these subjects had the highest T-4 and T-3 values recorded in the survey. The use of an established index[6] was unhelpful in identifying these patients.

The clinical features of hypothyroidism had been previously recognized in 12% of patients and the diagnosis confirmed, and a further four subjects were found to be clinically hypothyroid when recalled for study. This group had the four highest TSH values and lowest T-4 values in the survey. The T-3 values were also very low in three of these patients, the fourth value lying within the normal range. The use of a clinical index again proved to be of little value.[9]

Altogether 79% of patients were clinically euthyroid at the time of survey and they were found to be clinically and biochemically similar irrespective of time since operation. Of this group 65% had a raised serum TSH. Our study of patients a year or more after subtotal thyroidectomy suggests that the serum TSH may remain consistently raised for many years. It is difficult, however, to be certain that there is no change in thyroid function over the years since patients who develop clinical thyroid failure, and who have the highest TSH values,[10] are progressively removed from this follow-up group for treatment.

The significance of a raised serum TSH in asymptomatic subjects has been the subject of much controversy.[10-13] It has now been established in a large-scale community survey that TSH values over 5 μU/ml are seen in less than 2·5% of the normal population. Now that the normal range of serum TSH concentrations in normal subjects has been defined it may be assumed that any increase in serum TSH concentration reflects downward deviation from the optimum level of circulating thyroid hormones and to some extent gives an indication of the magnitude of that deviation. This contention is supported by our data. The mean serum T-4 in the euthyroid subjects with a normal TSH was very similar to that observed in a normal population. The serum T-4 in the group with a raised serum TSH was significantly lower but still within the normal range. The serum T-3 concentrations were similar in both groups. These findings confirm similar observations in radioiodine-treated patients.[14 15] Hence probably this minor reduction in total thyroid hormone concentration is sufficient to induce a rise in serum TSH but insufficient to produce the clinical features of thyroid failure. The maintenance of the serum T-3 level in patients with mild and subclinical thyroid failure has been reported previously[10 16] and was confirmed in our study. This presumably reflects a compensatory mechanism, probably TSH dependent, whereby smaller amounts of iodine are used to produce a metabolically more potent thyroid hormone. The finding of a normal or mildly raised T-3 in the face of a raised serum TSH shows that T-3 cannot be the sole regulator of pituitary TSH release.

Subtotal thyroidectomy in this series rendered 79% of patients clinically euthyroid. The high prevalence of raised serum TSH levels in euthyroid subjects after thyroid surgery is confirmed and can be accounted for by minor changes in circulating thyroid hormone concentration. The possible long-term significance of a minor reduction in serum T-4 and increase in serum TSH is not certain at present and will require further long-term studies.

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Comparative Study between Endoscopy and Radiology in Acute Upper Gastrointestinal Haemorrhage

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Summary

A total of 158 patients with acute upper gastrointestinal haemorrhage were studied, and the 53 patients on whom emergency endoscopies were performed were compared with the remaining 105. The cause of the bleeding was found in 51 of the endoscopy group and 39 of the control group. Three patients in the endoscopy group and 16 controls died. In the endoscopy group the correct preoperative diagnosis was made in all cases and there was less delay before operation. In the control group five patients had no diagnosis before operation, the preoperative diagnosis was wrong in nine, and five had laparotomies during which no cause of bleeding was found. The patients in the endoscopy group who did not have operations had a shorter stay in hospital than the controls.

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Introduction

Emergency endoscopy of the oesophagus, stomach, and duodenum in patients with acute upper gastrointestinal haemorrhage provides a more precise method of diagnosis than emergency radiology.[1-3] It is not known if this benefits the patient, however, as no comparative series have been published. This paper reports a retrospective comparative study in which morbidity and mortality were assessed.

In the King's College Hospital group patients with haematemesis and melaena were admitted under the duty physician. One group of physicians had a policy of immediate endoscopy, and the others requested endoscopy only if the emergency barium meal findings were negative. Both groups used the same surgeons and surgical criteria throughout the study.

Patients and Methods

Details of all patients with haematemesis or melaena during the last two years were drawn from the diseases index. One hundred and fifty-eight patients with proved upper gastrointestinal haemorrhage were included in the study. The haemorrhage was considered proved if haematemesis or melaena was seen by a member of the medical or nursing staff or if the history was confirmed by anaemia or the need for an intravenous infusion. Patients admitted directly to the liver unit (and not under the duty physician) were excluded since endoscopy was performed on every patient with haematemesis. Patients in whom the haematemesis or melaena was the terminal event in a malignant disease which had been previously diagnosed were also excluded. Otherwise all patients, apart from 14 whose notes were unavailable, were included in the study.

The endoscopy group consisted of 53 patients—18 female and 35 male—with an average age of 57·8 years (range 14-83 years) who were admitted under a consultant with a policy of performing emergency endoscopy. Patients were included in this group even if they were unfit for endoscopy. The other 105 patients—37 female and 68 male, with an average age of 54·5 years (range 16 to 90 years)—were included in the control group (table I).

TABLE I—*Age Distribution in Endoscopy and Control Group*

Age (Years):		0–29	30–39	40–49	50–59	>60	Total
Endoscopy Group	Men	5	2	6	9	14	38
	Women	2	1	0	2	10	15
Controls	Men	10	7	11	16	24	68
	Women	3	2	3	6	23	37

In the endoscopy group all examinations were performed within 48 hours of admission (and usually within 12 hours) in the ward side room or routinely in the theatre endoscopy room. They were all performed by the author using an ACMI 7089 forward-viewing instrument, and in four cases an Olympus JFB side-viewing instrument was used as well. Metaclopramide (10 mg) was administered intramuscularly to all patients half an hour before the examination and those bleeding vigorously also underwent gastric washout with a large-bore Ryle's tube immediately before the examination. A 4% lignocaine spray was used for local pharyngeal anaesthesia. Up to 40 mg diazepam was given slowly intravenously until dysarthria (and almost always amnesia) was induced, followed by atropine 0·6 mg. The dose of diazepam was insufficient to produce appreciable drowsiness or suppress the cough reflex. The patients were examined in the left lateral position. If blood clots obscured the fundus the instrument was withdrawn into the oesophagus and the patient turned on to the right side, and the fundus examined.

The control patients underwent emergency radiological examination, usually within 48 hours of admission. In some endoscopy was also performed subsequently.

There were no statistically significant differences between the two groups with regard to age, sex, previous haemorrhage, or transfusion requirements. Thirteen patients in the endoscopy group and 21 in the control group had melaena alone; the remainder had haematemesis with or without melaena. Eight of the endoscopy group and 11 of the controls had had a previous episode of bleeding. Patients in the endoscopy group received an average of 3·5 pints (2·0 l.) of blood each (39 needed a blood transfusion), while the controls received an average of 2·8 pints (1·6 l.) of blood each (61 needed a transfusion; table II).

TABLE II—*No. of Patients transfused and Amounts of Blood given in Endoscopy and Control Groups*

No. of pints:	0	2	3	4	5	6	>6
Endoscopy Group	14	4	4	10	5	6	10
Controls	44	13	11	13	6	7	11

Results

DIAGNOSIS

The diagnoses made in the two groups are shown in table III. In the endoscopy group a diagnosis was made in 51 patients—all those in whom the examination was successful. In 43 positive evidence of the site of bleeding (blood clot or actual bleeding) was found. One patient with a massive haematemesis inhaled vomit before he could be examined and subsequently he died of bronchopneumonia. The examination was abandoned in an alcoholic patient to save the instrument from damage after he had bitten through the gag, but when he had recovered from delirium tremens there was no abnormality found on endoscopy. In no instance was the endoscopic diagnosis shown to be completely wrong, but in two patients the nature of a gastric ulcer, as diagnosed endoscopically, was mistaken. A gastric ulcer was thought to be benign after endoscopy, laparotomy, and macroscopic examination. A histological examination however, showed infiltration at the base of the ulcer by malignant cells. In another patient a gastric ulcer was thought to be in the antrum, but it was shown at laparotomy to be a greater curve gastric ulcer positioned at an hour glass stricture. Initially radiology failed to show any lesion in this case, but a later barium meal permitted the correct diagnosis to be made. There were no complications due to endoscopy in this series.

TABLE III—*Diagnoses in Endoscopy and Radiology Groups*

Diagnosis	Patients examined Endoscopically	Patients examined Radiologically
Oesophagus:		
Oesophagitis	3	—
Oesophageal ulcer	2	2
Varices	1	1
Mallory-Weiss Syndrome	3	0
Hiatus hernia	0	6
Oesophageal stricture	0	1
Stomach:		
Ulcer	15	18
Malignant ulcer	1	0
Carcinoma	3	3
Possible ulcer	0	5
Possible carcinoma	0	1
Erosions	6	—
Gastritis	2	—
Anastomotic ulcer	2	1
Duodenum:		
Ulcer	12	14
Haemangioma	1	0
Scarred cap	0	13
Possible duodenal tumour	0	1
No diagnosis	0	41
Unfit for examination	1	2
Failed examination	1	0
Total	53	105*

*Four patients had two lesions shown.

Radiological examination provided a possible diagnosis in 62 out of 105 cases. A firm diagnosis of a lesion which was the probable cause of bleeding was made in only 39

cases when simple hiatus hernia, deformed duodenal cap without ulceration, and doubtful lesions were not included. Eight positive diagnoses and nine negative diagnoses were subesquently proved totally incorrect.

OPERATIONS

Twelve patients in the endoscopy group and 24 in the control group had operations during their admissions. Another two in the endoscopy group and three in the control group had elective operations (table IV). In the endoscopy group all patients had a positive diagnosis, which was confirmed on operation though the nature of two ulcers was misdiagnosed as mentioned above. In three patients no ulcer could be found initially at laparotomy. Nevertheless, the endoscopical findings were confined when a duodenal ulcer was found on opening the duodenum in one, and a fundal gastric ulcer was found in each of the other two—one by high gastrostomy and one by partial gastrectomy. The surgeons thought that the lesions probably would not have been found without the information from endoscopy.

TABLE VI—*Data on Operations in Endoscopy Group and Control Group. Results expressed as Numbers of Patients*

	Endoscopy Group	Controls
Median no. of days before operation:	2	5
Early operation	12	24
Elective operation	2	3
No diagnosis before operation	0	5
Diagnosis incorrect at operation	0	9
Laparotomy where no cause of bleeding was found	0	5
Mortality of early operations	2 (14·3%)	7 (25·9%)

In the control group five patients had no diagnosis before operation, and in nine patients the radiological diagnosis was found to be incorrect at laparotomy. Erosive gastritis was found in one patient with radiological evidence of prepyloric ulcer and in one with evidence of a deformed duodenal cap. Three gastric ulcers and a duodenal ulcer were found in patients whose barium meal findings had been normal. No cause of bleeding was found at laparotomy in three patients in whom hiatus heria, deformed duodenal cap, and duodenal tumour were the radiological findings. Altogether five laparotomies were performed where no cause was found for the bleeding. A subsequent endoscopy showed a leiomyoma of the duodenum in one, and a gastric ulcer was found at necropsy in another. In the remaining 17 cases laparotomy confirmed the radiological findings. There was less delay before operation in the endoscopy group—median two days (average 3·1 days)—than in the control group—median five days (average 8·3 days). The difference was significant at the 5% level using the non-parametric test.

MORTALITY

Three patients (5·7%) in the endoscopy group and 16 (15·2%) in the control group died ($\chi^2 = 3{\cdot}1$, significant at the 10%level only). In the endoscopy group the patients who died were aged 67, 71, and 73 (average 70·3 years). One inhaled vomit before endoscopy could be performed and died of bronchopneumonia, the second died of postoperative complications, and the third died of congestive cardiac failure after an operation.

In the control group the average age of the 16 patients who died was 70·6 years (range 55-90). Two patients who had oesophageal ulcers invading the aorta or the subclavian artery died rapidly, and two were medically unfit for operation. One patient died of bleeding oesophageal varices and hepatic coma and another with a duodenal ulcer refused operation. Three other patients died without operation, which was postponed as there was no definite radiological diagnosis. Two of these had necropsies performed and bleeding from a hiatus hernia and a gastric ulcer were found. Both these lesions should have been visible at endoscopy. Seven died after operations—one of congestive cardiac failure, four of postoperative complications, and two of bleeding which had continued after laparotomies where the cause of bleeding was not found. Necropsies were performed on the last two patients. In one a gastric ulcer was found. The other patient had recurrent melaena. Barium meal and enema examination and endoscopy of the oesophagus, stomach, and duodenal cap (performed by another endoscopist) when the patient was not bleeding showed nothing abnormal as did laparotomy. A later endoscopy when the patient was bleeding using a JFB duodenoscope showed a tumour of the second part of the duodenum. He died before operation could be performed. The cause of death found at necropsy was bleeding from a leiomyoma of the duodenum. This case illustrates the importance of endoscopy when the patient is bleeding and of using a side-viewing duodenoscope to examine the second and third parts of the duodenum if no cause of bleeding is found. Another patient with recurrent melaena had normal findings on three barium meal examinations and an endoscopical examination with an end-viewing instrument when she was not bleeding. A later endoscopical examination with a side-viewing duodenoscope when she was bleeding showed a haemangioma of the second part of the duodenum.

STAY IN HOSPITAL AND FOLLOW UP

The average length of stay in hospital (± S.D.) of the patients who survived and who did not have an operation was 11·2 ± 5·5 days in the endoscopy group and 19·6 ± 11·2 days in the control group. The difference was significant at the 1% level using the non-parametric test. The patients were followed up for an average of 5·1 months (range 0-16 months) in the endoscopy group and 3·7 months (range 0-24 months) in the control group. In the former there were two further haematemeses from ulcers previously diagnosed at endoscopy. In the latter group four further haematemeses occurred—three in patients who had had normal barium meal findings and one in a patient who had had a duodenal ulcer diagnosed. Two patients in the control group, in whom no cause was found for the haematemesis, were found to have carcinomas of the stomach within six months of their admission with haematemesis.

Discussion

As in other series[1-3] endoscopy provided a high incidence of positive diagnosis. The only patients in whom a diagnosis was not made were those in whom a complete examination was not possible. The unusually high incidence of positive diagnosis was probably due to endoscopy being performed within 48 hours of admission and to the inclusion of only patients with proved haematemesis. Of the 21 patients in the control group who had endoscopy performed more than 48 hours after admission a diagnosis was only made in 12. Radiology provided a definite diagnosis in only 39 cases. Though some series have reported a high diagnostic accuracy from radiology[4] it has some intrinsic disadvantages. Lesions such as erosions and oesophagitis cannot be diagnosed radiologically and if there are two potential bleeding points it is impossible to tell which is the cause of the bleeding. If radiology is performed before endoscopy it delays the endoscopic examination until barium has left the stomach completely, which is often not for 48 hours, after which the chance of a positive diagnosis is considerably reduced.

Two patients in the control group had carcinoma of the stomach discovered less than six months after a barium meal for haemtemesis had shown nothing abnormal. In the endoscopy group two of the four patients with a carcinoma of the stomach also had barium meals within 48 hours of admission and in neither were the carcinomas diagnosed radiologically. In one it was an early carcinoma which had not invaded the adventitia and therefore it had a good prognosis. Endoscopy would probably have diagnosed the carcinoma in the two control group patients with normal barium meal findings had it been performed at the first admission.

This study aimed to discover whether the increased accuracy and speed of diagnosis provided by emergency endoscopy results in definite benefit to the patient. The two study groups were comparable as regards age, sex, and previous episodes of bleeding. The endoscopy group had slightly more severe haemorrhages in that more patients needed blood transfusions and they each needed more blood. There was a considerable difference in the mortality of the two groups—5·7% in the endoscopy group and 15·2% in the controls. The groups were not large enough for this to be statistically significant, but routine emergency endoscopy would probably reduce the mortality from gastrointestinal haemorrhage.

The surgeons were the same in both groups and the incidence of operations in both was remarkably similar. The delay before operation was significantly shorter in the endoscopy group, however. Presumably this was because an accurate diagnosis was made rapidly, and therefore a decision regarding management could be made more easily. In the control group five patients had no diagnosis before operation, in nine the diagnosis was found to be totally wrong at operation, and five had laparotomies during which no cause of bleeding was found. These three phenomena did not occur at all in the endoscopy group. The operative mortality in the endoscopy group was 14·3% compared with 25·9% in the controls. The hospital stay of those patients who survived and did not require an operation was significantly shorter in the endoscopy group, as the diagnosis could be made with certainty.

CONCLUSIONS

Emergency endoscopy should be performed in patients with acute upper gastrointestinal haemorrhage as soon as practicable and certainly within 48 hours of admission. Radiology is unnecessary in most cases and should not be performed until after endoscopy. Endoscopy provides an accurate diagnosis, probably gives an earlier diagnosis of carcinoma, and probably reduces the mortality. It causes less delay before operation, more correct diagnosis before operation, and fewer laparotomies where no site of bleeding is found. Patients who do not have operations have a shorter stay in hospital if a quick diagnosis is made by endoscopy.

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Outside Medicine

Sir William Petty

ERICH STRAUSS

British Medical Journal, 1975, **1**, 30-32

The life of Sir William Petty was one of unusual range and achievement even in the heroic seventeenth century. He was an authentic product of the English people at a time when it was entering the public stage previously reserved for noble lords and prominent servants of the Crown.

Petty was born in Romsey, Hampshire, on 26 May, 1623, the son of a small clothier. There he acquired as much education as could be found in a sleepy country town and went to sea as a cabin boy on a cross-channel ship. When he broke his leg and was left at Caen to fend for himself, he managed to study for a year at a French Jesuit College. As a sailor he scraped together enough money to study in Holland and France. In Paris he acted as an amanuensis for Thomas Hobbes, with whom he read Vesalius.

Thames Ditton, Surrey
ERICH STRAUSS.

Dr. Petty

Though his intellectual interests were very wide, with a strong mathematical bent, it was during his time abroad that he began to concentrate on medicine, and particularly on anatomy. After his return to England in 1646 he combined medical studies at Brasenose College, Oxford, with earning a living in and around London, mainly through the preparation of anatomical specimens and other laboratory work, for his numerous inventions remained unsuccessful. In March 1650 he at last became Doctor in Physics at Oxford and a few months later a candidate of the London College of Physicians.

Oxford University had been a stronghold of royalism in politics and of scholasticism in philosophy, and the victorious Commonwealth had to replace several recalcitrant opponents with its own supporters. Dr. Petty was first made a Fellow