Barium enema or colonoscopy for the investigation of iron deficiency anaemia?

J M Sayer, M T Donnelly, A S McIntyre, J R Barton, M J Grundman, F R Vicary and R G Long

ABSTRACT – **Objective:** To determine whether double contrast barium enema is adequate for excluding carcinoma of the colon in patients with iron deficiency anaemia.

**Design:** Prospective audit.

**Subjects:** One hundred and twenty-three patients with iron deficiency anaemia.

**Intervention:** All patients had upper intestinal (GI) endoscopy, duodenal biopsy and double contrast barium enema. Malignant disease and other GI pathology were treated. Patients with recurrent or persistent anaemia at follow-up were colonoscoped.

**Outcome measure:** Colon cancer missed on barium enema examination but detected on colonoscopic examination.

**Results:** An identified GI lesion contributing to their anaemia and 11 colon cancers were found in 71% of patients, all identified on barium enema. Two pre-cancerous conditions were missed on barium enema examination. Only 45% colonoscopies inspected the caecum.

**Conclusion:** Double contrast barium enema with sigmoidoscopy is probably sufficient for excluding carcinoma of the colon in iron deficiency anaemia.

Carcinoma of the colon is the most important potentially curable cause of iron deficiency anaemia secondary to gastrointestinal (GI) blood loss; 4–16% of patients with iron deficiency anaemia have carcinoma of the colon[2-5]. Most patients with carcinoma of the colon presenting with iron deficiency anaemia have right-sided colonic lesions which present late because the patients have few or no symptoms until the disease is advanced. Sometimes the anaemia has been wrongly attributed to another cause[7-9].

The lower GI tract can be visualised using either double contrast barium enema or colonoscopy. Because of technical problems, it is not always possible to visualise the right colon at colonoscopy, but adequate views of the right colon are important for the investigation of patients with iron deficiency anaemia[1]. Barium enema examination may therefore be preferable to colonoscopy, but this may miss some cases of carcinoma of the colon in the presence of overlapping loops of bowel or if diverticular disease is present, as well as low rectal carcinomata, so sigmoidoscopy should also be performed[10,11].

The study reported here was designed to determine whether barium enema examination, combined with rigid sigmoidoscopy, performed at the outpatient visit is adequate to investigate patients with iron deficiency anaemia to exclude a diagnosis of carcinoma of the colon.

**Method**

All men and postmenopausal women presenting to the gastroenterology outpatient clinics of three hospitals (City Hospital, Nottingham, Chesterfield Royal Hospital and the Whittington Hospital, London) over a two-year period were investigated according to a standard protocol:

- Clinical examination and rigid sigmoidoscopy in the outpatient clinic.
- Confirmation of the anaemia as iron deficient.
- Daycase upper GI endoscopy at which duodenal biopsies were taken to exclude coeliac disease.
- Barium enema examination.

All investigations were performed on routine lists by either a consultant or a specialist registrar.

Patients in whom the initial investigations revealed malignant disease were referred for surgery or palliative treatment, as appropriate. All other patients were treated conventionally and given oral ferrous sulphate 200 mg tds for two months. They were reviewed at one, three and six months, with a repeat measure of haemoglobin and ferritin. If the haemoglobin fell or the ferritin did not return to the normal range, the patient was referred for colonoscopy.

Although, ideally, all patients should undergo both barium enema and colonoscopy, it was felt inappropriate to perform both investigations in patients in whom either malignant disease had already been identified or the anaemia had resolved.

Some patients were tested by their general practitioners (GP) for occult GI blood loss using faecal occult blood tests, but faecal occult blood testing was not included as part of the protocol. It was felt that all patients with iron deficiency anaemia should be investigated, regardless of the results of occult faecal blood tests[1].

J M Sayer MD MRCP, Registrar, City Hospital, Nottingham
M T Donnelly MD MRCP, Registrar, City Hospital, Nottingham
A S McIntyre MD MRCP, Registrar, now Consultant, City Hospital, Nottingham
J R Barton MD FRCP, Registrar, now Consultant, Whittington Hospital, London
M J Grundman FRCP, Consultant, Chesterfield Royal Hospital, Chesterfield
F R Vicary FRCP, Consultant, Whittington Hospital, London
R G Long MD FRCP, Consultant, City Hospital, Nottingham

J R Coll Physicians Lond 1999;33:543-548
Laboratory indices

The presence of anaemia was based on the following limits:

- **Haemoglobin**: less than 11.8 g/dl (women) or 13.5 g/dl (men). These criteria for anaemia are based on data from population studies12.
- **Iron deficiency**: serum ferritin less than 15 μmol/l or serum iron less than 11–30 μmol/l (female) or 14–34 μmol/l (male), with a total iron binding capacity of more than 45–72 μmol/l13–15. Iron deficiency was confirmed by measurement of serum ferritin, serum iron and total iron binding capacity, or by demonstrating a rise in haemoglobin of at least 2 g/dl in response to oral iron therapy for at least three weeks16.

Follow-up

After two years, all patients were followed up through a questionnaire sent to their GP which asked whether the anaemia had recurred and whether any further contributing cause had been identified.

Results

One hundred and twenty-three patients were included in the study (53 men), mean age 60 years (range 15–78 years) for the men and 68 years (range 49–86 years) for the women. The mean haemoglobin at presentation was 8.9 g/dl (range 5.2–12.5 g/dl) (men) and 8.4 g/dl (range 4.6–11.7 g/dl) (women). All patients included in the study had a microcytic anaemia, with an appropriate response to oral iron therapy (rise in haemoglobin of at least 2 g/dl after the first four weeks of treatment). Iron deficiency, confirmed as described above, was found in 70 patients, and 11 other patients had a low serum iron with a high iron binding capacity. Three patients were subsequently found to have anaemia of chronic disease as well as iron deficiency.

Rigid sigmoidoscopy identified one patient with a rectal carcinoma and two with ulcerative colitis. It also excluded rectal polyps in two patients whose barium enema reports suggested the presence of polyps in the rectum.

The results of the barium enemas are shown in Table 1. One patient who could not retain the barium was excluded from the study (0.8% failure rate). There were no complications of the radiological examinations. All the carcinoma of the colon cases were identified on barium enema examination, apart from a low rectal tumour which had already been seen at rigid sigmoidoscopy. No new cases of colon carcinoma were revealed during the six-month follow-up in outpatients or when the GPs were surveyed after an interval of 18 months to two years. Eight of the 12 cases of carcinoma of the colon were on the right side, two in the transverse colon and two were left-sided lesions.

Both cases of colitis had quiescent disease or mild activity and were identified during rigid sigmoidoscopy, although the characteristic changes were subsequently noted on the barium studies. Neither patient had symptoms of active colitis and both settled with mesalazine and oral iron.

Colonoscopy was performed in 31 patients after barium examination, in 20 (66%) of them because of recurrent or refractory anaemia and in the others to remove suspected colonic polyps. The final diagnosis in patients undergoing colonoscopy examination for refractory anaemia are shown in Table 2. Most of the colonoscopies confirmed the barium enema findings of either a normal colon or diverticular disease. However, three patients were found to have new diagnoses at colonoscopy: adenomatous colonic polyp (1), Crohn’s disease (1) and angiodysplasia (1).

Barium enema suggested a polyp in 11 patients; this was confirmed in eight at colonoscopy: adenomatous polyps (5), hyperplastic polyps (2) and inflammatory polyps secondary to ulcerative colitis (1). The three patients in whom no polyp was found were assumed to have had adherent faeces mimicking the appearance of a polyp. One of these patients had angiodysplasia of the colon.

Table 3 shows the extent of the colonoscopic examination in the 20 patients with persistent or refractory anaemia following barium enema and upper GI investigations, as assessed by the colonoscopist. Three of the examinations confined to the left side were planned limited investigations to remove left-sided polyps from patients who had already had a satisfactory radiological examination of the right colon. The other left-sided examinations (16%) represent technical failures.

### Table 1. Abnormalities detected on double contrast barium enema examination in a group of patients with iron deficiency anaemia.

| Diagnosis                        | Patients | %  |
|----------------------------------|----------|----|
| Carcinoma of colon               | 11       | 8.9|
| Colonic polyps/possible polyps   | 11       | 8.9|
| Ulcerative colitis               | 1        | 0.8|
| Crohn’s disease                  | 1        | 0.8|
| Diverticular disease             | 40       | 32.5|

### Table 2. Final diagnoses in patients who underwent colonoscopy for refractory anaemia.

| Diagnosis                                      | No. of patients |
|------------------------------------------------|-----------------|
| Oesophagitis/Barrett’s oesophagus             | 5               |
| Peptic ulceration                             | 4               |
| Colonic adenoma                               | 1*              |
| Angiodysplasia                                | 1*              |
| Crohn’s disease                               | 1*              |
| Non-steroidal anti-inflammatory drugs         | 2               |
| Carcinoma of cervix                           | 1               |
| No cause for anaemia found                    | 5               |

* Diagnosis made at colonoscopy, not apparent from barium studies.
Upper GI investigations with gastroscopy and duodenal biopsy identified a cause for the anaemia in 71 patients. Oesophagitis with or without Barrett’s change was considered an aetiological factor for iron deficiency anaemia, but uncomplicated hiatus hernia was not. Peptic ulceration included gastric and duodenal ulceration and erosions.

Identified causes of iron deficiency

Table 4 shows the identified causes of iron deficiency anaemia in all the patients after completion of the radiological and endoscopic investigations, including the patients with refractory anaemia who underwent colonoscopy. More than one abnormality of their GI tract contributed to the anaemia in 10 patients (Table 5). Twenty-seven patients were on non-steroidal anti-inflammatory drugs (NSAIDs), in addition to having an identifiable cause for the anaemia in their GI tract. In all, 39 patients were on NSAIDs and two were taking warfarin. Five patients were thought to have a low dietary intake of iron, but formal dietary assessment was performed only when dietary deficiency was a suspected feature. In eight patients, the iron deficiency reflected malabsorption secondary to coeliac disease.

Three patients had a haematological cause for the anaemia. One patient had a malignant tumour of his post-nasal space. This was extensive and bleeding and thought to be the main aetiological factor for his anaemia. His GI investigations showed that he also had oesophagitis. Two other patients with negative GI investigations was subsequently found to have carcinoma of the cervix. One patient with angiodysplasia of the stomach and one with oesophagitis were subsequently found to have carcinoma of the lung. No identifiable cause for the iron deficiency anaemia was found in 23 (19.5%) patients.

Follow-up

Twelve patients (9.7%) failed to attend for follow-up at three months and a further 16 (13%) at six months. To ensure that no new diagnoses had been missed among the patients who failed to attend for follow-up, questionnaires were sent to all the patients’ GPs 18–24 months from the start of each patient’s investigations for the anaemia to determine whether the patient was still alive, whether the anaemia had recurred and whether any further cause for the anaemia had been identified.

Ninety seven questionnaires were returned (79%). Six patients had moved to a new area and nine had died:

- five of those who died had malignant disease diagnosed during the investigations performed as part of this study: carcinoma of the stomach (2) and carcinoma of the colon (3)
- two patients died of pneumonia, in both of whom their anaemia was attributed to blood loss from oesophagitis
- one patient died of a cerebrovascular accident, the anaemia having been attributed to NSAID ingestion
- the cause of death in the ninth patient is unknown; this patient’s anaemia was also attributed to NSAID intake.

Table 5. Dual gastrointestinal (GI) pathology found in patients with iron deficiency anaemia investigated with upper GI endoscopy, sigmoidoscopy, barium enema and colonoscopy.

| No. of patients | First diagnosis | Second diagnosis |
|-----------------|-----------------|-----------------|
| 3 | Oesophagitis/Barrett’s oesophagus | Colonic adenoma |
| 1 | Carcinoma of oesophagus | Colonic polyps |
| 1 | Barrett’s oesophagus | Diverticular stricture |
| 1 | Gastric atrophy | Total villus atrophy |
| 1 | Gastric ulcer | Hyperplastic colonic polyps |
| 1 | Gastric antral polyp | Carcinoma of the colon |
| 1 | Duodenitis | Carcinoma of the colon |
| 1 | Duodenitis | Angiodysplasia of the colon |
Five new diagnoses had been reached during the follow-up period, but no new cases of GI malignancy were found:

- three patients were thought to have anaemia of chronic disease associated with other inflammatory conditions: rheumatoid arthritis (2) and temporal arteritis (1)
- two patients had carcinoma of the lung.

Fifteen patients were known to have persistent or recurrent anaemia two years after their investigations. These included the three with anaemia of chronic disease mentioned above, and patients with inflammatory bowel disease (2), coeliac disease (1) and angiodysplasia of the colon (1). In total, 80% of the patients with persistent or recurrent anaemia had at least one identified cause for the anaemia, although only 33% of this group had been investigated with colonoscopy. Of the patients whose anaemia had resolved, 77% had one or more identified causes for their anaemia. Only 22% of these patients had been investigated with colonoscopy.

Discussion

We found an incidence of carcinoma of the colon of 9.8%, coeliac disease of 6.8% and dual pathology of 73%, figures similar to those reported in other studies. Previous studies have found dual pathology in 7–17% of patients presenting with iron deficiency anaemia. It is recommended that all such patients should undergo investigation of both the upper and the lower GI tract.

There is particular concern to identify lesions of the right colon in patients with iron deficiency anaemia. All the barium enema examinations in this study visualised the caecum, and in many the terminal ileum was also seen. A randomised study comparing double contrast barium enema with colonoscopy in patients with rectal bleeding found adequate imaging of the colon by barium enema in 93% compared with 85% for colonoscopy. In comparison, the success rate for total colonoscopy in this group of patients was only 42%, while 16% of the colonoscopies failed to examine the right side of the colon. Other studies have reported failure to reach the caecum in 8–45% of procedures. One alternative for patients in whom the colonoscopist has failed to reach the caecum is to proceed immediately to a single contrast barium enema study while the patient's bowel remains prepared. This can exclude malignancy, although it may miss small mucosal lesions. It is tolerated by elderly patients better than a double contrast barium enema. However, it requires easy access to a radiology department. The combination of flexible sigmoidoscopy with a barium enema has considerable advantages for the patient since most mucosal lesions such as ulcerative colitis have already been excluded by the endoscopic examination.

Although only 30% of the patients were colonoscoped, 79% were followed up at two years by a questionnaire to their GP and no new cases of carcinoma of the colon were found at this time. This does not give a true false negative rate for barium enema examination since 21% of the patients were lost to follow-up, but it compares favourably with that obtained in other studies in which 7–35% of barium enema examinations were wrongly reported as negative. If colon cancer has developed in one of the patients lost to follow-up, this would lead to a comparable rate of false negatives to that in the other studies. The highest rates of false negative examinations are seen in patients with diverticular disease. In our study, 33% had diverticular disease; despite this, cancer of the colon had not been missed in any of the patients for whom two-year follow-up information was available. A questionnaire to the GP was felt to be the best way of following up these patients. The majority were elderly, and it would be distressing to the family to receive a questionnaire if a patient had died. This means, however, that information was not available on the 21% who had no GP, had changed their GP or where the patient had died but the GP had no record of the cause of death. Again, the finding of colon cancer in one or more of the patients in whom two-year follow-up was not available would alter the conclusion of this study.

Colonoscopy can visualise vascular abnormalities such as angiodysplasia, but the relationship of such vascular anomalies to the aetiology of the anaemia is often unclear. Colonoscopy has a therapeutic as well as a diagnostic potential, but the risk of major complications during or following the procedure is much higher than the complication rate for barium enema examination. The risk of perforation during a diagnostic colonoscopy is 0.06–0.17% compared with a risk of 0.004% or less associated with barium enema. In patients over 80 years, Bat et al. had a complication rate of 0.9%, with a perforation rate of 0.002%.

Some patients find colonoscopy preferable because it is performed under sedation, but radiological studies may be less painful for patients with long mesenteries and a floppy colon. Some authors have therefore advocated that elderly patients with iron deficiency anaemia should be investigated with double contrast barium enema rather than colonoscopy, and that only those with suspicious lesions requiring biopsy or with symptoms persisting without a diagnosis should proceed to colonoscopy.

After two years' follow-up, no colon carcinoma had been missed on double contrast barium enema examination, but two adenomatous polyps and one case of Crohn's disease were recognised only at subsequent colonoscopy. These represent precancerous lesions. Four new polyps were found on colonoscopic examination in patients with persistent anaemia; two of these were small and hyperplastic. Other studies have also found difficulty with the detection of polyps, particularly small polyps, on barium enema examination. McIntyre and Long found five new adenomata in their group of 25 patients who proceeded to colonoscopy because barium enema examination had failed to reveal a cause for the anaemia. Folk reviewed all patients with polypoid lesions who had undergone both
barium enema and colonoscopy, and found that both procedures detected approximately 90% of all lesions found. In a group of patients with rectal bleeding, Thoeni and Venbrux found that three of 46 polyps had been missed on barium enema examination, but that colonoscopy missed four polyps and two cancers. Rex et al. also found that colonoscopy detected small polyps more accurately in patients with lower GI bleeding.

It is unlikely that small polyps (<1 cm in diameter) are major contributors to the aetiology of the iron deficiency anaemia and their risk of malignant change is small. The risk of finding colon cancer in the presence of a polyp smaller than 1 cm is less than 1%, and the risk of subsequently developing colon cancer is equivalent to the population risk. In elderly patients, it may be safer to leave such lesions rather than risk colonic perforation during colonoscopic polypectomy.

In this study, all patients had a rigid sigmoidoscopy performed in the GI outpatient clinic at presentation. This procedure provided important clues to the aetiology of the anaemia in five patients (4%), and eliminated possible rectal polyps (as suggested by barium enema examination) in two other patients. Two patients had colitis which was not suspected from the history. Other studies using faecal occult blood testing have also found a significant proportion of patients with unsuspected colitis. All the patients had mild or quiescent disease, with symptoms so mild that they did not report to their doctor. We feel that sigmoidoscopy is an important part of the investigation of patients with iron deficiency anaemia. Flexible sigmoidoscopy may have advantages over rigid sigmoidoscopy, as with screening for colorectal cancer. However, it requires a separate appointment in most hospitals because it is performed in the endoscopy unit rather than the outpatient clinic. This has cost implications.

Iron deficiency anaemia is a common problem in the GI outpatient clinic. Although it is important to investigate patients to exclude serious underlying GI pathology, 20% have no identifiable cause for the anaemia. Long-term follow-up suggests that anaemia does not recur in the majority of these patients. However, it is not possible to identify patients with significant pathology on the basis of clinical history and examination alone.

Sigmoidoscopy and barium enema provide an acceptable alternative to colonoscopy for the examination of patients with iron deficiency anaemia to exclude colon cancer. This represents a safer, cheaper and more rapidly available option for the investigation of elderly patients than colonoscopy. A small proportion of these patients have pre-malignant pathology missed on the barium enema examination. If the anaemia persists or recurs, the patient should be referred for prompt colonoscopy.

Acknowledgements

We are grateful to our radiological colleagues for their help with this study. This study was set up at the request of the British Society of Gastroenterology. No financial support was received, and no conflict of interest occurred. Some of these results were presented in abstract form at the British Society of Gastroenterology meeting in 1994.

References

1. Sayer JM, Long RG. A prospective on iron deficiency anaemia. Gut 1993;34:1297–9.
2. McIntyre AS, Long RG. Prospective survey of investigations in outpatients referred with iron deficiency anaemia. Gut 1993;34:1102–7.
3. Till SH, Grundman MJ. Prevalence of concomitant disease in patients with iron deficiency anaemia. Br Med J 1997;314:206–8.
4. Zuckerman G, Benitez J. A prospective study of bidirectional endoscopy (sigmoidoscopy and upper endoscopy) in the evaluation of patients with occult gastrointestinal bleeding. Am J Gastroenterol 1992;87:62–6.
5. Kepezyk MT, Kadakia SC. Prospective evaluation of gastrointestinal tract in patients with iron-deficiency anaemia. Dig Dis Sci 1995;40:1283–9.
6. Cook IJ, Pavli P, Riley JW, Goulston KJ, Dent OF. Gastrointestinal investigation of iron deficiency anaemia. Br Med J 1986;292:1380–2.
7. Goodman D, Irvin TT. Delay in the diagnosis and prognosis of carcinoma of the right colon. Br J Surg 1993;80:1327–9.
8. O’Reilly D, Long RG. Carcinoma of the colon presenting with dyspepsia. Postgrad Med J 1987;63:215–6.
9. Allison MC, Baxter JN, Russell RI. The potential pitfall of attributing iron deficiency anaemia to ulceration in a Barrett’s oesophagus. Scot Med J 1991;36:182–3.
10. Kerwenter J, Brevingle H, Engarás B, Haglin E. The yield of flexible sigmoidoscopy and double-contrast barium enema in the diagnosis of neoplasms in the large bowel in patients with a positive haemoccult test. Endoscopy 1995;27:159–63.
11. Brewer NT, Grieve DC, Saunders JH. Double-contrast barium enema and flexible sigmoidoscopy for routine colonic investigation. Br J Surg 1994;81:445–7.
12. Garby L. Iron deficiency: definition and prevalence. Clin Haematol 1973;2:245–55.
13. Dallman PR, Yip R, Johnson C. Prevalence and causes of anaemia in the United States 1976 to 1980. Am J Clin Nutr 1984;39:437–45.
14. Cook JD, Skikine BS. Iron deficiency: definition and diagnosis. J Intern Med 1989;226:349–55.
15. Cook JD. Clinical evaluation of iron deficiency. Semin Hematol 1982;19:6–18.
16. Frewin R, Henson A, Provan D. ABC of clinical haematology. Iron deficiency anaemia. Br Med J 1997;314:360–3.
17. Rockey DC, Cello JP. Evaluation of the gastrointestinal tract in patients with iron deficiency anaemia. N Engl J Med 1993;329:1691–5.
18. Rex DK, Weddle RA, Lehman GA, Pound DC, et al. Flexible sigmoidoscopy plus air contrast barium enema versus colonoscopy for suspected lower gastrointestinal bleeding. Gastroenterology 1990;98:855–61.
19. Aldridge MA, Sim AJW. Colonic findings in symptomatic patients without X-ray evidence of colonic neoplasms. Lancet 1986;i:833–4.
20. Bat I, Pines A, Shemesh E, Levo Y, et al. Colonic polyps in patients aged 80 years or older and its contribution to the evaluation of rectal bleeding. Postgrad Med J 1992;68:355–8.
21. Boardman P, Nolan DJ. Computed tomography of the colon in elderly people. Br Med J 1994;308:1639 (letter).
22. Boulos PB, Karamanos DG, Salmon PR, Clark CG. Is colonoscopy necessary in diverticular disease? Lancet 1984;1495–6.
23. Durdleley P, Weston PMT, Williams NS. Colonoscopy or barium enema as initial investigation of colonic disease. Lancet 1987;i:549–51.
24. Lindsay DS, Freeman JG, Cohden I, Record CO. Should colonoscopy be the first investigation for colonic disease? Br Med J 1988;296:167–9.
25. Thoeni RF, Venbrux AC. The value of colonoscopy and double contrast barium enema examinations in the evaluation of patients with subacute and chronic lower intestinal bleeding. Radiology 1983;146:603–7.

Journal of the Royal College of Physicians of London Vol. 33 No. 6 November/December 1999
Cotton PB, Williams CB. Practical gastrointestinal endoscopy. Oxford: Blackwell Scientific Publications, 1996:218–9.

Baillie J. Complications of endoscopy. *Endoscopy* 1994;26:185–203.

Blakeborough A, Sheridan MB, Chapman AH. Complications of barium enema examinations: a survey of UK consultant radiologists 1992 to 1994. *Clin Radiol* 1997;52:142–8.

Ward MC, Gundroo D, Bailey RJ, Mehta TV, Vallon AG. Effect of investigation on the management of elderly patients with iron deficiency anaemia. *Age Ageing* 1990;19:204–6.

Fork FT. Double contrast enema and colonoscopy in polyp detection. *Gut* 1981;22:972–7.

Hoff G, Forster A, Vatn MH, Sauraj, Larsen S. Epidemiology of polyps in the rectum and colon. Recovery and evaluation of unresected polyps 2 years after detection. *Scand J Gastroenterol* 1986;21:853–62.

Atchery TM, Ershoff D. Do characteristics of adenomas on flexible sigmoidoscopy predict advanced lesions on baseline colonoscopy? *Gastroenterology* 1994;106:1501–4.

Spencer RJ, Melton LJ, Ready RI, Ilstrup DM. Treatment of small colorectal polyps: a population-based study of the risk of subsequent carcinoma. *Mayo Clin Proc* 1984;59:305–10.

Hardcastle JD, Chamberlain JO, Robinson MH, Moss SM, et al. Randomised controlled trial of faecal-occult-blood screening for colorectal cancer. *Lancet* 1996;348:1472–7.

Howarth G, Robinson MFE, Jenkins D, Hardcastle JD, Logan RFA. High prevalence of undetected inflammatory bowel disease (IBD): data from the Nottingham faecal occult blood (FOB) screening trial. *Gut* 1997;40(Suppl 1):A21.

Winawer SJ, Fletcher RH, Miller L, Godlee F, et al. Colorectal cancer screening: clinical guidelines and rationale. *Gastroenterology* 1997;112:594–642.

Sahay R, Scott BB. Iron deficiency anaemia – how far to investigate? *Gut* 1993;34:1427–8.

Address for correspondence: Dr J M Sayer, Ivy Cottage, Main Street, Epperstone, Nottingham NG14 6AU. Tel: 0115 966 3608 (home)