THE TREATMENT OF ACUTE PERITONITIS, AND OTHER CONDITIONS ASSOCIATED WITH GRAVE SHOCK, WITH NOTES ON CASES OF INTESTINAL OBSTRUCTION, etc.

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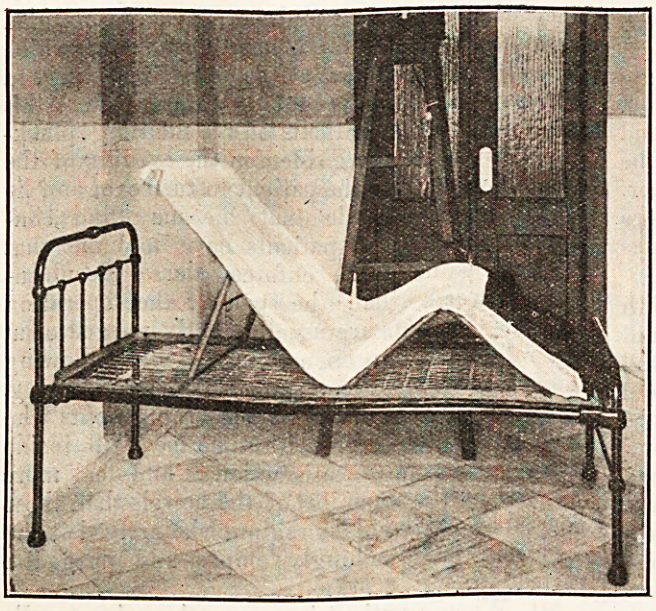
The reason for bringing this subject forward is not that there is anything startling or new to say, but because after enquiry I have been left very doubtful as to whether in this country the more recent advances in such treatment have been as widely appreciated as their importance warrants: and therefore I feel that the experience of various members of this hospital staff for the last three years being at my disposal, such experience might be usefully exploited to illustrate the great changes that have taken place during the past five years or so in the methods available of dealing with such a serious condition as acute general peritonitis. The great changes to which I refer are those due to the work of Fowler and Murphy, and briefly put consist in the adoption of the sitting position by the patient and a slow continuous administration of large quantities of normal saline by the rectum. Upon reading the various literature upon the subject one finds that there are numerous modifications of the original Fowler-Murphy recommendations, and although I proposed to describe the method that we have been gradually led to adopt in this hospital, I do not for a moment suggest that this particular method is the one and only method that could or ought to be adopted by any one working in a different hospital and under different conditions.

It was in 1907 that this treatment by posture and rectal administration of fluid was commenced here; at first it was thought that having to depend as we so often have upon an ignorant and temporary ward boy as a special attendant upon the patient the continuous administration of fluid was an attempt beyond our capabilities, and we tried instead the plan of giving two hourly enemata of saline solution, the patient being supported in a sitting position by means of a bed rest and by a pillow or pillows placed below his knees; these measures gave us a great improvement in our results, but were attended by many disadvantages, such as undue disturbance of the patient by the two hourly enemata, great difficulty in keeping the patient propped up in bed, much worry to an already overworked nurse, etc.; so that successive modifications were gradually evolved until the present procedure was adopted, and this has remained practically unaltered during the past year.

Our procedure is as follows:—Immediately patient develops or is admitted with signs and symptoms pointing to acute general peritonitis, he is placed in a sitting position and maintained in that position by means of a special wooden or iron framework (made without difficulty by any local workman), the construction of the special frame can be readily understood from the accompanying diagram and photograph. An operation having been decided upon, the extent and nature of operation must depend partly upon the cause of the peritonitis and partly upon the general condition of the patient. In those very desperate cases of two or three days duration which are unfortunately well-known to all who practise in the East, the only operation attempted is that of draining the peritoneal cavity: and the best drainage is by means of three tubes inserted deep down, one in the middle



line just above the pubis, and one in each flank: the whole operation taking about five minutes: no attempt is made either to search for the cause of the peritonitis or to cleanse the abdominal cavity.

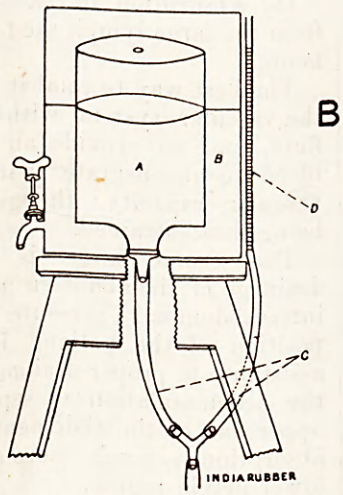
The question of the advisability of searching for the cause of the peritonitis is one of great difficulty, much depends on the condition of the patient and his surroundings. Whenever possible, a search should be made, but it is essential the search should be quick and carried out with as little disturbance of the abdominal contents as possible. To fulfil these essentials, it is necessary the operator must have had considerable experience in abdominal operations, and also be aided by a sufficient number of skilled assistants with all the instruments for abdominal operations.

Unless the conditions can be obtained, I believe, the best results will be obtained by making no search, but by simply inserting drainage tubes as described below.

As an instance, I may mention a case of perforated typhoid ulcer in which the patient was far too ill to allow of any abdominal search being made. Under abdominal drainage and subsequent Fowler-Murphy treatment the patient made a really rapid recovery. Unfortunately he died some 14 days later of acute intestinal obstruction due to a band when quite convalescent. On such experience as I have had, I have come to the conclusion that unless all the means and appliances for rapid abdominal work are at hand it is best not to search in *advanced* cases of acute peritonitis.

Not a few of these apparently hopeless cases have recovered; in some without the cause of the peritonitis ever being revealed, in others the cause has been subsequently discovered as a ruptured appendix abscess or suppurating tube by the residual local collection of pus left after the subsidence of the more general trouble. Exactly which cases should be dealt with in this simple and quick manner and which should be submitted to more thorough abdominal search must always be a matter for the particular operator to decide, but I am convinced that in patients gravely ill as the result of toxin and bacterial absorption from the peritoneal cavity little disturbance of the peritoneum and its contents is a very important factor in the subsequent well being of the patient, it is therefore of the very highest importance that all possible efforts should be made to arrive at an exact diagnosis before the abdominal cavity is opened; the old saying "open and see" applied to abdominal lesions is no doubt very excellent, but used as it so often is an excuse for careless preoperative observation has probably caused the loss of many lives.

The operation simple or complex having been completed, the patient is put to bed supported as before in a sitting position and before his complete recovery from the anæsthetic the rectal irrigation is begun. The apparatus in use here is shown in the accompanying illustrations, and although perhaps a trifle formidable and complicated in appearance is really in actual practice very simple and efficient. The main principle aimed at is to allow fluid of a fairly equable temperature to run into the rectum at a certain slow rate, the rate being adjustable to the absorbent powers of the rectum of the particular patient.



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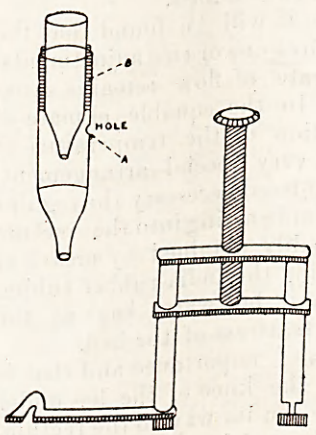

C

The essential points are:—

1. A simple regulator: this is provided by the ordinary screw pinch cock.

2. An indication of the rate of flow visible to the nurse or other attendant. The glass dropper B serves this purpose and is easily prepared by fixing a glass tube drawn out to a narrow neck into the lumen of a slightly wider tube—to allow of steady flow and for the escape of intestinal gases it is important that either the thinner tube should not accurately fit the wider, or that the latter should be pierced by a small hole as at "a."

3. A rectal nozzle that is easily introduced does not irritate the rectum and is not readily kinked or blocked. An ordinary vaginal glass douche nozzle bent to an angle of about 135° fulfil these conditions.

4. A height of fluid which will suffice to overcome the intra-rectal pressure: in considering this height it must be understood that the height of the vent hole in the glass indicator C above the rectum is the height of the column of fluid acting upon rectum.

The rate of flow which we have found usually well retained is about 12 oz. per hour. The number of drops necessary to give such flow will depend upon the indicator in use and must be determined experimentally for each indicator; those in use here deliver 12 oz. per hour at a drop rate of 60 to 80 per minute.

For greater convenience a gauge glass attached to the inside bottle A is fixed to the side of the hot water jacket B and at the end of an hour the attendant can at once say how much fluid has passed from the bottle A into the rectum can alter the rate of drop in accordance with the information so obtained.

For the first hour it will be found that the screw regulator requires one or two adjustments, but after that the rate of flow remains satisfactorily constant. In the equable climate of Rangoon the regulation of the temperature of the fluid requires no very special arrangement, but should it be considered necessary the regular temperature of the fluid passing into the rectum could, I think, be readily obtained by means of covering or surrounding the India-rubber tubing with one or two small hot-water bags as the tube passes over the mattress of the bed.

One minor point is of importance and that is to place a pad under the knee of the leg under which the tube passes on its way to the rectum. If this is neglected the weight of the leg presses on the tube and stops the flow of fluid.

It must be remembered that the fluid is being properly given it will be retained and absorbed; as Murphy has pointed out if the fluid is returned it is certain that it is not being properly given. The details are simple, but to obtain the best results they must be carried out with precision.

Any failure of the fluid to pass into the rectum owing to kinking of the India-rubber tubing, blocking of the nozzle by fæcal accumulation, or by the height of the indicator above the rectum being insufficient to counterbalance the inter-rectal pressure is shown at once by the filling of the lower portion of the indicator with fluid and its overflow from the hole "a."

In this hospital the regular administration of fluid per rectum in the way has taken the place of intravenous saline transfusions in all save the few cases in which it is necessary to bring about an immediate and very rapid restoration of blood-pressure, such as cases of large hæmorrhages from wounds, etc.

In a few cases treated this rectal infusion of saline has been rendered difficult or impossible by—

(*a*) restlessness of the patient;

(*b*) blocking of the rectum and lower bowel by fœces.

To avoid "a" we frequently give morphia immediately after the operation, one dose has usually proved sufficient, for one of the great advantages of the treatment is that with the steady absorption of fluid the restlessness disappears and the distressing thirst is relieved in a most remarkable manner; "b" can be generally prevented or relieved by washing out the lower bowel with a large soap, and water or turpentine enema.

The "rationale" of the treatment now known as the Fowler-Murphy treatment is, I think, plain. The most pressing dangers of acute general peritonitis are—

(*a*) Shock due, in part at any rate, to the great increase in capacity of the splanchnic vascular area dilated by the inflammation.

(*b*) Absorption of bacteria and their toxins from the large lymph sac formed by the peritoneum.

The best way to combat the first is to supply the vascular system with a steady in-flow of fluid, and so provide an increased volume of blood commensurate with the increase of vascular capacity: the general blood-pressure being thus sustained.

The second danger is limited by the free drainage of the abdomen and the relief of the intra-abdominal pressure while the sitting position of the patient is not only a great assistance to proper drainage, but also prevents the accummulation of septic products in the upper half of the abdomen, from which region absorption is much more active than from the lower pelvic region.

I would especially like to bring the above-mentioned treatment to the consideration of Civil Surgeons in outlying districts who as we all know by experience are frequently called upon to treat cases of acute peritonitis under circumstances of great difficulty.

To them, I believe, the Fowler-Murphy treatment will be of the greatest use. The incision for the insertion of the tubes can be made under the influence of a local anæsthetic and the subsequent treatment carried out by some such apparatus as is described in this article.

I would point out the apparatus required is in no way complicated, all the necessary parts can be, and in our case are being obtained or manufactured locally. We have in the Rangoon Hospital three sets of apparatus which are in more or less constant use, and with the exception of the screw pinch cock all the other parts of the apparatus have been made by the hospital workmen.

That a less clumsy apparatus can be made by more skilled workmen is apparent to all, but the

one depicted in the diagram has efficiently stood the test of work for a year and is capable of being quickly made by the ordinary workmen found in the bazaar.

When once the apparatus has been properly started in working order and the number of drops per minute regulated no very skilled further supervision is necessary. It requires frequent inspection and possibly some regulation of the number of drops per minute, but this can well be carried out by a nurse, an hospital assistant, or even a compounder.

Although it is not my purpose or intention to endeavour to impress this treatment upon the profession out here by citing statistics—such can be read any day in any home journal, our results do I think amply support the majority of such claims and statements in order to illustrate the scope of this method, I venture to append a few very brief notes of the last half dozen cases so treated in this hospital.

Illustrative Cases.

Mg. Po Myin, male, 27, Burman. Admitted on 1st February, 1910.

Fever of some days' duration. Ran the usual course of a severe typhoid: symptoms of perforation developing upon the evening of the 23rd February. Abdomen opened 1 A.M. on 24th February. Perforated ulcer closed. The whole of the lower part of the abdominal cavity infected and no evidence of limitation by adhesions. Drainage tubes inserted and rectal irrigation started. Died on 28th February, 1910, but no signs of general peritonitis developed and the man died of the severe typhoid infection.

Post-mortem.—The general peritoneal cavity free from infection, localised peritonitis of the lower one-fourth of the abdomen, chiefly adhesive.

Mr. F. C. K., European, age 27. Admitted on 4th February, 1910. Discharged "cured" on 14th March, 1910.

Symptoms.—Those of a sub-acute peritonitis of the upper one-third of abdomen.

Diagnosis.—Leaking liver abscess under surface of liver.

Operation showed adhesions and great thickening about the duodenum. Liver and gallbladder healthy. The diagnosis was altered to leaking duodenal ulcer and a posterior gastro-jejunostomy performed. Owing to the distension of the bowel and adhesions the operation was difficult and prolonged. With rectal irrigation, the patient made a good recovery from the shock of the operation, and no thirst was ever complained of, although nothing save occasional sips of water was allowed by the mouth for three days.

Ma Kyaw, Burmese female, aged 22, married. Admitted February 10th, with acute general peritonitis, and history pointing to a ruptured tubal pregnancy of three days' duration.

Laparotomy.—Abdomen distended with mixture of blood and blood clot which was removed. The left Fallopian tube was found distended and ruptured. Signs of acute general peritonitis. Three drainage tubes inserted one in middle line, one in each flank. Patient placed in Fowler position with continuous rectal irrigation. Patient's condition after return to ward was very bad, but she quickly rallied and in 48 hours was out of danger.

Tubes were removed on fourth day. Seven days later patient again suddenly developed symptoms of acute peritonitis with great pain, and marked abdominal distension presumably due to rupture of a collection of pus into abdominal cavity. Under local anæsthetic wounds were opened up and three tubes again inserted. On opening abdomen a mixture of pus and peritoneal fluid escaped. Fowler's position, continuous rectal irrigation. Patient rapidly recovered and left hospital in a good state of health. No search was made for the source of the pus nor was any attempt made to cleanse the abdominal cavity. The second operation was done in bed with patient in Fowler's position.

Hindu, male, age 35, cooly. Admitted 6th March 1910 for constipation and abdominal pain of three days' duration.

No vomiting. General condition satisfactory. Distended coil of intestine visible. Intestinal obstruction, cause uncertain, was at once diagnosed, and operation performed.

The first incision was in the middle line, but upon exploring the abdominal cavity, it was found that the obstruction was in the large bowel on the left side, and so a second incision was made over the seat of obstruction. Volvulus of the sigmoid was found and reduced, and as the walls of the gut appeared rather seriously damaged, the large bowel was opened and fixed to the abdominal wall.

The operation was more prolonged than was advisable, and after operation the man's temperature rose to 103° and rate of pulse from 64 to 120, 130, but with the rectal absorption he was free from thirst and general discomfort, and upon the second day his pulse had dropped to 100 and he was out of danger.

A. R., Hindu, male, 42, compositor. Admitted on 25th February, 1910, for pain all over the body and general malaise of several months' duration. During the night of the 27th he suddenly developed acute abdominal symptoms. Pulse previously 80—90 being 138, and barely perceptible with acute pain in the upper part of the abdomen.

Upon the 28th he had improved a little, but his general condition was so bad that it was thought best to postpone operation particularly as the signs were limited to only the upper portion of abdomen. Upon the 6th an operation was performed for what was thought an abscess about the lower surface of the liver.

Typical fat necrosis was found and the pancreas drained. The operation was a serious one as the man's general condition was very poor, but the rectal irrigation was well retained and the man made an excellent recovery.

Ma Kha, aged 45, admitted February 14th, 1910, in a very bad state of health with large sloughing fibroid polypus of the uterus. Not only the polypus but the cervix also was much ulcerated and so indurated as to give rise to a suspicion of cancer vaginal hysterectomy—24 hours after operation patient developed signs of general peritonitis and appeared to be in a dying condition Fowler-Murphy treatment was at once commenced, and a large tube introduced through the wound left by the hysterectomy. The peritonitis rapidly subsided and the patient made a good though somewhat prolonged recovery.

Intussusception.—Two cases aged 25 and 35 years respectively. The first case was of three days' standing but the symptoms were not urgent and so much resembled dysentery that an outside practitioner had diagnosed that disease, a rectal examination rectified the diagnosis. On opening the abdomen the intussusception was readily reduced and the patient made a rapid recovery. The second patient was admitted with urgent symptoms of intestinal obstruction of five days' duration and with general peritonitis. The cause of obstruction was undiagnosed, but on opening the abdomen a gangrenous intussusception was found; this was brought out of the abdomen, the gut above cut across, and a Paul's tube inserted; the patient did not rally and died in a few hours. In both cases the intussusception was of the ileo-cæcal variety.

Intussusception of the bowel is a rare form of intestinal obstruction as met with in the practice of the Rangoon General Hospital. Such cases as have been

met with have occurred chiefly amongst adults, in an experience of some nine years at this hospital. I can only recall one case occurring in an infant, and although doubtless cases do occur amongst infants, which are allowed to die untreated, still I feel sure this form of intestinal obstruction is comparatively rare. Fitz Williams in the *Lancet* of March 1908, urges the view that intussusception is caused in infants largely by errors of diet. He states: "it is a matter of interest from the point of view of the possibility of a too generous diet being responsible for the condition to note that intussusceptions occur almost without exception in fat well developed and healthy children, and that in 34 cases in which it was possible to obtain a history of the cause in 25 what may be termed errors of diet were mentioned, the remaining nine were due to mechanical causes." In Germany where breast feeding is far more general and more strictly carried out than in England, intussusceptions in infants are relatively very rare. The same condition largely holds good in Burma, every mother unless incapacitated by illness suckles her child, and continues to do so often for two or two and a half years. It would appear then possible this may be the reason for the comparative rareness of intussusceptions amongst infants in this country.

Volvulus, three cases, aged 20, 35 and 60 years respectively.

The first case was a volvulus of the small intestine, with obstruction of five days' standing. The obstruction was relieved but the patient died 36 hours later of gangrene of the intestine. In the second and third cases the usual form of volvulus of the sigmoid flexure was present.

In the second case there had been total obstruction of the intestines for three days, the abdomen was much distended but there was no vomiting. The abdomen was opened in the middle line without the cause of the obstruction being diagnosed.

As a volvulus of the sigmoid flexure was at once apparent, this incision was closed and a second one made over the position of the sigmoid flexure. The gut was punctured and then drawn outside the abdomen; as a portion of the bowel was gangrenous, this was left outside the abdomen as a Paul's tube tied in. The patient did well, and though two subsequent operations were necessary to close the fæcal fistula left, the patient made an excellent recovery and was discharged from hospital with his abdominal wounds securely healed. In the third case the obstruction had been complete for two days and the sigmoid flexure was enormously distended; the patient had been operated on one year previously in this hospital for an exactly similar condition. An incision was made in the left semilunar line, the volvulus punctured and then untwisted; and the lower part of the sigmoid loops of intestine was sewn to the abdominal wound with a view to preventing any future volvulus occurring. The patient made a rapid recovery.

In my opinion the number of the cases of this form of obstruction has been unusually few this year; for volvulus is a fairly common accident amongst natives (especially natives of India) in this town. Except for rare instances in which the small bowel has been involved the variety met with has been invariably that affecting the sigmoid flexure. It is singular that as a rule the symptoms are not particularly acute, patients rarely come to hospital before the third day of obstruction, pain is not a prominent feature and vomiting is more often absent than present. The leading symptoms are complete obstruction with very marked abdominal distension, the distension being chiefly in the left subcostal region.

The results of treatment have been very encouraging much more so than European statistics would lead one to expect. The most important points in the treatment are, I believe, the speedy recognition of the cause of the obstruction, if possible, before the abdomen is opened, certainly before extensive handling or disturbance of the abdominal contents has taken place and a properly placed incision. No attempts to deal with the volvulus except through a properly placed incision should not be made, *i.e.*, after opening the abdomen in the middle line the volvulus is found to be of the sigmoid variety, the original incision should be abandoned and a new one made low down and well to the left of the left rectus muscle. No attempt at reduction should be made till the distended condition of coil of gut has been relieved, and the gut itself brought out of the abdomen. As the contents are largely gaseous a long small bore trocar will relieve the distension sufficiently to allow the coil to be brought down and outside the abdomen once outside. The bowel can be safely and completely emptied by a small incision. Should the patient's condition be fairly good, the bowel should be fixed to the abdominal wall since recurrence is by no means infrequent, but in attempting this the prolongation of the operation should not be allowed to entail any risk to the patient's life.

Organic Stricture, one case.—The patient was a sailor, aged 20 years. Complete obstruction had occurred eight days previously at sea, and he was operated immediately on arrival in port. The abdomen was enormously distended, the patient had fæcal vomiting and signs of general peritonitis. The obstruction was found to be due to an organic stricture in the wall of the descending colon completely occluding the gut; the colon was cut across and brought outside the abdomen. A Paul's tube being tied in, three drainage tubes were placed in the abdominal cavity, the patient, however, died in a few hours. This patient had suffered badly from syphilis two years previously and the structure appeared to be due to cicatricial contraction following on an annular ulcer—a microscopic examination bore this view out

Strangulated Hernia.—16 cases of which 5 died and 11 recovered.

1. Complete obstruction of less than 24 hours' standing, 11 cases, 1 died, 10 recovered.
2. Complete obstruction of less than 3 days' standing, 1 case, 1 died.
3. Complete obstruction of less than 4 days' standing, 2 cases, 1 died, 1 recovered.
4. Complete obstruction of less than 6 days' standing, 1 case, 1 died.
5. Complete obstruction of less than 8 days' standing, 1 case, 1 died.

The patient who died in class (1) was suffering from acute tuberculosis of the lungs and died from an exacerbation of this disease four days after the operation. The intestinal obstruction had been satisfactorily relieved. The condition of the patients in the other classes was an admission in each case very bad. In one case 2 feet of gangrenous gut was resected, the patient, however, died in a few hours.

Two cases of obstructed incarcerated hernia with symptoms of intestinal obstruction were operated on. The ages of the patients were 48 and 63 respectively. One died and one recovered. The patient who died was suffering from a very large hernia of many years' standing; it contained amongst other intestines, the cæcum and vermiform appendix. The patient's health was very poor, and he died 14 days later when all symptoms of intestinal obstruction had passed off. The other patient, though old and feeble, recovered from the operation rapidly.

Intestinal Obstruction from Bands.—Four cases with one recovery. The recovery took place in a patient aged 16 years, in whom the ileum was obstructed low down by a band, the obstruction itself being of three days' standing. In the other three cases the obstruction was in two of six days' and in the third of seven days' standing; in the last case a loop of gut one foot long was gangrenous, the loop was brought out of the abdomen and the gut at the base joined by a lateral anastomosis, but the patient died in 36 hours.

In all, 31 cases of intestinal obstruction have been operated on with 16 recoveries and 15 deaths; these results bear out the view of Moynihan that "The sur-

gery of intestinal obstruction is disheartening work, and that few surgeons in a series of cases of over 20 can show a mortality of less than 50 per cent."

In two cases of strangulation resection of the gut was performed, both patients died in a few hours. Any operation on the intestine itself in cases of acute obstruction is to be depreciated, the patients are not in a condition to stand anything but the shortest possible operation and the gut itself is in the worst possible condition for suturing: it is wiser to limit the scope of the operation as far as possible to the relief of the obstruction and the evacuation from the distended intestine of its toxic contents. This point is of great importance; if the contents of the obstructed intestine, after relief of the cause of obstruction are allowed to pass along into the healthy intestine, much of the contained toxic material will be absorbed and the patient's chance of recovery considerably lessened. For the same reason it is a good practice to wash out the stomach before the operation, especially if vomiting is present; in intestinal obstruction the patients are dying from absorption of the excessively toxic contents of the obstructed bowel, and anything that will lessen this absorption is of the greatest value.

As regards after-treatment continuous rectal irrigation combined with the sitting posture (Fowler-Murphy treatment) has proved of the greatest possible advantage. Whenever general peritonitis is present, this treatment should be combined with free abdominal drainage, a drainage tube in each flank and one in the middle line reaching well down into the pelvis.

In cases of intestinal obstruction amongst natives of the East, it is often most difficult to form a correct estimate of the patient's condition; both the pulse and the aspect of the patient are untrustworthy. For instance in a case mentioned above of strangulation of supposed six days' standing the patient's general aspect was so reassuring and the pulse both in rate (88) and volume so good that the history was disbelieved and the case looked on as one of recent origin. In consequence intestinal anastomosis was carried out; the patient died, however, about 12 hours later, after three or four loose motions, death being due to intestinal toxic absorption after the operation.

This dissembling of the true gravity of the case may be due to the taking of opium before admission into hospital or very possibly the slowing of the pulse rate may be attributed to toxic absorption from the dammed up intestinal contents. Whatever the cause, too much reliance must not be placed on a slow pulse rate in cases of this nature.

Again, during the operation the appearance of the strangulated gut may be most misleading, but quite obviously lining may become gangrenous after the relief of the obstructing cause; this occurred in a case of volvulus of the small intestine. Such post-operative gangrene is particularly liable to occur in cases of strangulated hernia which have been subjected to the well-meaning but energetic attention of the patient's friends.

Post-operative gangrene, it seems likely, is caused by thrombosis spreading from the larger mesenteric veins to the smaller venules, or to embolism of the arterioles situated in the distal part of the mesentery. On relief of the obstruction and restoration of the blood current in the larger branches of the mesenteric arteries emboli already formed in these vessels may be swept onwards and plug the smaller arterial arches in the free border of the mesentery. In support of this view, I may mention one case of post-operative gangrene showed *post mortem* scattered areas of gangrene along the free mesenteric border in a manner that could only be explained on the above hypothesis.

For these reasons it is wiser to look on Intestinal Obstruction in a Native as a much more severe illness both generally and locally than a similar catastrophe happening to a European.

OPERATIONS FOR ACUTE INTESTINAL OBSTRUCTION.

Operations.	Number of cases.	5		10		20		30		40		50		60 & above		Result.		Remarks.
		Discharged.	Died.	Discharged.	Died.	Discharged.	Died.	Discharged.	Died.	Discharged.	Died.	Discharged.	Died.	Discharged.	Died.	Discharged.	Died.	
		M F	M F	M F	M F	M F	M F	M F	M F	M F	M F	M F	M F	M F	M F	M F	M F	
For Intestinal Obstruction Acute.																		
Imperforate anus	2	... ...	1 1	... ...	... ...	. .	... ...	... ...	... ...	. .	... ...	... ...	... ...	... ...	... ...	. .	1 1	
Intussusception	2	... ...	. ...	. .	... ...	1 ...	... ...	. .	... ...	1 .	. .	... ...	... ...	1 ...	... ..	2 .	1 ..	
Volvulus	3	... ...	.. ...	... ...	... ...	. .	1 ...	... ...	... ...	... ...	... ...	... ...	... ...	... ...	... ..	... .	1 ...	
Organic stricture	1	... ...	.. ...	... ...	. ...	... .	1 ...	. .	... ...	... ...	1 1	... ...	... ...	... ...	... ..	1 ...	1 1	
By bands	3	. .	.. ...	... ...	.. ...	1 ...	... ...	. .	... ...	... ...	. ...	... ...	... 1	... ...	... ..	... ...	1 ...	
By bands, with re-section of Gut	1	... ...	... ...	... ...	... ...	... ...	... ...	... ...	... ...	... ...	... ...	... ...	... ...	... ...	... ...	... ...	... ...	
Strangulated Hernia.																		
Herniatomy with radical cure	15	... ...	... ...	... .	... ...	... ...	... ...	3 .	1 .	5 ...	1 ...	2 ...	2 ...	1 ...	. ..	11 .	4 ..	
,, with re-section of Gut.	1	... ...	... ...	... ...	... ...	... ...	... ...	... ...	... ...	... ...	... ...	... ...	1 ...	1 ...	.. ...	... ...	1 ...	
,, for obstructed Incarcerated Hernia	2	... ...	... ...	... ...	. ...	. ...	... ...	... ...	... ...	... ...	... ...	... ...	1 ...	1 ...	.. ...	1 ...	1 ...	
Total ...	30	.. ...	1 1	... ..	... ...	2 ...	2 ...	3 ..	1 ...	6 ..	3 1	2 .	5 ...	3 ...	... ...	16 ...	12 2	

A.—Diagram of saline container:

"a" an ordinary quart bottle inverted (the bottom having been knocked off) and surrounded by a tin hot-water jacket "b."

"b" a tin surrounding the inverted bottle and forming a hot-water jacket. This tin is covered with thick felt.

"c" rubber connection from "a," one limb passing up to the glass gauge "d."

"d" a piece of $\frac{1}{4}$ inch diameter glass tubing graduated, so that each division represents 4 oz. of fluid in the bottle "a."

B.—Diagram of glass dropper:

The thinner of the glasses can be fitted and held firm within the wider by means of India rubber tubing, forming a collar at "b" by which the thinner tube is gripped.

"a" a small hole in the wider tube.

C.—Ordinary screw "pinch cock" used as a regulator.