THE MORTALITY STATISTICS OF TWO HUNDRED AND SEVENTY-SIX CASES OF ACUTE INTESTINAL OBSTRUCTION

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This study of the mortality statistics of intestinal obstruction is based upon a series of 276 consecutive cases of acute intestinal obstruction admitted to the German Hospital in the ten years ending with 1913. Some of the earlier histories were far from complete, and we have therefore used only those facts which could be found in practically all of the histories.

The etiology of the cases was as follows:

- Post-operative adhesions ...................... 81 cases
- Post-inflammatory adhesions .................. 16 cases
- Strangulated hernia ............................. 156 cases
  - Inguinal ....................................... 77
  - Femoral ........................................ 50
  - Umbilical ...................................... 21
  - Ventral ........................................ 7
  - Subdiaphragmatic .............................. 1
- Carcinoma of sigmoid .......................... 8 cases
- Volvulus ....................................... 5 cases
- Fecal impaction ............................... 3 cases
- Intussusception ................................. 2 cases
- Adynamic ileus ................................ 2 cases
- Congenital bands .............................. 1 case
- Cause unknown or not recorded ............... 2 cases

Of the 276 cases, 158 recovered and 118 died—a mortality of 42 per cent. One case is reported as improved, possibly one of the rare instances of spontaneous recovery or a mistaken diagnosis. The case noted as unimproved on the records probably declined operation and insisted upon discharge from the hospital.

A mortality of 42 per cent. in a large series of cases of acute intestinal obstruction is not an unusually high one. It is far higher than it should be, but an analysis of the records will easily disclose very definite reasons for such an unsatisfactory state of affairs.

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In 241 cases we found adequate records of the average time from the onset of the condition to the time of operation. In the cases that recovered it was 61.7 hours or over 2½ days, and in the case that died, 97 hours or 4 days and 1 hour. Under such conditions it is to be wondered at that so many cases had a fortunate outcome.

There is no doubt that in practically every instance, taking similar classes of cases, the time elapsing between the onset of the obstruction and the operation is the vital factor. Coley (Keen's Surgery, vol. iv, p. 50) states that in the first 24 hours the mortality in strangulated hernia should not be over 10 per cent.; in 72 hours it becomes 50 per cent. Naunyn (Ibid., p. 645), in an analysis of 288 cases of ileus, states that recoveries within 48 hours were 75 per cent., but on the third day only 35 to 40 per cent. recovered. Pilcher (Medical News, 1902) reports 40 cases of acute intestinal obstruction due to gall-stones with a mortality of 52.5 per cent.

Da Costa (Modern Surgery, p. 976) states that mortality in acute intestinal obstruction is 60 to 70 per cent. and states also that prompt diagnosis and operation would much reduce this.

Ruge (Archiv. f. klin. Chir., 1910-1911, xxiv, pp. 711-760), in a report of Korte's Hospital cases of obstruction following appendicitis, reports a mortality of 50 per cent. in early obstruction, i.e., immediately following upon the inflammatory process, and 45.8 per cent. in cases due to late or old adhesions. He reports in all 44 cases. J. V. Brown (Surg., Gynec. and Obst., 1911, xii, p. 186) reaches the same conclusions as to the unnecessarily late operations in acute intestinal obstruction in a study of 59 cases in his experience. The only author whose experience seems not entirely to coincide with these facts is Woolsey (Trans. Amer. Surg. Assoc., 1910, xxviii, p. 270), who in 26 cases of acute intestinal obstruction found that the average duration of the illness before operation had been rather less in the nine fatal cases than in the seventeen which recovered.

A more detailed analysis of the different groups of cases brings to light certain definite features concerning each group.

As to sex, our cases were divided fairly evenly, 144, or 52 per cent., being females, and 134, or 48 per cent., being males. Evidently complications arising from disease of the female pelvic organs slightly overbalanced the more frequent occurrence of hernia and disease of the appendix in the male.

Of special groups as regards etiology we find that hernias and post-operative and post-inflammatory adhesions furnish 253 of the 276 cases of obstruction.
There were in all 156 cases of strangulated hernia, or 56.4 per cent. of the total.

These were subdivided as follows:

<table>
<thead>
<tr>
<th>Type of Hernia</th>
<th>Number</th>
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<tbody>
<tr>
<td>Strangulated inguinal hernia</td>
<td>77</td>
</tr>
<tr>
<td>Strangulated femoral hernia</td>
<td>50</td>
</tr>
<tr>
<td>Strangulated umbilical hernia</td>
<td>21</td>
</tr>
<tr>
<td>Strangulated ventral hernia</td>
<td>7</td>
</tr>
<tr>
<td>Strangulated subdiaphragmatic</td>
<td>1</td>
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</tbody>
</table>

Of the 77 strangulated inguinal hernias, 57, or 74 per cent., recovered, and 20, or 26 per cent., died. Of the 50 cases of strangulated femoral hernia, 36, or 72 per cent., recovered, and 12, or 24 per cent., died. One was noted as improved, possibly spontaneous recovery or reduction; and one is noted as unimproved.

Of the 21 cases of strangulated umbilical hernia, 12 recovered and 9 died, or 42 per cent. Of the seven ventral or incisional hernias, 4 recovered and 3 died, or 42 per cent.

The higher mortality in the umbilical and ventral hernias is accounted for by the frequently observed fact that acute symptoms are often delayed and of lesser severity than in the inguinal and femoral hernias, and the indications for operations not quite as early and definite as in the other varieties of hernia.

Nevertheless, such a mortality in strangulated hernias is appalling. It is true that the average operation for an early strangulated hernia of any of the ordinary varieties does not offer great technical difficulties nor should it be attended by great mortality. The explanation is again to be found in delay before operation. It is our practice at the German Hospital to operate strangulated hernias as soon as possible after admission; the delay, therefore, as in all cases of obstruction admitted to hospitals, is before the admission of the patient. In some few instances the patient may be slow to consult a physician, but generally this is not the case.

In hernia especially the physician has a clue and guide to the cause of the symptoms in the very existence of the hernia. Oversight must be rare, except, possibly, in instances of Richter's hernia. But the hernia, while plainly indicating the source of trouble, also opens the way for delay in the operative treatment of the obstruction by giving an opportunity for an attempt to correct the condition by taxis and manipulation.

Coley gives five minutes as a safe length of time to employ taxis. Many indeed of our cases at the German Hospital have, before admis-
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sion, been subjected to manipulations, often severe and inexpert, extending over many hours and even repeated upon successive days.

When we consider the dangers and difficulties of taxis in strangulated hernia and bear in mind the fact that manipulation has been resorted to in practically every case before its admission to the hospital, we are justified in making it our practice to operate at once upon every strangulated hernia regardless of any other considerations. When ether or chloroform anaesthesia are not safe, local anaesthesia, and in rare cases spinal anaesthesia, will enable us to overcome this difficulty.

Although in our statistics we coincide with Coley in stating that the highest mortality in strangulated hernias is in the umbilical and ventral, our mortality in strangulated inguinal hernias (26 per cent.) was slightly higher than that of the femoral (24 per cent.), the reverse of what this author states. We are also able to substantiate his statement that the mortality is in large hernias and when the sac contains adherent omentum, and we believe that these two factors common to umbilical hernias are important in contributing to the high operative mortality in these cases.

Next to hernia in number are post-operative adhesions, there being in our series 81 cases, or 29 per cent., of the total number. Of the 81 cases, 41 recovered and 40 died, a mortality of 49.3 per cent. This mortality also is high and can only be accounted for by the long average time elapsing between the onset of the disease and operation. While the symptoms of strangulation of a femoral or inguinal hernia are fairly well known to the physician, it would seem that in other cases of intestinal obstruction terminal symptoms only are recognized. It is true that usually a case of obstruction has been diagnosed as colic, acute gastritis, or enteritis, and that a diagnosis of intestinal obstruction is not made until we begin to have the symptoms of toxæmia, peritoneal inflammation and persistent vomiting, often fecal.

In a small percentage of the cases the obstruction occurred during convalescence and while the patient was still in the hospital, when the diagnosis could be made early and treatment promptly instituted. The average time from the first operation to the obstruction was two years and three months. The longest period intervening was twenty years (following a hysterectomy).

Of the 81 cases of post-operative adhesions, 51 followed operations for appendicitis and 44 of this series had drainage at the original appendiceal operation. Each drainage case can safely be held to mean a case in which operation was delayed beyond the time of election. In line with endeavors to prevent instead of treating avoidable surgical
conditions, nothing is more important than to forestall the development of pus within the peritoneal cavity. Of the 51 cases, 27 died. A large percentage at least of these patients would never have had adhesions or the consequent obstruction had they been operated upon early in the appendiceal attack and had drainage not been necessary.

Seventeen cases are stated to have been due to post-operative adhesions, the primary cause not being given.

Fourteen followed operations upon the female pelvic organs, hysterectomies, salpingo-oophorectomies, etc. A certain number of such cases are now doubtless avoided by the greater care exercised in covering raw surfaces, stumps, etc.

Post-inflammatory adhesions were 16 in number. The term is used to designate new adhesions from an inflammatory or peritonitic process. Of these 11 died, a mortality of 68.7 per cent. This is partly due to the weakened and septic condition of the patients at the time of operation and partly due to the difficulty of diagnosis. Our results must always be in question in these cases. Our only hope is in minimizing the cases of peritonitis and of resulting obstruction. Most of such cases occur after operation for appendicitis in its later stages.

A more difficult post-operative condition to explain is adynamic ileus, of which there were 2 cases, one recovering and one dying. In the absence of a septic cause excessive handling of the viscera may be held to account for it. A more probable explanation is the occurrence of a thrombosis of the mesenteric veins.

There were three cases of fecal impaction with two deaths, a mortality of 66⅔ per cent. Fecal impaction generally occurs in elderly people and often much time elapses before operation. The onset and course are more or less insidious and the patients have usually been treated vigorously by purges, starvation, enemata, etc. Moreover, operative intervention very occasionally leads to enterostomy and colostomy, and this in itself is an unfavorable factor. One case of acute obstruction is recorded as having been caused by congenital bands. Of late years so-called “congenital” bands have received an increasing amount of attention. We believe that bands of extent great enough to produce obstruction are rarely congenital—that they are practically always due to subacute or unrecognized attacks of peritonitis.

There were five cases of volvulus, of which three recovered and two died, or 40 per cent. This is a condition not very frequent and generally not definitely diagnosed before operation. The sudden onset and rapid development of symptoms, however, are always sufficient to
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make clear the fact that some abdominal catastrophe demanding surgical intervention has occurred.

The same is true of intussuception in adults, of which there were two cases in this series; one recovered and one died. The case which recovered was a most interesting one. The intussuception occurred during typhoid fever, was correctly diagnosed and promptly operated. It has been elsewhere reported by one of us in conjunction with Dr. H. F. Page (Amer. Jour. Med. Sci., December, 1907).

There were eight cases of acute obstruction complicating carcinoma of the sigmoid. It is not to be expected that in such cases recovery could occur.

Taken as a whole, numbers of cases in which adequate records were kept show certain interesting points in symptomatology. In 63 cases, from 1908 to 1912 inclusive, with records of the vomiting, there were 35 recoveries and 28 deaths. In the cases recovering 5 only had reached the stage of fecal vomiting, but the average length of time the patients had been vomiting was two days and one hour. Of the 28 cases dying, 14 had fecal vomiting and 14 non-fecal vomiting only. The average duration of the vomiting had been two days and sixteen hours.

It would seem almost impossible that a patient with persistent uncontrollable vomiting with other symptoms of obstruction should be allowed to continue ill for over two days without a diagnosis or appropriate treatment.

In ninety cases, 1908 to 1912 inclusive, in which a record was kept of the fecal evacuations, 52 were cases that recovered and 38 died. In the recovered cases bowel movements had been absent on an average for two days and twelve hours and in those that died, three days and five hours. These figures point, as do the previous ones, to inexcusable delay, for in practically every case vigorous means had been adopted to produce an emptying of the bowel. Here we may well sound a note of warning against misinterpreting evacuations of the lower bowel only as a result of enemata, especially when the colonic contents are emptied by a high enema.

A review of the entire mass of statistics upon this series of cases makes it evident that in almost every instance, in spite of symptoms so plain as to be pathognomonic, diagnosis has been tardy and operation delayed. Prompt diagnosis and immediate operation will reduce the mortality in acute intestinal obstruction to a mere fraction of that encountered at present.