SURGERY IN BLEEDING PEPTIC ULCERS*

BY

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This paper records a study of 400 patients admitted for haematemesis and melaena. Emergency surgery was undertaken on selected patients but the overall mortality increased when more frequent emergency operations were performed in the latter half of the series.

The proper management of haematemesis and melaena is a constantly recurring problem. Our material consists of 473 patients admitted for haematemesis and melaena between January, 1953, and July, 1958. Four hundred of these (87%) were for proved or suspected peptic ulceration, and the main object of this paper is to discuss the place of surgery in this group. The overall mortality of the ulcer group was 6.25%. Ninety-eight (24.5%) were submitted to emergency surgery. The remaining 73 patients (13%) bled from causes other than ulcer. The Mansfield hospitals serve a population of some 200,000 in a well-defined area. All patients admitted to hospitals and nursing homes for definite haematemesis and melaena are included and classified according to Avery Jones (1956).

ANALYSIS OF RESULTS

In the analysis of results, the ulcer group as a whole is considered first, then all patients in the ulcer series operated on in the acute phase or later. Next comes a summary of other operations done for peptic ulcer over the same period. A more detailed account of the emergency operations (that is within 24 hours of bleeding) in the ulcer group and their results follows. The first 200 and the second 200 of the whole peptic ulcer group are then compared. Finally, there is a short section on the causes of bleeding other than an ulcer, and the emergency operations that were done in this group.

THE ULCER GROUP AS A WHOLE

DIAGNOSIS, MORTALITY, AND EXTENT OF EMERGENCY SURGERY.—Table I shows how the whole ulcer group divided according to the emergency operations, diagnosis, and mortality. There were 400 admissions and 358 patients. Chronic ulcers

TABLE I
DIAGNOSIS, MORTALITY AND EMERGENCY OPERATIONS
IN 400 ADMISSIONS FOR BLEEDING PEPTIC ULCER

Diagnosis	Total	Deaths	Emergency Operations
Duodenal ulcer	159	14 (8.8%)	45
Gastric ulcer	70	7 (10.0%)	37
Acute lesion group	125	3 (4.2%)	13
Unclassified ulcer	27	1 (3.7%)	0
Post-operative ulcer	19	0	3
Totals	400	25 (6.25%)	98

(58%) were diagnosed by radiology or at operation. Duodenal ulcers outnumber gastric ulcers by 159 to 70. The acute lesion group (32%) refers to those patients in whom radiology failed to show an ulcer three weeks or so after admission. The unclassified group (6%) refers to incompletely investigated patients with strong presumptive evidence of peptic ulceration. The post-operative group (4%) followed gastro-enterostomy or partial gastrectomy. The whole series mortality is slightly higher for gastric ulcers (10%) than for duodenal ulcers (8.8%), although the operative mortality was rather higher for duodenal ulcers. The acute lesion group had a mortality of 4.2%. No necropsy was done on the patient who died in the unclassified group. None of the post-operative group died.

AGE, LESIONS, MORTALITY, AND SEX.—The effect of age on the death rate is shown in Table II.

TABLE II
MORTALITY BY AGE IN PEPTIC ULCER GROUP

Age	Number of Cases	Deaths
25	20	0
25-34	32	0
35-44	55	0
45-54	97	3 (3.1%)
55-64	96	2 (2.1%)
65-74	70	12 (17.1%)
75-84	23	7 (30.4%)
85+	7	1 (14.3%)
Totals	400	25 (6.25%)

* Based on papers read at a meeting of the East Midland Surgical Society held in Mansfield.

Thirty-eight per cent of the patients were over 60. The mortality in patients below 60 for the whole series was 1.2%, and above 60, 14.5%. The three deaths in patients below 60 were all in men, two after emergency operations (one with the dangerous combination of bleeding and perforation), and the other the unclassified death in the medical wards. There were 19 deaths (19%) in the 99 chronic ulcer patients over 60, and eight deaths (37%) in the 30 over 75. The proportion of chronic ulcers increases with age and includes a relative increase in gastric ulcers. The mortality in the chronic ulcer group over 60 is 19.2% and in the other groups 4.8%.

There were nearly twice as many men as women in this series (263 : 137). The mortality in men (7.6%) was more than double that in women (3.6%), in spite of slightly higher age and gastric ulcer incidence in women.

RECURRENT BLEEDING.—Just over a third of the patients had recurrent bleeding after admission and the mortality rose from 2.3% in the 266 patients who did not have recurrent bleeding to 14.1% in the 134 who did. Chronic gastric ulcers were most prone to bleed again (56%), then chronic duodenal ulcers (38%), post-operative lesions (27%), and last the acute lesion (18%). The mortality of patients over 60 who bled again after admission was 25% for chronic gastric ulcers and 33% for both chronic duodenal ulcers and the acute lesions. Below 60 there was no mortality except in the chronic duodenal ulcer group, where it was 2.3%.

SEASONAL INCIDENCE.—Three out of five of the 98 emergency operations were done in the winter months from October to March, although the 400 admissions were divided almost equally between winter and summer months. Cates (1959) found an increase in bleeding in the winter months.

DEATHS IN MEDICAL WARDS.—There were 11 deaths in the medical wards. The youngest, a man of 54 admitted moribund with a haemoglobin of 24%, died unclassified. The other 10 patients were aged between 68 and 89 (average 75). Of these, five died at various stages between being put to bed and the starting of a transfusion. An air embolus was found at necropsy in one who had not been transfused. Four others died after transfusion but within 24 hours of admission. In this latter group who never became fit for surgery was a man who died on his third admission for bleeding. His gastric ulcer had previously perforated. Also in this group was a man who had severe cor pulmonale and died three days after admission.

ALL OPERATIONS IN BLEEDING ULCER SERIES

OPERATION BEFORE DISCHARGE FROM HOSPITAL.—Emergency surgery (within 24 hours of bleeding or recurrence of bleeding) was used for 98 patients (24.3% of the admissions) in the ulcer group with mortality of 14.3%. A further small "early elective" group of 12 patients was operated on within a week of bleeding. There were three deaths: a patient of 60 died with cerebral thrombosis, and two others, aged 61 and 70, of pneumonia. Another group of 22 patients was successfully operated upon later and perhaps more wisely before their discharge from hospital. In all nearly a third of the patients admitted with haematemesis and melaena due to suspected or proved peptic ulceration have been operated on before their discharge from hospital.

EMERGENCY OPERATIONS.—This group of 98 patients (Table III) includes 55% of the chronic

TABLE III
NINETY-EIGHT EMERGENCY OPERATIONS

Diagnosis	Emergency Operations	
	No.	Mortality
Duodenal ulcers	45 (28.0%)	8 (18.0%)
Gastric ulcers	37 (55.0%)	4 (11.0%)
Acute ulcers	13 (9.0%)	2 (15.0%)
Post-operative ulcers	3 (19.0%)	0 (0.0%)
Totals	98 (24.5%)	14 (14.3%)

gastric ulcers, 28% of the chronic duodenal ulcers, and 9% of the acute lesion group in the whole series.

Below 70 years of age the mortality for emergency operations was 6.4% but above 70 it was 43% (Table IV). A third of the series were women, and only two died, aged 72 and 84. The highest mortality group was for men with chronic duodenal ulcers, of whom eight out of 36 (22%) died.

In 95 patients a partial gastrectomy of the Polya type was done for most of the duodenal ulcers, and in a few a Billroth I type of partial gastrectomy was done. A Billroth I operation was done for most of the gastric ulcers with an occasional Polya operation and one wedge resection for the remainder of

TABLE IV
AGE AND MORTALITY IN EMERGENCY OPERATION FOR ULCER

Age	Number of Patients	Deaths
49	21	0
50-59	33	2 (6.1%) (1 with perforation)
60-69	23	3 (13.0%)
70-79	19	8 (42.0%)
80-89	2	1 (50.0%)
Totals	98	14 (14.3%)

the gastric ulcers. There were two vagotomies with oversewing of the bleeding stomal ulcer, one done successfully by Mr. M. J. Murphy on a man of 84 who had had a previous gastro-enterostomy. The inside of the stomach remnant was always carefully inspected but gastrotomy was not often performed before gastrectomy.

Three surgeons did 89 of these operations, with 12 deaths, and five were concerned in the remaining nine with two deaths.

Of the 98 patients, 88 had had a haematemesis as well as a melaena, and 93 either continued to bleed or had recurrent bleeding after admission. Many of the elderly patients had the usual serious associated lesions found in the literature. In one patient the large inflamed duodenal ulcer could be felt before operation.

CAUSES OF DEATH.—The patients who died received an average of 5 to 6 pints of blood. Post-operative chest complications and leaking suture lines head the causes of death (Table V) after emergency gastrectomy as they do after the elective operation. The leaking duodenal stump occurred in a patient bleeding fast from a large, inaccessible, penetrating duodenal ulcer. He might have been

TABLE V
CAUSES OF DEATH AFTER EMERGENCY GASTRECTOMY
IN 98 CASES

Post-operative chest complications (1 after burst abdomen)	4
Embolus (1 after burst abdomen)	3
Leaking duodenum	1
Leaking gastro-duodenal anastomosis	1
Pancreatitis	1
Severe wound infection (streptococcal)	1
Miscellaneous	3

saved by transfixion ligature of the bleeding point, with pyloroplasty and possibly vagotomy. The pancreatitis might perhaps have been avoided in the same way, or by leaving the ulcer and risking the rare chance of a secondary haemorrhage. Patients in the miscellaneous group faded away, one with a possible coronary thrombosis. Another patient had the dangerous combination of haematemesis and perforation. One patient had such a bad chest that his operation was deferred on this account until after his third and fatal recurrent bleed.

COMPLICATIONS.—Non-fatal complications include a fourth pulmonary embolus, two more burst abdomens, and two leaking suture lines, a high incidence of these three complications. One patient had a discharge through his wound after a Billroth I partial gastrectomy, eventually healing, but needing a further operation months later for pyloric stenosis. The other had one of the curious delayed duodenal

stump leaks following Polya gastrectomy eight weeks after he left hospital, and is now well.

PATIENTS WITHOUT CHRONIC ULCER AT LAPAROTOMY.—The 13 patients who did not have a chronic ulcer at laparotomy are of particular interest. All except one, a man of 64 with severe recurrent bleeding, had had a typical ulcer history with a previous admission for bleeding. An ulcer was said to have been found in three of the seven patients who had previously had a barium meal.

At operation, six were found to have an acute ulcer, one acute gastritis, and one hypertrophic gastritis. In the remaining five petechiae and acute erosions were recorded, but no histological abnormality was reported in the three examined. All were treated by partial gastrectomy and so far, a year and a half after the end of the series, none have bled again, or had further dyspepsia.

FURTHER BLEEDING AFTER DISCHARGE.—By the end of the series four of the 84 survivors had already been re-admitted with bleeding and one other had a small bleed at home. Three of the five were men who had had Polya gastrectomies for duodenal ulcers, and are well so far. There were two interesting women with duodenal ulcers and also multiple small bowel haemangiomas. One had had a Billroth I gastrectomy and may have bled the second time from the haemangiomas, but the other developed a stomal ulcer after a Polya gastrectomy and later had a vagotomy. These patients are included in Table III. A fourth patient died from a stomal ulcer as a terminal event after admission for another cause: he had had a leiomyosarcoma of the small bowel resected at the time of the emergency gastrectomy for a bleeding duodenal ulcer.

OPERATION BEFORE END OF SERIES.—A further 24 elective operations were done on a subsequent admission, and nine patients treated medically in this series subsequently had an emergency operation from which two died. A third patient treated medically died later, also from bleeding. He was not fit for operation on his later admission. As far as we know, none of those treated medically perforated after discharge from hospital, although one did perforate in hospital and died after emergency gastrectomy. By the end of the series nearly half of all the patients who survived had been operated on, either at the time of bleeding or later, and as time goes on this proportion will increase. Thus four out of five chronic gastric ulcer patients who survived after admission for bleeding have been operated on, compared with two of three chronic duodenal ulcers. In the post-operative group (Table VI) nine of 16 patients had operations. No

TABLE VI
POST-OPERATIVE GROUP (BLEEDING AFTER PREVIOUS GASTRIC OPERATIONS)

Previous Operation	Total Number	Operations			No Operation
		Total	Polya	Vagotomy	
Polya for duodenal ulcer	6 (1)*	2	0	2	4
Gastroenterostomy	6 (1)	4	3	1	2
Billroth for duodenal ulcer	3 (2)	2	1	1	1
Billroth for gastric ulcer	1 (1)	1	1	0	0
Totals	16 (5)	9	5	4	7

*No. of women in brackets.

ulcer was seen on the radiograph after barium meals of the seven patients in this group who were not operated upon and they were all well when the series ended.

PEPTIC ULCER SURGERY 1953-58.—During the time covered by these 400 admissions for bleeding with 98 emergency operations, 241 perforated ulcers were dealt with and 510 elective operations for peptic ulcer were performed. Simple suture of the perforation was carried out in most cases, with a mortality of 6%. The mortality of all the elective procedures was 2.4%. These operations were done by consultants and registrars, and nine out of 10 were partial gastrectomies. Vagotomy was becoming more frequent towards the end of the series.

There were three deaths after emergency operations for bleeding ulcer complicating another disease. This group is excluded by definition from the main series.

COMPARISON OF FIRST AND SECOND PARTS OF SERIES

The first 200 admissions for bleeding peptic ulcers were from January, 1953, to the beginning of February, 1956, and the second 200 followed until July, 1958.

In the first 200 patients there were 34 (17%) emergency operations, with four deaths after operation and five in the medical wards. In the second 200 in the series, there were 64 (32%) emergency operations with 10 deaths after operation and six in the medical wards. The overall increase in the whole series mortality rate was from 4.5% to 8%. The number of patients dying without operation has increased in the second half from five to six and the number operated upon as an emergency has almost doubled, with some increase in the operative mortality.

There was a slight predominance in the number of chronic ulcers in the second series (117 to 112), and in the group over 60 years of age, the number of chronic ulcers was greater in the later series by 56 to 43. Of these patients, 34.5% were over 60 in the first part of the series and 41% were over 60

in the second part. The incidence of recurrent bleeding was also higher in the second series (73 to 61). In the emergency operations there was much the same relative distribution of types of ulcer, including the acute group. The ages were rather higher in the second half of the series.

CAUSE OF BLEEDING OTHER THAN ULCER

Our present concern in these patients (Table VII) is with diagnosis and not with the details of treatment. Seventy-three of the 473 admissions for haematemesis and melaena were due to causes other than suspected or proved peptic ulcer (Pease, 1959). Two patients with blood diseases also had ulcers but probably bled because of the blood diseases.

TABLE VII
CAUSES OF BLEEDING OTHER THAN ULCER
IN 73 ADMISSIONS

	No. of Admissions
Bleeding oesophageal varices	25
Carcinoma of stomach or oesophagus	13
Blood diseases	13
Hiatus hernia	9
Drugs	5
Vascular accidents	3
Uraemia	2
Diverticulitis	1
Duodenal polyp	1
Munchausen syndrome	1
Total	73

EMERGENCY OPERATIONS FOR BLEEDING NOT DUE TO PEPTIC ULCER.—There were six emergency operations in the 64 patients without ulcers admitted on 73 occasions. One carcinoma of the stomach was resected after bleeding and perforation. The other five patients had cirrhotic livers. Two men also had ulcers demonstrated radiologically, and one had perforated previously. At laparotomy in both cases the bleeding was from the varices and not from the ulcers. Another man who had never vomited passed bright red blood by the rectum and died on the table. A woman had a Billroth I partial gastrectomy on her second admission for bleeding. Previously a duodenal ulcer had been suspected by the radiologist, but at operation there was no ulcer and no enlargement

of the liver or spleen. Two years later, after her third bleed, it was realized that she had portal hypertension. She is now well after a portocaval anastomosis. In retrospect, the fifth patient with cirrhosis should not have been operated on.

Oesophagoscopy had often been done in patients with cirrhosis and the presence of varices did not always exclude an ulcer as a cause of the bleeding. It is not always conclusive, but mistakes usually occur in just those cases in which it is omitted. Patients with bleeding oesophageal varices are usually treated at this hospital in the first instance with a Sengstaken bag.

GENERAL MANAGEMENT

MEDICAL RÉGIME AND INDICATIONS FOR TRANSFUSION.—All patients with haematemesis and melaena are admitted in the first instance to the medical firm on duty. A surgeon is informed of all patients over 45 years of age and others with a proved ulcer or recurrent bleeding. For most patients orthodox medical treatment is employed with early feeding, rehydration, and blood transfusion as indicated. Facilities were not available for blood volume studies (Gunz, Gebbie, and Dick, 1954; Tibbs, 1956). Clinical judgment, haemoglobin estimation, and packed cell volumes have been used as the index for transfusion. All patients whose haemoglobin is below 60% are transfused. Careful assessment and continued observation are necessary, particularly in those patients who have bled severely before admission, and those whose blood pressure is low and pulse rate raised at the time of admission. The first pint is usually given in three hours unless the patient is bleeding fast. If the patient's condition is not stable after 3 pints of blood, the surgeon is again consulted. Dunphy (1954) advises surgery if the patient's condition is not stable after 4 pints of blood, and Elliott, Hartle, Marshall, and Zollinger (1958) if not stable after 5 pints of blood.

Stomach aspiration has not been used as a routine except to help in the diagnosis of patients who have only had melaena. Emergency fluoroscopy and endoscopy have not been used, nor has oral adrenaline and stypten (Brandon, 1956).

Most patients recover on this medical régime (75.5% in this whole series). Those who need an elective operation before discharge from hospital (9% of this series) are generally better operated on after full recovery in three weeks' time. Those who do not respond to the medical régime and in whom surgery is indicated are watched carefully, and the decision if and when to operate (24.5% of this series) is made generally in consultation with a consultant anaesthetist.

INDICATIONS FOR EMERGENCY SURGERY.—The logical employment of emergency surgery is for those patients who are likely to bleed to death without it. The criteria of selection have varied in this series within the broad principles first suggested by Avery Jones (1947) and amplified by others. The approach has been more aggressive in the second half of our series. Each patient must be judged on his merits, particularly in the older age groups, when severe bleeding is more serious, and there are often other adverse complicating features. These may be an indication for surgery rather than the reverse (Stewart, Cosgriff, and Gray, 1956; Snyder and Berne, 1957). Patients of middle age and above with chronic ulcers tend to bleed again with a worsening prognosis. In our series the mortality was between 25% for chronic gastric ulcers and 33% for chronic duodenal ulcer patients over 60 with recurrent bleeding. Any patient may bleed to death from an acute ulcer, as did one of our patients, or from gastritis. The incidence of bleeding ulcers is less in women than in men, and the mortality in women less than half that of men in our series.

There is general agreement on early operation for concomitant bleeding and perforation and for most patients with chronic gastric ulcers of whom 56% bled again in this series. In patients with chronic duodenal ulcers, Chinn, Littell, Badger, and Beams (1956) found that 31% bled again after admission compared with 38% in this series, and of those who bled a second time 64% bled a third time. Gray, Olson, and Manrique (1957) give even higher figures, and emphasize the danger of one massive bleed in the elderly. Chinn *et al.* (1956) stress the poor prognosis in men over 50 with multiple acute erosions. Weber, Nash, and Gregg (1957) consider that the administration of 10 pints of blood give a patient a bleeding diathesis.

The decision to operate rests on the history, severity or recurrence of bleeding, and the age of the patient. At present our arbitrary age divisions are at 40 and 55. Thus emergency surgery may be employed at once for a patient over 40 with a known gastric ulcer and a severe bleed, and is certainly employed if there is a recurrence of bleeding. In a patient below 40 years one would normally await a recurrence of bleeding. The patient aged over 55 with a known chronic duodenal ulcer would be operated on at once if the bleeding were severe, or if the bleeding were recurrent in a patient over 40 years. Patients with a good clinical history of chronic peptic ulceration are treated in the same way. The benefits of surgery seem to be at least partly responsible for our mortality of 1.7% in patients under 60, and 7.4% in patients under 75, with chronic ulcers. Those with a short or a typical

history are not operated on unless the bleeding is persistent or recurrent. Operation is undertaken earlier in the older age groups, and in all age groups with more severe bleeding. Occasionally an unusual blood group may influence the decision to operate. Once this decision has been made the patient is made fit for surgery as soon as reasonably possible. We have not used arterial transfusion. When there is doubt in the diagnosis, oesophagoscopy is carried out before laparotomy.

DISCUSSION

The incidence of bleeding varices in Great Britain (5.3% in our series) is generally less than in published series in the U.S.A., where there has been an increasingly aggressive attitude to accurate diagnosis by emergency fluoroscopy and endoscopy (Katz, Friedman, and Selesnick, 1958; Switzer and Nichol, 1958; Warthin, Ross, Baker, and Wissing, 1953; Baker, 1959; Rigler, 1959). The routine use of emergency barium meals would not be practicable in this hospital even if thought desirable. Gastroscopy has not been used in our series. Oesophagoscopy has probably not been used as extensively as it should have been in some doubtful cases.

Some physicians treat patients with bleeding ulcers entirely without surgery. Miller (1954) of Dallas, Texas, has had no deaths in 400 patients treated medically, and Duggan (1956) of Newcastle, New South Wales, has had no patient operated on in the last two years. Much of the controversy about the treatment of the bleeding peptic ulcer is still due to incomplete information. Comparison of series of different ages, types of ulcer, degree of bleeding and so on, can be misleading, and the fate of all patients must be known whether or not they are treated by surgery (Tanner, 1950). Progress after the acute episode must also be considered before a final assessment of mortality.

Most recent authors, however, advocate selective surgery, and it is probably true to say that the whole series mortality of the bleeding peptic ulcer is usually below 10% and an average of 15% have

emergency operations. The operative mortality is generally of the order of 15%, and 15% of patients do not have a chronic ulcer although at least half of these may have an acute ulcer or gastritis. The number of acute lesions found at laparotomy will vary with the number of patients operated upon as an emergency.

From the very considerable literature available only some recent large series in the United Kingdom are compared in Table VIII.

Tanner (1950) has several series with a varying incidence of emergency surgery and varying mortality (7.5% to 12%). He has an exceptionally high proportion of old patients with gastric ulcers. His mortality in the Finsterer phase when 59% were operated upon as an emergency was if anything lower than on more conservative régimes. Our mortality increased from 4.5% to 8% as the use of emergency surgery increased from 17.5% to 32%.

The increasing number of yearly admissions from bleeding peptic ulcer, and their increasing ages have been reported by Fraenkel and Truelove (1955), Avery Jones (1956), and Large (1960). Our second series of patients were older, had more chronic ulcers, and more recurrent bleeding. These factors, together with the larger number who have had definitive surgery, may account for the increased mortality. On the other hand, we may well have been doing more emergency surgery than was necessary. Avery Jones (1956) has emphasized the increase in whole series mortality that may occur in these circumstances. In spite of increasing numbers of older patients with more chronic ulcers, the mortality in Oxford fell from 19% to 5.3% (Fraenkel and Truelove, 1955) and in Reading from 7.4% to 5.9% (Large, 1960), while it remained between 7% and 8% at the Central Middlesex Hospital, London (Avery Jones, 1956).

The ages and mortality rate of our patients fall between the extremes in Table VIII. The series with the highest proportion of elderly patients had the highest mortality, as might be expected.

Chesterfield is a neighbouring town to Mansfield with a similar population, but Gaunt (1960), in a

TABLE VIII
RECENT COMPARABLE SERIES

	% Patients Over 60	% Emergency Operations	% Series Mortality
Fraenkel and Truelove (1955) Oxford	42.0	14.1	5.6
Waterson (1956) Cambridge	45.0	9.0	9.3
Avery Jones (1956) Central Middlesex	40.0	10.0	7.9
Cates (1959) Bristol	33.0	13.5	5.4
Gaunt (1960) Chesterfield	34.5	4.5	4.5
Large (1960) Reading	50.9	19.9	5.9
Present series, Mansfield	38.0	24.5	6.25
1953-56, Mansfield	34.0	17.0	4.5
1956-58, Mansfield	41.0	31.0	8.0

very similar but somewhat younger series, had only 4.5% of his bleeding ulcer patients operated on with a whole series mortality of 4.5%, the same as in the first half of our series, when 17% were operated upon as an emergency.

The number of patients found with a chronic ulcer varies at emergency operation considerably. Spencer and Maloney (1956) reviewed 49 such patients, including 11 of their own. Bruce and Dudley (1959) in their series of some 180 emergency gastrectomies had 31 (17%) patients on whom they carried out a blind gastrectomy. In seven of the 31 there was no abnormality. Large (1960) in 97 emergency operations found 20 acute ulcers, and no abnormality on gastrotomy in another four. In our 98 emergency operations we found 13 patients without a chronic ulcer, six with acute lesions, two with gastritis, and five with no gross abnormality. A definite ulcer was found in all the cases of Fraenkel and Truelove (1955) and Gaunt (1960).

In some of the patients without a chronic ulcer, enlarged nodes or thickening may confirm the diagnosis of an acute ulcer, which may be multiple. Sometimes, however, no ulceration is appreciated until the stomach has been opened before or after resection. Most surgeons prefer a gastric resection or possibly a sleeve resection for acute gastric ulcers. Bohn (1949) and Large (1960) have successfully practised submucosal excision for 23 bleeding acute gastric ulcers since 1946. Avery Jones (1956) suggests that this may be done only in women.

There has been much recent concern about the correct procedure when no ulcer or other abnormality is found, the "*laparotomie blanche*" of the Continental authors (Tanner, 1958; Bruce and Dudley, 1959, 1960, and others). Osborne and Dunphy (1957) have described a most careful routine at laparotomy and insist on a wide gastrotomy, also recommended by Gilchrist and Chunn (1954), Schulenburg, Barnetson, and Jacobs (1956), Spencer and Maloney (1956), Avery Jones (1959). Others inspect the inside of the stomach through a speculum or sigmoidoscope introduced at laparotomy.

Before resection it must be established that bleeding is occurring high in the intestinal tract rather than, for example, from a jejunal haemangioma (Read, 1960). Our patient with the leiomyosarcoma of the small intestine was obviously bleeding from a duodenal ulcer. Many surgeons carry out empiric, blind, or speculative gastrectomy, then inspecting the inside of the stomach remnant carefully. Partial gastrectomy cures most of these patients but not all of them, and in a very few even a total gastrectomy may be needed then or later (Shuttleworth and Hutt, 1958; Castagno and Hardaway, 1958; Palmer, 1959).

We did not encounter the rare eponymous Mallory-Weiss disease or the Zollinger-Ellison or Groenblat-Stranberg syndromes. None of our 13 patients without chronic ulcers bled again, even when followed up from two to seven years. If nothing is done except a laparotomy some two-thirds of the patients will bleed again (Gray, Shands, and Thuringer, 1954; Kirtley, Riddell, and Smith, 1957).

Even after partial gastrectomy a distressingly large number of patients bleed again, five in 84 of the survivors in our series. This was most common in men with a duodenal ulcer, four out of 22 in our series. Donaldson, Handy, and Papper (1958) had similar results, as did Boles, Cassidy, and Jordan (1957) who described the recurrence of bleeding as disappointing and challenging. Mydland, Bartholomew, and Ferris (1956) consider that this bleeding is particularly prone to recur after re-operation for stomal ulceration after gastro-enterostomy. Gilchrist and Chunn (1954) regard patients with acute erosions as particularly likely to bleed again. It has been suggested that vagotomy be added to the partial gastrectomy in these groups. Large (1960) found that most patients who bleed after a partial gastrectomy bleed from acute lesions or gastritis, and not from a true ulcer.

The first stage in the operation for severe bleeding is to stop the bleeding and a simple transfixion ligature has been life saving. Albright and Kerr (1955) and I. S. M. Jones (1960) have advocated a more frequent return to this simple principle. Warthin *et al.* (1953), Smith and Farris (1958), Dorton (1958), and Westland, Movius, and Weinberg (1958) combine this with a vagotomy and pyloroplasty in bleeding duodenal ulcers. This procedure might have saved two of our emergency operation patients. Vagotomy without a direct attack on the ulcer is only used in some of the post-operative group. Partial gastrectomy remains the routine emergency operation for most of our patients.

SUMMARY

Four hundred patients admitted for bleeding peptic ulcer with a mortality of 6.25% are analysed in detail.

Ninety-eight (24.5%) were treated by emergency operations. The 13 patients who did not have a chronic ulcer included six with acute ulcers and two with gastritis.

In the first 200 patients admitted the mortality was 4.5%, 34.5% of patients were over 60, and the emergency operation rate was 17%. In the second 200 the mortality was 8%, 41% of patients were over 60, and the emergency operation rate was 31%.

The indications for surgery, the operations employed, and their complications and results are discussed.

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