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A NEW AID IN THE EARLY RECOGNI-TION OF POST-OPERATIVE ILEUS.

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Often the most experienced surgeons feel considerable uncertainty as to the nature of an acute abdominal lesion when characterized by apparent obstruction of the bowel. The patient's chances of recovery depend very largely upon the early recognition of the lesion present. \mathbf{If} one delays long enough, following an abdominal operation, the occurrence of inhibition of bowel activity, accompanied by progressive abdominal distention, beginning within twenty-four hours, unrelieved by ordinary remedies, continuing in a more obstinate and progressing manner, during the second, third and fourth days, with rapid pulse, increase in temperature and rate of respiration, restlessness, cold perspiration, vomiting of dark material, sometimes of fetid odor, but without the passage of gas or fecal matter from the bowel, with finally tense distention of the abdomen, leaves no doubt as to the presence of acute post-operative ileus. Even the passage of gas and fairly satisfactory bowel movements does not exclude an obstruction which may have occurred high up in the small bowel. This obstruction may be a paretie eondition due to adynamic causes as for instance infection, or it may result from mechanical conditions. Small intestine obstruction not often supervenes as the result of adhesions unless the adherent small intestine is thereby fixed to some immovable organ or part.

In the treatment of mcchanical obstruction of the bowel following laparotomy, early recognition of the condition is of the greatest import in order that the profound general depression attending the later stages of the obstruction may be minimized. Naturally every surgeon regards with suspicion any untoward postoperative symptoms, at least oue of which occurs in a greater or less degree in the majority of abdominal cases. The occurrence of distention, particularly in the epigastric region, accompanied by vomiting or sfrequent gagging, or gulping of small quantities of dark fluid, or any one of a number of other symptoms belonging to the category above listed, becomes immediately a cause of disquietnde. If twentyfour hours can be saved in reaching a decision in a case requiring further operation, great help has been rendered the patient.

While recognizing the comparative certainty with which intestinal obstruction can be diagnosticated, the desirability of making the earliest possible diagnosis impcls the writer to again call attention to his experience in the employment of the X-ray as a diagnostic adjunct in these cases. In 1910, we began the employment of the X-ray examination with our present technic in cases of ileus, especially in deciding on the advisability of post-operative surgical interference. In 1915, before the Section on Surgery, General and Abdominal, of the American Medical Association, the writer urged this method of roentgen study for all suspected post-operative cases with special refcrence to determining the existence or nonexistence of an obstruction, the degree of the hindrance, the location, and perhaps the nature of the lesion. Furthermore, we were able to determine whether or not the obstruction was progressive. Continued experience in the employment of this means of diagnosis confirms our confidence in its value.

Counting the day of operation as the first day, given a patient on the third day after operation, presenting symptoms suggestive of acute intestinal obstruction, he should be transferred to a carrier, conveyed to the roentgeu ray department, a fourteen by seventeen inch plate with intensifying screen placed under him without removing him from the carrier, and a quick exposure made. The exposure is not necessarily instantaneous; it must only be short enough so that the patient can hold his breath. With intensifying screen, the exposure need not be longer than five or even teu seconds, and with powerful apparatus it may be reduced to a fraction of one second. Even if bedside apparatus is used, the improved types now available for bedside purposes, will permit exposures within the ten-second limit. The plate is then removed and the patient returned to his room and bed without further manipulation or inconvenience than is required to lift him onto the stretcher and back again. Indeed, with the type of bedside apparatus which the present war has de-



Figure 1. Acute colonic obstruction. (Carcinoma of the sigmoid.) Note gas distention of the colon which by its outline is characteristic of colon, rather than small intestine.

veloped, there is no reason why the entire examination cannot be conducted in the patient's room without more inconvenience to him than the slight manipulation necessary to place the plate holder. No preparation of any kind is required; dressings need not be removed. The plate is then developed and the findings noted as soon as it is taken from the fixing bath. Not more than fifteen or twenty minutes need be consumed in the entire process.

The developed roentgenogram will reveal at once whether there is any gas distention of the bowel, and if so, whether the distention occurs in the small or in the large intestine. Enormous gas distention of the stomach is occasionally seen, and the absence of a gas accumulation in the stomach at once rules out acute post-operative dilatation of the stomach. Small and large bowel may be distinguished by the characteristic outlines of the gas areas. In acute colonic obstruction, the haustral markings as well as the peripheral dis-

tribution of the gas along the course of the colon are sufficiently characteristic to identify the large bowel (Fig. 1). Equally characteristic is the appearance of the gas-distended coils in acute obstruction of the small bowel; the coils are more or less parallel and the caliber of the small intestine is increased to $1\frac{1}{2}$ or 2, and sometimes 3 inches (Figs. 2-6). It is seen that the distention is not confined to a short segment of the intestine but involves one or more feet of the small bowel, usually many A certain amount of postoperative disfeet. tention of the small bowel is frequently noted where there are no symptoms suggestive of obstruction, but in the serious cases the degree of distention is at once apparent and suggestive. The serrated contour of the bowel is characteristically different from the contour of the colon due to the markings of the haustra coli; so that we are at once able to recognize and differentiate acute postoperative gastric dilatation and obstruction in the large or small intestine.

Observation of the cecal region is especially



Figure 2. Acute post-operative ileus, plate made immediately after the administration of one ounce of barium stirred in water. (a) Stomach. (b) Numerous coils of gas distended intestine, characteristic of acute intestinal obstruction. Nevertheless, operation not yet decided upon. See Fig. 3. Gas distended ileum differentiated from colon (c) by feathery outline. Colon characterized by haulstral markings.

helpful, for if the cecum contains gas, it is not likely that the obstruction is in the small bowel. The case illustrated in Figure 6 is very instructive on this point. Most of the gas is contained in the cecum, yet the coils of distended small intestine occupying the left side of the abdomen are clearly seen. Redoubled efforts to get the

bowels to move were successful in this case and the patient made an uneventful recovery without further operative interference. If there had not been present marked distention of the cecum, operation would have been urged. If the gas collections, as above described, are seen to occupy the middle of the abdominal shadow while the flanks are gas-free, it is probable that the obstruction is in the lower ileum, though not so low as the ileocecal region. When the gas areas occupy the true pelvis and the middle of the abdominal shadow, one may suspect the ileocecal region. Intussusception may be discovered by colonic injection with an opaque material. Early physical findings in these cases are very difficult to demonstrate with surety, whereas the roentgenologic findings may be demonstrated much earlier, and gain in surety as the gas distention progresses.

If the observation of the gas-filled bowel (without the ingestion of barium) does not make clear the location of the obstruction (Fig. 2), time will be saved by proceeding at once to the



Figure 3. Same case as shown in Fig. 2, six hours later. (a) distended coil of jejunum more clearly shown up by barium. Enterostomy. Cure.

administration of the barium enema to rule out colonic obstruction. If the entire colon fills, it is then recognized that the obstruction must exist in the small bowel. If the findings thus far are still indecisive, and the clinical symptoms are not yet clear, with the permission of the surgeon a small amount of barium sulphate, say half an ounce, may be administered by mouth in any medium which the patient will take (Fig. 3). These cases are often also so doubtful from the clinical standpoint that final decision as to operation is postponed in any case, and there is ample time for some of the barium to pass on into the small intestine (Fig. 3). After a little experience, however, it is quite unnecessary to administer any barium at all by mouth, the decision being rendered on the appearance of the abdominal shadow with reference to the character and distribution of the gas areas which it may present.



Figure 4. Very high grade of acute obstruction near ileocolic junction. Extreme dilatation of small bowel. Enterostomy. Cure.

If non-surgical treatment seems preferable at first, the progress of the case under treatment may be watched by means of the X-ray. Emphasis should be laid on the fact that it is not necessary to administer any barium or other opaque meal in pursuing these studies, for in the great majority of cases, the observations are made possible by the gas distention of the intestine. There is therefore no delay incurred; and no objection can be raised to the X-ray study of these patients on account of possible danger through delay or through the introduction of new food material into the digestive tube in the presence of possible obstruction.

It must be admitted that the employment of the above technic without the use of barium sulphate does not routinely give satisfactory data unless the case is immediately post-operative. We presume this is due to the fact that in the post-operative cases, the bowel is practically empty, whereas in the other classes of acute intestinal obstruction, the bowel is often loaded with fecal material. Nevertheless, when used in conjunction with an opaque meal the X-ray method gives decisive information in any class of intestinal obstruction.

If the first plate made by the technic described earlier in this paper, does not give decisive information and the surgeon feels that the operative indication is not clear, the policy of watchful waiting may be pursued, and a second roentgenogram made after an interval of eight or twelve hours. The writer sees no objection at all to the administration of an ounce of barium sulphate stirred in water, immediately after the conclusion is reached that the clinical data aided by the first roentgenogram, is indecisive. When this is given, one is often astonished to find that at the second examination considerable barium has reached the small intestine just proximal to the site of obstruction (a, Fig. 3); in such cases the barium adds a certain value to the examination. This course has been followed in a number of cases with nothing but beneficial effects so far as we have been able to observe.

Since the adoption of the general practice of avoiding purgation in the pre-operative treat-



Figure 5. Acute small intestine obstruction, upper abdomen, attending gangrene of cecum in case of carcinoma of sigmoid: (a) gas distended stomach. (b) three parallel reaches of enormously distended small bowel crossing upper abdomen. Death, in spite of operation.

ment of our surgical cases, the number of acute post-operative intestinal obstructions has been greatly reduced and material for the study of the subject of this paper is now only occasionsociety.

ally encountered. The observations, upon which the value of the above technic has been estimated, were made during nine years upon twen-



Figure 6. Acute small intestine obstruction low in bowel. Considerable distention of the cecum and ascending colon, marked distention of parallel coils of small bowel. Recovery after non-surgical treatment.

ty-nine patients operated in Battle Creek by the surgeons of the Battle Creek Sanitarium and in Chicago by members of the staff of the St. Luke's Hospital.

SHOCK, HEMORRHAGE AND BLOOD TRANSFUSION.*

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The condition called shock has always been one of the greatest anxieties the operating surgeon and consulting internist has had to face. It is of great interest to all branches of medicine and does not alone concern the surgeon. The condition itself is essentially a medical one, one of pathological physiology and progress in its study has been made by physiological meth-The recent war stimulated an immense ods. amount of work both experimental and clinical and has, I believe, brought out the fact that the condition called surgical shock, wound shock, traumatic shock, secondary shock, etc., is not primarily an entity, but a clinical picture that may be due to a variety of causes working singly or in combination. This is probably the

*Read at general meeting, Wayne County Medical Society.