation (Rescorla et al. , 1990) .

Dott classified the various forms of intestinal malrotation . This classification falsely divides a continuous process but facilitate the understanding of its complexities :

STAGE I :

Exomphalos ; failure of the intestine to return to the abdominal cavity presents at birth (Gilbert et al. , 1990) .

STAGE II :

The second stage of rotation consists essentially of the reduction of the physiological hernia in orderly sequence . Abnormalities of the second stage are due to a departure from this sequence . The bulk of the caecum is an important factor in ensuring that it remains outside the abdomen until the remaining gut is reduced (Decker & du Plessis , 1986) .

Non rotation and partial rotation ; the failure of the midgut to undergo rotation . In this condition the umbilical ring is lax . The colon and caecum are the first constituents of the physiological hernia to reduce . The small gut which follows displaces the colon and the superior mesenteric aretry to the left (Decker & du Plessis , 1986) .

If the duodenum is seen to descend in a straight line to the right of the superior mesenteric vessels to join the small bowel all of which lie in the right hemi-abdomen with the colon lying all to the left , then no rotation has occurred . Partial rotation is