Papers and Originals

Haematemesis and Melaena, with Special Reference to Factors Influencing the Outcome

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Summary: In a study of 2,149 emergency admissions because of haematemesis or melaena during a 15-year period, the sex ratio, age distribution, and main diagnostic groups showed no major change. Various factors affected the prognosis, such as the age of the patient, the underlying diagnosis, a low blood pressure on arrival at hospital, gross anaemia on arrival there, and the pattern of bleeding after admission. The fatality rate remained virtually constant throughout the period studied in spite of changes in diagnostic methods and management. There was a changing pattern in the type of operation performed in the treatment of bleeding peptic ulcer. Vagotomy combined with a drainage procedure and with a direct surgical attack on the bleeding point became more widely used at the expense of Polya or Billroth I partial gastrectomy and gave the best results. It is at first paradoxical that improved surgical results should not be reflected in a general improvement in the fatality rate, but this finding can be explained by the smaller proportion of patients treated by emergency surgery in the later years of the period studied. It is concluded that emergency surgery should be performed more frequently and that vagotomy plus drainage is the operation of choice in the peptic ulcer group.

Introduction

Haematemesis and melaena are among the commonest causes of emergency admission to hospital in this country and are responsible for many deaths. It is of interest to assess the extent to which developments in medical knowledge and surgical practice have influenced the outcome of this common and dangerous emergency.

The Radcliffe Infirmary is highly suitable for such an inquiry. It is the only hospital admitting medical and surgical emergencies from the City of Oxford and from a wide surrounding area. The population served is about 300,000 and has not shown major changes in size during the past 20 years. It has been accepted practice in the Radcliffe Infirmary for over a quarter of a century for patients with haematemesis or melaena to be admitted to the medical ward on emergency duty and for a surgeon to be consulted if the question of surgical treatment arises; in many cases a surgeon is consulted even if there appears to be no immediate likelihood of surgery being required.

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Sources of Study

The case-notes of all patients admitted as emergencies with haematemesis or melaena during the 15-year period 1953-67 inclusive were taken as the starting point. Patients whose bleeding episodes appeared to be trivial were excluded. Infants below the age of 2 years were also excluded. Details were extracted from the case-notes and entered on a special form designed for subsequent transfer to I.B.M. 80-column punch cards for mechanical sorting. For most patients all the information we sought to extract was available in the case-notes, but there were some specific items which were not always recorded. These were few in number and were not enough to distort the results. We have excluded them from the Tables, and this fact explains why the totals in the various Tables do not always agree.

In addition to the patients admitted as emergencies there were others who developed haematemesis or melaena while in hospital; they have not been included.

Composition, Assessment and Treatment

There were 2,149 emergency admissions to the Radcliffe Infirmary because of haematemesis or melaena during the 15 years 1953-67 inclusive, a period which divides conveniently into three successive quinquennia. The rate of admission was fairly constant at around 140 per annum. The male:female ratio was 2:1. The relative excess of women in the second quinquennium was not enough to make the distribution of men and women in the three quinquennia differ significantly from a random distribution ($\chi^2 = 3.1$, $n = 2$, $P > 0.05$). There was a high proportion of elderly subjects in all three quinquennia, two-fifths of the men and three-fifths of the women being aged 60 or over. The season of the year had little influence on the rate of admission, though there was a small excess during the winter months. The day of the week had no influence, with one exception—namely, that men were less likely to be admitted on a Sunday than on any other day.

Previous History.—Most (81.4%) of the patients had had symptoms referable to the gastrointestinal tract before the onset of the bleeding episode. One-third had a previous history of haematemesis or melaena. Multiple previous episodes of bleeding were relatively common (11.6%). Even so, only 23.8% of the patients had had a previous relevant diagnosis, and among them duodenal ulcer was predominant.

Previous Medication.—The patients recorded as having taken drugs before the bleeding episode increased greatly in number during the period studied, there being four times as many in the third quinquennium (222) as in the first (53). Among the individual drugs, aspirin occupied a dominant position. Few patients were taking either corticosteroids (14) or

phenylbutazone (13) as the sole drug when they developed the bleeding episode. Sixty-nine, chiefly men, had consumed excessive amounts of alcohol before they bled and the proportion remained steady throughout.

Symptoms and Signs.—By the time the patients reached hospital almost all (98.5%) had had overt haematemesis or melaena. There were roughly equal numbers with haematemesis alone, melaena alone, and haematemesis and melaena combined. Over half the patients were admitted within 24 hours of the onset of symptoms attributable to bleeding and most of the remainder were admitted during the next five days. On admission to hospital about one in nine had a systolic blood pressure of less than 100 mm. Hg, one-third had a pulse rate of more than 100 a minute, and one-quarter had haemoglobin values of less than 8 g./100 ml.

Radiology.—A considerable change in radiological practice occurred during the period studied, with 10 times as many early—that is, within five days of admission—barium meal examinations being performed in the third quinquennium (421) as in the first (40). The total number of patients examined by barium meal increased from 398 in the first quinquennium to 536 in the third. In other words, the main change was in making the barium meal examination largely an emergency procedure.

Endoscopy.—This was rarely used in the early diagnosis of the causes of haematemesis and melaena during the period studied.

Pattern of Bleeding after Admission.—Most patients (78.6%) appear to have suffered from a single episode of bleeding and only 3.5% had repeated episodes of bleeding after admission. A bigger proportion (11.9%) had evidence of continued bleeding after admission without frank episodes. In the remaining 6.0% the pattern of bleeding was uncertain. The pattern of bleeding was closely similar in the two sexes, and this was also true in each quinquennium.

Final Diagnosis.—In 91% of the patients the final diagnosis did not rest simply on clinical judgement or past history, but was based on radiological examinations, on the findings at surgical operation or necropsy, on endoscopy, or, in the case of blood dyscrasias and liver disease, on laboratory investigations. A firm diagnosis based on decisive positive and objective findings could be assigned to 75% of the patients (Table I). Among these, duodenal ulcer as the sole finding was the commonest diagnosis; gastric ulcer as the sole finding was only half as common; while the remainder were made up of patients with single or multiple known diagnoses. Those with duodenal ulcer were more likely than those with gastric ulcer to have had chronic symptoms and to have suffered from previous bleeds. Patients without a final diagnosis based on objective evidence commonly had a history of chronic gastrointestinal symptoms and of previous acute upper gastrointestinal bleeding.

Blood Transfusion.—Most patients (75-80% in all three quinquennia) were treated by blood transfusion, and more than half of these received five or more bottles of blood, each bottle containing 540 ml. of citrated blood. Of the entire series, 13.5% were given large transfusions of more than 10 bottles. Among those brought to emergency surgery 42.2% received large transfusions compared with only 8.2% of those treated by early elective surgery.

Blood Groups.—The ABO blood groups are known for 96.1% of the entire series. When compared with the 11,215 new blood donors of the Oxford area during the period 1953-61, the present series shows a considerable surplus of group O and a corresponding deficit of group A, the difference being highly significant ($P < 0.0001$). There were considerable differences between the men and women in respect of ABO blood groups, which will be the subject of a separate publication.

Surgery.—The proportion of patients treated by emergency surgery declined during the period studied, while the propor-

TABLE I.—Main Diagnostic Groups

Final Diagnosis	First Quinquennium			Second Quinquennium			Third Quinquennium			Whole Period		
	Males	Females	Total	Males	Females	Total	Males	Females	Total	Males	Females	Total
Oesophageal varices ..	14 (2.9)	5 (2.5)	19 (2.8)	7 (1.4)	4 (1.4)	11 (1.4)	6 (1.3)	15 (6.8)	21 (3.1)	27 (1.9)	24 (3.4)	51 (2.4)
Gastric ulcer ..	67 (14.1)	33 (16.7)	100 (14.8)	71 (14.2)	56 (19.5)	127 (16.1)	60 (12.8)	37 (16.9)	97 (14.1)	198 (13.6)	126 (17.9)	324 (15.1)
Gastric carcinoma ..	8 (1.7)	4 (2.0)	12 (1.8)	13 (2.6)	4 (1.4)	17 (2.2)	16 (3.4)	2 (0.9)	18 (2.6)	37 (2.6)	10 (1.4)	47 (2.2)
Duodenal ulcer ..	163 (34.2)	38 (19.2)	201 (29.8)	162 (32.4)	53 (18.5)	215 (27.3)	165 (35.2)	42 (19.2)	207 (30.1)	490 (33.9)	133 (18.9)	623 (29.0)
Stomal ulcer ..	5 (1.1)	0 (0.0)	5 (0.7)	4 (0.8)	0 (0.0)	4 (0.5)	4 (0.9)	0 (0.0)	4 (0.6)	13 (0.9)	0 (0.0)	13 (0.6)
Other known diagnoses ..	92 (19.3)	34 (17.2)	126 (18.7)	124 (24.8)	70 (24.3)	194 (24.6)	135 (28.8)	74 (33.9)	209 (30.4)	351 (24.4)	178 (25.3)	529 (24.6)
No positive diagnosis ..	127 (26.7)	84 (42.4)	211 (31.3)	119 (23.8)	100 (34.8)	219 (27.8)	83 (17.7)	49 (22.4)	132 (19.2)	329 (22.8)	233 (33.1)	562 (26.2)
Total ..	476	198	674	500	287	787	469	219	688	1,445	704	2,149

Percentages are given in parentheses.

TABLE II.—Proportion of Patients Treated by Emergency and Early Elective Surgery

	First Quinquennium			Second Quinquennium			Third Quinquennium			Whole Period		
	Males	Females	Total	Males	Females	Total	Males	Females	Total	Males	Females	Total
No. of patients ..	476	198	674	500	287	787	469	219	688	1,445	704	2,149
Treated by emergency surgery ..	122 25.6	38 19.2	160 23.7	97 19.4	50 17.4	147 18.7	77 16.4	28 12.8	105 15.3	296 20.5	116 16.5	412 19.2
Treated by early elective surgery ..	44 9.2	8 4.0	52 7.7	43 8.6	19 6.6	62 7.9	42 9.0	12 5.5	54 7.8	129 8.9	39 5.5	168 7.8

TABLE III.—Main Types of Surgical Operation Employed

	First Quinquennium		Second Quinquennium		Third Quinquennium		Whole Period			
	No.	%	No.	%	No.	%	Males	Females	No.	%
Operations for oesophageal varices ..	11	5.2	5	2.4	6	3.7	11	11	22	3.7
Simple oversewing of ulcer ..	6	2.8	10	4.8	7	4.4	14	9	23	4.0
Polya partial gastrectomy ..	64	30.2	64	30.6	19	11.9	116	31	147	25.3
Billroth I partial gastrectomy ..	81	38.2	46	22.0	24	15.0	103	48	151	26.0
Vagotomy plus drainage ..	27	12.7	56	26.8	80	50.0	131	32	163	28.1
Other including multiple ..	23	10.8	28	13.4	24	15.0	51	24	75	12.9
Total ..	212	100.0	209	100.0	160	100.0	426	155	581	100.0

tion treated by early elective surgery remained constant (Table II). We defined emergency surgery as any operation carried out to control dangerous haemorrhage and performed within one week of admission. Surgical operations not fulfilling these criteria but performed within three months of admission were classed as early elective. The types of surgical operation most commonly performed changed greatly in the extent to which they were used during the period studied, with vagotomy plus drainage and a direct surgical attack on the bleeding point being increasingly employed, while partial gastrectomy became less used (Table III).

Outcome of Attack

Some of the main features of the outcome of the bleeding episode which brought the patient into hospital are given in Table IV. It will be seen that the fatality rate for the three quinquennia has shown no appreciable change during the period of study, the figures for the two sexes combined being 10.1%, 7.9%, and 9.0% respectively. Considering the sexes separately, the men show a progressive decline in the fatality rate and the women a progressive increase; these two opposing trends counterbalance each other to give the flat fatality rate for the whole series. The table also shows whether the deaths followed surgery or not, and in each case whether or not the immediate cause of death was haemorrhage. One in four of the surgical deaths was due to haemorrhage, so it is evident that surgical intervention was far from universally effective in controlling bleeding.

Of the 291 patients who developed medical complications 127 (43.6%) died, there being no appreciable difference between the risk for men and women. We took as medical complica-

tions such conditions as chest infection, deep venous thrombosis, pulmonary embolism, cerebrovascular accidents, and heart failure. Medical complications occurred more often in patients brought to surgery (25%) than in those not operated on (9.2%). Nevertheless, among the patients who developed medical complications the risk of dying was the same whether they had been treated surgically or not (44.9% and 42.4% respectively).

Among the patients not brought to surgery the results became worse in the third quinquennium (Table V). The fatality rate was much lower than among those treated by surgery, but this is to be expected as severity of bleeding is the main indication for emergency surgery. The small rise in fatality rate among the non-operated patients was sufficient to counterbalance the effects of improved results with surgery because the non-operated group was three times as large as the surgical group.

Outcome in Relation to Some Individual Factors

Age

It is well known that increasing age is associated with an increasing fatality rate from haematemesis, and this relationship is clearly brought out in Table VI. Only the results for the total period are shown, but they were consistent for the three quinquennia. The main risk falls on patients aged 60 and over. Though the trend is the same in the two sexes, elderly women appear to survive haematemesis and melaena better than elderly men. In spite of this, the overall fatality rates for the sexes were similar because this favourable tendency was counterbalanced by the bigger proportion of elderly subjects among the women.

TABLE IV.—Deaths from Haemorrhage and from Other Causes

	First Quinquennium			Second Quinquennium			Third Quinquennium			Whole Period		
	Males	Females	Total	Males	Females	Total	Males	Females	Total	Males	Females	Total
No. of Patients	476	198	674	500	287	787	469	219	688	1,445	704	2,149
Deaths in Surgical Group	36 (7.6)	5 (2.5)	41 (6.1)	23 (4.6)	6 (2.1)	29 (3.7)	12 (2.6)	11 (5.0)	23 (3.3)	71 (4.9)	22 (3.1)	93 (4.3)
Death from Haemorrhage	7	2	9	3	1	4	4	2	6	14	5	19
Death from Other Causes	29	3	32	20	5	25	8	9	17	57	17	74
Deaths in Medical Group	17 (3.5)	10 (5.1)	27 (4.0)	17 (3.4)	16 (5.6)	33 (4.2)	23 (4.9)	16 (7.3)	39 (5.7)	57 (3.9)	42 (6.0)	99 (4.6)
Death from Haemorrhage	9	5	14	7	2	9	8	8	16	24	15	39
Death from Other Causes	8	5	13	10	14	24	15	8	23	33	27	60
Total deaths	53 (11.1)	15 (7.6)	68 (10.1)	40 (8.0)	22 (7.7)	62 (7.9)	35 (7.5)	27 (12.3)	62 (9.0)	128 (8.9)	64 (9.1)	192 (8.9)

Percentages are given in parentheses.

TABLE V.—Deaths in the Medical and Surgical Groups

	First Quinquennium			Second Quinquennium			Third Quinquennium			Whole Period		
	Males	Females	Total	Males	Females	Total	Males	Females	Total	Males	Females	Total
No. in medical group	310	152	462	360	218	578	350	179	529	1,020	549	1,569
No. of deaths	17	10	27	17	16	33	23	16	39	57	42	99
% deaths	5.5	6.6	5.8	4.7	7.3	5.7	6.6	8.9	7.4	5.6	7.7	6.3
No. in surgical group	166	46	212	140	69	209	119	40	159	425	155	580
No. of deaths	36	5	41	23	6	29	12	11	23	71	22	93
% deaths	21.7	10.9	19.3	16.4	8.7	13.9	10.1	27.5	14.5	16.7	14.2	16.0
No. in whole series	476	198	674	500	287	787	469	219	688	1,445	704	2,149
No. of deaths	53	15	68	40	22	62	35	27	62	128	64	192
% deaths	11.1	7.6	10.1	8.0	7.7	7.9	7.5	12.3	9.0	8.9	9.1	8.9

TABLE VI.—Influence of Age on Outcome

Age Group	Male			Female			Total		
	No. of Patients	Died		No. of Patients	Died		No. of Patients	Died	
		No.	%		No.	%		No.	%
<40 years	269	5	1.9	62	4	6.5	331	9	2.7
40-59 "	579	25	4.3	219	13	5.9	798	38	4.8
60-79 "	508	78	15.4	344	37	10.8	852	115	13.5
80+ "	89	20	22.5	79	10	12.7	168	30	17.9

Previous History

Seven out of every 10 of the patients had a history of gastrointestinal symptoms for three months or longer and 7.5% of them died. One in 10 patients had a shorter history, and 10.1% of these died. The remaining 20% had had no previous gastrointestinal symptoms and yet 12.0% died. In other words, patients admitted with no previous gastrointestinal symptoms had the worst prognosis, while those with chronic symptoms had the best. This emphasizes the point that any patient admitted as an emergency with haematemesis or melaena must be regarded as at considerable risk irrespective of the previous history. Indeed, we think it possible that there has been a tendency to regard patients who bleed without previous dyspeptic symptoms as likely to do so well that emergency surgery is often wrongly deferred.

This opinion is reinforced on considering the outcome in relation to the previous diagnosis. The patients with no previous gastrointestinal diagnosis had a fatality rate of 8.8%, which was about the same as that of patients with a previous diagnosis of gastric ulcer (9.3%) and was actually higher than that of patients with a previous diagnosis of duodenal ulcer (6.0%).

It is also interesting that the fatality rate was somewhat higher in patients with no history of a previous bleed (9.0%) than in those with one or more previous bleeding episodes (7.5%). In other words, little attention should be paid to whether it is the patient's first or subsequent bleed when considering how best to manage the current bleeding episode.

Fifty-one patients who had previously been treated by Polya partial gastrectomy, Billroth I partial gastrectomy, or vagotomy combined with a drainage procedure and who were then later admitted with acute upper gastrointestinal haemorrhage had a more favourable outcome (3.9% fatality) than the remainder of the series (9.1% fatality).

Previous Medication

The 295 aspirin takers had a more favourable outcome than the rest of the series, their fatality rate being 5.1% as against 9.6% for the others, a difference which is statistically significant (S.E. of difference = 1.5). So far as the presenting symptoms were concerned, the aspirin takers were closely similar to the remainder in relation to the proportion with haematemesis, with melaena, or with the two combined. They received blood transfusion as often as the remainder (about 75% in each case), but were somewhat less likely to receive transfusions of more than five bottles (37.9% as against 44.4%). They were somewhat more likely to have normal findings on barium meal examination. The aspirin takers were twice as likely to have had no previous gastrointestinal symptoms before the bleeding episode (30.9% as against 16.6%) and, conversely, were less likely to be brought to operation (16.6% as against 28.7%), and if they were, the operative fatality rate was less.

We have already mentioned that only 14 patients of the entire series were on corticosteroid treatment as the sole medication when they developed their bleeding episode. Only one of these patients died, a man of 76 in whom multiple gastric erosions were found at necropsy. Among the other 13, three had definite evidence of gastric ulcer and one had suggestive radiological evidence, one had duodenal ulcer and hiatus hernia, and in the remainder no positive gastroenterological diagnosis was made. Only one patient was brought to operation, a man with gastric ulcer who responded to blood transfusion and was later treated by early elective partial gastrectomy; his postoperative course was uneventful.

Ten of the 13 patients who were taking phenylbutazone were women, which is not surprising in view of the heavy female preponderance in rheumatoid arthritis. Only one was

under the age of 55. None of these patients had a previous gastrointestinal diagnosis. One patient died, a man of 74 with a gastric ulcer who was brought to emergency surgery and treated by oversewing of the ulcer; he died from heart failure. Of the other 12, one had a gastric ulcer, one a duodenal ulcer, and in 10 no positive diagnosis was made.

Presenting Symptoms

The three main types of these symptoms were haematemesis, melaena, or the two combined; roughly equal numbers of patients presented in each of these three main ways. The mode of presentation had a major influence on the outcome of the bleeding episode, for the patients who presented with haematemesis had twice the fatality rate of those who presented with melaena (12.0% as against 5.4%). Those who presented with both haematemesis and melaena were intermediate (9.4%), but closer to those with haematemesis only.

Condition on Admission

Some of the patients were recorded as being in a state of "shock" when they arrived at hospital. We have made no use of this information in our analysis as we consider the clinical judgement of shock to be too subjective for reliance to be placed on it. By contrast, the pulse rate and blood pressure are measurements which are easy to obtain with a reasonable degree of accuracy.

The blood pressure results show a striking relationship between the systolic blood pressure on arrival at hospital and the outcome (Fig. 1). Even a moderate degree of hypotension

FIG. 1.—Fatality rate in relation to three factors on admission to hospital.

carried a fatality rate more than double that experienced by patients with a systolic blood pressure of 100 mm. Hg or more. The few patients arriving at hospital with severe hypotension had a bad prognosis, about a third of them dying. We have analysed the outcome in detail, taking account of age and sex. The results were similar in the two sexes. Patients aged 60 and over had a bad prognosis when the systolic blood pressure was less than 100 mm. Hg. With younger patients the main effect was shown when the systolic pressure was less than 80 mm. Hg; then their prognosis became as bad as that of the older group (32.3% fatality rate as against 31.4%).

By contrast, the pulse rate on admission to hospital offers little useful guide to the prognosis (Fig. 1). There was some increase in the fatality rate when tachycardia was present on admission, but the difference was not a major one, and in the relatively small sample of patients with severe tachycardia there was no progressive rise of fatality rate.

The haemoglobin level on admission to hospital also had some bearing on the outcome (Fig. 1). Patients with a normal

haemoglobin level or only mild depression (12 g./100 ml. or higher) had the most favourable outcome, and increasing degrees of anaemia were associated with increasing fatality rates, so that patients with severe anaemia had nearly double the fatality rate of those without an appreciable degree of anaemia. It is worth noting that the severely anaemic group was quite large, amounting to about a quarter of all those patients in whom haemoglobin levels were estimated on admission. A larger proportion of patients with severe anaemia on admission were women, but their outcome was more favourable than that of men with severe anaemia.

Pattern of Bleeding after Admission

Not surprisingly, the outcome bore a strong relationship to the pattern of bleeding after admission to hospital. Patients with a single episode of bleeding had the best prognosis, those with repeated episodes were next best, and those with continued bleeding after admission had much the worst prognosis (Fig. 2).

FIG. 2.—Fatality rate in relation to pattern of bleeding after admission.
FIG. 3.—Fatality rate in relation to volume of blood transfused. (One bottle = 540 ml. of citrated blood.)

Blood Transfusion

The size of the blood transfusion had a striking relationship to the outcome (Fig. 3). Patients given a transfusion of not more than four bottles had a low fatality rate which was similar to that of those who were not transfused. Patients receiving 5 to 10 bottles of blood had double this fatality rate, but the striking increase in fatality rate occurred in those given massive transfusions of more than 10 bottles.

Detailed examination shows that most of the deaths in patients not transfused or transfused with less than 5 bottles were predominantly medical deaths, whereas among those given larger transfusions most of the deaths were surgical. Large transfusions of citrated blood are apt to give rise to

citrate intoxication with an increased tendency to bleed, though this can be overcome by parenteral administration of calcium. We cannot determine to what extent citrate intoxication contributed to the high fatality rate of patients given massive transfusions.

Diagnosis

The outcome in relation to the diagnosis, taking all three quinquennia together, is shown in Table VII. Bleeding from oesophageal varices was a dangerous condition with 43% fatality rate. Gastric ulcer was much more dangerous than duodenal ulcer and the difference in fatality rates is statistically significant (difference = 3.7%, S.E. of difference = 1.56). When the results are analyzed according to age and sex, however, it transpires that this difference is almost entirely a function of age and is due to the bigger proportion of elderly subjects in the gastric ulcer group (Fig. 4). Bleeding carcinoma of the stomach was associated with a high fatality rate. Bleeding from known erosions was dangerous, but it must be remembered that during the period under review this diagnosis was usually made with certainty only at emergency surgical operation or at necropsy, as gastroscopy was used but little. Stomal ulcers were confined to men; they were a small group but with several deaths. Uncomplicated bleeding disorders were not rare as a cause of admission, but there were no deaths.

Patients with other known diagnoses, including multiple diagnoses, formed a large group (467 patients). Examples of other known diagnoses were hiatus hernia, duodenal diverticulum, and benign tumour. Multiple diagnoses included such combinations as peptic ulcer and hiatus hernia, gastric ulcer combined with duodenal ulcer, and peptic ulcer plus oesophageal varices. It is not surprising that this group had a higher fatality rate than most of the single diagnostic groups, but the patients were such a heterogeneous collection that it has not proved useful to attempt to analyze the results in any detail.

FIG. 4.—Fatality rates in bleeding gastric and duodenal ulcer in various age groups.

TABLE VII.—Outcome in the Main Diagnostic Groups

	Whole Period								
	Males			Females			Total		
	No.	Died		No.	Died		No.	Died	
		No.	%		No.	%		No.	%
Oesophageal varices	27	11	40.7	24	11	45.8	51	22	43.1
Gastric ulcer	198	19	9.6	126	11	8.7	324	30	9.3
Gastric carcinoma	37	11	29.7	10	5	50.0	47	16	34.0
Known erosions	34	7	20.6	28	6	24.0	62	13	21.0
Duodenal ulcer	490	27	5.5	133	8	6.0	623	35	5.6
Stomal ulcer	13	4	30.8	0	0	0.0	13	4	30.8
Other known diagnoses, including multiple	317	46	14.5	150	18	12.0	467	64	13.7
No positive diagnosis	329	3	0.9	233	5	2.1	562	8	1.4
Total	1,445	128	8.9	704	64	9.1	2,149	192	8.9

Finally, there remains another substantial group composed of 562 patients in whom no positive diagnosis could be made. The fatality rate among these patients was low (1.8%). We imagine that many patients in this category suffered from multiple erosions, haemorrhagic gastritis, or acute peptic ulcers and were not brought to surgery, subsequently escaping diagnosis by the methods then in vogue. After the period under review we used gastroscopy to examine patients admitted with haematemesis or melaena when an emergency barium meal examination had proved negative and found lesions such as erosions, gastritis, or gastric ulcer in 25 out of 44 examined (57%).

We have examined the data separately for the three quinquennia. No striking change occurred on moving from the first to the third quinquennium with the various diagnostic groups, with one exception. This concerned bleeding gastric ulcer in men, in whom the fatality rate fell sharply from 22.4% in the first quinquennium to 1.7% in the third (Table VIII). No corresponding change occurred in the women with gastric ulcer. Similarly, the patients with duodenal ulcer showed only random fluctuations of the fatality rate from one quinquennium to the next. We have already seen that deaths among men treated by surgery showed a progressive fall during the period under study and the present data suggest that the improvement was especially applicable to the men with gastric ulcer.

Outcome in Relation to Surgery

The overall risk of surgical operation performed during the admission to hospital because of bleeding was 16% (Table IX), a substantial figure, with little difference between men and women. When the two sexes are considered separately for the three quinquennia, the men show a progressive decline in the surgical fatality rate, while the women show the opposite trend; however, the numbers for the separate quinquennia are not large and these differences in surgical fatality rates may be simply random fluctuations.

Emergency and Early Elective Surgery

The risks of emergency and early elective surgery are compared in Table IX. Emergency surgery carried a considerable fatality rate, there being one death in every five patients so

treated, making it about three times as dangerous as early elective surgery. Among the men treated by emergency surgery there was progressive improvement in the fatality rate, the figures being 27.1%, 17.5%, and 14.3% for the successive quinquennia, a difference which is close to the level conventionally accepted as statistically significant ($\chi^2 = 5.538$, $n = 2$, $0.1 > P > 0.05$). With the women the reverse trend applied, emergency surgery in the last quinquennium being associated with a much higher fatality rate than in both previous quinquennia. If the figures for the first two quinquennia are combined and compared with those of the last, the percentage fatality rates are significantly different (difference = $23.2\% \pm 9.7$).

Recurrence of Bleeding

This occurred in about 8% of the patients treated surgically. It was found that 37% of them died and that in three-quarters of these fatal cases the apparent cause of death was bleeding.

Other Surgical Complications

Apart from recurrent bleeding, surgical complications occurred in 16.6% of the patients treated surgically, and these complications were associated with a high fatality rate of 42.7%. By surgical complications we imply conditions such as leaking anastomoses, general peritonitis, subphrenic abscess, fistula formation, and burst abdomen.

Men and women treated surgically were equally liable to develop these complications of surgery and they shared an equally bad outlook. The complications, however, showed a downward trend during the period under review, the frequency of occurrence of one or more of them being 66.6%, 36.4%, and 27.3% for the three successive quinquennia.

Type of Surgical Operation

How frequently the three most used types of gastric operation were performed in the three quinquennia, and the numbers of deaths which occurred, are shown in Table X. The figures for the total period show that Polya partial gastrectomy was associated with the highest fatality rate (21.1%), Billroth I partial gastrectomy was appreciably better (13.2%), while vagotomy plus a drainage procedure gave the best results

TABLE VIII.—Outcome by Sex in Gastric and Duodenal Ulcer

		First Quinquennium			Second Quinquennium			Third Quinquennium		
		No. of Patients	Died		No. of Patients	Died		No. of Patients	Died	
			No.	%		No.	%		No.	%
Gastric ulcer	Men	67	15	22.4	71	3	4.2	60	1	1.7
	Women	33	5	15.2	56	3	5.4	37	3	8.1
	Total	100	20	20.0	127	6	4.7	97	4	4.1
Duodenal ulcer	Men	163	12	7.4	162	10	6.2	165	5	3.0
	Women	38	1	2.6	53	3	5.7	42	4	9.5
	Total	201	13	6.5	215	13	6.0	207	9	4.3

TABLE IX.—Outcome Following Emergency and Early Elective Operations

Type of Operation		First Quinquennium			Second Quinquennium			Third Quinquennium			Whole Period		
		Males	Females	Total	Males	Females	Total	Males	Females	Total	Males	Females	Total
Emergency	No. Deaths	122	38	160	97	50	147	77	28	105	296	116	412
	% Deaths	33	5	38	17	6	23	11	10	21	61	21	82
	% Deaths	27.1	13.2	23.8	17.5	12.0	15.6	14.3	35.7	20.0	20.1	18.1	19.9
Early elective	No. Deaths	44	8	52	43	19	62	42	12	54	129	39	168
	% Deaths	3	1	4	6	0	6	1	1	2	10	2	12
	% Deaths	6.8	12.5	7.7	14.0	0.0	9.7	2.4	8.2	3.7	7.8	5.1	7.1
Total	No. Deaths	166	46	212	140	69	209	119	40	159	425	155	580
	% Deaths	36	5	41	23	6	29	12	11	23	71	22	93
	% Deaths	21.7	10.9	19.3	16.4	8.7	13.9	10.1	27.5	14.5	16.7	14.2	16.0

(8.0%). This trend applied to both sexes. Vagotomy plus a drainage procedure became increasingly used during the period under study while the popularity of both types of partial gastrectomy declined. Polya partial gastrectomy resulted in a fatality rate of about 20% in all three quinquennia, whereas the other two types of operation gave results which improved after the first quinquennium.

On comparing the patients undergoing these three types of gastric operation it was found that vagotomy plus drainage was used somewhat more often in younger patients than was partial gastrectomy. It was also found that a smaller proportion of the vagotomy plus drainage operations were performed as emergency measures. It is therefore essential to analyze the results for these three procedures in relation to the age of the patient, and whether the operation was an emergency or early elective one, before it is possible to draw valid comparisons.

The percentage fatality rate of the three types of operation when these two factors are taken account of simultaneously is shown in Table XI. It will be seen that there is little to choose between the three operations so far as patients aged under 60 are concerned, but with those aged 60 and over vagotomy plus drainage emerges as the operation giving the best results.

TABLE XI.—Outcome in Two Main Age Groups in Relation to Type of Operation

Age Group	Type of Operation	Emergency			Early Elective		
		No. of Patients	Deaths		No. of Patients	Deaths	
			No.	%		No.	%
< 60 years	Polya	52	3	5.7	13	0	0.0
	Billroth	61	5	8.2	17	0	0.0
	Vagotomy	47	4	8.5	52	2	3.8
60 + years	Polya	69	25	36.2	12	3	25.0
	Billroth	63	14	22.2	10	1	10.0
	Vagotomy	42	5	11.9	22	2	9.1

It is also of importance to consider the results of these three types of surgical operation in relation to the specific lesion causing the bleed. The results obtained in duodenal ulcer, gastric ulcer, and a miscellaneous group are given in Table XII. We must emphasize here that the patients with duodenal ulcer were those who had this lesion and no other; the gastric ulcer patients likewise were confined to those with this single diagnosis. The miscellaneous group actually contained many patients with gastric or duodenal ulcer, but they had additional abnormalities such as hiatus hernia, combined gastric ulcer and duodenal ulcer, a bleeding disorder in addition to the peptic ulcer, and so forth. The results show that vagotomy plus drainage was the most successful operation for duodenal ulcer and for gastric ulcer; while in the miscellaneous group it was equivalent to a Billroth operation and better than a Polya. We have further analyzed these data to take account of age and whether the operation was an emergency or early elective procedure, and vagotomy plus drainage still emerges as the surgical operation yielding the best results (data not shown).

It has often been stated that recurrent bleeding is more likely to occur after vagotomy plus drainage than after a partial gastrectomy. The relevant results obtained in our study are shown in Table XIII. It will be seen that the main factor influencing recurrent bleeding was whether the operation was

done as an emergency or as an early elective procedure; by contrast, the differences between the three types of gastric operation were marginal.

TABLE XII.—Outcome following the Three Main Types of Operation in Three Diagnostic Groups

Type of Operation	Duodenal Ulcer			Gastric Ulcer			Miscellaneous		
	Total	Deaths		Total	Deaths		Total	Deaths	
		No.	%		No.	%		No.	%
Polya	56	8	14.3	27	5	18.5	64	18	28.1
Billroth	12	2	16.7	81	8	9.9	58	10	17.2
Vagotomy + drainage	110	6	5.5	15	0	0.0	38	7	18.4

TABLE XIII.—Recurrent Bleeding after Operation

Type of Operation	Emergency			Early Elective			Total		
	No.	Recurrent Bleeding		No.	Recurrent Bleeding		No.	Recurrent Bleeding	
		No.	%		No.	%		No.	%
Polya	121	11	9.1	25	0	0.0	146	11	7.5
Billroth I	124	7	5.6	27	3	11.1	151	10	6.6
Vagotomy + drainage	89	8	9.0	74	0	0.0	163	8	4.9
Total	334	26	7.8	126	3	2.4	460	29	6.3

Discussion and Conclusions

The salient fact which emerges from the present study is that over a 15-year period the fatality rate among patients admitted as emergencies with haematemesis or melaena remained remarkably steady in the three successive quinquennia. We had assumed that we should find a progressive improvement during this 15-year period and we have analyzed the results in considerable detail in order to find the reasons for the failure of improvement to occur. The number of patients was similar in all three quinquennia, and their composition by age and sex likewise remained essentially similar. Haematemesis and melaena are usually due to one of several main underlying conditions, and it is therefore relevant that the chief diagnostic groups remained virtually identical in size. In other words, there was no obvious change in the type of patient admitted or in the proportions of different diagnoses to obscure an underlying improvement in medical and surgical management.

Blood transfusion is the mainstay of medical treatment, and this was performed in more than three-quarters of the patients, the proportion transfused remaining steady throughout the period studied. The proportion of patients treated by massive transfusions likewise remained steady.

Patients not responding satisfactorily to medical treatment are usually brought to emergency surgery. The surgeon plays the dominant part in the control of dangerous haemorrhage not responding to blood transfusion. During the period studied a big shift occurred in the surgical management of bleeding peptic ulcer, which represents a substantial proportion of the patients with haematemesis or melaena. At the beginning of the period a partial gastrectomy was the usual method of surgical treatment, Polya and Billroth I operations being about equally used, whereas vagotomy plus drainage (combined with

TABLE X.—Main Types of Operation Employed, and Outcome

Type of Operation				First Quinquennium			Second Quinquennium			Third Quinquennium			Whole Period		
				Males	Females	Total	Males	Females	Total	Males	Females	Total	Males	Females	Total
Polya	Total	..	..	58	6	64	45	19	64	13	6	19	116	31	147
	Deaths	..	..	12	1	13	11	2	13	2	3	5	25	6	31
	% Deaths	..	..	20.7	16.7	20.3	25.0	10.5	20.3	15.4	50.0	26.3	21.6	19.4	21.1
Billroth	Total	..	..	57	24	81	27	19	46	19	5	24	103	48	151
	Deaths	..	..	12	2	14	4	1	5	0	1	1	16	4	20
	% Deaths	..	..	21.0	8.3	17.3	14.8	5.3	10.9	0.0	20.0	4.2	15.5	8.3	13.2
Vagotomy plus drainage	Total	..	..	22	5	27	43	13	56	66	14	80	131	32	163
	Deaths	..	..	3	1	4	2	0	2	6	1	7	11	2	13
	% Deaths	..	..	13.6	20.0	14.8	4.7	0.0	3.6	9.1	7.1	8.8	8.4	6.3	8.0

oversewing of the ulcer) was employed in a minority of cases. As time went by vagotomy plus drainage came to be used more and more, and this procedure was performed in 75% of the emergency operations in which one of these three procedures was used.

Vagotomy plus drainage has emerged as more successful than a partial gastrectomy. Among patients aged less than 60 the fatality rate was low and there was no great difference between vagotomy and partial gastrectomy; but among patients aged 60 and over the surgical fatality rate was considerable and the results with vagotomy were decisively better than with either type of partial gastrectomy.

As medical treatment remained essentially unaltered throughout the period studied, and as surgical practice showed a clear advance due to the increasing use of vagotomy plus drainage, it is at first sight paradoxical that no improvement in the overall fatality rate occurred. The explanation appears to be simple. During the period studied a diminishing proportion of patients were treated by emergency surgery. Thus the improved results of surgery were counterbalanced by the failure to perform emergency operations on as many patients in the last quinquennium as in the first.

For the future there appears to be a *prima facie* case for the more frequent use of emergency surgery in the management of haematemesis and melaena. There are a number of clinical features at the time of the patient's admission to hospital which have a bearing on prognosis and could be used as indications for early surgery. To what extent attempts at early precise diagnosis of the underlying cause of the bleeding will influence prognosis must remain problematical. To date, the increasing use of emergency barium meal examinations has had no beneficial effect on the outcome, but this may have been due to a failure to proceed to early surgery in spite of earlier diagnosis of focal lesions. Endoscopy remains to be fully exploited. The main question is whether emergency surgery should be practised as soon as possible after admission in patients shown to have a focal lesion and with some attributes

suggesting the possibility of a poor prognosis if handled along traditional lines. In other words, is it better to operate preventively than to wait for further heavy bleeding to occur?

In this connexion it is highly pertinent that in the present series four out of every five patients who died did so after they had been in hospital more than two days. So far as those dying without surgery are concerned the figure was three out of every four. If bleeding oesophageal varices are excluded, because these are likely to be dangerous however they are treated, four out of every five medical deaths occurred more than two days after admission. Among patients with gastric or duodenal ulcer no fewer than seven out of every eight medical deaths occurred more than two days after admission. It is plain that there was ample time for emergency surgery to be carried out on most of the patients who died without being treated surgically.

While these conclusions are based solely on the experiences of the Radcliffe Infirmary, we consider that many of our findings are applicable to many other hospitals employing traditional methods in the treatment of acute upper gastrointestinal bleeding. The problem is a large and important one. As the Radcliffe Infirmary deals with a population of 300,000, an annual admission rate of 140 patients with haematemesis or melaena implies that there are about 28,000 emergency admissions each year for the whole country. If our fatality rate of 8.9% is taken as representative, this means that there are about 2,500 deaths in hospital each year from this cause. In a large proportion the underlying cause is a benign focal lesion. In view of the great efforts that are being made to reduce the fatality rate in other common and dangerous conditions, such as myocardial infarction, it seems strange that comparatively little attention is paid to improving the methods of managing severe haematemesis and melaena.

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Relationship between Breathlessness and Anxiety in Asthma and Bronchitis: A Comparative Study

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Summary: Two personality testing forms, the Eysenck Personality Inventory Form A and the Cattell Self Analysis Form, were completed on 471 hospital patients who fell within the general diagnostic range of asthma, bronchitis, or both. Respiratory diagnoses were based on the standard M.R.C. questionnaire. All categories of patients showed a tendency towards neuroticism, anxiety, and introversion, and the scores were slightly higher for bronchitics than for asthmatics. Neuroticism and anxiety increased with increasing respiratory disability. Variations in these scores with age of onset of symptoms and length of history were small.

Introduction

Personality testing by means of questionnaires is now an accepted method of psychological investigation. The Eysenck Personality Inventory Form A (Eysenck and Eysenck, 1964) and Cattell's Self Analysis Form (Cattell and Scheier, 1963), the

one English and the other American, have now been completed on many thousands of subjects, principally in psychiatric units and educational establishments. The Eysenck Personality Inventory Form A aims to measure neuroticism and introversion-extraversion, and Cattell's Self Analysis Form total anxiety and its components. Each, as a result of laborious experiment, is now regarded as giving a reasonably accurate assessment of these measurements. So far, they have been little used for general medical purposes, except in small series of patients. The opportunity has been taken of applying them to a large group of hospital patients who fell within the general diagnostic range of asthma and bronchitis. The clinical grading was based on answers to the Medical Research Council (1966) questionnaire on respiratory symptoms, to which some questions specifically relating to asthma were added.

The purpose of the study was to determine whether these personality traits were especially associated with asthma or bronchitis or with some component of either. The question of using other hospital patients as controls was considered, but difficulties were encountered in deciding which patients had similar degrees of disability and whether patients suffering from non-pulmonary diseases could be included. In the event, it was decided that the comparison should be between

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