

Mechanical Small Bowel Obstruction: A Plea for Earlier Surgical Intervention

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THE mortality rate of acute intestinal obstruction has declined steadily since 1900. During the first third of this century a mortality rate of up to 60% was not unusual.^{6, 9} With the advent of effective nasogastric suction,¹³ safe blood transfusion, and recognition of the value of abdominal roentgenograms, the mortality rate by 1945 had decreased to the 20% level.^{3, 5} By 1955 Smith *et al.*¹⁰ in the review of intestinal obstruction at the University of Minnesota Hospitals, reported 12.5% mortality rate. Finally, Turner *et al.*¹² in a comparative survey from the Mayo Clinic quoted the fatalities as 27% (1920-29), 21% (1930-39), and 4% (1940-49). The latter authors emphasize more the adjuncts of surgical therapy including antibiotics, fluid and electrolyte replacement, and better anesthesia as significant features in the improved statistics.

While admitting that factors other than surgical therapy are extremely valuable in the overall management of patients with intestinal obstruction, the present review of 111 such cases seen at the University of Kentucky Medical Center and St. Joseph's Hospital, Lexington, Kentucky, will stress the importance of early judicious surgical intervention.

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Clinical Material

This series consists of 111 consecutive unselected patients with mechanical small bowel obstruction admitted to the two hospitals located in Lexington, Kentucky. Acute mechanical small intestinal obstruction in the adult comprises the bulk of the series but a few patients with congenital, sub-acute, or chronic obstruction of the small bowel are included.

As shown in Figure 1 the age range was newborn to 89 years with the largest concentration in fifth, sixth, and seventh decades. In fact, 73% of the patients were above 40 years of age and 40% were 60 years of age or older. This age range and percentage distribution is similar to other reviews. There were 6 females and 50 males in this series. This sex distribution was relatively constant for the entire age range.

Figure 2 shows the etiologies of all obstructions and gives the absolute incidence of each and the percentages of the three major categories. Adhesions accounted for more than 50% of the obstructions and hernia for 23%. Malignancy disease, metastatic or primary, was the third leading cause of small bowel obstruction with congenital lesions, intussusception, volvulus, vascular occlusion, gallstones, and trauma being infrequent causes.

All patients underwent surgical procedures. They received at least a liter of

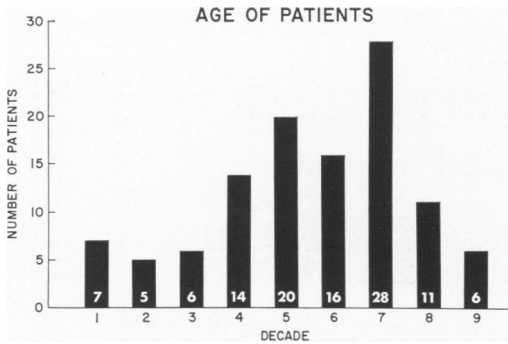


FIG. 1. Age distribution of 111 patients with acute intestinal obstruction.

Hartman's solution preoperatively and blood and plasma as needed. Most of the procedures were performed under general anesthesia with endotracheal intubation.

There were 26 complications (Fig. 3), a morbidity of 23.4%. The most frequent complication was infection. Of 11 septic processes, nine were superficial wound infections; eight were controlled by drainage and intensive local wound care. One patient developed gram negative septicemia and died, and the only obvious source was the superficial wound infection. The two deep contaminations were a pelvic abscess which responded to drainage through the rectum and a generalized peritonitis which led to sepsis and eventual death.

The pulmonary complications were atelectasis and pneumonitis. There was only one significant episode of aspiration pneumonitis which reflects the adequate preoperative gastric decompression and quality of anesthesia. Recurrent atelectasis and eventual sepsis in one newborn contributed significantly to his death. The two cardiac problems were postoperative episodes of congestive failure in previously compensated heart patients. Both responded to fluid limitation and diuretics in addition to maintenance digoxin. Two additional patients developed thrombophlebitis of the lower extremities which responded to conservative measures.

There were four episodes of reobstruction requiring second laparotomies prior to

discharge from the hospital. These occurred from 3 to 12 days after the first procedure. All patients survived the second operation. One patient developed severe upper gastrointestinal bleeding from stress ulceration and was treated successfully by a vagotomy and antrectomy.

There were five deaths in 111 patients, a mortality rate of 4.5%. The mechanism of death was overwhelming sepsis in two, terminate malignant disease in two and a major pulmonary complication in one.

Figure 4 shows the time interval from onset of symptoms to hospitalization and relates this to complications and deaths. As the time interval increases so do the relative number of complications and deaths. The average duration of symptoms prior to hospitalization in the uncomplicated, non-fatal group was 37.7 hours. This figure increased to 55.3 hours in the complicated group and to 59.0 hours in the fatal group. The first and last figures are significantly different at a p value of 0.05 (Student's t test).

As demonstrated in Figure 5 in-hospital delay prior to operation increases the number of complications and fatalities. The in-hospital time prior to duration averaged 9.9 hours in the uncomplicated, non-fatal group as opposed to 17.6 hours in those who subsequently developed complications

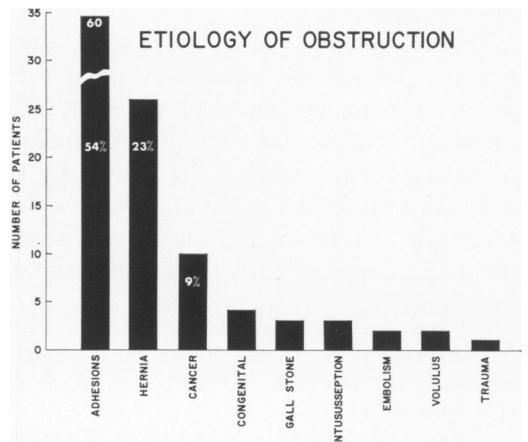


FIG. 2. Etiology of small bowel obstruction.

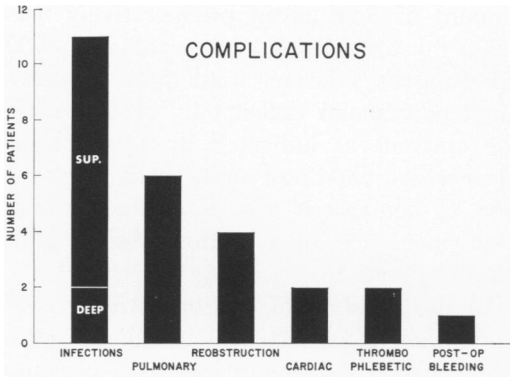


FIG. 3. Postoperative complications making a total morbidity rate of 24.3%.

and 25.2 in those who died. While these figures show a significant difference, not all of this time can be legitimately called unwarranted delay. Undoubtedly, the longer time required to prepare for operation patients who eventually succumbed reflects their more serious presenting conditions.

The relation of morbidity and mortality to resection or operative decompression of the obstructed bowel is shown in Figure 6. This is another way of relating delay in operative intervention to increased morbidity and mortality since those, who require evacuation or resection or both, represent

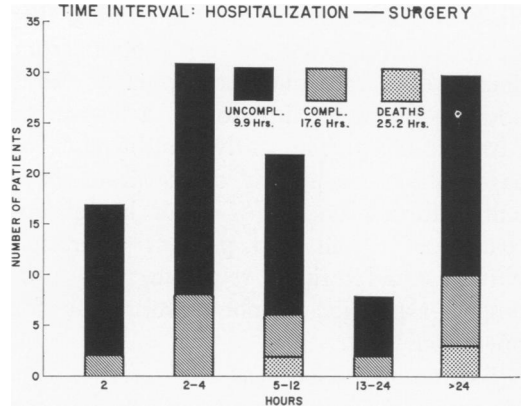


FIG. 5. Relation of complications and fatalities to interval between hospitalization and surgery.

cases of delayed therapy. As expected, the lowest morbidity and mortality was in the group neither resected nor evacuated. However, the highest complication and mortality rate came in the group who underwent resection without operative decompression.

Discussion

Prompt surgical intervention requires early diagnosis of acute intestinal obstruction. Any patient with cramping abdominal pain and obstipation must be considered to have intestinal obstruction until proven otherwise. Plain films of the abdomen and

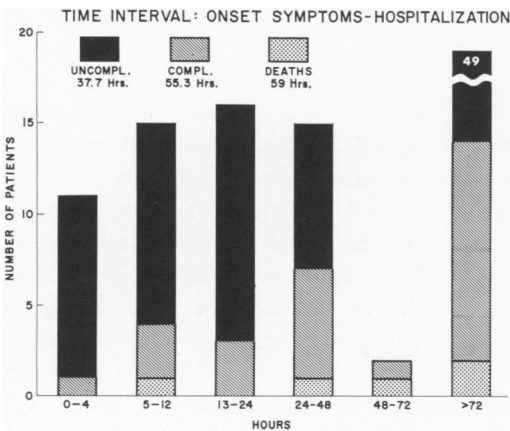


FIG. 4. Relation of complications and fatalities to interval between the onset of symptoms and admission to the hospital.

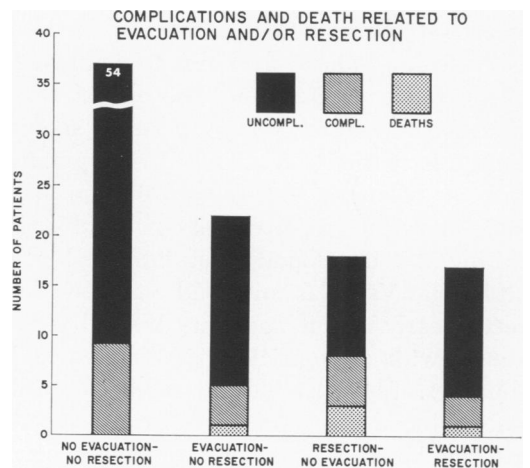


FIG. 6. Relation of complications and deaths to resection or evacuation.

chest x-rays are essential to aid in the different differentiation of obstruction from ileus and to rule out pneumonia or other possible thoracic disease as a cause of paralytic ileus. The early employment of nasogastric suction may demonstrate feculent material, typical of small bowel obstruction. It will also prevent aspiration with its deleterious sequelae, but prolonged aspiration is not a substitute for operation.

Barium meal x-ray was used infrequently. However, the reluctance to use barium for fear of creating more complete obstruction or allowing barium to escape intraperitoneally is based on inadequate evidence. In fact, recent reports support the use of barium by mouth in patients with obstruction as a means of establishing an early diagnosis and thus reducing the time from admission to operation. Moseley and Sermier⁷ gave barium to 74 patients and were able to demonstrate by x-rays the point of obstruction in 29 and found abnormal segmentation or loss of jejunal folds characteristic of patients with mechanical block in 45. They point out that the barium studies should not supersede the clinical observations of an experienced surgeon nor should the x-ray examinations be allowed to delay a necessary operation.

Understanding that the basic nature of intestinal obstruction is a third space loss of vascular volume has led to improved preoperative preparation. The almost routine use of central venous pressure monitoring in patients receiving large quantities of balanced electrolyte solution has simplified the replacement of fluid lost during the development of intestinal obstruction. Vascular overload can be detected early and if necessary treated vigorously with appropriate digitalization and diuretics. Fluid should be replaced until pulse, blood pressure, and urine output are stabilized. A patient, no matter how old, can usually be prepared within 8 hours for operation. In this series the least

amount of fluid given preoperatively was 1,000 ml. and the most in excess of 8000 ml. Ringer's solution. Inadequate replacement of vascular deficit only compromises the outcome as indicated by a recent review where persistent tachycardia or elevation of hematocrit was associated with a high incidence of resection and a high mortality rate.⁴

In the conduct of the operative procedure, general anesthesia should be used. All patients with acute intestinal obstruction require thorough exploration of the abdominal contents to exclude the presence of multiple obstructions or several areas of compromised bowel. From the results in this series, it appears that evacuation of bowel contents, particularly when a resection is done, is advantageous. This may be accomplished by a peroral tube or with temporary needle or catheter enterostomy. The higher morbidity and mortality in patients who underwent resection without evacuation may be an indication of the toxicity of substances left within the bowel lumen. Perhaps systemic absorption of these agents produce adverse cardiovascular and other effects. For this reason antibiotic agents should be used throughout the course, particularly when strangulating obstruction is suspected. The benefit of antibiotic drugs in such obstructions has been documented experimentally by Barnett *et al.*¹ and Cohn.²

The concept of therapeutic delay as a cause of increased mortality is not new. Tendler and Cartwright¹¹ in 1956 recorded a 34.6% mortality in 544 patients who had symptoms for 72 hours or more prior to admission compared to 8.3% fatalities in 794 patients whose symptoms were present for 24 hours or less. In 1963 Zollinger *et al.*¹⁴ found that delay of more than 24 hours before instituting therapy doubled the mortality. They felt that 12 hours was the maximum amount of time needed to prepare the patient for operation. In the present series initial notes on the charts of

patients whose treatment was delayed indicated doubt on the part of the physician as to the diagnosis and, more disastrously a lack of an organized plan to establish the diagnosis.

A particularly difficult diagnosis is the detection of reobstruction postoperatively. This occurred four times and each patient required another operation. Here, early diagnosis is imperative, and barium by mouth may be particularly helpful. Delayed reoperation may be fatal because of "metabolic bankruptcy"⁸ in a patient fasted for prolonged period.

As preoperative preparation improves and anesthetic management is more skillful, the mortality from abdominal exploration should approach zero. Although there is a place for careful non-operative evaluation of a patient with abdominal distention and pain, the time is coming when the risk of exploratory laparotomy for adynamic ileus may not be as great as the risk of neglecting a simple obstruction or allowing it to progress to strangulation.

Summary

In 111 consecutive cases of mechanical small bowel obstruction the morbidity rate was 23.4% and mortality rate 4.5%. Various factors contributing to these complications are discussed with particular emphasis on delay of treatment as a major cause for unsuccessful outcome.

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DISCUSSION

DR. ISIDORE COHN, JR. (New Orleans): I have both an interest and considerable past experimental experience with the problem of intestinal obstruction. Dr. Holloway has made a very nice presentation of their experience with the problem, and I think he has emphasized—more in the

manuscript than in his presentation—the debt all of us owe to those who have come before who have segregated the difference between simple and strangulation obstruction. Today no real justification exists for loss of life due to simple obstruction, unless we can blame this on either patient or physician delay.