PAPERS AND SHORT REPORTS

Outcome of endoscopy and barium radiography for acute upper gastrointestinal bleeding: controlled trial in 1037 patients

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Abstract

A study was conducted to find whether the higher diagnostic yield of endoscopy compared with barium radiography improves management or survival in patients with acute upper gastrointestinal bleeding. A total of 1037 patients were entered into a randomised study comparing the outcomes after each investigation. The diagnostic yield in patients who underwent endoscopy was 73% (382 of 526 cases) and in those examined by radiography 55% (280 of 511 cases). A fifth of the patients in the radiology group and a tenth of those in the endoscopy group subsequently underwent the alternative investigation; in most cases, however, no additional diagnostic information was obtained. Operation rates were similar in the two groups, though patients in the endoscopy group were generally operated on sooner. Mortality rates were also similar in the two groups, though post-operative mortality was higher in the endoscopy group.

Endoscopy may be a more accurate means of diagnosis than radiography, but it offers no short-term benefits in management.

Introduction

Most studies comparing fiberoptic endoscopy and barium radiography in patients with acute upper gastrointestinal bleeding show that endoscopy provides a substantially higher diagnostic yield.¹⁻⁴ Nevertheless, there is no evidence that this results in improved management or survival of patients, and the few randomised clinical trials of endoscopy have failed to show any improvement in mortality. In general, however, the number of patients studied has been small,⁵⁻¹² and since the overall mortality rate in acute upper gastrointestinal bleeding is low, possibly a larger study would show a reduction in mortality. We have therefore conducted a large, randomised study of the investigation of patients with acute upper gastrointestinal bleeding by either endoscopy or radiography, and the preliminary results have been reported.⁹ We have now entered over 1000 patients into the study and report here the final results.

Patients and methods

All patients admitted with acute upper gastrointestinal bleeding to the City Hospital, Nottingham, between June 1975 and December 1979 and to the General Hospital, Nottingham, between January 1976 and April 1979 were considered for the study. These two hospitals jointly serve a population of about 700 000. All the patients gave a history of haematemesis or melaena or both precipitating their admission to hospital, and proof of acute upper gastrointestinal bleeding—for example, by nasogastric aspiration of blood—was not required. Suitable patients were allocated to one or other investigation by drawing prearranged randomised cards. Randomisation and investigation were usually done on the morning after admission, though occasionally more urgent investigation was required. In some less urgent cases investigation was delayed for more than 24 hours. Fiberoptic endoscopy was performed by experienced endoscopists, usually with an Olympus oblique-viewing GIF-K endoscope. Occasionally the Olympus GIF-P2 forward-viewing paediatric endoscope or the Olympus JFB-2 side-viewing endoscope was used instead of or as well as the GIF-K. Barium-meal examinations were performed with a double-contrast technique. The patients remained in the care of the physician under whom they were admitted, who with the surgical staff decided when operation was necessary.

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During the study 1373 patients were admitted with acute upper gastrointestinal bleeding, of whom 1037 were allocated at random to investigation by endoscopy or radiography. The remaining 336 were excluded for various reasons. A total of 110 patients did not require investigation, either because the bleeding was trivial or because it was accompanied by other serious disease which precluded active management such as carcinomatosis, leukaemia, severe cardiac failure, or cerebrovascular accident. Twenty-seven patients required operation before investigation could be carried out, and eight died soon after admission and before investigation. In 26 patients endoscopy was thought to be inappropriate because of severe respiratory disease or rheumatoid disease of the cervical spine. In 60 patients radiography was thought to be inappropriate, in 29 because of previous gastric surgery, in 27 because a recent barium-meal examination had shown no abnormality, and in four because of pregnancy. Five patients refused investigation. During a part of the study it was not possible to organise investigation at weekends at one of the hospitals, and during this period 52 patients were excluded. The remaining 48 were excluded because our system of identifying patients in the wards failed, and investigation had been arranged independent of our study.

Results

Of the 1037 patients, 526 were investigated by endoscopy and 511 by radiography; and the sex distribution and ages of the patients in the two groups were similar (table I). Most investigations were done within 24 hours after admission but there tended to be more delay in patients investigated by radiography than in those subjected to endoscopy (table I). The severity of bleeding in the two groups was compared from blood transfusion requirements and lowest haemoglobin concentrations recorded (table II), and no significant differences emerged.

TABLE I—Comparison of patients allocated at random to endoscopy or radiography

	Endoscopy	Radiography
No of patients	526	511
Male to female ratio	341:185	348:163
Mean age $\pm$ SEM (years)	59.2 $\pm$ 0.8	59.7 $\pm$ 0.8
No (%) aged over 60	291 (55.3)	289 (56.5)
No investigated in:		
<24 hours	456	381
24–48 hours	51	82
>48 hours	19	48

TABLE II—Severity of bleeding judged by amount of blood transfused and by lowest haemoglobin concentrations

	Total in group	Units of blood transfused			Lowest haemoglobin concentration (g/dl)		
		Nil	1–5	>5	>10	7.0–9.9	<7.0
No allocated to endoscopy	526	211	204	111	242	179	105
No allocated to radiography	511	210	195	106	223	205	83

The diagnostic yield achieved by endoscopy (382 cases; 73%) was substantially higher than that achieved radiologically (280 cases; 55%), and the pattern of diagnostic subgroups differed appreciably in the two series (table III). The higher diagnostic yield of endoscopy was due partly to the recognition of superficial lesions that are rarely identified radiologically, particularly Mallory-Weiss tears, oesophagitis, gastritis, gastric erosions, and duodenitis. In addition, gastric ulcer was identified far more commonly by endoscopy than by radiology, and conversely duodenal ulcer was identified more commonly radiologically than endoscopically.

We had hoped that the patients would be investigated by only the method to which they had been allocated, but 112 of the 511 patients examined radiologically subsequently underwent endoscopy and 59 of those randomised to endoscopy subsequently underwent radiography. These second investigations were usually done some days after admission, only a quarter of the x-ray examinations and one-fifth of the endoscopies being done within two days of admission. The second investigations were often done to confirm the findings of the

first, and endoscopy was needed for biopsy of gastric ulcers identified radiologically and to confirm duodenal ulcer identified radiologically. In 32 of the 112 patients randomised to radiography who later underwent endoscopy and 13 of the 59 randomised to endoscopy who then underwent radiography additional diagnostic information was acquired; in most cases, however, no new lesions were found.

TABLE III—Findings in two groups of patients

	No allocated to endoscopy (n = 526)	No allocated to radiography (n = 511)
Oesophagus:		
Mallory-Weiss tear	31	2
Varices	10	5
Oesophagitis/ulcer	32	14
Carcinoma	1	0
Stomach:		
Gastritis/erosions	27	1
Ulcer	134	83
Tumour	16	11
Volvulus	0	1
Duodenum:		
Ulcer	122	160
Duodenitis	8	0
Carcinoma of pancreas	1	2
Aortic aneurysm	0	1
Total diagnostic yield	382 (72.7%)	280 (54.8%)
No bleeding site found	144 (27.3%)	231 (45.2%)

The effect of investigation on management was assessed by examining operation rates, mortality, and duration of hospital stay (table IV). The operation rates were virtually identical in the two groups of patients, 76% of operations being done for chronic peptic ulcer in the endoscopy group and 82% in the radiology group. There was only one patient (in the endoscopy group) in whom no bleeding site was identified at laparotomy. Operations tended to be done earlier in the endoscopy group than the radiology group (table V).

Mortality rates in the two groups of patients were similar. We attempted to classify the causes of death (table VI), recognising that it is often not possible to say why a patient died even after necropsy. The deaths from carcinomatosis and other disorders (mainly cardio-respiratory) were thought to be unrelated to the upper gastrointestinal bleeding and therefore could not have been influenced by changes in management of the bleeding. Seventeen patients who had not undergone operation died from uncontrolled gastrointestinal bleeding. Post-

TABLE IV—Effect of investigation on management of patients

	Total in group	Patients having operation	Deaths	Duration of hospital stay (days)	
				≤7	>7
No (%) allocated to endoscopy	526	95 (18.1)	44 (8.4)	298	228
No (%) allocated to radiography	511	93 (18.2)	39 (7.6)	286	225

TABLE V—Timing of operations

	Total in group	Day				Total operated
		0–1	2–3	4–7	≥8	
No allocated to endoscopy	526	31	20	27	17	95
No allocated to radiography	511	20	39	21	13	93

TABLE VI—Causes of deaths

	Total in group	Post-operative complications	Bleeding	Carcinomatosis	Other	Total deaths
No allocated to endoscopy	526	21	8	7	8	44
No allocated to radiography	511	13	9	2	15	39

operative complications were the most common cause of death, most of these being "medical," such as bronchopneumonia and pulmonary emboli. "Surgical" complications probably contributed to mortality in seven patients in the endoscopy group (peritonitis two cases, subphrenic abscess one, leakage from common bile duct one, burst abdomen one, duodenal fistula one, intraperitoneal haemorrhage one) and one in the radiology group (peritonitis). There were no deaths from gastrointestinal bleeding in patients who came to operation.

Of all 1037 patients studied, 83 (8.0%) died; 79 of the 336 excluded patients also died, however, making the overall mortality 11.8%. The high mortality rate in the excluded patients was due largely to disorders unrelated to the upper gastrointestinal bleeding in patients in whom investigation was not required.

The time spent in hospital was not influenced by the type of investigation (table IV).

A total of 115 of the 526 patients in the endoscopy group and 106 of the 511 in the radiology group subsequently underwent operation or came to necropsy or both, and these independent findings were used to compare the accuracy of the two diagnostic techniques. In most cases the results of the investigations were proved correct, endoscopy proving more accurate than radiology (table VII). Duodenal ulcer was missed as often by radiography as by endoscopy but was more often incorrectly identified radiologically. This suggests that the more frequent recognition of duodenal ulcer radiologically overall (table III) might have been due to overdiagnosis. Gastric ulcer, however, was missed more often radiologically than endoscopically, suggesting that endoscopy is indeed more accurate in identifying these lesions.

TABLE VII—Accuracy of investigations as judged by findings at operation or necropsy

	No (%) allocated to endoscopy (n = 526)	No (%) allocated to radiography (n = 511)
No of patients coming to operation or necropsy or both	115	106
Diagnosis correct	103 (90)	86 (81)
Diagnosis incorrect	12 (10)	20 (19)
Missed lesions:		
Duodenal ulcer	5	5
Gastric ulcer	4	7
Mallory-Weiss tear	0	2
Erosions	0	2
Others	2	3
Diagnoses not confirmed:		
Duodenal ulcer	1	4
Gastric ulcer	1	2

Discussion

We have confirmed that investigating acute upper gastrointestinal bleeding by fiberoptic endoscopy provides a higher diagnostic yield than barium radiography, due not only to the recognition of superficial lesions endoscopically but also to the more accurate identification of gastric ulcers. Over 1000 patients were studied but there was no evidence that the increased diagnostic yield of endoscopy improved mortality.

We chose to investigate patients on the morning after admission because such a policy could be reasonably achieved in most hospitals and we aimed to provide data that could be applied to other hospitals. Furthermore, a slight delay in investigation allows time for patients to be fully resuscitated, and we found that few patients required operation while awaiting investigation. More urgent investigation of these patients by endoscopy might, therefore, have influenced decisions on management; however, such a policy would have increased our numbers by only 35 and it is unlikely that the overall result would have been much influenced by this small number. A quarter of the patients admitted with acute upper gastrointestinal bleeding were not entered into the trial, most because investigation was not needed or owing to organisational difficulties, and the exclusion of these patients is unlikely to have influenced the results. Some patients, however, were excluded because endoscopy or radiography was thought to be specifically indicated. As both investigations were available it was difficult to justify random allocation in these patients; and

while their deliberate allocation to one or other diagnostic group might have affected the overall results we think that this is unlikely, as the number of patients was relatively small and their prognosis when examined separately was no different from that in the remainder.

A fifth of the patients allocated to radiography and a tenth of those allocated to endoscopy also underwent the alternative investigation while in hospital. In particular, negative findings on endoscopy or radiology were sometimes followed by the alternative investigation, in most cases with negative results. Most of these second investigations were done long after the acute bleeding had stopped, only 22% being done in the first two days; and additional diagnostic information was obtained in only 45 of these 171 second investigations. This diagnostic information seldom contributed materially to management, and we therefore saw no reason to withdraw them from the overall analysis.

Fiberoptic endoscopy is a safe procedure, though it is associated with a small morbidity and mortality.¹³ In our study no serious complications directly attributable to endoscopy occurred. The severity of bleeding, as judged by lowest haemoglobin concentrations and by blood transfusion requirement, was similar in the two groups, indicating that neither procedure was particularly likely to cause rebleeding. Postoperative mortality was, however, rather higher in patients randomised to endoscopy (21) than in those randomised to radiography (13), due mainly to seven deaths from surgical causes in the endoscopy group compared with only one in the radiology group. Conceivably air insufflation at endoscopy caused technical difficulties at operation, but we have no reason to believe that this occurred, and it is more likely that the variation was a chance finding.

Though no general differences in outcome were found between the two groups, the overall pattern may conceal benefits which accrue to a particular group after a particular method of investigation. Two groups of special interest are those with variceal bleeding, in whom mortality rates are generally high and bleeding is not necessarily variceal, and those with bleeding from gastric or duodenal ulcer, in whom selection for operation is difficult. Variceal bleeding is infrequent in Britain, accounting for fewer than one in 50 episodes in our patients. Coincidental bleeding from other sites is common and fiberoptic endoscopy is much more likely to identify the bleeding site correctly.¹⁴ A similar but smaller study than ours conducted in the United States in a population in whom liver disease is common did not, however, suggest that such benefits were obtained.¹¹

Though the methods of managing upper gastrointestinal bleeding have not changed appreciably for 30 years, the treatment of peptic ulcer has improved. Our study spanned the time of introduction of histamine H₂ antagonists, but no conclusive evidence of benefit from their use has been shown in upper gastrointestinal bleeding. The results in patients with gastric and duodenal ulcer do not suggest any special benefit which might be obtained if, say, endoscopy enabled one to recognise the patient with arterial bleeding and to avert its consequences by operation.

We conclude that though endoscopy provides a more accurate diagnostic method than double-contrast barium-meal radiography, there is no attendant short-term benefit in managing patients.

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Comparison of surgical and medical management of bleeding peptic ulcers

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Abstract

During 1975-80, 908 patients admitted to Nottingham hospitals with gastrointestinal bleeding and found to have gastric or duodenal ulcers were analysed retrospectively for short-term outcome of treatment. Overall one-quarter of all patients underwent operation, but when the years 1975-7 were compared with 1978-80 the operation rate fell from one in three to just over one in five. Death rates were much lower in patients treated medically than in those who underwent operation, and the risks of operation were greater for patients with gastric ulcer. Less conventional operations were attended by greater mortality. Almost all patients who died during medical treatment and three-quarters of those who died after operation were over 65. No differences in age or clear variations in haemoglobin concentrations or transfusion requirements were found between the earlier and later periods.

Reduction in operation rates had no appreciable effect on mortality, despite the accepted view that early operation is advisable.

Introduction

Over half of all patients admitted to British hospitals with haematemesis and melaena are found to have peptic ulcers. Though questionnaires completed by gastroenterologists indicate varied beliefs about the needs and timing of operation for bleeding peptic ulcer, it is generally suggested that the elderly, those with a history of bleeding ulcer or dyspepsia, and those

with recurrent bleeding in hospital, particularly from a gastric ulcer, often need operation.

Vigorous early diagnostic policies and therapeutic measures have become the rule in the past 30 years, and lately fiberoptic endoscopy and specific antiulcer treatment have been widely used, though without clear evidence that they influence outcome. We suggested in a limited comparative study of two hospitals in Nottingham that wide recourse to early operation may not necessarily be helpful.¹ We now present the results of a large survey of outcome in bleeding peptic ulcer in Nottingham during a period when the overall operation rate had fallen appreciably.

Patients and methods

We collected information about the outcome in over 900 patients admitted to Nottingham hospitals with bleeding gastric or duodenal ulcer from 1975 to 1980 by reference to hospital inpatient diagnostic indices and to records held in hospital endoscopy units. The Nottingham City and General hospitals were the only acute admitting hospitals in Nottingham up to 1979, when the General Hospital was replaced by the University Hospital. Patients were admitted to these hospitals according to a daily rota system. Figures for the City Hospital were a consecutive series from late 1975 to the end of 1980. Figures for 1976 to 1978 and for 1980 represent complete series for the General and University hospitals, respectively. In the transfer year (1979) we were unable to document all patients with haematemesis and melaena admitted to the General or University hospital.

A total of 1730 patients entered controlled trials of the management of bleeding; 908 had gastric or duodenal ulcer.

Information on age, severity of bleeding, transfusion requirements, treatment, and outcome was systematically recorded during the admission. We record the short-term outcome by the time of hospital discharge or death in the 908 patients. All patients were admitted under the care of general physicians and referred for a surgical opinion at the discretion of the physicians concerned. Between 1975 and 1979 diagnostic procedures were carried out during a controlled trial comparing radiology with endoscopy, according to a prearranged randomisation schedule, and the results of that study are given in our accompanying paper. Thereafter patients at both hospitals were entered into a further trial, still in progress, comparing the value of two medical treatments—antifibrinolytic with tranexamic acid, and antisecretory with cimetidine.

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