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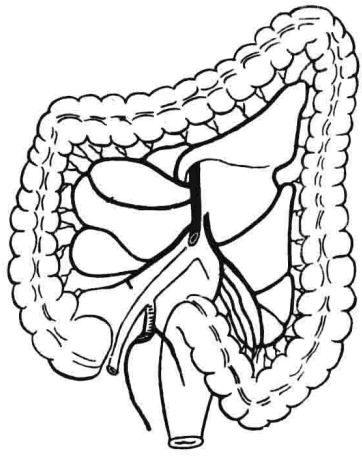

INTESTINAL OBSTRUCTION

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Preface

FOR MANY DECADES THE PROBLEMS posed by intestinal obstruction have captivated the interest of the entire medical profession. From the medical student to the scientist working in his laboratory, from the general practitioner, occupied with details of diagnosis, to the surgeon engaged in technical corrective measures, all must, either through design or through necessity, acquire some knowledge of this disease.

The practicing surgeon, to whom the responsibility of the care of patients with obstruction is entrusted, is the individual who is most deeply and intimately concerned with its various manifestations. In teaching hospitals many of the duties involved rest upon the shoulders of the resident staff. It is to all of these clinical surgeons that this book is addressed.

Numerous conferences, discussions, and teaching rounds have indicated that there are three particular subjects which the young surgeon must consider. They are:

1. What are the salient facts about intestinal obstruction? Although an imposing amount of fundamental information has been published, its abundance may excite confusion rather than lead to clarification. Medical literature contains thousands of papers on intestinal obstruction, many of which are valuable, either because of originality or because they present the most recent or complete discussions that are available. However, many articles are repetitious or are now chiefly of historical interest. Hence, in the interest of clarity and brevity, data have been selected and an encyclopedic collection of all available material has been avoided deliberately in this book.

2. What are the exact technical methods of management of specific types of obstruction? It is apparent that any attempt to compress a concept of a treatment of obstruction into a cookbook formula would be impossible and unwise. Blind routine cannot be substituted for surgical judgment; yet good

judgment can be negated by inattention to, or lack of knowledge of, the exact techniques involved in the indicated surgical procedures.

3. Where may further facts be obtained? Any reader who is interested in a particular facet of obstruction wishes to know more than can be furnished by a small text. For that reason the bibliography becomes an important guide to further information and other references. Therefore, insofar as possible, the most informative and readily available material has been cited.

From the historical point of view, it should be noted that intestinal obstruction has provided a focal point of interest in the Massachusetts General Hospital for over half a century. Scudder, Richardson, McIver, and McKittrick, as well as many others, have made important contributions to the knowledge of this disease. The main attention has been focused continually upon the clinical problem that is presented by the individual patient. Meanwhile, independence of thought has been promoted, so that individual opinion is not repressed, though it occasionally may be at variance with that generally accepted by other members of the surgical staff. In this text the author has designated those areas in which individual points of view, either from this hospital or elsewhere, have been substituted for generally accepted surgical opinions.

All students of intestinal obstruction will recognize the enormous debt that is owed, not only to our clinical teachers, but also to many other outstanding pioneers, such as Gamble and Wangensteen. This book, therefore, is presented with due humility, since it must include a recapitulation of the contributions of others. Thanks are also given to Mrs. Muriel McLatchie Miller for the illustrations; to Dr. Laurence L. Robbins, Chief of the Department of Radiology of the Massachusetts General Hospital, for a number of illustrations and helpful advice; to Dr. Richard Schatzki, Chief of Radiology of the Mount Auburn Hospital, for several radiographs; to Dr. Leland S. McKittrick for suggestions and criticisms; to Dr. Wm. C. Quinby for advice on pediatric surgery; to Miss Mary Sullivan and Miss Olive Dingle for aid in preparation of the manuscript, and, above all, to the surgical residents of our hospital who have devoted so much time and thought to the care of these patients.

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Historic Milestones

THE TREATMENT OF INTESTINAL OBSTRUCTION before the year 1800 was essentially the same as that used for constipation. Sporadic cures of the disease had been secured by the use of forcible enemas or by the oral administration of mercury, while multiple percutaneous punctures of the distended colon sometimes had prolonged life.

In 1713 Littre suggested the possibility of proximal decompression of the bowel by direct incision. This was not accomplished, however, until Pillore, in 1776, successfully made a cecostomy for the relief of obstruction due to cancer of the rectum. This operation was demanded by the patient despite the fact that six surgical consultants advised against it. The patient died less than a month later from necrosis of a jejunal loop caused by 2 pounds of mercury that he had swallowed a month before the operation.

Duret performed the first successful sigmoidostomy in 1793, but little enthusiasm was encountered until Amussat, in 1839, found, after careful anatomic studies, that a colostomy could be made in the left lumbar area without entering the peritoneal cavity. He advised its routine use for cancer of the rectum. For several decades thereafter "Amussat's operation" was employed frequently.

Meanwhile, studies of the methods of suture of lacerated intestine were progressing. It is possible that traumatic wounds of the colon may have been sutured by Lanfrancus about the year 1300, and he apparently understood that peritoneal surfaces of the intestine should be held together by suture until healing occurred. For centuries thereafter fecal fistulas must have been comparatively common because of traumatic lacerations of the bowel and operations for strangulated hernias. Nevertheless, suture of the intestine demanded little attention until Travers, in 1813, published an extensive mono-

graph of clinical and experimental studies proving the necessity of serosal sutures to maintain continuity. He showed that mucosal eversion was the cause of failure. Lembert's suture, the first of a long list of sutures to accomplish this purpose, still is known to every surgeon. It was described by him in 1826 and first used in the human being by Dieffenbach in 1836.

Another early contribution was a resection of the rectum by Lisfranc, leaving an uncontrollable perineal colostomy stoma. In 1833 Reybard carried out a resection and anastomosis for cancer of the colon.

Anesthesia and asepsis were necessary before any more significant progress could be made. Late in the last century numerous contributions appeared, setting the pattern for the technical details still followed today. A lag in appreciation of physiologic principles meant that progress was greater in the field of colonic surgery than in that of the small intestine. For obstruction of the colon two modes of therapy evolved—that of resection and primary anastomosis and that of obstructive resection. By 1892 Bloch was able to collect reports of 138 cases in which cancer of the colon had been treated surgically, and added three of his own. He proved that exteriorization was a far safer operation at that time than primary anastomosis. Paul, in 1895, apparently without any knowledge of Bloch's work, came to similar conclusions. This method of resection was advocated by Mikulicz and later perfected by Rankin. It frequently has been known since by Rankin's term—"obstructive resection."

Primary resection and anastomosis of the colon meanwhile had lost favor. Murphy had introduced his button method of anastomosis in 1892, but it was not until 1908, when Parker and Kerr introduced the principle of aseptic anastomosis, that this method again became safe. Since that time innumerable variations of aseptic suture and clamps to facilitate the procedure have been described.

Within the last two decades there has been a wide and nearly universal trend toward resection and primary anastomosis of the unobstructed colon and a similar, but slower, swing away from "aseptic" to open anastomosis. Extension of these principles to the obstructed, nonprepared colon still must be accepted with some qualifications.

Technical progress in surgery of obstruction of the small intestine lagged far behind. Jejunostomy was recommended by Fuhr and Wisener in 1886. This procedure remained essentially the sole method in the surgeon's armamentarium for the treatment of simple obstruction due to adhesions and bands for nearly a half century. It reached the height of popularity in the decade 1920-1930, when it was agreed generally that the operation was useful when simple obstruction was present but valueless in the presence of strangulation or paralytic ileus.

Fortunately, adjuvant measures for the treatment of obstruction were being developed. Hartwell and Hoguet instituted a new era when they discovered in 1912 that the lives of dogs with high intestinal obstruction could be prolonged by the subcutaneous injection of saline solution. Numerous other laboratories have contributed to this field, in which Gamble and associates have made outstanding additions to our knowledge.

The wide use of enterostomy as a surgical technique had introduced many new complications and failed so frequently that Wangensteen's popularization of constant suction to an inlying gastroduodenal tube came in 1933 as a major advance. Tubes had been used sporadically before that time. A stomach tube had been employed for feeding by John Hunter in 1790 and by Physick to wash out a stomach in 1813. Einhorn and Gross described their duodenal tubes in 1910, and the Levin tube appeared in 1921. Siphonage drainage of the stomach in cases of intestinal distention was introduced by Westerman in 1910, and the application of continuous suction to duodenal tubes by Ward in 1925. In the succeeding years many surgeons employed intermittent siphonage or suction for a variety of conditions, such as peritonitis or distention. Finally Wangensteen and Paine proved the superiority of suction, and after the successful use of suction by Wangensteen in the treatment of mechanical obstruction, the method became established. It is now used so commonly that it is almost impossible for the young surgeon to realize the desperate condition of patients with intestinal obstruction before the introduction of suction and adequate fluid replacement, or to appreciate the extreme importance of these contributions.

The long intestinal tubes were introduced by Miller and Abbott in 1934; others were described by Johnston in 1938, Harris in 1945, Cantor in 1946, and Grafton Smith in 1952.

The introduction of antibiotics also heralded a new era. Though clinical results have not been as impressive as experimental evidence, it is apparent that some advanced cases of obstruction are now amenable to surgical intervention that were nonsalvageable before.

Because of the simultaneous impact of improved operative methods; fluid, blood and electrolyte replacement; tubes, and antibiotics, the past decade has been one of stress and flux. Various clinics have tended to champion certain methods of treatment, though gradually some measure of agreement has been achieved.

This brief summary may be supplemented by the historical reviews of Allen on surgery of the colon, Colcock on colostomy, Shelley on enterostomy, and Paine on intestinal intubation.

2

Anatomy

A. SMALL INTESTINE

THE SURGEON MUST APPRECIATE the fact that the small intestine varies considerably in length, ranging from 12 to 22 feet. Normally the duodenum is about 1 foot long, the jejunum 7 to 8, and the ileum 10 to 12. The dividing line between jejunum and ileum is not sharp. Despite the fact that the jejunum tends to be above the umbilicus and the ileum below, and despite variations in the pattern of arterial arcades, accurate orientation in any case of obstruction is impossible until the surgeon identifies the ligament of Treitz and the ileocecal valve. Because of variations in the length of the bowel, both of these fixed points must be located before extensive resections are carried out. Except when anomalies of rotation are present, the second, third, and fourth portions of the duodenum are retroperitoneal and the remainder of the small intestine intraperitoneal. Normally the mesentery of the intestine is attached closely to the posterior abdominal wall, but occasionally there may be a complete lack of fixation, when the whole jejunum, the ileum, and sometimes the right, and very rarely the entire, colon are suspended only by a tiny pedicle that bears the superior mesenteric vessels.

B. LARGE INTESTINE

The anatomic divisions of the colon (cecum, ascending colon, hepatic flexure, transverse colon, splenic flexure, descending colon, and sigmoid colon) are easily identified. There is less agreement about nomenclature of the distal gut. In this book, in accordance with Gilchrist's definition, the rectum will be divided into two portions, the intraperitoneal and the extraperitoneal. The intraperitoneal begins at the point where the mesentery of the sigmoid disappears, approximately opposite the third sacral vertebra, and

extends down to the base of the pouch of Douglas. It is about 8 cm. in length and corresponds to the less precise term "rectosigmoid." It will be noted that the anterior wall at this section of the rectum is covered by visceral peritoneum, though the posterior wall is extraperitoneal. The extraperitoneal rectum extends from the base of the pouch of Douglas down to the anus. It is entirely extraperitoneal, and it also is about 8 cm. long.

Variations in the length and diameter of the colon are not uncommon. An unusually long colon is called a dolichocolon and is subject to volvulus. In megacolon, not only is the colon long but the diameter is greatly increased. The extent of the mesenteric fixation is also variable. Frequently the right colon is entirely free on a mesentery. On the other hand, the descending colon essentially always is firmly fixed to the lateral and posterior walls. The sigmoid is free on a mesentery in childhood, but often develops partial fixation later in life because of inflammatory adhesions.

C. BLOOD SUPPLY

The typical blood supply of the intestine and colon is shown in Figures 1 and 2. The duodenum is supplied by a mesenteric arch arising from the superior and inferior pancreaticoduodenal arteries, which originate, respectively, from the gastroduodenal and superior mesenteric. The right and transverse colons are also supplied through the superior mesenteric, via the ileocolic, right colic and mid-colic branches. The left colon receives blood from the inferior mesenteric by way of the left colic branch to the splenic flexure and descending colon and the sigmoid branches. The terminal portion of the inferior mesenteric, the superior hemorrhoidal, runs to the intraperitoneal rectum. The lower portion of the rectum depends upon the middle hemorrhoidal, from the hypogastric artery, and the inferior hemorrhoidal, from the internal pudendal.

Variations in the pattern of the major blood vessels supplying the colon are common. Several investigators, including Steward and Rankin and Basmajian, have shown the frequency of these anomalies. The ileocolic artery is always present. According to Steward and Rankin, the right colic artery was absent in 18 per cent of their specimens. It arose from the superior mesenteric in only 40 per cent; it came in 12 per cent from the ileocolic and in 30 per cent from the middle colic. The middle colic artery was absent in 5 per cent of the cases. In 10 per cent there was an accessory middle colic artery supplying the left side of the transverse colon. In all cases the artery began its course to the right, and usually only a part of one branch passed to the left of the median line of the body. There were usually only two branches of the artery but occasionally as many as four. The left colic artery was al-

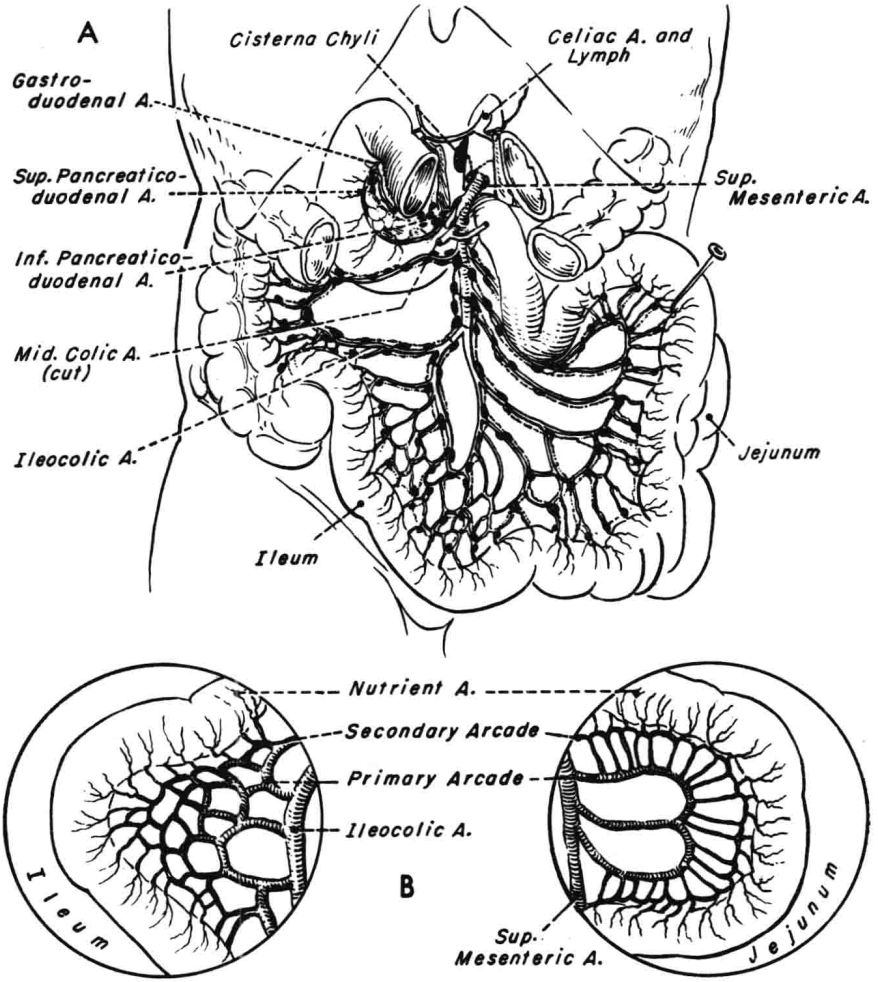

Fig. 1.—Blood supply and lymph nodes of small intestine. **A,** pancreaticoduodenal arch courses along inner-curve side of duodenum. Multiple branches of superior mesenteric artery supply jejunum and ileum. **B,** variations in arterial arcades in upper jejunum and lower ileum.