the late 1960s. An assisted ventilation unit was opened in 1967. Since 1974 most patients with severe attacks of asthma in Cardiff have been admitted to a special respiratory unit in keeping with the recommendations of Jones[2] and Cochrane and Clark.[4] This has allowed standardisation of treatment and assessment and has paved the way for the introduction of a service for earlier admission of patients. We recommend that such units be introduced more widely by physicians interested in asthma.

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Prospective comparison of double-contrast barium meal examination and fibreoptic endoscopy in acute upper gastrointestinal haemorrhage

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Summary

Fibre-optic endoscopy was compared prospectively with double-contrast radiology in 53 consecutive patients admitted with acute gastrointestinal haemorrhage. The bleeding site was correctly identified by endoscopy in 94% of patients and the final diagnosis was correctly given in 89%. The corresponding figures with radiology were 83% and 74%. Among the 50 patients with a final diagnosis of a bleeding site in the upper gastrointestinal tract endoscopy indicated the site of bleeding in all and radiology indicated it in 88%. Both investigations were well tolerated by patients. Endoscopy is the investigation of choice, but when it is not available double-contrast radiology will show the site of bleeding in 80-90% of patients.

Introduction

Until the advent of fibre-optic endoscopy the barium meal was the principal tool for investigating patients with acute upper gastrointestinal haemorrhage. A cause for bleeding could be found in 76% of patients using the Hampton technique,[1] and the acute ward barium-meal examination had an accuracy of 83%.[2] Workers using fibre-optic endoscopy have shown, however, that false-positive radiological diagnoses are not uncommon,[3] that multiple lesions are present in 15% of patients, and that 26% of patients with duodenal ulcers bleed from a different source. Lesions were present in 26 out of 34 patients with a negative barium-meal result.[4] The diagnostic accuracy of endoscopy in the early investigation of acute upper gastrointestinal haemorrhage varies from 86% to 97%,[3 5-8] but the accuracy of radiology has fallen since 1952 to 37% to 51%,[3 5 7] although accuracy rose to 59% when possible diagnoses were included[5] and 65% when the emergency films were reviewed.[7]

Many recent studies can be criticised because they have compared endoscopy with a retrospective review of routine radiology reports. A retrospective review of radiology and endoscopy over four years showed a bleeding-site detection rate of 61·5% by radiology and 57% by endoscopy.[9] Another retrospective review of radiology and endoscopy also failed to show a significant difference between the two techniques.[10] Not all hospitals are equipped with fibreoptic endoscopes and in those that are standards must vary. Double-contrast radiography of the stomach is more accurate than the conventional techniques, reducing the error rate from around 22% to 6% when compared with endoscopy,[11] and has been strongly advocated in acute upper gastrointestinal bleeding.[12] We carried out a prospective comparative study of endoscopy and double-contrast barium-meal examination in patients with acute upper gastrointestinal haemorrhage.

Methods

All patients admitted to the medical wards with a diagnosis of haematemesis or melaena underwent both endoscopy and a barium-meal examination, with the order of investigation determined by random allocation. When possible the first investigation was carried out within 24 hours and the second the next day. The endoscopies were performed by one author (GWS) and the double-contrast barium meals by two (RRC and GWS). The second investigation was always performed with full knowledge of the clinical findings and the results of the previous investigation. Endoscopes used were the forward-viewing Olympus GIFP and ACMI F8 and the side-viewing Olympus JFB2 and GFB2. Barium meal examinations were performed using an under-couch tube with a 2·0-mm focal spot, barium sulphate (Baritop), effervescent powder, and an anti-foaming agent. Some patients were given Metoclopramide 30 minutes before the examination, and most had either intravenous glucagon 0·2 mg or hyoscine butylbromide (Buscopan) 20 mg.

Results

Sixty-six patients entered the trial. Two-thirds were examined within 24 hours of admission and the average delay was 1·8 days for the first examination and 3·7 days for the second (range 2 hours to 17 days and 6 hours to 8 days respectively). Fifty-three patients underwent both endoscopy and double-contrast barium meal examination, endoscopy being the first examination in 25 and the second in 28. The

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trial was stopped when the physicians' preference for endoscopic demonstration of the bleeding site became too strong for random allocation to continue.

Withdrawals—Thirteen patients were withdrawn, 11 because they received no barium meal, one because endoscopy had not been performed, and one because neither investigation had been performed. Of the 12 who underwent endoscopy, the diagnosis was made in 11, and in the 12th profuse bleeding seen below the cardia was misinterpreted as being due to a gastric ulcer but at surgery was found to be due to a bleeding gastric varix. One of these patients, a 77-year-old man with a clinical diagnosis of carcinoma, died. Endoscopy was performed 17 days after his initial haemorrhage and showed a large chronic benign gastric ulcer; he died during surgery the next day.

Diagnoses—Gastric ulcer (in 18 of the 66 patients), duodenal ulcer (in 18), and oesophagitis (in 7), were the three commonest causes of bleeding. Table I shows the final diagnosis in the 53 patients completing the trial and shows the lesions missed by endoscopy and radiology.

TABLE I—*Final diagnosis and results*

Final diagnosis	No of patients	Missed by endoscopy	Missed by radiology
Oesophagitis	4		1
Oesophageal ulcer	2	*	*
Oesophageal Mallory-Weiss tear	1		1
Gastric Mallory-Weiss tear	1		1
Oesophageal varices	3		1
Gastric varices			
Gastric ulcer	13		1
Gastric erosions	5		1***
Gastric carcinoma	2	*	*
Duodenal ulcer	18	*	
Duodenal erosions	1		
Blood loss, undiagnosed	1	1	1
No evidence of bleeding	2		
Total	53	4	12

*Bleeding site correctly given, but diagnosis wrong or incomplete.

In two patients a flow pattern[13] was seen next to duodenal ulcers, and within a few hours endoscopy showed active bleeding in both these patients. In addition to those responsible for bleeding 13 further lesions were seen in 11 patients with endoscopy, and 10 additional lesions were seen in seven patients with radiology. Hiatus hernia was not regarded as a diagnosis from this point of view, nor reported as a cause of bleeding. Of the additional lesions diagnosed radiologically, four were not confirmed endoscopically, and one had been thought to be the cause of bleeding.

Clinical accuracy—A lesion responsible for bleeding was diagnosed in 50 of the 53 patients. The clinical diagnosis was correct in 20, incorrect in 23, and not made in seven. A clinical diagnosis of bleeding gastric erosions due to drugs was made on 10 occasions and was correct once. The other causes in these 10 patients were duodenal ulcers (in 4 patients), gastric ulcer (1), oesophageal varices (2), and Mallory-Weiss tears (2).

Accuracy of investigation—In these 50 patients (table II) the lesion was seen endoscopically in 47 and the site of bleeding was determined in the remaining three, though the diagnosis was incomplete or incorrect. Active bleeding or adherent clot was seen in 36 patients. Barium-meal examination showed the site of bleeding in 44 patients (88%) but provided the correct diagnosis as well in only 39 (78%). This difference in accuracy between the two investigations was statistically significant ($P < 0.025$). There was no significant difference in the results achieved by the two radiologists and no significant difference in the results whether endoscopy or radiology was performed first. All 11 radiological failures or partial failures occurred in patients in whom endoscopy showed active bleeding or adherent clot. Endoscopy showed the site of bleeding in 50 (94%) of the 53 patients (two of whom were thought probably not to have bled) and produced the final diagnosis in 47 (89%). Radiology showed the site of bleeding in 44 (83%) and provided the correct diagnosis in 39 (74%).

Surgery and deaths—Surgery was performed on five of the 53 patients. The endoscopic diagnosis was confirmed in all five and there were no negative laparotomies. Five patients died, none of whom were suitable for surgery.

TABLE II—*Comparison of endoscopic and radiological accuracy in 50 patients with final diagnosis of a bleeding site in upper gastroenterological tract*

	Endoscopy		Radiologist A	Radiologist B	Total on radiology	
Final diagnosis given	47 (94%)	100%	19	20	39 (78%)	(88%)
Correct site but wrong or incomplete diagnosis	3		4	1	5	
Wrong			3	3	6	
Total	50		26	24	50	

Discussion

Recently the place of emergency investigation in the management of acute gastrointestinal haemorrhage has been under review. Arteriography has given good results in a few hands,[13 14] but the main interest has centred on fibreoptic endoscopy and barium-meal examinations. In our study clinical diagnosis was accurate in 47% of patients, double-contrast barium-meal examination in 83%, and fibreoptic endoscopy in 94%. Endoscopy is not without its hazards,[15] and one of our patients developed an aspiration pneumonia. Most patients found endoscopy no more unpleasant than a barium-meal examination and it was less tiring for the elderly and immobile.

It is essential to have an adequate range of instruments to provide an endoscopy service. The paediatric forward-viewing endoscope ensures that there are no intubation failures, as all patients can swallow this without discomfort, even when they cannot manage a larger adult instrument. Modern forward-viewing endoscopes are capable of retroversion to examine the upper body of the stomach near the cardia, but high lesser curve ulcers can, nevertheless, be missed with a forward-viewing instrument. We now use both forward- and side-viewing instruments whenever examination with the initial end-viewing endoscope has failed to show adequately the site of bleeding; this happened in 20 of the 53 patients in this series. The area around the cardia has been described as the site of bleeding in more than half the patients admitted with acute upper gastrointestinal bleeding to city hospitals in the United States.[16] Such a high incidence may not be true in Britain, but in our experience if a double-contrast barium-meal picture appears to be normal on initial inspection in a patient who is bleeding then the bleeding site is usually near the cardia. In these patients attention to mucosal detail in the upper body of the stomach and lower oesophagus is often rewarding.

This study confirms that endoscopy is the initial investigation of choice for patients admitted to hospital with acute gastrointestinal haemorrhage, but to gain full advantage from it it should be carried out after resuscitation and within 24 hours of admission. Clinical diagnosis is unreliable. If endoscopy is not available a high degree of diagnostic accuracy may be expected from the double-contrast barium-meal examination.

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