

## OPERATIVE MORTALITY IN INTESTINAL OBSTRUCTION

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No APOLOGY need be offered for further study of intestinal obstruction. Not only is the operative mortality extremely high (in the neighborhood of 45 per cent.), but moreover, there seems to have been no improvement in this mortality in the last thirty-five years. Although the statistics of various clinics are not always strictly comparable because of the method of selection of cases, a consideration of these figures gives an excellent idea of the gross mortality. Table I shows a mortality in 2,345 collected cases of 46.5 per cent. This number includes 1,000 cases collected by Gibson<sup>6</sup> from the literature of 1888 to 1898 which have a mortality of 43.2 per cent. Recently McIver<sup>7</sup> reported 335 cases from the Massachusetts General Hospital with a mortality of but 31 per cent. This series, however, apparently does not include paralytic ileus. Other figures are Brill,<sup>8</sup> 124 cases with 36 per cent. mortality; Tuttle,<sup>9</sup> 150 cases with 50 per cent. mortality; Souttar,<sup>10</sup> 3,064 cases with only 32 per cent. mortality and Braun and Wortman,<sup>11</sup> 379 cases with 39 per cent. mortality.

TABLE I

*Comparative operative mortality in intestinal obstruction at different clinics*

Clinic	Cases	Mortality
EVANSTON HOSPITAL (10-year period). Collected by Christopher, F., and Jennings, W. K.	127	44.9%
JOHNS HOPKINS HOSPITAL (10-year period), Finney, J. M. T. <sup>1</sup> .....	217	35.0%
NEW YORK HOSPITAL (17-year period), Cornell, N. W. <sup>2</sup> .....	218	58.4%
LOS ANGELES COUNTY GENERAL HOSPITAL (5-year period), Vidgoff, I. J. <sup>3</sup> .....	266	45.9%
CHARITY HOSPITAL AND TOWN INFIRMARY, NEW ORLEANS (5-year period), Miller, C. Jeff <sup>4</sup> .....	342	60.0%
LEBANON HOSPITAL, NEW YORK (10-year period), Koslin, I. I. <sup>5</sup> .....	175	40.0%
VARIOUS HOSPITALS Collected from the literature 1888-1898 by Charles L. Gibson <sup>6</sup> .....	1,000	43.2%
Total.....	2,345	46.5%

The present study is based upon 127 proved cases of intestinal obstruction occurring at the Evanston Hospital in the ten-year period from 1922 to 1932. These cases were operated upon by twenty visiting surgeons of whom

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five attended 79 per cent. of the cases. The relative operative mortality of the five men having the most cases is of interest and is shown in Table II.

TABLE II

Surgeon	Cases	Mortality
A.....	32	25%
B.....	20	45%
C.....	16	50%
D.....	14	43%
E.....	13	84%
15 surgeons.....	25	40%

The commonest etiology at the Evanston Hospital was adhesions and following this in order of frequency came neoplasms, volvulus, paralytic ileus, incarcerated hernia, intussusception, mesenteric thrombosis, and miscellaneous. This is somewhat at variance with the incidence of etiology shown in 1,332 cases collected from the recent literature and including the Evanston Hospital cases. In this series (Table III) the etiology in order of frequency was adhesions, hernia, miscellaneous, intussusception, malignancy and volvulus. In McIver's series strangulated external hernia occurred more frequently than obstruction due to adhesions.<sup>7</sup>

TABLE III

*Incidence of etiology of intestinal obstruction in different clinics*

Clinic	Adhe- sions	Hernia	Intusus- ception	Malig- nancy	Volvu- lus	Miscel- laneous
Evanston Hospital.....	46	9	9	32	14	17
Johns Hopkins Hospital <sup>1</sup> .....	128	50	8	26	8	25
New York Hospital <sup>2</sup> .....	110	10	36	16	16	47
Los Angeles County General Hospital <sup>3</sup> .....	170	49	11	22	4	8
Charity Hospital and Tourn Infirmery <sup>4</sup> .....	98	96	42	17	34	55
Lebanon Hospital <sup>5</sup> .....	26	60	34	10	9	30
Total.....	578	274	140	123	85	182

The mortality according to etiology was studied in the Evanston Hospital cases and is shown in Table IV. The highest mortality was in mesenteric

TABLE IV

*Operative mortality in intestinal obstruction at the Evanston Hospital*

Cause of Obstruction	Cases	Deaths	Mortality
Adhesions.....	46	13	28.2%
Neoplasms.....	32	12	37.5%
Volvulus.....	14	7	50.0%
Paralytic Ileus.....	12	11	83.3%
Incarcerated Hernia.....	9	7	77.7%
Intussusception.....	9	2	22.2%
Mesenteric Thrombosis.....	3	3	100.0%
Miscellaneous.....	2	2	100.0%
Total.....	127	57	44.9%

TABLE V  
*Relationship of operative mortality to etiology at different clinics*

Clinic	Adhesions		Hernia		Intussusception		Malignancy		Volvulus		Miscellaneous	
	Cases	Mort.	Cases	Mort.	Cases	Mort.	Cases	Mort.	Cases	Mort.	Cases	Mort.
Evanston Hospital.....	46	28.2%	9	77.7%	9	22.2%	32	37.5%	14	50.0%	17	94.1%
New York Hospital <sup>2</sup> .....	105	41.8%	10	30.0%	36	47.2%	16	75.0%	13	46.1%	38	65.8%
Los Angeles County General Hospital <sup>3</sup>	170	37.6%	49	60.0%	11	66.0%	22	68.0%	4	75.0%	8	12.5%
Charity Hospital and Tourn Infirmary <sup>4</sup>	98	58.1%	96	61.5%	42	52.4%	17	88.2%	34	58.8%	55	70.9%
Lebanon Hospital, New York <sup>5</sup> .....	26	34.6%	66	25.7%	34	32.3%	10	40.0%	9	44.4%	30	83.3%
Total.....	445	42.0%	230	50.0%	132	44.7%	97	59.8%	74	54.0%	148	71.6%

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thrombosis and paralytic ileus and the lowest was in intussusception and the cases due to adhesions. In Table V is tabulated a series of cases from recently published statistics at representative clinics.

From Table V it will be noted that the percentage of mortality at the Evanston Hospital due to adhesions, intussusceptions, malignancy and volvulus was less than the average. The operative mortality in intussusception was 22.2 per cent. which compares very favorably with the general average of 44.7 per cent. The mortality in the adhesions cases was 28.2 per cent. as compared to the average of 42.0 per cent. On the other hand, the showing in hernia and in the miscellaneous cases was poorer than the average. Of interest in this connection was the fact that in McIver's<sup>7</sup> series the mortality for strangulated external hernias was but 18 per cent. in 147 cases.

Mere speed of operation did not seem to have a bearing in the Evanston Hospital Cases. (Table VI.) It is quite possible, however, that the cases

TABLE VI

*Relationship of operating time to mortality in 109 cases of intestinal obstruction (all causes)*

Operating Time	Cases	Deaths	Mortality
Under 30 minutes.....	14	6	42.8%
30 to 60 minutes.....	51	17	33.3%
Over 60 minutes.....	44	17	38.6%

in the poorest condition were operated upon most quickly. In the forty-six cases of intestinal obstruction due to adhesions there were previous operations in thirty-four cases. (Table VII.)

TABLE VII

*Types of previous operations noted in forty-six cases of intestinal obstruction due to adhesions*

A. *Single operations*

(1) Appendectomy.....	13
(2) Pelvic operations.....	9
(3) "Laparotomy".....	3
(4) Cholecystectomy.....	2
(5) Herniotomy.....	2
(6) Gastroenterostomy.....	1
(7) For intestinal obstruction.....	1

B. *Two operations*

(most recent noted first)

(1) Hysterectomy; appendectomy.....	1
(2) Herniotomy; appendectomy.....	1
(3) Pelvic operation; "laparotomy".....	1

C. *No operations*..... 12

Appendectomies and pelvic operations were the commonest offenders. It is of interest to note in this connection that 68 per cent. of Vidgoff's<sup>3</sup> cases of all types of intestinal obstruction had had previous operations. In seventy-

two of his cases there were mid-line incisions and in 62 per cent. of these there had been operations upon the female pelvic organs. Twenty-four and two-tenths per cent. of Miller's<sup>4</sup> cases and 40.0 per cent. of Finney's<sup>1</sup> had had previous operations.

The earlier the diagnosis is made and operation carried out the lower the mortality. This statement is graphically borne out in Tables VIII and IX.

TABLE VIII

*Relationship of operative mortality to the duration of symptoms before operation in cases of obstruction due to adhesions*

Duration of Symptoms before Operation	Cases	Deaths	Mortality
Under 24 hours.....	4	0	00.0%
24 to 48 hours.....	10	3	30.0%
Over 48 hours.....	25	9	36.0%
Not given.....	7	1	14.4%

TABLE IX

*Relationship of operative mortality to duration of symptoms before operation in cases of intestinal obstruction due to volvulus*

Duration of Symptoms before Operation	Cases	Deaths	Mortality
Less than 24 hours.....	2	0	00.0%
24 to 48 hours.....	6	2	33.3%
Over 48 hours.....	5	4	80.0%
Not stated.....	1	1	100.0%

The mortality in cases of intestinal obstruction due to external hernia was 66.6 per cent. and in internal hernia 100.0 per cent. Death followed all three of the cases due to incisional hernias. (Table X.)

TABLE X

*Types of hernias causing intestinal obstruction*

A. <i>External</i> .....	6	Deaths.....	4	Mortality.....	66.6%
(a) inguinal.....	2	Deaths.....	1	Mortality.....	50.0%
(b) femoral.....	1	Deaths.....	0	Mortality.....	00.0%
(c) incisional.....	3	Deaths.....	3	Mortality.....	100.0%
B. <i>Internal</i> .....	3	Deaths.....	3	Mortality.....	100.0%
(a) ileum through omentum (previous hysterectomy and appendectomy)					
(b) ileum through mesentery of a Meckel's diverticulum					
(c) not stated					

An attempt is made to appraise the value of the various operative procedures in Tables XI, XII and XIII. The case for enterostomy is strengthened by Table XI which gives an operative mortality of 33.0 per cent. In the cases due to volvulus (Table XIII) the mortality was less where enterostomy was not done. In the intussusception cases (Table XII) the mortality was far less where the bowel was not opened.

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TABLE XI

*Relationship of operative mortality to operative procedures in cases of intestinal obstruction due to neoplasms*

Type of Operation	Cases	Deaths	Mortality
Resection.....	5	2	40.0%
Resection and enterostomy.....	4	2	50.0%
Enterostomy only.....	18	6	33.0%
Enteroenterostomy.....	2	0	00.0%
Exploratory only.....	2	1	50.0%
No operation.....	1	1	100.0%

TABLE XII

*Relationship of type of operation to mortality in cases of intestinal obstruction due to intussusception*

Type of Operation	Cases	Deaths	Mortality
Resection.....	2	1	50.0%
Reduction of intussusception.....	7	1	14.3%

TABLE XIII

*Relationship of operative technique to operative mortality in cases of intestinal obstruction due to volvulus*

Procedure	Cases	Deaths	Mortality
Enterostomy.....	2	2	100.0%
No enterostomy.....	12	5	41.6%

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