Staff Meeting Bulletin
Hospitals of the » » »
University of Minnesota

Intestinal Obstruction

[...]me XIII | Friday, January 23, 1942 | Number 13

STAFF MEETING BULLETIN
HOSPITALS OF THE . . .
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Volume XIII | Friday, January 23, 1942 | Number 13

INDEX

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William A. O'Brien, M.D.

I. LAST WEEK

Date: January 16, 1942

Place: Recreation Room, Powell Hall.

Time: 12:15 to 1:30

Program: "Carcinoma of the Uterine Cervix"
Charles E. McLennan

Discussion:
K. W. Stenstrom
L. G. Rigler

Present: 135

Gertrude Gunn,
Record Librarian

- - -

Will you please check your office for Hospital charts and return all not in active use in your department to the record room?

Gertrude Gunn,
Record Librarian

II. ANNOUNCEMENTS

1. DIVISION OF INTERNAL MEDICINE

The Seminar on Hemoglobin Derivatives and Related Subjects will meet Friday, January 23, at 7:30 p.m. in Todd Amphitheater. Dr. W. H. Hollinshead will discuss "Stereobilin Tolerance and Urobilinogen Excretion in Liver and Biliary Tract Disease."

All interested are invited to attend.

C. J. Watson

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2. ANATOMY SEMINAR

Room 226, Institute of Anatomy at 11:30 Saturday, January 24.

"Hemorrhagic Diatheses"

Dorothy Sundberg Reif.

3. SEMINAR IN PATHOLOGY

12:30 p.m., Monday, January 26, 1942, Room 104, Institute of Anatomy. Intraocular malignant melanomas. Dr. A. H. Downing. Visitors welcome.

E. T. Bell

- - -

4. SEMINAR IN PROTEINS

8:00 p.m., Room 116, Millard Hall, Thursday evening, January 29. Lecture by Professor B. L. Crawford, "Evidence for Zwitterion Structure of Proteins."

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5. CENTER FOR CONTINUATION STUDY

The University of Minnesota will offer a "Review Course in Dietetics" at the Center for Continuation Study, February 9, 10, 11, 1942. The program will cover the fundamentals of nutrition, dietary applications in health and disease, institutional practices, and nutrition education for lay persons and others. Active dietitians are urged to attend as the program will be keyed to present day problems. A special invitation is also extended to dietitians who have become inactive through marriage or for other reasons.

The details of the program will be announced a short time before the course starts. Tuition is $5.00. Room and Board optional. Write to Center for Continuation Study, Minneapolis, for further information.

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III. INTESTINAL OBSTRUCTION

Clarence Dennis
Schuyler Pillsbury Brown

Although improved techniques in the management of small intestinal obstruction have cut the mortality to a quarter of that obtaining 20 years ago, this affliction still commands a mortality rate between 18 and 20% in the leading surgical clinics. (Table I)

Table I

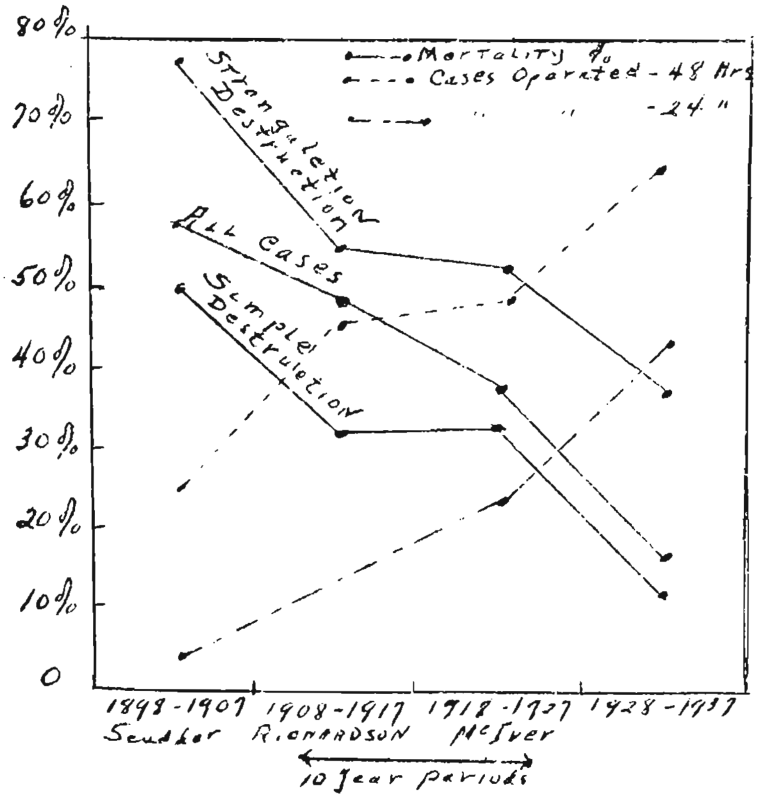
Mortality Rates in Small Intestinal Obstruction

Reported from Several Clinics in the Past 3 Years

Lewis (Cook County)	21.7%	
Schlicke (Mayo)	17.8%	
McKittrick & Sarris (Mass.G.H.)	20.0%	
Johnston (Wayne & Detroit Receiving)	9.5%	(excludes strangulation obstruction)
Leigh (P. & S., N.Y.C.)	13.2%	(selected cases)
Wangensteen, 1939	17.9%	

Table II, from McKittrick and Sarris, indicates the improvement in one representative institution, The Massachusetts General Hospital.

Table II



Although McKittrick places much of the credit for this improvement on early operation, he also stresses the part which continuous gastro-enteric suction has played, either with the suction apparatus developed by Drs. Wangensteen and Paine or with the Miller Abbott tube.

Discussion of the improvement which has occurred generally requires some discussion of the factors involved in small bowel obstruction. Anatomically speaking there are but 2 types of intestinal obstruction, the simple obstruction--that which bars only the passage of intestinal content, and the strangulating obstruction--that which prevents also the flow of blood to or from the involved segment. Obstructions of either type may be partial or they may be complete, according to the degree of interference with flow of intestinal content.

The mechanisms of obstruction, in the approximate order of their frequency, are as follows:

1. External hernia.
2. Intussusception.
3. Adhesive bands within the abdomen around or beneath which loops of bowel become wrapped. These are frequently found in association with
4. Adhesions of the bowel to other structures with the formation of kinks

which render the obstruction ever more complete as the degree of distention increases.

5. Foreign body or obturation obstruction, in the great majority of cases due to large gall stones reaching the gut by cholecystenteric fistulae.
6. Volvulus.
7. Internal hernias -- as diaphragmatic, paraduodenal or types through defects left by the surgeon.
8. Mesenteric vascular occlusion, causing failure of passage of content not through actual obstruction to the lumen but rather through loss of motility.

Hernias, adhesive bands, volvulus, and of course mesenteric vascular occlusion are prone to lead to gangrene of the involved bowel and fatal peritonitis if operative intervention is not prompt. Intussusception also leads frequently to gangrene of the intussusceptum, but the unsheathing intussuscipiens remains viable and delays or prevents infection of the peritoneal space.

The Manner of Onset of Symptoms - Diagnosis

The onset of obstruction is followed within a short time by accumulation of fluid, food, and gas above the site of closure. The mechanism of pain production is two-fold -- either a rapid stretching of the intestinal muscular wall or resistance to the strong peristaltic contractions of that layer. In many instances, particularly in partial simple obstructions, this accumulation is gradual, and the inevitable stretching of the bowel wall is sufficiently slow so that pain is not appreciated by the patient except at the moments when peristaltic rushes in the gut reach the distended area. This pain, occurring with the arrival of peristaltic rushes at the distended bowel, is the cramp commonly associated with intestinal obstruction. The frequency of rhythmic pendular contractions in the jejunal muscle has been shown by Alvarez and associates to be about twice that of muscle from the terminal ileum. There is reason to believe that the frequency of periods of increased local muscular activity, corresponding to peristaltic rushes, also follows a gradient. In cases in which the level of intestinal obstruction is in doubt, the frequency of cramps may occasionally be of aid, the cases presenting intervals less than 3-4 minutes tending to have high obstructions and those of 8-10 minutes low ones. The appreciation of pain between cramps is probably a function of the rapidity with which material is accumulating above the obstructed area.

Gas is normally present throughout the intestinal canal, but in the small intestine, where activity is great, it usually does not collect in pockets large enough for X-ray visualization. With the onset of obstruction and stagnation above, gas in quantity collects abov a smaller quantity of fluid. Each peristaltic rush forces a little more gas and fluid into this closed space, resulting at first in gurgles audible with the stethoscope at the moment of the height of the cramp. As the volume enclosed within the bowel above the obstruction increases, the wall of this bowel is stretched increasingly more tightly, and the pitch of the audible sound coming with each cramp rises correspondingly until it becomes the familiar tinkle or borborygmus of established intestinal obstruction.

Distention of the small bowel is accom panied by reverse peristalsis from time to time, and regurgitation into the stomach with vomiting occurs. In complete ileal obstructions of 2-3 days' duration, the vomitus begins to assume a fecal character; the fecal vomiting appears later in partial obstructions. Although some of the distention is due to fluid in the gut, the greater part of it comes from swallowed air, as Drs. Wangensteen and Rea have shown in dogs. The presence of this gas within the bowel is not helpful in producing physical signs of obstruction, but because of it X-ray diagnosis is accurate in the vast majority of cases. Flat plates of the abdomen reveal a ladder-like arrangement of gas-filled coils of small intestine. In obstructions of several days' duration, the ratio of fluid to gas increases, and upright films of the abdomen show definite fluid levels in the distended loops of bowel. Furthermore, the degree of absence of gas visible in the colon is a good index of the completeness of obstruction provided gas has not been injected with enemas. Although a barium meal outlines the obstructed bowel very beautifully, the barium sulfate is apt to cake and increase the completeness of obstruction. It is therefore to be condemned.

In certain cases the degree of obstruction is slight enough so that compensatory hypertrophy of the intestinal muscle above is adequate to prevent decompensation. Between these extremes are many cases with partial obstruction complete enough to give the symptoms already mentioned, but in whom sufficient hypertrophy occurs to permit visualization on the abdominal wall and palpation with the examining hand. This degree of hypertrophy can develop in 7 to 10 days of chronic partial obstruction.

Cause of Death

The cause of death in bowel obstruction has been extensively studied and is not yet settled. In high obstructions, sufficient water, acid, and chloride are lost to lead to death in very short order from dehydration, hypochloremia, alkalosis, and uremia. With obstructions at progressively lower levels, these changes become less evident, and in the terminal ileal obstruction they are inconsequential. In these cases the deaths are due to one of two causes, either prolonged distention or gangrene of the bowel wall, the presence or absence of gangrene depending on whether a simple or a strangulating obstruction is present.

The mechanism by which distention proves lethal is hotly debated. Sperling showed that a sustained intraluminal pressure of 15 cm. of water is capable of injuring the bowel wall through vascular stasis, thus altering the histology, and impairing the viability of the gut, and opening a new avenue of absorption, namely, transperitoneal migration. That products of bacterial action may be the noxious substances so absorbed is indicated by the report by Poth and Knotts that the placing of succinyl sulfathiazole in such loops prolongs survival of the animal 500%. Afferent nervous impulses have been considered lethal (Antoncic and Lawson) but this has not been corroborated as yet, although nausea and vomiting with secondary disturbances of chemical balance may be so produced (Burget et al).

In the case of unrelieved strangulating obstructions, gangrene of the bowel wall occurs, and death is usually due to peritonitis. Inasmuch as venous compression is greater than arterial, large enough quantities of blood may be lost into the lumen of the bowel and into the peritoneal space to cause early death from shock. In addition to the symptoms already outlined as characteristic of simple small bowel obstruction, these patients are apt to experience sudden onset of the attack with severe, frequently constant pain, often low in the back as well as in the abdomen. The escape of bloody fluid or seepage from the gangrenous gut leads to marked tenderness in the abdomen, with muscle spasm and rebound tenderness. Elevation of temperature and leucocytes follow in a few hours.

The essentials of diagnosis of simple small bowel obstruction, therefore, are:

1. Crampy abdominal pain.
2. Vomiting - fecal if late.
3. More or less abdominal distention.
4. Minimal abdominal tenderness - localized.
5. Borborygmi with the peaks of the cramps.
6. X-ray findings on flat plate of abdomen.

Strangulating obstruction presents:

1. Pain - usually crampy - often persisting between cramps -- often in the back.
2. Vomiting - fecal if late.
3. Distention.
4. Tenderness over a considerable area.
5. Borborygmi unless late enough for paresis of the gut to have occurred.
6. X-ray findings.
7. Spasm and rebound tenderness.
8. Shock (occasionally).

Treatment of Bowel Obstruction

The preceding discussion indicates that proper therapy should consist of relief of distention and, when present, early resection of gangrenous bowel. At clinics such as the Massachusetts General Hospital, where two-thirds of the patients are admitted in the first 48 hours of the attack, the emphasis has been laid on early operation before the onset of distention.

At this hospital, on the other hand, enough of the patients have arrived later to draw attention to alleviation of already present distention as the primary problem. Drs. Wangensteen and Paine developed the siphon suction apparatus now in general use in this country, and have shown that constant suction on an inlying duodenal tube will decompress cases of simple small bowel obstruction. More recently Miller and Abbott have perfected a 12 foot double-lumen tube tipped with a balloon which can be inflated through one lumen to facilitate passage of the tube down the small intestine.

Johnston and Abbott and others have outlined many maneuvers which can be used to pass the tip of the Miller-Abbott tube into the duodenum. Although most workers place the patient on the right side and ease the tip of the tube, balloon empty, along the lesser curvature in the same fashion one inserts a Wangensteen duodenal tube, Johnston had some success filling the stomach with water and floating the air-filled balloon into the pylorus. These procedures are most successfully performed under fluoroscopic control. Abbott has recently reported the use of a stylet 0.016 in. piano wire to stiffen the tube sufficiently to cause it to pass into the pylorus directly, the stomach being dilated with 5-600 cc. of air. This procedure has worked nicely in our very small experience with it also.

Hartwell and Hoguet in 1912 called attention to the value of large amounts of normal salt solution in the treatment of high obstruction. Clinical applications were made by Haden and Orr and others. With this impetus, efforts have been made to give an adequate caloric intake by the paraoral route--as outlined by Coller and Maddock. At this hospital, a caloric intake in excess of 1200 calories a day is accomplished by the administration of 20% glucose solution not faster than 200 cc. per hour. A proper level of plasma electrolytes and blood urea nitrogen is usually quickly attained by giving sufficient salt and water to permit excretion of a liter of urine and 2 - 5 G. of salt daily. The available vitamins are given parenterally. In patients unable to take food by mouth over considerable periods, the use of amino acid preparations plus small amounts of human plasma, such as 100 cc. daily, has become routine in an effort to maintain a normal nitrogen balance. Larger quantities are necessarily given if the plasma protein level is found low.

Most important, the patient is watched closely at 4-6 hour intervals for evidences of peritoneal irritation or failure of decompression. Flat X-ray plates of the abdomen are made from time to time, but this cannot be implemented with barium by mouth, a preparation which is likely to increase the degree of obstruction and one which is often difficultly aspirated by the inlying tube. If a tube cannot be passed into the small bowel in 48 hours, and the obstruction persists with continuing distention, catheter enterestomy without exploration is the usual procedure.

If signs of peritoneal irritation appear, exploratory laparatomy is in order regardless of the degree of distention. In this type of patient, sufficien hemorrhage is likely to have occurred to precipitate shock, and blood or plasma in quantity should be at hand before unde taking surgical intervention.

In patients in whom a Miller-Abbott tube has been passed into the lower reaches of the small bowel, feeding by mouth of a liquid or low residue diet is often feasible, even if the obstruction fails to relent. Such procedure greatly facilitates the metabolic preparation of the patient for operation.

The appearance of gas in the colon,

s recognized by X-ray flat plate, or the passage of gas by rectum indicates that the obstructive mechanism has relented. It is customary here to allow the tube to remain in place an additional day or two and to check the tolerance of the patient to cessation of suction for a half day before withdrawal of the tube.

Fine and associates have demonstrated that respiration of high concentrations of oxygen aids in diminishing the gaseous distention in cases of intestinal obstruction. The method has proved of aid in some cases here, but suction is a much more direct approach to the problem of distention, and oxygen is used only as an additional measure in those cases in which suction alone has proved inadequate.

Results

In the period from June 1, 1938 to January 1, 1942, 118 patients suffering from obstruction between the ligament of Treitz and the cecum were treated at the University of Minnesota Hospitals. The present detailed study is concerned with 102 of these patients, most of the remainder being patients in whom small intestinal obstruction was a minor incident in death from some other cause. These special causes were:

Table III

Carcinomatosis	5 cases
Congenital anomalies in new-born infants	4 cases
Abdominal abscesses perforating bowel	2 cases
Subphrenic abscess and sepsis from ruptured appendix	1 case
Tuberculous peritonitis	1 case
Rider embolus at bifurcation of aorta followed terminally by mesenteric thrombosis	1 case
	14 cases

Inasmuch as the surgical treatment of obstruction is under consideration, two cases dying in the hospital early in the study period without having been seen by a surgical consultant are also excluded. One of these was a gallstone obstruction, the other an intussusception.

The corrected figures are shown in Table IV. These are limited to small bowel obstruction cases treated by the surgical service in the 3 years and 7 months under consideration.

Table IV

Patients Treated for Small Bowel Obstruction on the Surgical Service of the U. of M. Hospitals. June 1, 1938 to January 1, 1942

Total Cases	109
Total Patients	102
Total Deaths	17
Case Mortality	15.7%
Patient Mortality	16.7%
June 1, 1931 to June 1, 1938	
Case Mortality	14.7%
Patient Mortality	17.9%

It will be observed that but slight improvement has occurred in the patient mortality. The variance between the case mortalities indicates that a smaller percentage of repeated admissions has occurred for obstruction recurring after conservative therapy.

The cases have been broken down into groups for study. Inasmuch as the use of the term "strangulation" implies constriction of blood supply and not yet loss of viability, it is somewhat ambiguous from the point of view of prognosis. We therefore have divided the cases into those which proved to have gangrenous bowel present at the time of admission or later, and those which did not have gangrenous bowel present. A second division separates those treated entirely by conservative methods from those treated by any type of operative procedure.

Conservative Treatment of Simple Obstructions

Table V shows the cases treated only by conservative therapy in which no gangrenous bowel was present.

Table V

Simple Small Bowel Obstruction

Conservative Therapy

Total Cases	32
Total Patients	30
Deaths	0

Intubations of Small Bowel°	Not Attempted	Success	Failure with Relief	Failure followed by Enterostomy
Wangensteen tube	2	13	5	8
Miller-Abbott tube	0	11	3	6

°The figures do not check because of 2 patients in whom failure occurred with the Wangensteen tube, and success was achieved with the Miller-Abbott Tube.

It is evident that this is a small risk form of treatment if one can be reasonably assured that the obstruction is of a type which will relent. Some patients, 10 in all, obtained relief and recovery with gastric suction alone. Success in intubation of the duodenum was achieved in just half the simple obstructions when the Wangensteen tube was used. Intubation was accomplished in a slightly greater proportion of the cases with the Miller-Abbott tube.

Operative Treatment of Simple Obstructions

The second major group of patients consists of cases treated operatively who proved to have no gangrenous bowel present. Table VI presents the data for this group.

Table VI

Simple Obstruction Treated Operatively

Total Cases	57	
Total Patients	52	
Total Deaths	8	
Case Mortality		14.0%
Patient Mortality		15.4%

Among the operations performed, catheter enterostomy first draws attention, for it is the procedure adopted when conservative management fails. The procedure is done by an almost perfectly aseptic procedure, placing the catheter in an emptied segment of gut after the Witzel technique. Table VII shows our experience with catheter enterostomy.

Table VII

Catheter Enterostomy in Simple Obstruction Cases

Total Cases	17
Total Patients	16
Indications	
Failure to pass Wangensteen tube	6
Failure to pass Miller-Abbott "	4
Failure to pass either tube	2
Fear of strangulation	1
Failure of Wangensteen tube to decompress	1
Blind loop	2
Failure of a previous enterostomy	1
Function	
Good	14
Poor	2
Patient died too soon to estimate	1
Mortality	
From Enterostomy itself	1
From other causes after successful enterostomy	5

The total number of enterostomies erformed is not indicated in this table, s some have been done prophylactically t the time of resection of gangrenous owel, etc.

The various operative procedures perormed on the patients with simple small owel obstruction are indicated in 'able VIII.

Table VIII

Operations for Simple Obstructions

	Cases	Deaths
Ierniopiasties	18	1
Interostomy alone	12	2
with other procedure	5	1
Intussusceptions	9	0
Lyses for adhesions	5	1
+ enterostomy	1	1
Adhesive Band Section	1	0
+ enterostomy	2	0
Removal of Gallstone	3	0
+ enterostomy	1	0
Enteroanastomoses following catheter enterostomy	2	1
At time of catheter enterostomy	1	0
Resections	2	1
+ lysis	1	0

Conservative Treatment of Patients with Gangrenous Bowel

The third major group with which we are concerned encompasses those cases treated conservatively in which gangrenous bowel was present. The data are presented in Table IX.

Table IX

Conservative Therapy in the Presence of Gangrenous Bowel

Total Cases	5
Total Deaths	4

Survival - Perforation of appendical abscess into bowel.

Deaths:
1. Postoperative strangulation around appendicostomy - not recognized.
2. Mesenteric venous thrombosis - admitted after 6 days.
3. Strangulation around adhesive band - not recognized.
4. Intussusception - admitted moribund.

There were 4 deaths. These cases are not to be construed as arguments against conservative therapy, for in two the pressure of obstruction was not recognized at all, and in the other two the patients were moribund on admission.

Operative Treatment for Patients with Gangrenous Bowel

The final cases for presentation are those with gangrenous bowel treated operatively (Table X).

Table X

Operative Treatment of Intestinal Obstructions with Gangrenous Bowel

Total Cases	15
Total Patients	15
Deaths	5
Mortality	33-1/3%

Recoveries	
Resection of gangrenous bowel and primary anastomosis	7
Exteriorization with delayed closure	2
Inversion of gangrenous area during hernioplasty	1
Deaths	
Reduction of gangrenous intussusception	2
Excision or exteriorization of gangrenous bowel in presence of gross pus or peritonitis	3

Results in the Recent Past

In the past $1\frac{1}{2}$ years it is felt that the management of intestinal obstruction cases has been facilitated by placing the responsibility for the supervision of them in the hands of 2 people. Improvements in the maintenance of metabolic balance by parenteral routes seems to have played a part in building patients up to be in better condition for surgical procedures. Finally, it seems as if the adoption of aseptic methods of intestinal anastomosis plus local sulfonamide implantation have decreased the risk of operative procedures.

A review of the figures substantiates these impressions. If the 43 month period under study is broken into halves, and the figures are calculated for each separately, the data of the final table are obtained.

Table XI

Intestinal Obstruction

Mortality Rates for 3 Consecutive Periods at the U. of M. Hospitals

	1931-1938	June 1, 1938 - Mar. 15, 1940	March 15, 1940 - January 1, 1942
Number of Cases	190	61	48
Number of Patients	156	57	45
Deaths	28 cases	11 cases	6 cases
Mortality			
Case	14.7%	18.0%	12.5%
Patient	17.9%	19.3%	13.3%

Further evidence of improvement brought about by the factors just mentioned is offered by the fact that of 9 cases for which resections were done because of gangrenous bowel in the final period, not 1 patient has been lost. Of these, 3 were infants with gangrenous intussusceptions. The 6 deaths which have occurred are worthy of note. Three died because of faulty surgery, such as accidental rupture of the bowel during the enterostomy, poor placement of the catheter, and leaving defects in the abdomen through which internal herniations subsequently occurred. Two died from failure to recognize the presence of obstruction, and 1 died of adhesive peritonitis despite repeated decompressions.

McKittrick is inclined to stress the importance of early treatment, and had no deaths in 43 cases operated upon within 24 hours of the onset of the disease. We found no such correlation. He also stresses the mounting risk with increase in the age of the patient. Perhaps our findings in this respect serve only to demonstrate that our series is too small for detailed statistical study, for our lowest mortality rate, 8 1/3%, fell in the group of patients over 70 years of age.

Conclusions

1. Despite improvement in the past two decades, small bowel obstruction still commands too high a mortality rate.

2. Simple small bowel obstruction presents:
   a. crampy colicky pain
   b. vomiting
   c. distention
   d. only minimal tenderness

e. borborygmi with the cramps
f. fairly typical x-ray findings

3. Strangulating obstructions present the findings of simple obstruction plus:
   a. constant pain--often in the back
   b. spasm of abdominal muscles plus rebound tenderness as a rule
   c. shock--occasionally

4. Death in small bowel obstruction is usually due to:
   a. long continued distention or
   b. gangrene of the bowel and peritonitis
   c. chemical imbalance in high obstruction only

5. Treatment consists of:
   a. proper water and salt administration
   b. decompression of the distended gut by nasal tube, or by catheter enterostomy, if the tube is inadequate
   c. parenteral administration of sugar, plasma, etc. to give a complete metabolic balance
   d. resection of gangrenous bowel if present
   e. late operative restoration of continuity to the bowel if the obstruction fails to relent spontaneously.

6. Results of treatment of 102 patients with small bowel obstruction from June 1, 1938 to June 1, 1942 are presented.

7. Our treatment of this condition is apparently improving.

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7. GOSSIP

As predicted last week, the Emergency Surgery course at the Center for Continuation Study broke all medical course records. The official attendance was 102. By way of coincidence it is also course #102 in the medical, hospital service, public health series. Old-time observers at the Center believe that this course reached the highest peak of enthusiasm for both physician-students, and faculty. Everyone seemed to be doing just a little better job than usual. Head surgeon, Coller, of the University of Michigan, delighted everyone with his simple straight-forward manner of teaching. He also has kept intact our record of finding out that the "big shots" from elsewhere prove to be local people in disguise for he hails from Brookings, South Dakota.

The Hospital Administrators' course next week establishes a new custom in that a faculty reception will be held the first evening at 8:00 P.M. All faculty representatives who are to teach in the course, and their wives, will come to meet the students. This type of instruction (adult) is a personal matter and our visiting students always like to meet the faculty (no grade involved so that apple polishing is not suspected).

The final bulletin of postgraduate courses arranged for the American College of Physicians has been received. Course #1 Allergy, Roosevelt Hospital, New York City, is filled to capacity, registration 8. Course #3, General Medicine, University of California and Stanford University Medical Schools has been withdrawn because of lack of adequate enrolment due to war concern along the Pacific Coast. Course #4, Internal Medicine, Johns Hopkins University and the University of Maryland, Baltimore, has been cancelled because the Hopkins Hospital Unit is being called for active service. Course #10, Internal Medicine, University of Minnesota, Center for Continuation Study, was sold out during the first week (before the program appeared). The registration limit for this course is 60. The Mayo Foundation and the Mayo Clinic will offer Course #7, Arthritis and Rheumatic Diseases, April 13-18, and Course #8, Peripheral Vascular Diseases, including Hypertension, April 6-18. There will also be courses in Boston, Philadelphia, St. Louis, Chicago, and Denver.

Last Sunday was a banner day at the Museum of Natural History. Attendants clocked nearly 800 persons in and out of the building. A large percentage were parents and children who came to see the free movies at 3:30. The Department of Interior had a sound movie on 'Bears in Alaska," and the new division of animal and fish conservation had a colored movie of the wild game refuge in North Dakota. In the spring bears amuse themselves by sliding down the snow-covered hills just like our boys and girls do, except that they do not use a piece of tin or cardboard. Their food consists of ground squirrels and other rodents who hibernate longer than they do. Finally, they take to salmon fishing in the streams. Most pathetic are the cubs who are orphaned. No one looks after them and no one teaches them anything as the other cubs receive a high grade education. Dry river beds in North Dakota have had water fed into them and through a series of dams the streams have been kept at a uniformly shallow level. In this protected spot an amazing variety of wild life is found.

I have passed the house trailer agency many times and have always wanted to stop. This time I did. I learned that house trailers are in greater demand than ever before. A pair of rented tires may be used to convey them to your residence site (defense work). The tires are sent back and the base of the trailer is protected for the winter. Most trailers contain comfortable living accommodations for 4 people. Daybeds at both ends are selected from standard furniture stores, except in the larger trailers where orthodox beds are used. The galley consists of a refrigerator, stove, sink, cupboard and shelf space, and closets for clothing. When swung open the full-length mirror and the door on the opposite side divide the room into 2 sections. The insulation exceeds that of the average home. A letter from a trailerite and his wife located in the north country miles from a neighbor out on an open plain told of temperatures 35° below zero outside and 76 to 80° on the inside. One of our Minneapolis doctors is so trailer-minded that he conducts a trailer business, with a manager, show rooms, repair shops, etc. He is said to have the largest retail business in our city....