Small Bowel Obstruction: A Roentgenologic Study

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MUCH has been written about the relative importance and time of appearance of gaseous distention and of fluid levels in the bowel. The earliest roentgenograms were made in the erect position, and fluid levels assumed great importance. Alton Ochsner's conclusions, based on animal experiments and published in 1933, seem most firmly grounded and generally accepted. He believed, as had other observers before him, that plain roentgenograms of the abdomen were extremely valuable as an early diagnostic procedure in cases of ileus. He demonstrated that the earliest roentgenographic evidence of obstruction was an accumulation of gas proximal to the point of obstruction. In his experiments gaseous distention preceded demonstrable fluid accumulations, and was greater in volume. This latter conclusion was a direct contradiction of previous findings both by Ochsner and other workers. Enough gas for roentgen diagnosis occurred as early as the three hour period in simple obstruction of the jejunum, and as early as one hour in strangulated obstruction. In both simple and strangulated obstructions of the ileum, gas was demonstrable within an hour; the distention was more marked in strangulated obstruction.

The technique of roentgen examination used in various centers differs rather widely. Some observers still adhere to the belief that the barium meal should be used in order to secure more accurate diagnosis, but the majority oppose this procedure on the basis of its danger. The administration of small amounts of barium suspension through a Miller-Abbott tube introduced to the region of the obstruction may be most helpful, and entails no risk to the patient, inasmuch as the suspension may be withdrawn with comparative ease when its object has been achieved. Some believe that the barium enema is a valuable adjunct to the plain roentgenogram of the abdomen. Some prefer films to be made in the erect position, some prefer to use the prone, supine or lateral positions, or combinations of these. The patients in whom the presence of bowel obstruction is suspected are, in my experience, usually very ill, and bedside examination has frequently been necessary. I have not felt that the procedures other than a single roentgenogram of the abdomen, and occasionally the barium enema, add enough information to justify the manipulation they involve. In the majority of the cases here reported a single roentgenogram made with the patient supine has been the only radiographic procedure used.

I support those who condemn the use of opaque media by mouth in the presence of known complete obstruction. A few cases included in this series were given barium by mouth when obstruction existed, and although in these cases serious consequences were avoided, the barium study usually added relatively little additional information. An illustrative case is that of a fifty-seven year old man who had had loss of weight, pallor, and weakness for several months, and abdominal pain, nausea and vomiting for two days. He was referred for barium meal examination, and although dilatation of the small bowel was obvious, it was not thought to be sufficiently great to contraindicate completion of the examination. At six hours, however, marked dilatation of the entire small bowel was well visualized. A questionable deformity of the cecum was seen. For some reason the surgeon preferred not to operate upon the patient immediately, and a barium enema was performed one week after the initial study. At this time there was still retention of barium in the small bowel, and the carcinoma of the cecum was well visualized by the enema.

I have had no personal experience with the procedure of small intestinal intubation. It would appear that this is perhaps the most satisfactory method to decompress small bowel obstruction. In addition, by the introduction of small amounts of barium through such a tube, it may prove to be possible to localize and determine the nature of obstructive lesions with greater accuracy, and with reasonable safety.

In many cases the colon cannot be adequately prepared, and this with the serious condition of the patient makes barium enema examination rather unsatisfactory. Not infrequently, as when the possibility of a colonic obstruction is suggested by the presence of gas and/or fecal material limited to the

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Fig. 1. Tremendous distention of small bowel loops due to adhesions about the terminal ileum, 24 days after removal of the appendix.
proximal portion of the large bowel, the enema is indicated. Such was the case in a patient in whom a single film of the abdomen suggested small bowel obstruction but showed much gas and fecal material stagnating in the left colon. A barium enema showed total obstruction of the mid-sigmoid, due to a carcinoma.

The radiologist can, with few exceptions, determine the presence of small bowel obstruction, since he rarely sees the patient so early that there is no gaseous distention present. Great caution must be exercised not to interpret every instance of slight gaseous distention of the small bowel as one of mechanical obstruction. I believe that the size and form of the dilated loops, and distribution of the gas pattern are of great value in differential diagnosis. In paralytic ileus we commonly see a scattered patchy distribution of gas, usually moderate dilatation of the small bowel, and associated comparable distention of the colon. Before the widespread use of the Ward-Wangensteen method of duodenal drainage, gastric distention was also commonly observed either in mechanical or paralytic ileus. It is now rather infrequently seen, due to the fact that the patients are often given such treatment early. The presence of a known factor which may act as a reflex irritant is, of course, helpful in the differential diagnosis of mechanical small bowel obstruction from paralytic ileus.

Even the earliest observers found that the location of small bowel obstruction often can be determined with accuracy but that the nature of the lesion is rarely revealed. Reports in the literature and my own observations confirm this experience. This study was undertaken in an endeavor to ascertain whether the location and the cause of small bowel obstruction could be determined by radiologic examination. I have been able to obtain no additional data which might give a clue to the determination of etiology. In the majority of the cases I studied, the presence and approximate location of small bowel obstruction could be ascertained by roentgen examination, but only in the occasional case could the etiology be determined prior to operation.

Ninety-two cases were studied in which the roentgen diagnosis of small bowel obstruction was made. The criteria for this diagnosis were the presence of several greatly distended coils of small bowel, whether serpentine in arrangement as is seen in the majority of cases, or forming the typical ladder pattern, in the absence of etiologic factors other than direct occlusion of the bowel. So common is the presence of dilatation of isolated small bowel segments in cases of urinary calculi, severe urinary tract infection, biliary colic, morphinization, pneumonia, and traumatic injury of the vertebral column or pelvis, among other causes, that these etiologic factors were carefully excluded. The older opinion that the presence of any demonstrable quantity of gas in the small bowel is prima facie evidence of bowel obstruction is untenable. Nor is the presence of a demonstrable "hairpin turn" proof positive of an obstructive lesion, for this may be a manifestation of paralytic ileus accompanying an extra-intestinal lesion. This fact must not be lost sight of, however; the presence of demonstrable quantities of gas in the small intestines, with or without either ladder pattern or "hairpin turn" renders the exclusion of mechanical ileus imperative.

Among the patients I studied, adhesions resulting from old or recent surgical procedures were the commonest causes of obstruction. An almost equal