

## 49-Year-Old Woman With Acute Abdominal Pain and Nausea

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A 49-year-old woman presented to our emergency department at noon because of abdominal pain that awoke her at 5 AM. She described feeling full; however, she was able to expel flatus. Throughout the morning, the abdominal pain gradually worsened. She had cramping, intermittent, and diffuse pain in the upper and lower abdominal areas bilaterally. The pain was associated with nausea but no vomiting. She had undergone total abdominal hysterectomy and bilateral salpingo-oophorectomy 6 months previously because of uterine fibroids that caused menorrhagia.

The initial examination revealed an anxious woman with a diffusely tender nondistended abdomen. Bowel sounds were normal, and no peritoneal signs were present. Findings on a rectal examination were normal, and there was no impacted stool. A subsequent evaluation included decubitus and upright x-ray films of the abdomen, findings of which were interpreted as showing an increased amount of stool in both the small and the large bowel but otherwise normal. Blood studies showed mild leukocytosis with a leukocyte count of  $11.1 \times 10^9/L$  (neutrophils, 90.8%; monocytes, 2.0%; lymphocytes, 6.6%; basophils, 0%; and eosinophils, 0%). The levels of serum electrolytes and amylase were within the reference range.

**1. Based on the history, examination, and plain x-ray films, which one of the following is the least likely diagnosis in this patient?**

- a. Cholecystitis
- b. Constipation-induced colic
- c. Acute bowel obstruction
- d. Endometriosis
- e. Early appendicitis

The causes of abdominal pain are myriad. By classifying the pain based on the site, the causes can be divided into

upper, lower, and diffuse abdominal pain syndromes. Cholecystitis classically results in right hypochondrial pain with positive Murphy sign. However, patients with cholecystitis may occasionally present with nonspecific abdominal pain and nausea. Constipation-induced colic and acute bowel obstruction are difficult to distinguish clinically. Both may present with diffuse abdominal pain with nausea. Endometrial pain tends to be in the lower abdominal quadrants and usually presents as an intermittent pain syndrome; it rarely presents as a severe acute pain syndrome in a patient with no history of endometriosis. Women who have undergone bilateral oophorectomy rarely have pain from endometriosis. Therefore, the least likely diagnosis is endometriosis. In early appendicitis, pain classically begins as central abdominal pain that is often associated with fever and an increased leukocyte count.

The emergency department diagnosis was probable constipation-induced colic, and because the patient was able to expel flatus, there was a low suspicion of complete intestinal obstruction. She was discharged home and instructed to take an oral laxative. After taking the laxative, she felt increasingly nauseous, and 3 hours later vomited what appeared to be unchanged laxative (no fecal material was evident in the vomitus). The patient then experienced persistent abdominal pain and was no longer able to expel flatus. Thus, she returned to the emergency department. Findings on repeated decubitus and upright plain x-ray films of the abdomen (Figure 1) showed a moderate amount of stool in the colon with no evidence of obstruction or free air; otherwise, findings were similar to those on the previous plain x-ray films.

**2. Which one of the following management approaches would be inappropriate at this point?**

- a. Administer intravenous meperidine
- b. Initiate intravenous normal saline
- c. Reassure and discharge the patient
- d. Give clear water enema
- e. Insert a nasogastric tube for suction

Administering intravenous meperidine has been controversial, the reason being that it could mask symptoms and abdominal rigidity in an acute abdomen. Some recent studies<sup>1,2</sup> contradict this theory. Two double-blind placebo-controlled studies showed that administration of opiate

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See end of article for correct answers to questions.

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Figure 1. Upright plain x-ray film of the abdomen showing moderate amount of stool in the colon.

analgesia not only gave the patient more relief than placebo but also allowed physicians to assess and manage patients more effectively. No differences were noted in diagnostic or management errors between the groups, and a trend favored a more accurate diagnosis in the patients receiving analgesia. Intravenous hydration with normal saline would be standard therapy for patients who are dehydrated due to bouts of vomiting. Since this patient returned to the emergency department because of progression of her symptoms, a thorough reassessment is necessary, and reassuring and discharging her would be inappropriate. Because constipation-induced colic is a possible diagnosis, a trial of clear water enema would be reasonable. The only contraindication to administration of clear water enema in this situation is toxic megacolon or suspected colonic or rectal perforation. Giving the patient nothing by mouth is essential. The need for decompression of the stomach with nasogastric tube suction is controversial. The common practice in patients with possible intestinal obstruction is conservative management with nasogastric tube suction for 24 to 48 hours and then reassessment; surgery may be considered if no improvement occurs.

The patient was admitted to general medicine service with a diagnosis of constipation-induced colic or early small bowel obstruction. Her last bowel movement was 24 hours before admission. When the patient was next examined, she was resting quietly, experiencing occasional ab-

dominal pain. An abdominal examination revealed active bowel sounds with occasional rushes. Diffuse tenderness was noted in all abdominal quadrants, but there was no guarding or rebound tenderness.

**3. Which one of the following would not be included in the differential diagnoses at this time?**

- a. Acute diverticulitis
- b. Small bowel obstruction
- c. Crohn disease
- d. Ulcerative colitis
- e. Small bowel lymphoma

Acute diverticulitis usually presents with pain in the left lower abdominal quadrant, and inflammation may lead to a localized abscess. If adjacent organs are involved, a fistula or obstruction is possible. Obstruction can result in abdominal pain and vomiting. Small bowel obstruction may have a wide spectrum of presentation depending on its severity. Patients with mild and partial obstruction may have only abdominal pain and may be able to expel flatus and stool. Patients with severe obstruction usually present with abdominal distention and vomiting and are unable to expel stool or flatus. In Crohn disease, the transmural nature of the inflammatory process, which can involve any part of the gastrointestinal tract, can lead to fibrotic strictures that often present as repeated episodes of small bowel obstruction or, less commonly, colonic obstruction. In ulcerative colitis, the typical presentation is intermittent rectal bleeding associated with diarrhea and passage of mucus. Although periods of constipation may occur with mild disease, vomiting is unusual. Severe abdominal pain usually occurs only in advanced ulcerative colitis, and by this stage, frequent loose stools (>10 a day) are typical. Therefore, ulcerative colitis is extremely unlikely in this patient. Lymphoma of the small intestine, although rare, is the most common site for primary gastrointestinal lymphoma. This typically presents with abdominal pain, vomiting, weight loss, and anorexia. Small intestinal lymphoma may occasionally present as small bowel obstruction. Therefore, small bowel obstruction should be in the differential diagnosis.

The patient was admitted to the hospital. Intravenous fluids were initiated, and she was given nothing by mouth. Several enemas provided little result. About 12 hours later, her abdominal pain had diminished slightly, but she became nauseated and began vomiting. The vomitus was noted to be bilious. Further blood studies showed that the leukocyte count had increased to  $15.4 \times 10^9/L$  (neutrophils, 93.7%). Findings on flat plate and upright abdominal x-ray films were unchanged and interpreted as unremarkable.

At this point, a computed tomographic (CT) scan of the abdomen was obtained.

4. Based on the findings on the CT scan (Figure 2), which one of the following is now the most likely diagnosis?

- Small bowel obstruction
- Diverticular disease
- Appendicitis
- Pneumatosis cystoides intestinalis
- Sigmoid volvulus

The CT scan showed dilated small bowel involving the entire small bowel down to the distal terminal ileum. The transition point (Figure 2) was adjacent to a surgical clip from the patient's prior hysterectomy and oophorectomy. Beyond this point, the rest of the distal terminal ileum and colon were of normal caliber, compatible with small bowel obstruction. No findings suggested diverticular disease or appendicitis. Although hypodense areas were evident in the lumen of the small intestine, there was no air in the bowel wall to suggest pneumatosis cystoides intestinalis. Even though sigmoid volvulus may appear with dilated small bowel loops on a CT scan, the site where distended bowel begins should be proximal to the sigmoid colon, and thus the obstruction would be evident in the large bowel proximal to the sigmoid colon as well.

At this point, the patient had a nasogastric tube placed with intermittent suction. After 48 hours of nasogastric tube placement, she continued to have abdominal pain but no vomiting. She did not expel flatus or stool during this period. Findings on the abdominal examination had changed, revealing diffuse tenderness and distention without guarding or rebound. Bowel sounds were present and active.

5. Which one of the following is the most reasonable next step in the management of this patient?

- Continue conservative management with nasogastric tube suction and intravenous fluid
- Replace the nasogastric tube with a long intestinal tube to decompress the small intestine
- Send the patient for barium enema and hydrostatic reduction of the small intestinal obstruction
- Obtain a general surgery consultation for operative management
- Wait till patient expels stool or flatus, then obtain another CT scan of the abdomen

Continued conservative management beyond 48 hours without a good response is usually not recommended. The exact duration to continue conservative management is uncertain. Most experts agree that after 24 to 48 hours without substantial improvement, further intervention is appropriate. The use of a long intestinal tube has been shown to be potentially useful in selected cases of small

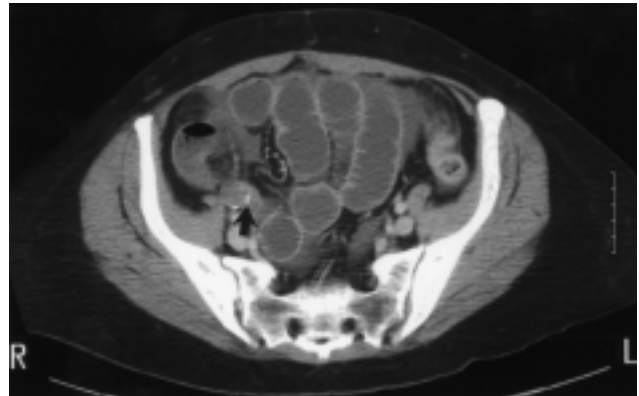


Figure 2. Computed tomogram of the abdomen. Transition point (arrow).

bowel obstruction but is generally reserved for patients with high operative risks.<sup>3,4</sup> Hydrostatic reduction with a barium enema is primarily used for intestinal intussusception<sup>5</sup> and is not suitable for small bowel obstruction of other causes. Additionally, hydrostatic reduction is associated with an increased risk of perforation in patients with small bowel obstruction. At this point, surgical decompression is the most suitable option for our patient. Further delay in decompression may result in bowel infarction. Thus, for most suspected cases of small bowel obstruction, consulting a general surgeon to monitor the patient's course is advisable. Because no important changes occurred in our patient's clinical state, a repeated CT scan of the abdomen would not be useful.

Abdominal exploration was performed. An adhesive band around the region of the terminal ileum causing a closed loop-type obstruction was found. Lysis of the adhesions and enterotomy at the terminal ileum for small bowel decompression was done. The surgeons gently decompressed the entire small bowel, from the ligament of Treitz to the terminal ileum. About 1500 mL of small bowel content was aspirated. The small bowel, which initially looked dusky, became pink, indicating vascular compromise that may have led to small bowel infarction if decompression had been delayed. The patient was discharged home in good condition.

## DISCUSSION

The diagnosis of small bowel obstruction can be difficult, particularly if the patient presents early with indeterminate symptoms and signs. Important features of a patient's history and symptoms are (1) prior abdominal surgery of both the upper and lower quadrants, (2) previous intra-abdominal malignancies, and (3) vomiting, crampy abdominal pain, abdominal distention, and inability to expel flatus. Important physical findings are (1) systemic signs of fever

and tachycardia suggesting strangulation, (2) signs of dehydration if vomiting and poor intake are prolonged, (3) abdominal tenderness and distention (important to note progress over time), (4) high-pitched or hypoactive bowel sounds on auscultation, and (5) an external hernia, which may reveal site and cause of obstruction. Possible laboratory findings of small bowel obstruction with ischemia or infarction are (1) leukocytosis and left shift, indicating possible strangulation with ischemia; (2) increased blood lactate and metabolic acidosis, suggesting bowel ischemia; (3) serum urea level higher than creatinine level and increased hematocrit, indicating dehydration; and (4) severe vomiting, implying metabolic acidosis with hypokalemia.

According to Bohner et al,<sup>6</sup> the most important diagnostic features in a patient's history and physical examination are previous abdominal surgery, signs of a distended abdomen, and increased bowel sounds. The sensitivities of detecting bowel obstruction based on a previous abdominal surgery and distended abdomen are 68.8% and 62.5%, respectively, and the specificities are 74.0% and 89.2%, respectively. When both are present, the specificity increases to 95%, but the sensitivity decreases to 46%. These results suggest that the history or physical examination alone would be insufficient to confirm the diagnosis of small bowel obstruction.

Initially, most physicians order a plain abdominal x-ray film based on a suspicion of small bowel obstruction. The next issue is when to obtain a CT evaluation of the abdomen. This depends on the contribution a CT evaluation would make in changing patient management. No prospective randomized trial has compared CT with plain x-ray films in the diagnosis of small bowel obstruction. One study, although not entirely applicable to our patient's presentation, attempted to address the issue of the benefit of a CT evaluation in a group of 91 patients presenting with acute abdomen.<sup>7</sup> The patients with acute abdomen who had no history of abdominal disease benefited the most from having a CT scan of the abdomen because management was changed after CT studies in 37% of 59 patients ( $P < .005$ ) with no history of abdominal disease compared with 10% of 32 patients with a prior history of abdominal disease ( $P > .05$ ).

In our patient, plain x-ray films of the abdomen were not informative; in fact, they were misleading. Thus, the sensitivity of plain x-ray films in patients with small bowel obstruction is an important issue. Various studies have estimated the sensitivity to be from 50% to 77%.<sup>8-12</sup> A review article by Balthazar and George<sup>13</sup> stated that plain radiographic findings are diagnostic in 50% to 60% of cases, equivocal in about 20% to 30% of cases, and may be misleading in 10% to 20% of cases. A major disadvantage of plain x-ray films is that they rarely reveal the cause of

bowel obstruction and often cannot determine the site of obstruction.<sup>14</sup> This is especially true in patients who do not swallow air in response to colicky abdominal pain, such as with our patient in whom there was no lucent contrast material (swallowed air) to help the radiologist appreciate distention of bowel loops proximal to luminal occlusion. These are not concerns with CT diagnostic studies. Hence, the trend is to perform CT diagnostic studies early in patients suspected of having small bowel obstruction, especially in those with equivocal findings.

The diagnosis of small bowel obstruction can be difficult to establish, and clinicians cannot rely solely on 1 particular modality. They must rely on the history, physical examination findings, and radiographic and laboratory findings. If the suspicion of small bowel obstruction is high but findings on a plain abdominal x-ray film are normal, CT diagnostic studies should be undertaken early.

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Correct answers: 1. d, 2. c, 3. d, 4. a, 5. d