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DISEASES OF THE STOMACH

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AND THEIR

SURGICAL TREATMENT

BY

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PREFACE TO SECOND EDITION

IN the preface to the first edition of this work we ventured to forecast that in the near future there would be a great activity in the surgical treatment of the diseases of the stomach. This forecast has been abundantly justified. During the two years that have passed since then the number of papers, discussions, and addresses dealing with one aspect or another of the various surgical diseases of the stomach has been very remarkable. Indeed; it has been no light task to keep abreast of the literature of the subject.

Our own experience has been considerable. Our combined records show a total of over 600 operations. During the last two years the mortality has been greatly reduced. In cases of simple gastro-enterostomy, for example, the death-rate is well under 5 per cent., and many of these patients were operated upon when almost in a desperate plight as the result of hæmorrhage or of chronic indigestion with frequent vomiting. The malignant cases still show, and must necessarily always show, a greater mortality than this. This is due, of course, to the nature and extent of the disease, and to the extremely enfeebled condition or to the age of the patient. We may briefly sum up our experience of cancer of the stomach by saying that our tendency seems to be to the more frequent performance of gastrectomy as compared with gastro-enterostomy. Though the latter operation is sometimes remarkably successful, it cannot be doubted that

even as a palliative operation there is much to be said in favour of partial gastrectomy.

The whole work has undergone a most careful revision. Indeed, the greater part of it has been rewritten, for where our knowledge has so greatly increased, the form and method of the first edition seemed inappropriate, and it was easier and more satisfactory to rewrite than to modify.

We desire to express our thanks to Dr. Campbell Thomson for the loan of three blocks used to illustrate the chapter on 'Acute Dilatation,' and to Dr. Porter Parkinson for the loan of one block, showing the perforation of a gastric ulcer in a child aged two. This illustration is reproduced from vol. i. of the *Transactions of the Society for the Study of Disease in Children*.

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PREFACE TO FIRST EDITION

THERE can, we think, be no need for an apologetic preface to a work dealing with the 'Surgery of the Stomach.' This branch of our art has made so great advances within the last few years that a review of its progress seems both fitting and desirable.

The present work took its origin in the Hunterian Lectures delivered by one of us at the Royal College of Surgeons of England in 1900. The attention called to the subject by those lectures resulted in a large increase in our experience of the various gastric conditions amenable to surgical treatment. To deal fully with subjects lightly touched upon in the lectures, to expand, in fact, those lectures into a volume, was a work which the lecturer unaided would have been hard pressed to accomplish in the space of time within which it was felt desirable to publish the volume. A collaboration seemed therefore desirable, and as we had been associated in hospital work more or less closely since 1887, when our relative positions were those of Honorary Officer and House Surgeon, the present collaboration seemed both natural and appropriate.

For every statement made in the book we jointly hold ourselves responsible. The whole work has undergone a careful revision by both of us, and much of it has been frequently discussed while in preparation and after completion.

That the aid of surgery must be called in to deal with

both simple and malignant disease of the stomach, in the future far more often than in the past, seems inevitable. We consider that we are justified in saying that our joint record shows that the risks of such surgery are far less than has been generally believed.

In support of this statement, one of us, in a series of over 200 operations on the stomach, can refer to the last seventy-five consecutive operations in his private clinic, including malignant and simple cases, with only one death (and that from accidental perforation on the twelfth day), and the other can point to a consecutive series of forty-seven hospital and private cases, with three deaths.

We take this opportunity to thank Dr. W. MacGregor Young, M.A., for his valuable assistance in illustrating the work by original drawings and diagrams, which will be found of great service in elucidating the text, and one of us also accepts the occasion of the preface to acknowledge the great help he received during the preparation of the Hunterian Lectures from Dr. Farquhar Macrae, now on the staff of the Western Hospital, Glasgow, but at that time assisting us in his private clinical work.

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SURGERY OF THE STOMACH

CHAPTER I

ANATOMICAL CONSIDERATIONS

THE stomach, when normal, is a somewhat pear-shaped hollow organ situated in the epigastric and left hypochondriac regions, the larger part (fully two-thirds) being under cover of the liver and diaphragm, but the anterior surface in its lower part lying against the anterior abdominal wall. Its general axis is not quite vertical, but inclined obliquely, the cardiac orifice being on the left of the tenth dorsal vertebra, while the pyloric outlet is situated on the right of the eleventh or twelfth dorsal vertebra, about an inch to the right of the middle line, and nearer the anterior abdominal wall. The channel of entrance into the stomach is vertical, but that of exit is directed downwards, backwards, and to the right.

Between the cardiac and pyloric orifices the stomach is curved along both its upper and lower borders. The upper border, known as the lesser curvature, between 3 and 4 inches in length, is slightly concave, looks upward and towards the right, and is nearly all situated to the left of the middle line. The greater curvature is about three times the length of the lesser, and, except for a small part near the pylorus, is convex throughout. Tracing it from the cardiac orifice, it is found to arch upwards to the left for about 2 inches; it then sweeps downwards and to the right until it reaches the middle line, where it again changes its direction and passes upwards, to the right and

slightly forwards, till it reaches the pylorus. When the stomach is filled with air under medium tension, the lower border reaches to within $1\frac{1}{2}$ to $2\frac{1}{2}$ inches of the umbilicus, being rather higher in women than in men (Ewald, 'Diseases of the Stomach,' p. 115).

The only fixed part of the stomach is the cardiac orifice, which lies at a point on the posterior abdominal wall corresponding in front with the junction of the seventh left costal cartilage with the sternum.

When the stomach is distended, its position is somewhat altered. The greater curvature comes forward, and the anterior surface is thus caused to look upward as well as to the front, while the posterior wall faces downwards and backwards. The pylorus, which is freely movable, is under these circumstances usually displaced 2 or 3 inches to the right of the middle line.

In its greatest length the normal stomach measures rather over 10 inches, and its diameter at its widest part (toward the cardiac end) is between 4 and 5 inches. The normal capacity of the stomach varies greatly in different individuals, but is probably never more than $2\frac{1}{2}$ pints (Ewald, 'Diseases of the Stomach,' p. 120).

The wall of the stomach, which is thinner than that of the œsophagus, though thicker than that of the small intestine, is composed of four layers—the serous, muscular, submucous, and mucous.

The serous coat is composed of peritoneum, which closely invests the whole viscus, except at the greater and lesser curvature, where the attachment is looser, allowing space for the larger bloodvessels.

The muscular coat consists of unstriped muscular fibres arranged in three more or less distinct layers—longitudinal, circular, and oblique. Of these three, that which is of special interest is the middle layer. This, toward the pylorus, becomes thicker and stronger, and when it reaches the exit from the stomach the circular fibres are heaped up so as to project inward into the lumen of the passage and form a distinct sphincter. Under normal circumstances the calibre of the pyloric orifice has a diameter of rather

less than half an inch. This diminution in the calibre is caused entirely by the increase of the muscular fibres, the longitudinal fibres taking no part in the process, but passing on into the first part of the duodenum.

The submucous coat is composed of areolar tissue, and is the tunic in which the larger arterioles break up. The submucous tissue does not bind the mucous membrane very closely to the muscular layer, but permits considerable sliding one upon the other.

The mucous membrane, which is thickest in the pyloric region and thinnest in the great sac, is richly supplied with glands. The whole interior of the stomach is covered by a single layer of columnar epithelial cells. Scattered throughout the mucous membrane, but most abundant toward the pylorus, are small masses of lymphoid tissue, which are of importance as occasionally ulcerating in Hodgkin's disease.

The stomach receives its blood-supply from all three of the branches of the celiac axis. The coronary artery of the stomach reaches the viscus at the cardiac end, and, after giving off branches to the lower part of the œsophagus, it runs along the lesser curvature from left to right, and anastomoses with the pyloric branch of the hepatic artery. From the hepatic artery two branches in part aid the supply of the stomach. The smaller of these, the pyloric branch, reaches the stomach at the upper margin of the pylorus, and passes toward the left along the lesser curvature to inosculate with the terminal branches of the coronary artery. The gastro-duodenal artery passes behind the first part of the duodenum close to the pylorus, and, after giving off the superior pancreatico-duodenal branch, continues from right to left along the greater curvature of the stomach as the right gastro-epiploic artery. The splenic artery runs along the upper margin of the pancreas from right to left, and supplies several small branches to the stomach before it gives rise to the left gastro-epiploic artery, which lies between the layers of the gastro-splenic omentum, and is continued along the great curvature of the stomach to anastomose with the terminal branches of the right gastro-epiploic artery.

From the two arches thus formed at the upper and lower margins of the stomach, vessels pass at right angles to supply the body of the viscus. The ultimate branches of these form an intricate network in the interglandular tissue, and from the capillaries round the mouths of the glands the veins take origin. These in the mucous membrane are fewer but larger than the arteries. They form a plexus in the submucous tissue, and then pass along with the arteries to form larger veins corresponding to the large arteries already described—viz., coronary, left gastro-epiploic, right gastro-epiploic, and pyloric veins. These all empty into the portal vein, either directly, as in the case of the pyloric and coronary veins, or by joining the superior mesenteric or splenic veins.

The lymphatics of the stomach, which are very numerous, arise in intimate relation with the gland tubules. They form a plexus of dilated lymph sinuses in the submucous tissue, and then pass toward the upper and lower margins, where they traverse a number of lymphatic glands which lie along the gastric borders of the small and great omenta respectively. Thence they pass to the cœliac glands, which lie beside the aorta above the origin of the superior mesenteric artery, those of the lesser curvature following the course of the coronary vessels until the cardiac orifice is reached, when they turn down behind the pancreas to reach the cœliac glands. Those on the greater curvature run with the right gastro-epiploic vessels, and in part with the splenic vessels, and reach the same lymphatic glands. Thence they pass, together with the vessels which drain the mesenteric glands, to open into the lower end of the thoracic duct.

The nerves of the stomach, derived from the terminal branches of both pneumogastrics and from sympathetic branches from the solar plexus, are very abundant, and not only account for the very severe pain caused by ulceration, but also for the severe collapse produced by injury, though it is a mistake to suppose that manipulation of the pylorus is always attended by the severe shock suggested by the experiments made by Dr. Crile; for in many cases we have freely handled the stomach and pylorus, and operated on them without our patient experiencing more shock than

would be expected after any abdominal operation. When the pylorus is adherent and the parts have to be much dragged on, severe shock is not infrequently seen, but this is due to interference with the large sympathetic nerves and ganglia behind the pylorus.

The relation of the sympathetic nerves with the seventh, eighth and ninth spinal roots accounts for the superficial tenderness of the epigastrium in ulceration, and for the reflected left shoulder-blade pain. This is well shown in pyloric adhesions complicating cholelithiasis, where, though the pain is originally on the right, passing to the right infra-scapular region, as soon as the pylorus becomes involved in the inflammation or tied down by adhesions, the pain passes also to the left subscapular region.

The anterior surface of the stomach is in relation above with the under surface of the left lobe of the liver and the diaphragm, and below with the abdominal parietes opposite the epigastric region. The posterior surface rests upon the transverse meso-colon, behind which are the pancreas and great vessels.

Above, the stomach is connected to the liver by the gastro-hepatic omentum, in the free (right) border of which run the common bile-duct, the portal vein, and the hepatic artery. To the left of the cardiac orifice, between the œsophagus and diaphragm, is a small fold of peritoneum, the gastro-phrenic omentum.

The gastro-splenic omentum lies at the extreme left of the stomach, but is of more importance in the surgery of the spleen than of the stomach.

The great omentum is attached to the whole lower surface of the stomach, from which it passes down over the transverse portion of the colon.

The above description applies to the normal stomach, but there is probably no organ in the body which varies so much in size, position, and relations under pathological circumstances.

It may be so contracted, as in some cases of cancerous or simple stricture of the œsophagus, as to lie quite away from the surface and be tucked under the liver and ribs, forming