THE MANAGEMENT OF INTESTINAL OBSTRUCTION

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INTRODUCTION

The Underlying Factors in Obstruction

Before speaking about the management of intestinal obstruction, mention must be made of the fundamentals underlying its problems.

The researches of Slome, Aird, Holt and others in this country, and of Wangensteen, Miller and Abbott in America, have shown that the main factors causing death in obstruction are :—

(1) In high small-intestine obstruction—severe and rapid dehydration from repeated vomiting.

(2) In low small-intestine obstruction—more gradual dehydration together with toxaemia, the sequel of distension.

(3) In large-intestine obstruction—distension leading to bacterial permeation of the bowel wall or frank gangrene resulting in peritonitis.

(4) In any type where resection has proved necessary—peritonitis.

(5) The closed loop type, which, particularly when accompanied by strangulation, is especially dangerous, since gangrene tends to be early.

Mortality

Mortality in intestinal obstruction is high and death is always attributable to late diagnosis, and, therefore, to delayed treatment. Supporting this statement are the facts that when at operation the cause of obstruction can be relieved by simple reduction of a hernia or severance of a band, the mortality is 5-6 per cent., whereas, where resection and anastomosis prove necessary, it rises steeply to 70 per cent. Indeed, the acute form is a " killer " unless relieved by early operation, and since an acute phase may be superimposed on any of the chronic forms, the potential danger of these latter has to be borne in mind, though the development of dangerous symptoms is never so rapid as in small intestinal obstruction.

Recent Advances in Treatment

The chief advances in the management of intestinal obstruction have been :—

(1) Earlier diagnosis ;

(2) Appreciation of the fundamental importance of fluid, chloride and protein balance, and a knowledge of how to recognise and correct imbalance ;

(3) An appreciation of the part played by distension by fluid and gas ;
(4) A recognition of the highly toxic nature of retained intestinal and of free peritoneal fluid ;
(5) Better anaesthesia ;
(6) Pre- and post-operative treatment by sulphonamides and antibiotics and by gastro-intestinal suction and intravenous fluids.

General Management

The first point in management then is early *diagnosis*. All should be alive to the ominous significance in a previously healthy person of colicky abdominal pain of increasing severity and frequency, accompanied by vomiting, and lasting more than 4-6 hours ; such a case is almost certainly a surgical one. The march of events in the closed loop varieties, and especially when strangulation of the vascular supply has been caused, is especially rapid. The tetrad—abdominal pain, distension, faecal vomiting and absolute constipation—is warning of impending death, and no case should be allowed to reach this stage. It cannot be stressed too strongly that until the later stages, there is no rigidity. Auscultation is of value since it differentiates between mechanical obstruction and paralytic ileus. The sub-acute type, occurring during convalescence after abdominal operations, may easily be overlooked unless its possibility be constantly in mind.

The second point in management is to try to discover *the cause and level* of the obstruction. The commonest causes are bands and adhesions, external hernias and carcinoma of the colon, but there are many other less common ones. Examination of the hernial orifices is the first thing necessary, and abdominal scars are suggestive. Straight X-rays will show gas and fluid levels and in infants are essential for assessing the level of obstruction.

Finally, an *assessment of the metabolic state* of the patient is of the utmost importance since, although operation is almost always necessary, active measures may be needed to render the patient fit for it.

METABOLIC BALANCE

In the acute forms of obstruction, time does not, at first, permit of elaborate laboratory investigations, nor are these essential. The sunken eyes, furred tongue and inelastic skin denote *dehydration*, and repeated vomiting, with or without distension, indicates *accumulation of fluid in stomach and small bowel*. For the retention of intestinal fluid an aspiration-tube should be used. For early cases, a Ryle's tube through the nose is adequate, but where distension is considerable, or when the vomitus is brown and vomiting regurgitant, a Miller-Abbott tube is more efficient. It is best manipulated with the patient on the right side, to help the tip pass through the pylorus, and its progress should be checked by X-rays. The passage through the nose of a Ryle's tube is
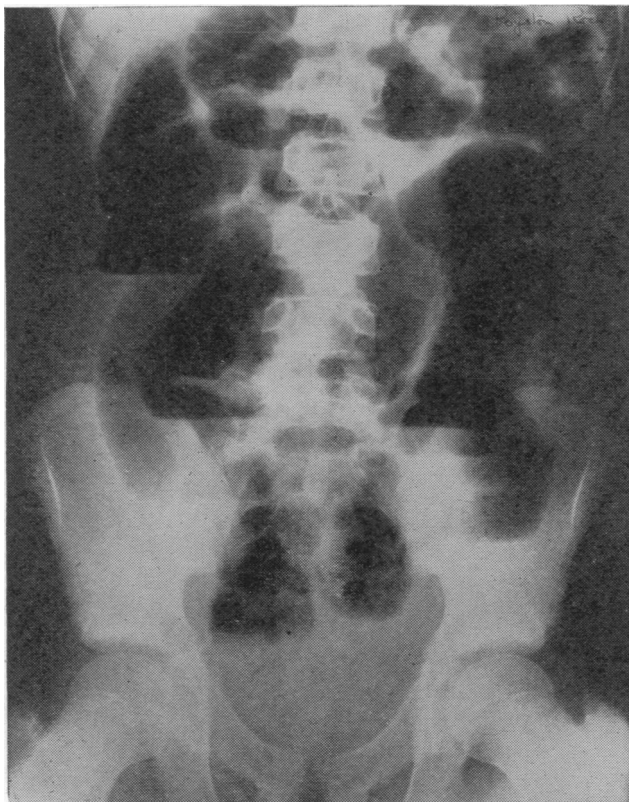
Fig. 1. Typical fluid levels in a child suffering from obstruction of lower intestine.

often rendered less unpleasant to the patient by cooling the metal tip with iced-water or by cocainising the nares. The effect of aspiration is quite remarkable since pain is very quickly abolished. Indeed, this rapid relief is almost diagnostic of obstruction, and to the inexperienced may be misleading in that a patient hitherto ill may, by suction and intravenous fluids, be transformed to one lying in comfort and looking well, yet still obstructed. For the dehydration, intravenous fluids in the form of normal saline or 5 per cent. glucose should be commenced. If complete obstruction has been present for 24 hours, something like 4,000 cc. will have been lost, and it is therefore necessary to give five or six pint bottles (540 cc.) of fluid—three of normal saline and two or three of 5 per cent. glucose—during the first few hours, i.e., at an average of about 60 drops per minute, operation being performed when the pulse rate and blood-pressure have become satisfactory. A careful fluid chart must be kept. The importance of *chloride balance* cannot be too greatly

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THE UNITED BIRMINGHAM HOSPITALS.

WATER BALANCE CHART.

Date—16.2.51.
All amounts in Fl. oz.
Please use English Numerals.

MACEFIELD

TIME	INTAKE			OUTPUT		
	By Mouth	Per Rectum	Intravenous	Urine	Vomit	Stomach Aspiration
1 a.m.						
2	2 Citrated Milk					
3				6		
4	2 ,,					
5						
6	4 ,,				2	
7					2 Yellow	
8	4 ,,					
9					6	
10					37 Brown.. 16+	Ryle's Tube
11						4
12 N.			20 N. Saline			3 Brown
1 p.m.						2
2						2
3						2½
4						1
5			20 N. Saline			2½
6						2 Yellow
7						2
8						2
9				3		1
10	1 Water					2 Yellow
11	1 ,,		20 N. Saline			1 Green
12 M.N.	1 ,,					3
TOTALS	15	—	60	9	63+	30

TOTAL	.. ..	75 oz.
METABOLISM	..	12 oz.
TOTAL INTAKE	..	87 oz.
TOTAL OUTPUT	..	141 oz.
BALANCE	.. ..	−54 oz.

* If patient is sweating much or has diarrhoea, an approximate estimate of fluid lost by these means must be subtracted from Balance.

TOTAL	.. ..	102 oz.
*SWEAT	.. 21 oz.	
RESPIRATION	14 oz.	39 oz.
*FAECES	.. 4 oz.	
TOTAL OUTPUT..		141 oz.

Fig. 2.

Figs. 2 and 3. Typical Fluid Balance Charts, showing in the left lower corner of (2) a negative balance which in (3), 24 hours later, has been corrected.

THE UNITED BIRMINGHAM HOSPITALS.

WATER BALANCE CHART.

Date—17.2.51.
All amounts in Fl. oz.
Please use English Numerals.

MACEFIELD

TIME	INTAKE			OUTPUT		
	By Mouth	Per Rectum	Intravenous	Urine	Vomit	Stomach Aspiration
1 a.m.	1 Water					2 Green
2	1					1
3	1		20 N. Saline			½
4	2 Water					½
5						
6	2			5		1 Green
7						
8	2		20 5% Dextrose			½
9						
10	2					1 Clear
11						
12 N.	2					½ Clear
1 p.m.				8		
2	2					
3			20 N. Saline			1 Clear
4	3 Glucose water					Tube up
5						
6	3					
7			Drip stopped			
8	3					
9		10 Tap water	10 N. Saline ....S.C. Hyalase			
10	3			10		
11						
12 M.N.	3					
TOTALS	30	10	70	23	—	8

TOTAL			110 oz.
METABOLISM	..	..	12 oz.
TOTAL INTAKE	..		122 oz.
TOTAL OUTPUT	..		70 oz.
BALANCE	..	..	÷52 oz.

* *If patient is sweating much or has diarrhoea, an approximate estimate of fluid lost by these means must be subtracted from Balance.*

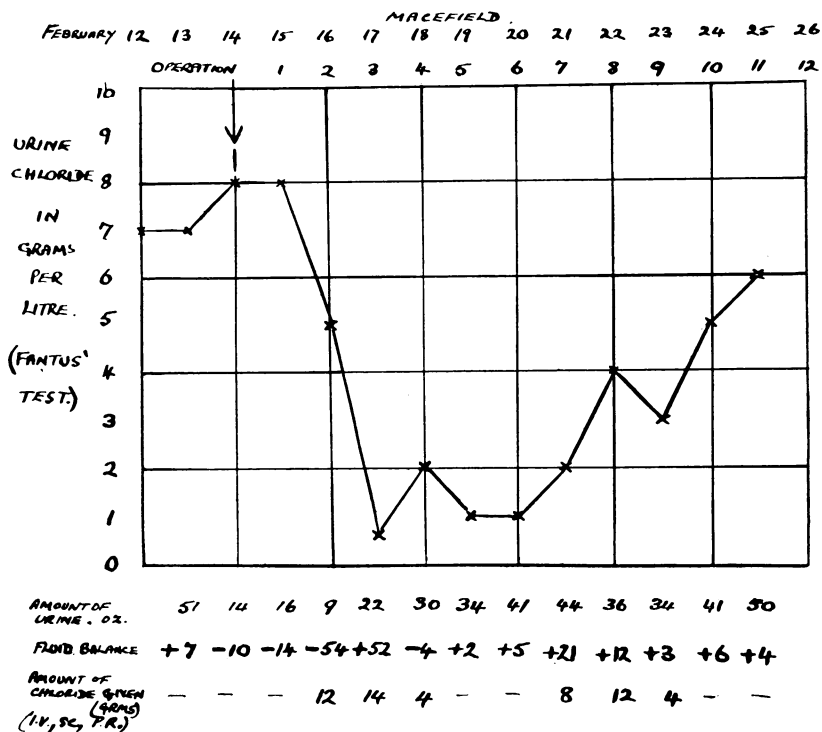| TOTAL	..	..	31 oz
*SWEAT	..	21 oz.	
RESPIRATION		14 oz.	39 oz.
*FAECES	..	4 oz.	
TOTAL OUTPUT	..		70 oz.

Fig. 3.

Fig. 4. Record covering 14 days, showing chloride output in the urine, fluid balance, and chloride intake via intravenous, subcutaneous or rectal routes.

stressed, and the urine must be tested at frequent intervals for chlorides, anything less than 3-4 gms. daily indicating chloride deficiency. After operation a more exact fluid and electrolyte balance can be maintained, all vomits, aspirates and urine being measured, as also fluids given by vein or mouth. It will also be necessary to estimate plasma proteins, since *hypoproteinaemia* must be corrected. But until there is a quick method of estimating blood volume, none of these measurements can be more than approximate during the early stages of management of a bad case of intestinal obstruction. However, the development of the micro-haematocrit technique of Meyerstein in my own Medical School, the newer researches on the quicker estimation of blood-volume, and the more general use of the flame photometer for the measurement of *Na and K*, will all make for reasonably accurate measurements at the short notice that clinical needs demand. On the other hand, it is only right to say that for those working in circumstances where such refinements are unlikely to become available, the lack of such accuracy need not deter them unduly—the following simple rules, controlled by accurate records, will enable any surgeon to obtain very gratifying results, for once fluids,

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chlorides, protein and Hb. are brought back to within physiological limits, the body has remarkable powers of recovery. By no means does every case of obstruction need the intensive treatment described above. A case of obstructed hernia, or of obstruction by band, recognised early and placed forthwith under surgical care, will require no more than one or two pints of saline intravenously, and the passage of a Ryle's tube shortly before anaesthetisation. A case of intussusception in a baby, diagnosed and transferred to hospital within six hours, rarely needs either intravenous fluids or stomach aspiration at all; though under such circumstances it is wise to have the operation table in the head-down position in order to prevent inhalation of toxic stomach contents pressed up into the oesophagus as the result of intra-abdominal manipulations during operation. On the other hand, obstruction in the elderly or the obese, or at any age when diagnosed late, presents the surgeon with a seriously ill patient, in whom operation would carry the gravest risk or be frankly impossible unless and until the upper bowel were emptied and the dehydration and alkalosis had been corrected. For such patients 5-6 pints of fluid daily containing glucose and about 8-10 gms. of chloride are needed. It may be necessary to give the whole of the fluid by vein, though the rectal route, or the subcutaneous route when combined with hyalurodinase, permit of fairly rapid absorption of fluid. Once the obstruction has been relieved increasing quantities may be given by mouth. For hypoproteinaemia, plasma will provide natural proteins but carries the risk of homologous serum jaundice, though not so much from " small pool " stocks. Whole blood is satisfactory whilst anaemia exists, but once cells and haemoglobin have reached normal levels, the supernatant serum of banked blood may be substituted. In the elderly, careful watch for pulmonary oedema is necessary, and should this develop, intravenous fluids must be stopped.

INDIVIDUAL TYPES OF OBSTRUCTION

I. Childhood

(A) Congenital

(1) *Imperforate Anus*. The very simple rule that when the perineum bulges on crying, the blind end of the rectum is sufficiently close to the surface to be reached by a simple incision, is true. In the absence of bulging, the level of the blind end can be shown by X-rays with the child inverted to bring the gas-bubble into it, a metal button being placed on the perineum as a marker. As Denis Browne pointed out in a recent Hunterian Lecture, there may be a minute opening, marked by a dark spot, gradual dilatation of which gives satisfactory relief: he calls it the " pin-hole anus."

So often in imperforate anus there is a fistulous communication between the lower rectum and urethra in the male, or posterior fornix of vagina in the female. In the latter, dilatation of the fistulous opening

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gives satisfactory relief until at four or five years the track can be dissected out and transposed to the normal site of the anus ; some surgeons prefer a colostomy as immediate treatment. The recto-urethral communication in boys is very difficult to deal with, and colostomy is the only satisfactory method of relief, and is likely to have to be permanent.

(2) *Duodenal Atresia.* The characteristic feature here is incessant vomiting of bile-stained fluid, and X-rays will confirm by showing gas in stomach and duodenal cap only. The atresia may be in the second part just at or beyond the ampulla. It is best treated by gastro-enterostomy a somewhat hazardous procedure in a new-born child, though less so since the regime of intravenous fluids. The atresia may also be in the 3rd or 4th parts, i.e., in the region of the superior mesenteric vessels, and may result from peritoneal bands of unknown origin, or it may be part of a malrotation of the gut. Division of the bands is sometimes sufficient, but where full relief is not obtained thereby, or where there is true narrowing of the bowel, an entero-anastomosis is the best operation.

Mortality in these cases is bound to be very high, but the situation should not be regarded as so hopeless as not to merit an attempt to effect a short-circuit.

(3) *Ileal Atresia.* This is often multiple, and X-rays will show that gas is present in at least the upper half of the small intestine. A lower paramedian incision will quickly reveal the collapsed bowel below and distended bowel above. The whole small intestine should be examined, since, in the presence of multiple sites of atresia, short-circuit operations may be necessary. Often, the lumen is so narrow throughout long stretches of bowel, that nothing useful can be done.

(B) First Two Years of Life

(1) *Intussusception.* Symptoms are so characteristic that early diagnosis should not be difficult. From a personal experience of 80 cases, I will mention one or two points. A striking feature is that in between attacks of pain, the baby not only looks pale, but lies unnaturally still. The second is that the small, tight intussusception sometimes lies under the liver and cannot for certain be felt. When thus in doubt, the surgeon should not hesitate to examine under an anaesthetic, doing this in the theatre, so that if a lump be confirmed, operation may at once be proceeded with. The third point is that the small tight intussusception is the one likely to produce the most blood : the loose one, travelling easily round the whole colon and down into the rectum, may give no blood at all. The final point is that after reduction by operation, the oedematous part near the apex presents a dimple : this must be eliminated by firm pressure, since it may well initiate a recurrence. The treatment of intussusception is operative. I feel very strongly that only when one is in a situation where no facilities for operation exist should one have recourse to

attempting to reduce the intussusception by rectal injections. The early case does not require intravenous therapy, though the passage of a Ryle's stomach tube diminishes the risk of inhaling stomach contents during intra-abdominal manipulations. In the late case, where dehydration is present, intravenous fluids must be given. Through a right paramedian incision, the intussusception is reduced by pressure, never by pulling on it. In the late case, where reduction is impossible, or gangrene is present, resection may be attempted, or the edge of the intussusceptum may be stitched to the intussuscipiens with the hope that the gangrenous area may slough and be passed per anum. In either event, the prognosis is poor.

(2) *Obstructed Hernia.* In a long experience of children's surgery, I have never seen a strangulated, irreducible inguinal hernia. A child whose hernia has become temporarily irreducible should be put on a gallows splint, or in a head-down position on a steep incline in bed, (such as a chair placed face downwards) with a cold compress over the hernia : within an hour it becomes reducible ; a radical cure should be undertaken within a week.

(3) *Tuberculous Peritonitis* may affect children in several ways leading up to obstruction. Caseating glands may cause adhesions, sometimes glueing together adjacent pieces of small gut with resulting kinks, sometimes involving so much of the mesentery as to reduce the whole of the small intestine to one conglomerate ball. The obstruction resulting from either of these forms is usually sub-acute, and after observation, it becomes obvious that laparotomy is called for. In the former type, adhesions may be separated or lateral anastomosis performed. Should the lesion be relatively single, the prognosis is good, but when multiple there is a marked tendency to recurrence. The second type is almost impossible of treatment.

(4) *Volvulus.* This is commonly associated with a Meckel's diverticulum attached to the umbilicus. The onset is sudden and vomiting early and extreme, a result of kinking of the duodenum. Laparotomy is necessary, when it is hoped that untwisting of the isolated small intestine may be possible. The diverticulum must, of course, be removed.

II. Adolescence and up to 30 Years

(1) *Inguinal and Femoral Hernia.* The first thing to do when encountered with any obstruction is to examine the hernial orifices, since this is the commonest cause next to intra-abdominal adhesions and bands. The dramatic event of obstruction may be the first occasion that the patient knew he suffered from hernia, or, it may have been a long-standing hernia but which was never before obstructed or irreducible. Unless the hernia has been obstructed for more than 12 hours or so, or unless the skin is oedematous and tender, strongly suggesting strangulation, reduction by taxis should be attempted, and if not at once successful, again after

the foot of the bed has been raised for an hour and a cold compress applied. It is also worth giving a simple enema. The term " taxis " must be understood, and is not very satisfactory. What is really wanted is circumferential pressure on the swelling together with a little push in the direction of the canal, whether inguinal or femoral. Should this fail, the patient must be prepared for operation, suction and intravenous fluids being applied according to the rules already outlined. On opening the sac, fluid is found and the gut is then inspected. If pink and viable, it is still important to inspect the neck, for pressure here by the constricting agent may have been sufficient to embarrass circulation at one point—this should be infolded by a few Lembert sutures. Should it be necessary to incise the neck of the sac before reduction is possible, the gut should be held with moist gauze to prevent it from slipping into the abdomen before inspection has been possible. Such incision should be upwards and inwards for an inguinal hernia, so as to be parallel with the deep epigastric artery, and inwards for a femoral hernia, watching for an abnormal obturator artery. Where the bowel is not viable— black, dull surface and of the consistency of wet paper—it is best to approach the neck from above, whether inguinal or femoral, since this affords a better chance of avoiding a leak from any gangrenous patch suddenly uncovered by opening the neck of the sac. Resection and end-to-end, or end-to-side, anastomosis must be carried out, a drainage tube being placed just inside the peritoneal cavity and antibiotics being administered for several days afterwards. When simple reduction by taxis has been effected, the possibility of reduction *en masse* must be kept in mind, and, following reduction by operation, the development of paralytic ileus or local spasm or subsequent stenosis must be borne in mind. Richter's hernia is a particularly dangerous type of obstruction because, being only partial, there is no constipation ; indeed diarrhoea may be present, and there is no distension. It may also be impossible to feel a lump at the hernial orifices. Nevertheless, the continuance of colicky pain with vomiting demands laparotomy, and a gangrenous patch is often found at the constriction ring.

(2) *Adhesions and Bands*. Operation scars in a case of obstruction are strongly suggestive of its cause. A short length of small gut may be adherent to the back of such a scar, becoming puckered and kinked by peristalsis, or narrowed by continued contraction of the scar tissue. The onset of symptoms is rarely precipitate as in hernia or as in obstruction under a band. These bands usually lie on the posterior abdominal wall, and are usually short, stretching between such structures as an appendix stump and a piece of omentum or mesentery, a Fallopian tube and an appendix epiploica, a gland and a piece of gut. A *Meckel's diverticulum* may act in this way, especially when attached to the umbilicus. Through a right lower paramedian incision, the abdomen is opened and a piece of collapsed bowel is sought for and traced upwards, its level

being determined by running a finger down to the root of its mesentery. By so tracing the collapsed bowel upwards, the band or other obstructing agent will be found. It is important to avoid pulling on distended bowel, although, since the introduction of suction, one does not often meet with the heavy, loaded coils of dilated bowel above the obstruction so common in pre-suction days. When the band is discovered, the bowel is gently packed off with wet mops and the band cut. The released coil must be carefully inspected for gangrene, especially at the site of constriction.

(3) *Internal Hernias.* These are rare, but the surgeon must always be prepared to deal with these difficult cases. The common sites are around the ileo-caecal and the duodeno-jejunal regions. the latter site being particularly difficult because of the relationship with mesenteric veins. After ascertaining the cause of obstruction the bowel is gently pulled out, but it may be difficult to reduce the last coil because of distension. The neck cannot be incised for fear of injuring the superior or inferior mesenteric vessels, but it can be gently stretched with the finger tip. If there is still difficulty the distended loop can be aspirated with a syringe and needle.

Other sites for internal hernia are the foramen of Winslow, the pocket between the two limbs of the sigmoid meso-colon, and holes in the omentum. The same principles of reduction should be applied.

III. Middle Age

(1) *Inguinal and Femoral Hernias*—as already described.

(2) *Bands and Adhesions*—as already described ; the same principles applying as in younger folk, though the importance of restoring and maintaining metabolic balance being even more important in the older group.

(3) *Umbilical Hernia.* This is especially a disease of obese, middle-aged women. The hernia has usually been present for many years, but has latterly grown larger, obstruction often finally being precipitated by an exacerbation of bronchitis. The hernia tends to cause pain and tenderness, and then the typical signs of acute obstruction develop. Two enemas may succeed in permitting of its reduction, but, if not, the acute phase, as also the unobstructed phase, is best dealt with by the Mayo type of operation. The fibrous ring at the neck of the sac is very likely to cause a patch of gangrene in the nipped bowel wall. In case of non-viability of a loop, resection will be necessary, a hazardous operation in a fat, bronchitic middle-aged person, but one rendered less so by the application of suction, intravenous fluids, antibiotics and breathing exercises. The abdominal wall should be drained, since a haematoma not uncommonly develops.

In a patient constitutionally ill from cardio-vascular, renal or pulmonary disease, or one in whom treatment has been long delayed, it may, in the presence of a non-viable loop of gut, be a life-saving procedure to

exteriorise the loop or to remove it, tying a Paul's tube into each end. This is, of course, especially useful when it is the transverse colon that is involved.

The contents of the sac—omentum, small intestine or transverse colon—are usually adherent to the fundus of the sac, and have to be separated carefully, but the neck is usually free.

(4) *Incisional Hernia.* This condition is self-evident and the patient is fully aware of its existence; indeed, he may easily have worn a surgical belt for some years to control it. A sudden movement, strain or cough may force more gut than usual into the sac leading to obstruction. After the usual preparation for operation, the hernia is surrounded by an elliptical incision and the neck is cautiously approached from one side. After separating adhesions and deciding on viability of the obstructed loop or any gangrenous patch at the ring of constriction and applying appropriate treatment, a repair of the abdominal wall, layer by layer, is carried out.

(5) *Volvulus.* The part involved in adults as opposed to children is the sigmoid colon, in constipated patients with a narrow base to the meso-sigmoid. It may only be partial and may then be reduced by enemas and positioning, the patient learning the position which in his case helps reduction. But where the torsion is complete, the characteristically striking thing is the very rapid and intense distension that follows—quite pathognomic. After suction and intravenous fluids have been started, laparotomy through a left paramedian incision is performed. It may be possible to untwist the sigmoid, but there is a marked tendency to recurrence, and I know of two cases where subsequent excision and end-to-end anastomosis proved necessary.

(6) *Diverticulitis.* This common cause of chronic obstruction rarely presents an acute phase, and when it does, it is usually diagnosed as carcinoma until laparotomy reveals it to be otherwise : and even then, it may be impossible of differentiation. The treatment of the acute phase is the same and is dealt with in the next paragraph.

(7) *Carcinoma.* In the acute form of obstruction, distension may be very great. With it pain may be severe but vomiting late or absent. Although it will be hoped that resection of the growth will prove possible, this forms no part of emergency treatment. History and examination may indicate the site of the tumour, and the incision can be placed accordingly, but often it is impossible to forecast the level of the obstruction, under which circumstances it is best to open the abdomen through a right or left sub-umbilical paramedian incision and then gently to explore. One first examines the caecum and if it is distended the obstruction must lie distal to it. The remainder of the colon is examined until the tumour is found. The liver and gland field are also examined, but for the acute phase colostomy is necessary. For carcinoma

of the pelvi-rectal region a sigmoid colostomy is performed : for splenic flexure constriction, transverse colostomy ; and for carcinoma more proximal than this, a caecostomy. When the growth is in a mobile part, where the Paul-Mickulicz technique can be used, it should be employed.

IV. Old Age

(1) *Carcinoma of Large Bowel.* Treatment is as for middle-aged people but where great distension exists and the patient is in a feeble state, there is a place for " blind caecostomy," using a Paul's tube. It can be undertaken under local anaesthesia and relieves the obstruction at once. Further treatment can be considered when the patient is in a fitter state.

(2) *Gall-Stone Obstruction.* A gall-stone may ulcerate through into the duodenum and then becomes impacted towards the last part of the ileum. Typical signs and symptoms of obstruction develop and it is sometimes possible on pelvic examination to feel it through the rectal wall as it lies in dependent small gut. A history of long-standing chole- cystitis may give a clue. After establishing gastro-duodenal suction and parenteral fluids, a laparotomy is performed and the stone is removed through a small incision, the bowel being closed again. Any doubt regarding viability necessitates resection or exteriorisation, depending on the general condition of the patient.

(3) *Faecal Impaction.* This may also be the cause of obstruction in elderly people, and signs and symptoms of obstruction develop. Unless enemata, say up to three or four, succeed in relieving the condition, laparotomy is necessary, otherwise perforation may occur, a complication witnessed by the author. The impaction is removed in the same way as the gall-stone.

V. Post-Operative Sub-Acute Intestinal Obstruction

(*A*) Sub-acute obstruction may develop during convalescence from any abdominal operation, there being at least six different sources :—

(1) The gap in the meso-colon following retro-colic partial gastrectomy or gastro-enterostomy.

(2) The space between the transverse colon behind and the anastomosis in front, in an ante-colic partial gastrectomy or gastro-enterostomy.

(3) The left para-colic gutter following colostomy.

(4) The right para-colic gutter following ileostomy.

(5) The V-shaped gap in the mesentery between the two ends of ileum in ileostomy.

(6) Kinking adhesions.   .

The first five should be preventable by closing the gaps concerned at the first operation. Nos. (1) and (3) are well-known, but No. (2), so far as I am aware has never been published, yet I know of three such

cases ; and it is, therefore, important to close the gap at the time of the anastomosis. Nos. (4) and (5) were dealt with by B. N. Brooke in a recent Hunterian Lecture on Ulcerative Colitis. The problem of adhesions has still to be solved. The important point in these cases is to recognise that partial obstruction has occurred. A satisfactory convalescence, interrupted by colicky pain with occasional vomiting and unsatisfactory bowel actions, should make one think of the possibility of an entrapped loop. It often occurs about the third-sixth post-operative day, and the re-establishment of suction and intravenous fluids abolishes the symptoms so completely that their occurrence may be thought of little significance until they return as soon as suction and intravenous therapy have been stopped. Laparotomy and a thorough examination for bands, adhesions or the hiatus mentioned above, are called for, the latter being closed, if found responsible.

(B) *Paralytic Ileus.* This serious form of obstruction—as its name implies, a paralysed bowel—not uncommonly follows conditions where local or widespread peritonitis has been present or develops during convalescence. Thus, after fulminating peritonitis, perforated peptic ulcer, ruptured ectopic gestation or pancreatitis, slow distension with constipation and absent bowel sounds may progress to gross distension, regurgitant vomiting and peripheral vascular failure. The absence of bowel sounds is the conclusive sign, and an indication to avoid " whipping a tired horse " with enemata, pituitrin or eserine. Gastro-duodenal suction and intravenous fluids, with nothing by mouth, is the regime best calculated to permit return of function to the poisoned non-striped muscle and autonomic apparatus of the gut wall.

Ileus may also occur in uraemia, pneumonia, fractures of the spine and spinal cord tumours, and calls for similar conservative measures.

VI.   Mesenteric Thrombosis

Sudden onset of abdominal pain with symptoms of intestinal obstruction and shock and an enema result containing dark blood intimately mixed with the stool should make one think of mesenteric embolism or thrombosis. In heart disease or in the presence of phlebothrombosis in any part of the body, embolism is the more probable, but will lead to spreading thrombosis in the mesenteric vessels. In either condition laparotomy is indicated, but should be followed by heparin for seven to ten days. At operation excision followed by end-to-end anastomosis is indicated.