PATHOLOGICAL CONSIDERATIONS ON SURGICAL
INTERFERENCE FOR PERFORATIVE ULCER
OF THE STOMACH AND DUODENUM.¹

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ALMOST the sole hope in cases of intraperitoneal perforation of gastric and duodenal ulcers lies in prompt surgical interference. Impending death can only be avoided by early diagnosis and immediate operation. If we act up to our recognition of pathological facts, free and speedy co-operation of physician and surgeon is essential. But successful surgical treatment must be based on an accurate knowledge of the lesion. The actual pathology, it is true, is still shrouded in considerable mystery, but much valuable information is forthcoming as to the general character of these ulcers.

Having recently had exceptional opportunities for the pathological examination of a number of these cases, I propose very briefly to record a few impressions, limiting myself, however, to a consideration of those points which may prove helpful in indicating the extent and possibilities of surgical interference. I shall restrict myself almost entirely to cases in which actual perforation occurred.

FREQUENCY OF PERFORATION.

In order to obtain some idea of the frequency of acute peritonitis consequent on perforation of gastric and duodenal ulcers, as compared with that due to perforation of other parts of the gastro-intestinal tract, and arising in the course of other diseases, I have examined the records of 3,471 *post-mortem* examinations made in the Manchester Royal Infirmary. The result of the analysis may be briefly tabulated thus :

Class of Cases.	No. of General Cases.	No. of Cases of Acute Peritonitis.
Medical Patients ...	2,764	44
Surgical „ ...	707	113
Total... ..	3,471	157

Of these 157 cases of acute peritonitis, the number actually due to perforation of gastric and duodenal ulcers was comparatively small, and I am strongly of opinion that the statistics of hospital cases are liable to give a somewhat erroneous idea as to its frequency. Many anomalous cases of sudden illness with acute abdominal symptoms rapidly terminating fatally, even before the subject can be brought to hospital or receive adequate medical assistance, are undoubtedly due to this condition. In the present series of cases there were 6 in which the acute peritonitis resulted from perforation of a gastric ulcer, and 6 from duodenal ulcer.

Of these 157 cases it is interesting here to note that 9 were due to perforative appendicitis.

SURGICAL GROUPING OF ULCERS.

Although to the pathologist these ulcers usually present somewhat similar characters, wherever they may be situated, still to the surgeon, from the consideration of the possibilities of surgical aid, they may be conveniently divided into three groups: (1) Gastric; (2) pyloric; and (3) duodenal.

GASTRIC ULCER.

Ulcer of the stomach has usually been stated to be most frequently met with on the posterior wall, near the pylorus, and towards the lesser curvature. The position, however, varies considerably; and yet to the surgeon it is the factor which above all others is of the greatest moment. For him there are but three positions: (1) Accessible, where the ulcer may be readily found and easily dealt with; (2) non-accessible, where the ulcer is both out of sight and out of reach; and (3) difficult, where it is more or less get-atable, but pos-

sibly only after much search, and where frequently efforts at closure are rendered arduous and perplexing.

The most accessible position is where the ulcer is situated on the anterior wall and near its greater curvature. The following appears to be a case belonging to this class:—

E. K., aged 24. Patient had been treated for gastric ulcer for some time; was brought to hospital in collapsed condition with distended abdomen. She had vomited and complained of abdominal pain before admission. Death occurred in three hours.

Necropsy.—Perforation on anterior wall of stomach 0.75 cm. in diameter, and situated 10 cm. below œsophageal opening, almost midway between greater and lesser curvature, 3.5 cm. from the former. Serous coat thickened and irregular around the perforation. On turning stomach upwards a round perforation was found on the posterior wall almost exactly opposite the perforation on the anterior wall; it was apparently due to *post-mortem* softening. The perforating ulcer was irregularly triangular, its longest diameter being 1.5 cm. It was funnel-shaped, and at one side the mucous membrane was much undermined. The surrounding tissue was indurated; the whole gastric mucous membrane was thickened as from chronic gastric catarrh. The peritoneal cavity was distended with gas, and contained ochre-coloured fluid having a foul, faecal odour, together with flakes of inflammatory lymph.

Inaccessible positions are those at or close to the œsophagus, and in many instances those near the smaller curvature. The following appears to me to be such a case:—

G. W., aged 32. Patient was admitted to hospital in very collapsed condition, giving history of profuse hæmatemesis. Death occurred in six days, apparently from asthenia.

Necropsy.—Stomach presented chronic ulcer, situated on smaller curvature 1½ inch to the right of œsophageal aperture. Greatest diameter, 4.5 cm.; shortest, 2.5 cm. A part of the ulcer extended downwards on to posterior wall of stomach, a portion also reaching forward on to anterior surface. Edges sharply defined, clean cut, rounded, and slightly undermined. The floor formed by glandular tissue lying immediately behind the smaller curvature and directly above the upper border of the pancreas. Several glands very distinctly seen on the floor of the ulcer, and a number of reddish points indicate the open mouths of eroded vessels. There was no indication of healing or cicatrization, but there was no mechanical obstruction to the passage of the gastric contents. Around the œsophageal opening were a number of small hæmorrhages.

Difficulties must often arise where the perforation is high up on the anterior wall near the lesser curvature, and especially when the stomach is small and contracted, or placed high up under cover of the ribs in a long chest, or hidden under an enlarged liver. Special difficulties necessarily are associated with perforation on the posterior wall. Occasionally in these instances perforation into the lesser peritoneal cavity is said to occur. I have however met with no such cases. Fortunately adhesions are usually formed to the pancreas and neighbouring structures. Such was found in the following case, which I here briefly mention, although in this instance no intraperitoneal perforation occurred.

S. L. B., aged 32. Symptoms of gastric ulcer extended back over ten years. Large chronic round ulcer, 1½ in. in diameter, situated 1½ in. to left of pylorus, mainly on posterior wall, but slightly encroaching on smaller curvature and edge of anterior wall. The edges were smooth, indurated, rounded, and extensively undermined. The floor was formed mainly by the head of the pancreas and peripancreatic tissues.

While position should naturally take the first place in the mind of the surgeon, other factors are not to be forgotten. The size of the ulcer varies much, and the size of the actual perforation gives no correct idea of the extent of the ulcer. Frequently the aperture of perforation is exceedingly small, and even *post-mortem* I have occasionally had some difficulty in quickly finding it. Gaseous injection through the œsophagus would prove of service in such cases. In shape the ulcer is by no means always round. Often it is very irregular, not infrequently it is somewhat triangular. Considerable difficulty may thus be experienced in dealing with an extensive ulcer, especially when situated in a position not readily accessible, or where it is in the near neighbourhood of the pylorus.

As regards number, in my experience these ulcers are usually single, and I know of no case where double perforation occurred at the same time. In one instance I met with a second perforation exactly opposite a perforated ulcer, but careful examination clearly indicated its origin in a localised *post-mortem* softening.

The condition of the surrounding tissues, and the shape and general condition of the stomach, must necessarily have very considerable influence on the results of surgical interference. While the edges of the ulcer are almost invariably rounded, thickened, and elevated, the surrounding tissue is often for some little distance extensively infiltrated. Sometimes the mucous membrane is so much undermined at the edges of the ulcer as to produce a distinct cyst-like cavity. In at least one case I have found the whole mucous membrane consider-

¹ Communication to the sixty-second annual meeting of the British Medical Association, July, 1894.

ably thickened, evidently from a long standing chronic diffuse catarrhal gastritis.

PYLORIC ULCERS.

The importance of the pylorus as the outlet of the stomach makes ulceration at this point of especial importance, for although perforation may be coped with by the surgeon, yet the possibilities and dangers of subsequent stenosis must ever be borne in mind.

The following are the only two cases of perforative pyloric ulcer that have come under my notice:

T. C., aged 29, labourer. On July 1st, during very hot weather, patient partook of some tinned beef. The following morning he was suddenly seized with severe abdominal pain, chiefly situated in the region of the umbilicus, and of a colicky nature. He vomited once. The bowels were not moved. Pain continued, and there was much abdominal tenderness on pressure, but there was no great rigidity or distinct evidence of peritonitis. The condition suggested irritant poisoning. Purgatives were taken, but without effect. Patient rapidly became collapsed, and died about midday on July 3rd.

Necropsy.—A perforated ulcer was found close to the pylorus, on the anterior wall. The aperture of perforation was 0.5 cm. in diameter. The abdominal cavity contained much gas, and many pints of a yellowish fluid, in which were numerous fat globules. The peritoneum was acutely congested. The other organs were fairly healthy, but suggestive of chronic alcoholism.

W. S., aged 36. Patient came under observation with characteristic symptoms of gastric ulcer. Digestive troubles had existed for nearly two years. The day but one after admission to hospital perforation occurred.

Necropsy.—On the anterior wall of the pylorus perforation through typical ulcer. Ulcer was extending into duodenum and also slightly into stomach. Stomach contracted. Peritoneum: acute diffuse septic peritonitis.

DUODENAL ULCERS.

In the *Post-mortem* Reports of the Manchester Royal Infirmary on medical cases examined since the year 1867 I can find only 10 cases of undoubted primary duodenal ulcer. I have, of course, excluded all those associated with burns and those where it appears to have been secondary to other conditions, such, for example, as gall stones. Only 6 of these ended by intraperitoneal perforation, the other 4 dying from hæmorrhage.

These cases suggest so many points of pathological interest and surgical importance that I here venture to append brief abstracts:

F. C., aged 19. Ulcer on posterior surface of duodenum the size of shilling piece, with aperture of perforation the size of a threepenny bit. Acute general peritonitis with much dark grumous fluid in the abdominal cavity.

H. D., a young adult. Just beyond pylorus was situated a triangular-shaped ulcer. Punched out appearance. Edges not at all infiltrated. At base of ulcer small circular aperture into peritoneal cavity. Base of ulcer non-adherent. By its side was a diverticulum, from the duodenum projecting backwards, about one inch broad and a half to three-quarters of an inch deep. No cause apparent for its formation. Acute general peritonitis with liquid fecal matter in abdominal cavity.

J. B., aged 26. Round ulcer three-eighths of inch in diameter and half inch beyond pylorus. Base formed by peritoneum only, in which was small perforation. Acute peritonitis with fecal matter in abdominal cavity.

J. H., elderly male. Circular ulcer on posterior surface immediately beyond pylorus, diameter $\frac{3}{4}$ inch, margins black and indurated. Perforation through base into peritoneal cavity, acute peritonitis.

M. F., aged 58. Ulcer just beyond pylorus on anterior wall, size of threepenny bit. Characteristic punched-out appearance. Liver lying towards posterior wall, and separated by considerable interval from lower ribs. Transverse slit along floor of ulcer, which is formed alone by serous coat. Acute peritonitis. Fæcal material and much inflammatory lymph in abdominal cavity.

The last of these cases of perforative duodenal ulcer is of considerable interest from the interesting clinical history of the manner of onset.

P. M., aged 19. On January 4th he walked from Warrington to Manchester, and on arrival at the latter place suddenly experienced violent pain in the stomach, vomited, and fell down unconscious. Death occurred the following day.

Necropsy.—Immediately beyond the pylorus on the anterior surface was a small round perforation corresponding with the floor of a round ulcer, which presented a characteristic punched-out appearance. The edges were very distinctly indurated. Fæcal matter was seen still oozing through aperture; remainder of duodenum normal; stomach congested; peritoneum, acute diffuse septic peritonitis.

Although the group of cases ending by hæmorrhage consequent on erosion into the vascular structures forming the floor of the ulcer, or due to extension of the ulceration into neighbouring vessels, strictly speaking does not come within the field of our present consideration, yet the measures necessary for the treatment of perforation may possibly, in some modified form, ultimately be found to prove useful in the arrest of fatal hæmorrhage, and hence the brief record of even a few cases may assist in indicating the lines of surgical attack.

C. W., middle-aged. At the junction of the first and second portions of

the duodenum, on the internal aspect of the gut, was a large ulcer of the size of a florin. The floor was formed by the indurated head of the pancreas. In the centre of the floor there appeared a small aneurysmal dilatation of an artery, which had ruptured into the intestine. The edges of the ulcer were thickened and reddened, but the neighbouring part of the bowel was healthy. The intestines contained a quantity of dark tarry material, consisting apparently of disintegrating blood. The stomach was somewhat dilated; the peritoneum was normal.

I. T., aged 33. A circular ulcer, $1\frac{1}{2}$ in. by 1 in., situated in the first part of the duodenum immediately beyond the pylorus and on the posterior wall; base formed by pancreas; stomach dilated and distended with blood and clot, which had apparently come from ulcer.

J. H., aged 46. Ulcer at commencement of duodenum on posterior wall $\frac{3}{4}$ in. by $\frac{3}{4}$ in. and nearly $\frac{3}{4}$ in. in depth; edges rounded, firm, and clean cut. The base presented small blood clot in orifice of large artery passing through head of pancreas; stomach dilated; duodenum filled with fluid blood.

In the above cases death appears to have been due to an acute hæmorrhage. In other instances repeated hæmorrhages may quite as surely lead to the fatal termination, as in the following case, which I recently had the opportunity of examining *post mortem*:

W. S., aged 29. Patient gave history of hæmatemesis, with other signs of gastric ulcer. Lately the vomit had assumed a brown colour, and the stomach had become dilated.

Necropsy.—Immediately beyond pylorus on the anterior wall was a large chronic ulcer, having a diameter of an inch and a half. Edges were rounded, smooth, indurated, and undermined, so that a large cyst-like cavity existed beneath borders of ulcer. Floor of ulcer adherent to gall bladder, being separated only by a thin membranous layer. Stomach much dilated.

It is somewhat interesting to note that all the cases of duodenal ulcers recorded in our hospital pathological reports occurred in males. In seven the exact age was obtained, giving an average of nearly 33 years.

OPENING OF THE MEDICAL SCHOOLS: INTRODUCTORY ADDRESSES.

UNIVERSITY OF CAMBRIDGE.

AN INAUGURAL LECTURE ON PHARMACOLOGY AND THERAPEUTICS.

Delivered on October 24th,

By J. B. BRADBURY, M.D., F.R.C.P.,

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It has been the custom for my two predecessors in this Chair to lecture on *materia medica* and therapeutics, or on pharmacology and therapeutics, and, as attendance on lectures on the physiological actions and therapeutic uses of remedies is required of all candidates for the M.B. degree of this University, I have decided to keep up the custom.

As, however, pharmacology, or the action of medicinal agents on the body generally and upon its various tissues and organs in health and in disease, has latterly developed into a very important department of medical study, and as the electors to this professorship were of opinion that the teaching of this subject should be increasingly encouraged, I trust in time, with the help of an assistant (whom by the favour of the University I have been allowed to appoint) that an active school of pharmacology, similar to the schools of physiology and pathology, will grow up. With the limited means at present at our disposal we cannot expect a very rapid or immediate growth; but our aim will be to encourage students to work at this subject both before and after taking their medical degrees.

Hitherto in very few of our medical schools has any provision been made for pharmacological study and research; whereas in Germany almost every university possesses a pharmacological laboratory of considerable extent, and pharmacology constitutes an important branch of the higher scientific teaching.

It is impossible for anyone to undertake satisfactorily pharmacological investigations who is not already acquainted with the experimental methods required in chemical, physiological, and pathological research, but a most excellent training in these subjects is now provided in our Cambridge laboratories. Indeed, it may be said that pharmacological investigations are, to a certain extent, carried on in these