

# INTESTINAL OBSTRUCTION\*

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INTESTINAL OBSTRUCTION is an important cause of hospital mortality, as shown by the fact that it is responsible for approximately ten per cent of all deaths on the surgical service at the University of Virginia Hospital. While the mortality rate to be presented is still high, recent developments directed toward the more complete protection of the surgical patient as a whole from the effects of disease and operation have markedly reduced it. The purposes of the present report are (1) to re-emphasize certain well-recognized features of the disease, (2) to mention some of the factors responsible for the encouraging improvement in mortality, (3) to discuss briefly a few of the controversial issues relative to treatment, and (4) finally, to add a group of 406 cases to the literature.

## LITERATURE

The extent of the decline in the mortality of intestinal obstruction is demonstrated in Table I in which are presented results reported by several authors. Although certain differences in the mortality rates reported are due to differences in classification and inclusion of material, a striking average improvement in results is indicated.

Lehman and Becker<sup>6</sup> recently reported the over-all mortality in 20,137 cases cared for by the Department of Surgery and Gynecology of the University of Virginia Hospital over a period of 12 years (1934 to 1945, inclusive). A comparison of this over-all mortality with that of intestinal obstruction was made in two six-year halves of the same period. The percentage decline in mortality in the two groups of cases proved to be almost identical. The improvements in mortality of all surgical disease and in intestinal obstruction specifically were ascribed to: "(1) An increase in the accuracy of the diagnosis of disease and particularly of the diagnosis of surgical complications, such as thrombophlebitis and shock. (2) A stricter attention to, and a more accurate management of water, electrolyte, protein, and vitamin balances in the surgical patient. (3) A better understanding of the role of blood volume

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and its control. (4) Major developments in the field of anesthesia and in the mechanical control of respiratory complications. (5) The introduction of specific chemotherapeutic and antibiotic substances. (6) The adoption of certain special therapeutic measures in common surgical diseases, such as those developed for the treatment of phlebothrombosis, thrombophlebitis, jaundice, intestinal obstruction, and others.”<sup>6</sup> The comparison presented suggests that the decline in mortality of intestinal obstruction is more largely due to general protective measures than to specific innovations in the treatment of obstruction to which most authors ascribe it.

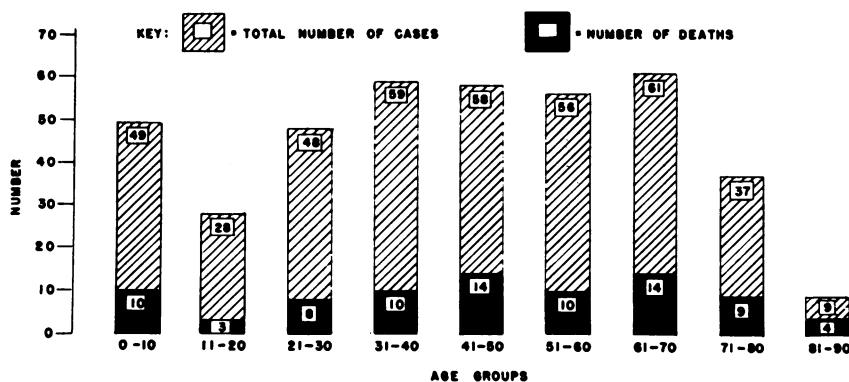


FIG. 1.—Distribution and mortality by age. Patients over 50 years of age comprise 40% of the material and 45% of the deaths. The death rate of patients up to and including 50 years of age is 18.6%. Above 50 years it is 22.7%. In one fatal case the age is not recorded.

TABLE I.—Intestinal Obstruction Results Reported by Other Authors.

Author	Years of Report	Number of Cases	Mortality (Percent)
Van Beuren and Smith <sup>1</sup> .....	1916-1919	60	66.6
Miller, C. Jeff <sup>2</sup> .....	1925-1929	343	60.9
Moss and McFetridge <sup>3</sup> .....	1930-1932	340	31.7
Callihan, Kennedy and Blain <sup>4</sup> .....	1936-1945	204	20.0
Eliason and Welty <sup>5</sup> .....	1934-1943	292	11.0
Becker, Davis and Lehman.....	1933-1947	406	20.4

MATERIAL

A series of 406 cases is reported, including all cases, with exceptions noted below, in which the diagnosis of mechanical intestinal obstruction was made on the Surgical and Gynecological service of the University of Virginia Hospital over a period of 15 years (1933 to 1947, inclusive). Excluded from the study were all cases of intestinal obstruction due to malfunctioning colostomy, rectal stricture, congenital atresia, congenital megacolon and impaction of feces. In addition, tumors of the bowel without clinical symptoms of obstruction indicating the need for prompt relief were not included. The

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reported cases either were admitted with a primary diagnosis of obstruction or developed it as a complication during hospitalization.

The age distribution by decades is presented in Figure 1. The youngest patient was one day old, the oldest 86 years. The average age was 42.3 years. The age of one patient who died was not recorded.

Sixty-two per cent of the patients were males, and 38 per cent were females (Table II). Had cases of rectal stricture on the basis of lymphopathia venereum been included, the sex difference undoubtedly would have been decreased.

TABLE II.—*Intestinal Obstruction Material and Results.*

	Number of Cases	Percent of Cases	Number of Deaths	Mortality (percent)
Total Cases.....	406	100.0	83	20.4
Sex				
Male.....	253	62.3	40	15.8
Female.....	153	37.7	43	28.4
Site of Obstruction				
Small bowel.....	365	89.9	74	20.3
Large bowel.....	41	10.1	9	21.9
Degree of Obstruction				
Partial.....	137	33.7	14	10.2
Complete.....	269	66.3	69	25.6
Type of Obstruction				
Simple.....	230	56.7	40	17.4
Strangulated.....	176	43.3	43	24.4
Bowel Resection				
Yes.....	49	12.0	12	24.5
No.....	357	88.0	71	19.8
Duration of Symptoms				
Less than 24 hours.....	157	38.6	16	10.2
More than 24 hours.....	249	61.4	67	26.9
Etiology of Obstruction				
Adhesions.....	186	45.8	34	18.2
External hernia.....	123	30.3	17	13.8
1. Inguinal.....	83	20.4	9	10.8
2. Femoral.....	26	6.4	6	23.0
3. Others.....	14	3.4	2	14.3
Neoplasms.....	35	8.6	7	20.0
Intussusception.....	27	6.6	10	37.0
Volvulus.....	12	2.9	2	16.6
Thrombosis and embolism.....	8	2.0	7	87.5
Others.....	15	3.7	6	40.0

Since large bowel obstruction is frequently complicated by small bowel obstruction, it is difficult to classify the material in a clear-cut way between the two levels. The difficulty is increased by the fact that there are also cases of primary mixed obstruction, such as ileocecal intussusception and incarcerated hernia sacs containing both large and small bowel. Since the risk associated with these lesions is primarily that of the small bowel obstruction, mixed obstructions have been classified in that category. Obstructions limited to the small bowel and those occasional primarily mixed types accounted

for 89.9 per cent of the entire material (365 cases) (Table II). Cases of primary large bowel obstruction accounted for 10.1 per cent (41 cases).

Complete obstruction existed in 33.7 per cent of the cases and partial obstruction in 66.3 per cent (Table II).

Forty-three per cent of the patients were found to have strangulated obstruction at operation or autopsy. The line between simple and strangulated obstruction is not always easy to define pathologically. In this study all cases which showed any evidence of compromise of the circulation, no matter how slowly or how promptly relieved by the release of pressure, have been classified as strangulated obstruction. The higher incidence of strangulation in this series as compared to many reported series is probably due largely to this method of classification. Another factor is the relatively high incidence of delayed treatment due to the rural origin of the majority of the patients.

Resection of bowel was performed in only 12.0 per cent of the cases (Table II). Nine cases were admitted in a moribund condition and died before operation could be performed.

Two hundred and forty-nine (61.4 per cent) of the patients had had symptoms of intestinal obstruction for 24 hours or more before their admission to the hospital, whereas the remainder (38.6 per cent) were earlier cases (Table II).

As in most reports, the most common causes of obstruction (Table II) were adhesions and external hernia, accounting together for three-fourths (76.1 per cent) of the entire series. The incidence of neoplasms is relatively low (8.6 per cent) when compared with other reported series. In all probability this is due to the fact that in the present survey were included only those cases of tumor which had produced a degree of obstruction requiring prompt treatment. Intussusception was the cause of the obstruction in 27 cases; of these, 16 occurred below the age of ten, accounting for one-third of all obstruction in this age group. There were 12 cases of volvulus, eight cases of mesenteric thrombosis or embolism, and the remaining 15 patients were obstructed by miscellaneous lesions.

The general principles of treatment employed in this series will be outlined in the discussion.

#### RESULTS

In the entire series there were 83 deaths, a mortality of 20.4 per cent (Table II). When the nine patients admitted in a moribund condition are excluded from the totals, there were 397 cases with 74 deaths, a mortality of 18.6 per cent.

The major factors influencing prognosis were the degree, type, duration and etiology of the obstruction (Table II). The mortality in small bowel obstruction was 20.3 per cent; in large bowel obstruction it was 21.9 per cent. Only 10.2 per cent of the partially obstructed patients died, while the mortality of complete obstruction was 25.6 per cent. The mortality rates for the

simple and strangulated obstructions were 17.4 per cent and 24.4 per cent respectively. The relatively slight difference in these two figures is probably due to the liberal interpretation of strangulation as already described. Of the patients seen within the first 24 hours of illness only 10.2 per cent died; the mortality was almost three times as great (26.9 per cent) in the patients who had been obstructed more than 24 hours.

The mortality in inguinal hernia with obstruction was 10.8 per cent as compared with 22.9 per cent for the remainder of the cases. This type of case included 20 per cent of the total material and only 11 per cent of the deaths.

#### DISCUSSION

Throughout the period studied the general principle has been maintained that intestinal obstruction is a disease requiring the earliest possible surgical relief, with the exception of a small group of cases that is termed on this service "reversible obstruction." This group, it is felt, may safely and effectively be treated by non-operative measures, particularly tube decompression. It includes those cases obstructed by a subacute inflammatory process due either to recent infective peritonitis or to recent surgical invasion of the peritoneum. In most instances decompression and rest of the intestine will permit the resolution of the inflammatory process with release of fixation and diminution of edema of the bowel wall. The danger of necrosis in this group is minimal. This is the type of case often successfully treated for many decades preceding the introduction of tube decompression by simple enterostomy.

Contrary to the practice reported by some authors, it is not felt that other types of obstruction, especially those due to old adhesions, are safely treated without operation. It is generally accepted that the relief of intraluminal pressure is the primary factor in protecting the patient from death from obstruction. This implies prompt, effective decompression in all cases. The most effective tube decompression is that by a tube which has passed the pylorus. Even the most ardent proponents of non-surgical treatment admit that in a number of cases intubation beyond the stomach is unsuccessful. In most cases the interval before the tube passes the pylorus and effective decompression begins is a matter of hours, during which treatment for the most important lethal factor in the disease is limited or absent. The apparent improvement in the condition of patients during this interval is often due to the correction of physiologic disturbances which is to be undertaken in any event. Such improvement may be misleading. In the first place, therefore, intubation as a definitive method of treatment except in "reversible obstruction" entails (1) failure of an essential element of treatment in some cases, and (2) delay in such treatment in most cases.

In the second place, the danger of perforation of the bowel from necrosis can never be absolutely estimated in advance. It is relatively easy to diagnose

a massive strangulated obstruction with the usual signs of severe illness, localized tenderness, mass, fever and leukocytosis. A small localized area of necrosis cannot be so diagnosed. Too many cases of obstruction from adhesions are explored in which a single band has created one or more small pressure points of gangrene to give the surgeon much confidence in his ability to affirm in advance that there is no danger of perforation. This conception does not deny the fact that intubation and suction in many cases are safe and effective. It challenges the conception that such cases can be predicted.

For these reasons once the diagnosis of "irreversible intestinal obstruction" is made on this service, further decisions are limited (1) to the specific requirements of preoperative preparation and (2) to the time of operation. The latter is performed just as soon as the patient seems ready for it, even though decompression may seem to have been effected.

Improvements in pre- and postoperative treatment have been adopted on this service as they have developed during the years covered by this study. There is need only briefly to mention the methods now employed. All cases are given normal salt solution intravenously, immediately followed by plasma and as soon as possible by whole blood if indications for blood volume replacement continue to be present. A Levin or Miller-Abbott tube is immediately introduced and suction is continued before, during, and after operation. In view of doubts of the propriety of non-surgical decompression in supposed "irreversible obstruction" coupled with technical difficulties in its use, the Miller-Abbott tube has been employed in fewer cases than in many clinics. Chemotherapeutic drugs and antibiotics are administered wherever contamination of the peritoneum is believed to have occurred or to be imminent.

This report demonstrates once more the accepted factors that modify the mortality in intestinal obstruction. The etiology, degree, type and duration of the obstruction influence the prognosis.

As in so many other diseases, promptness of treatment depending on early diagnosis is an essential factor for success. In this series obstructed inguinal hernia, so easily diagnosed, presents a mortality of only 10.8 per cent, which is about one-half of the mortality rate for the entire material. Although it represents 20 per cent of the total material, it includes only 11 per cent of the deaths. On the contrary, in femoral hernia, which is less easily diagnosed, particularly when the Richter type is present, the mortality (23.0 per cent) approximates that of the total material. These comparisons suggest that a more accurate picture of the problem of intestinal obstruction is afforded by omitting such easily diagnosed conditions as inguinal hernia from reports covering the general problem.

#### SUMMARY

An analysis of 406 cases of intestinal obstruction has been presented. Nine were admitted moribund.

The mortality for the entire series is 20.4 per cent, and exclusive of the moribund cases, 18.6 per cent. When cases of obstructed inguinal hernia are excluded the mortality is 22.9 per cent. Inguinal hernia represents 20 per cent of the material and 11 per cent of the deaths.

Certain well-recognized features of the disease have been re-emphasized. Some of the factors responsible for the encouraging improvement in mortality have been listed.

A distinction has been made between "reversible obstruction" and "irreversible obstruction."

The plan of treatment followed at the University of Virginia Hospital has been outlined, with emphasis on the importance of surgical intervention at the earliest possible moment in "irreversible obstruction."

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