Should colonoscopy be the first investigation for colonic disease?

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Abstract

Many patients with suspected colonic disease undergo rigid sigmoidoscopy, barium enema examination, and ultimately total colonoscopy, but the need for preliminary radiology has not been formally assessed. A total of 168 patients requiring large bowel investigation were therefore randomised to undergo either rigid sigmoidoscopy plus double contrast barium enema examination or total colonoscopy. Disease was found in 56 patients, including 14 with a carcinoma, 11 with polyps, and 16 with inflammatory bowel disease, the remainder having diverticular disease alone. Of the 89 patients allocated to double contrast barium enema examination, nine required a subsequent colonoscopy for suspected tumour or polyps, three because of incomplete radiological examination, and 12 for rectal bleeding for which no cause was found at the radiological examination. In 16 patients this yielded further information or altered treatment. Of the 79 patients undergoing total colonoscopy, only six required subsequent radiology.

As both procedures were well tolerated with no major complications total colonoscopy may be the preferred initial investigation where facilities allow.

Introduction

Fibreoptic gastroduodenoscopy is now accepted as the first investigation for the vast majority of patients with upper gastrointestinal symptoms.[1] Many patients with suspected colonic disease undergo rigid sigmoidoscopy and double contrast barium enema only to require subsequently a total colonoscopy. Several studies have compared the sensitivity and specificity of the radiological and endoscopic examinations of the large bowel and have emphasised the fallibility and complementary nature of the two investigations. Colonoscopy offers the opportunity for taking biopsy specimens and for treatment, but the need for a barium enema examination to precede direct visualisation of the bowel has not been formally assessed. This study aimed at ascertaining whether there may be a case for colonoscopy alone as the initial investigation for those with suspected large bowel disease.

Methods

All patients with suspected large bowel disease referred to our gastroenterology unit were randomly allocated to have either rigid sigmoidoscopy and barium enema examination or colonoscopy. The only exclusions were patients aged under 40 in whom the expectation of disease was low; those with a tumour on digital examination of the rectum; and those thought too frail to undergo bowel investigations.

Dietary and laxative preparations were the same for all patients. Iron and bran preparations were stopped one week before the procedure, and for the last two days fruit and vegetables were forbidden. The patients were given two sachets of sodium picosulphate (Picolax) to take the day before the investigation, and immediately before the examination they were given an oxyphenisatin (Veripaque) cleansing enema.

Procedures were performed on an outpatient basis except for those patients thought too frail or those in whom endoscopic polypectomy was performed, who were admitted as a precaution for a subsequent overnight stay. Colonoscopy was performed under pethidine and diazepam sedation. The barium studies were performed by several different radiologists, but most were consultants. Colonoscopies were carried out by four experienced colonoscopists. Clinical details and the results of any previous investigations were made known to the operators before either procedure.

The adequacy of each investigation, as defined by its ability to exclude mucosal disease, was graded on the quality of radiological or endoscopic views of the colon, which was assessed retrospectively from the report (for colonoscopy) or films plus the radiologist's report (for barium enema examination). The grading was applied to the following regions of the colon: rectosigmoid junction, descending colon, transverse colon, ascending colon, and caecum. The presence of any possible abnormality was recorded, together with an assessment of the degree of diagnostic certainty.

Complications were noted and graded as either major or minor. The decision to proceed to the alternative colonic investigation was taken by the consultant in charge of the patient and dictated on clinical grounds according to the results of the initial procedure. When possible, patients were later sent a questionnaire seeking information about their experience of both the preparation and the examination itself, and those who underwent both large bowel investigations were asked to express a preference.

Results

A total of 168 patients entered the study, 89 being randomised to rigid sigmoidoscopy plus barium enema examination and 79 to colonoscopy. The groups were comparable in age and indications (table I). Disease was found in 56 patients (some having multiple lesions): 14 had tumours, 11 polyps, 16 inflammatory bowel disease, 21 diverticular disease, and two other conditions. In 53 (67%) of the 79 patients undergoing colonoscopy the examination was regarded as complete—that is, good views were obtained of the whole of the large bowel. In contrast, in only 32 (36%) of the 89 patients undergoing barium enema examination was the examination considered to be complete. Overall, however, the percentage of bowel regions adequately visualised was similar in both groups, being 83% at barium enema examination and 81% at colonoscopy. Not unexpectedly, the region most commonly missed at endoscopy was the more proximal colon whereas radiological views of the rectosigmoid junction were the most frequently suboptimal. The diagnostic yield (figure) for initial colonoscopy was significantly greater than for initial barium enema examination (24/79 (30%) *v* 15/89 (17%); $p>0{\cdot}05$, χ^2 test).

More patients in the barium enema group required a second procedure than in the colonoscopy group (24 *v* 6; $p<0{\cdot}01$; χ^2 test), the indications in the barium enema group being incomplete examination (3), rectal bleeding with no apparent cause (12), suspected tumour (4), and a suspected or definite polyp (5). In the colonoscopy group six patients required barium enema examination because of an incomplete examination. Of the 20

TABLE I—*Symptoms in the 168 patients included in study*

Examination	No	Indications: Mean age (range)	Pain	Altered bowel habit	Rectal bleeding	Anaemia	Colitis	Others
Sigmoidoscopy and double contrast barium enema examination	89	54·7 (20·81)	39	66	37	21	6	0
Colonoscopy	79	57·3 (19·81)	47	53	29	11	4	3

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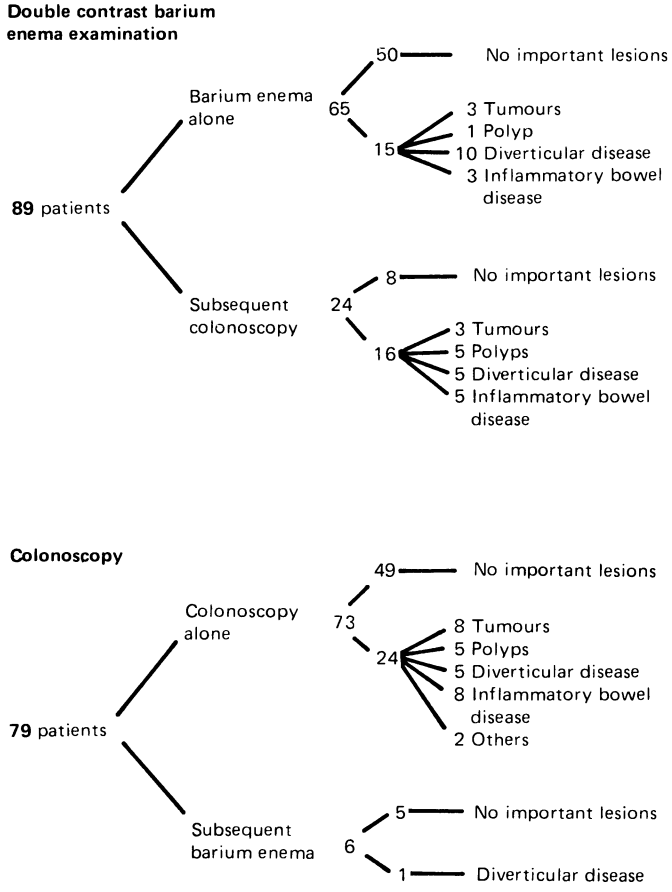
subjects who had inadequate visualisation of the whole colon at colonoscopy without subsequent radiology six were considered to have had adequate demarcation of the extent of their proctocolitis, three had proved polyps or cancers and radiological investigation was thought to be unwarranted as the patient would be submitted to surgery or subsequent follow up colonoscopy. In one subject with tenesmus the exclusion of distal lesions was the main aim of large bowel investigation. In two subjects diverticular disease without concurrent disease was deemed sufficient to account for their symptoms, two patients had impassable strictures, and five had other proved gastrointestinal disease including angiodysplasia, liver metastases, peptic ulceration, and Crohn's disease of the small bowel. One patient being investigated for anaemia was found to have myelodysplasia.

Although perfect visualisation of the whole colon was achieved in only 32 of the patients subjected to barium enema examination, in only three cases was an incomplete examination the sole reason for proceeding to colonoscopy. In the remainder, the exclusion of gross disease was thought to preclude the need for further large bowel investigation. In the barium enema group the second procedure (colonoscopy) was of diagnostic or therapeutic benefit in 16 patients, whereas this was the case in only one of the six patients who underwent colonoscopy first and then underwent a barium examination (figure). The "final" incidence of disease was very similar in the two groups,



Overall findings in patients randomised to colonoscopy or rigid sigmoidoscopy together with double contrast barium enema as the initial investigation of suspected bowel disease.

being 31/89 (35%) in the barium enema group and 25/79 (32%) in the colonoscopy group.

One hundred and twenty eight questionnaires were returned, the replies showing that both procedures were reasonably well tolerated with no significant differences between the two groups (table II). Of the 16 replies received from patients who underwent both procedures two preferred the barium enema examination and three the colonoscopy, with 11 expressing no preference.

Discussion

In 1982 Dyer asserted that "a barium enema is still a prerequisite for colonoscopic examination,"[2] whereas Williams, from the very large series at St Mark's Hospital, stated "Except where there is active inflammatory bowel disease it can be argued that a high probability of disease is an indication for colonoscopy."[3] Such disparate views may reflect differences in populations studied and the facilities or skill available.

TABLE II—*Replies from 128 patients to the question: Would you be prepared to undergo the procedure again if your doctor advised it?*

	Total	Never under any circumstances	Only if absolutely no alternative	Yes, but with some reservations	Without any reservations
Barium enema	64	0	16	16	32
Colonoscopy	64	1	18	9	36

In our study colonoscopy was undoubtedly better as a first line investigation in the detection and treatment of colonic disease. No patients sustained a major complication and none required urgent admission or treatment as a result of their investigation, confirming the known safety of both procedures.[4,5] Passage of the colonoscope to the caecum was achieved in 75% of patients and complete views were obtained in 67%, compared with only 36% in the barium group. Major disease was found in 56 patients (33%) and was evenly distributed between the two groups, suggesting that they were comparable. We must emphasise, however, that our purpose was not to decry the recognised value of good quality double contrast radiology but simply to assess the feasibility of colonoscopy as a first line procedure without prior barium study.

Since all the colonoscopies were carried out by four experienced operators, whereas barium studies were performed by many more radiologists it might be argued that the more consistent results were only to be expected. This contrast is likely to apply in many hospitals in clinical practice, however. For the same reason the decision to proceed to a second investigation was based on clinical grounds rather than strict predetermined criteria in order to correspond to standard practice. It is also our clinical practice to examine patients' *x* ray films ourselves; we realise that this retrospective assessment of both techniques for adequacy of views makes the comparisons open to question. These arguments against the comparability of the two techniques do not, however, invalidate the prime aim of this study.

Patients allocated to undergo total colonoscopy in the study did not also undergo rigid sigmoidoscopy as we thought that direct visualisation of the bowel need be performed only once. We do not propose that rigid sigmoidoscopy should be abandoned as it is a simple cheap procedure which may be performed in any clinic on unprepared patients.

Increasing use is now being made of flexible sigmoidoscopy,[6,7] a first line procedure which may be performed in the outpatient department.[8] In our hospitals suitable facilities are not available in outpatient departments and a cogent argument in favour of total colonoscopy can be made if the patient has to return to the endoscopy unit for the test. Moreover, although we found that only eight of 56 lesions were proximal to the splenic flexure—that is, beyond the theoretical limit of the flexible sigmoidoscope—many more patients would have required subsequent assessment of the whole colon regardless of the findings in the distal bowel.[9]

Several studies have addressed the question of the sensitivity and specificity of double contrast barium enema examination and colonoscopy.[10,11] We accept that endoscopy cannot be used as the "gold standard," although there is a negligible false positive rate[12] and clearly the final arbiter (pathological examination of the whole colon) will be available only in very few cases. Colonoscopy has been reported to miss an average of 12% of all polypoid lesions and even 11% of tumours,[4,12] although in our experience the latter figure seems a considerable overestimate. The advantages of taking random or target biopsy specimens for histological examination, not to mention the therapeutic option of polypectomy, are strong arguments in favour of the endoscopic technique.[3] Unlike colon-

oscopy, false positive results are not uncommon with double contrast radiology, and up to 29% of polyps may be missed, although this figure falls to under 10% for polyps over 1 cm in diameter.[13] The presence of diverticular disease makes the diagnosis of associated lesions more difficult,[10 14] some authorities recommending that colonoscopy should be performed in all patients with symptomatic diverticular disease.[14] Another important group comprises patients with overt or occult rectal bleeding with no cause found on rigid sigmoidoscopy or barium examination: lesions may be shown in 27-81% of such cases, including tumours in 3-11%.[4 15]

Accurate cost comparisons in our hospitals are difficult to make, but the greater necessity for colonoscopy after an initial barium study would suggest that a policy of performing endoscopy initially is likely to work out less costly. For this reason and for reasons of accuracy and expediency and to avoid multiple investigations total colonoscopy may be the preferred initial investigation for those with suspected colonic disease. We have shown that radiology is not a prerequisite for adequate colonoscopic examination.

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SHORT REPORTS

Apolipoprotein B polymorphism and altered apolipoprotein B and low density lipoprotein cholesterol concentrations in Finnish children

With a monoclonal antibody we studied the relation between genetic variation in apolipoprotein B and serum concentrations of lipoprotein cholesterol and apolipoprotein B. The polymorphism detected by this antibody (MB-19) is identical to the Ag(c/g) polymorphism, one of five allelic variations described by Bütler *et al* in the review by Tikkanen.[1] Antibody MB-19 distinguishes among three apolipoprotein B allotypes (immunophenotypes) encoded by the two allelic genes apoB(c) and apoB(g). Because of codominant transmission genotypes may be inferred from allotypes.

We report an association between apoB(c) and serum concentrations of apolipoprotein B and low density lipoprotein cholesterol in Finnish children.

Subjects, methods, and results

Serum samples were obtained from 513 children who participated in an ongoing multicentre study on atherosclerosis precursors.[2] The children were randomly selected from major cities and rural areas representing different parts of the country. Concentrations of serum lipids and low density lipoprotein and high density lipoprotein cholesterol and body mass index (kg/m^2) were determined[2] at the beginning of the study (1980), when the children were 9 years old. Serum apolipoprotein B concentrations were determined and allotypes assayed[1] in frozen serum that had been stored at −20°C for about five years. To evaluate the possible effects of storage on serum apolipoprotein B we correlated the present serum apolipoprotein B concentrations with those of the total and low density lipoprotein cholesterol obtained in 1980. Apolipoprotein B concentrations correlated well with the total cholesterol ($r=0{\cdot}757$, $p<0{\cdot}001$) and low density lipoprotein cholesterol concentrations ($r=0{\cdot}809$, $p<0{\cdot}001$), which supports the hypothesis that the apolipoprotein B had remained intact. Two tailed Bonferroni adjusted t tests were used for multiple comparisons between genotypes with standard BMDP software (University of California).

Factors related to atherosclerosis in 9 year old children according to presence or absence of apoB(c) allele. Values given are means (SD)

	Apolipoprotein B genotype		
	apoB(cc) or apoB(cg) n=223	apoB(gg) n=290	Significance
Cholesterol (mmol/l)	5·37 (0·79)	5·25 (0·89)	p=0·11
Triglyceride (mmol/l)	0·73 (0·29)	0·70 (0·29)	p=0·27
Cholesterol:			
Low density lipoprotein (mmol/l)	3·49 (0·72)	3·34 (0·80)	p=0·029
High density lipoprotein (mmol/l)	1·55 (0·27)	1·59 (0·33)	p=0·12
High density lipoprotein/total	0·29 (0·06)	0·31 (0·06)	p=0·006
Apolipoprotein B (mg/100 ml)	93·4 (21·2)	88·3 (20·8)	p=0·007
Body mass index (kg/m^2)	16·5 (2·2)	16·7 (2·5)	p=0·35

The table shows the subjects grouped according to the presence or absence of the apoB(c) allele. Children who had at least one apoB(c) allele (genotypes apoB(cc) or apoB(cg)) showed, as a group, higher serum concentrations of apolipoprotein B and low density lipoprotein cholesterol and lower high density lipoprotein/total cholesterol ratios than the group who did not have an apoB(c) allele (genotype apoB(gg)). Analysis by apolipoprotein B genotype showed that 8% of the children belonged to the apoB(cc) group, 35% to the apoB(cg) group, and 57% to the apoB(gg) group. The apoB(cg) children had higher serum concentrations of apolipoprotein B (+7·9%, p=0·007) and low density lipoprotein cholesterol (+5·4%, p=0·029) and lower high density lipoprotein/total cholesterol ratios (−6·1%, p=0·006) than children who had the apoB(gg) genotype. Children who had a double dose of the apoB(c) allele, however, did not differ appreciably from those who had a single dose.

Comment

Analysis of restriction fragment length polymorphisms shows variation at the gene locus that may or may not be expressed as alterations in protein structure. Conversely, monoclonal antibodies detect allotypic differences in polymorphic proteins and are suited for monitoring expressed genetic variations. Our study was designed to show possible relations between apolipoprotein B allotype and serum lipoprotein and apolipoprotein B concentrations. Assuming that genetic variation causing alteration in these concentrations could be more evident before hormonal and environmental factors had their full impact, we studied 9 year old children.

We showed significant increases in serum apolipoprotein B and low density lipoprotein cholesterol concentrations in children who had at least one apoB(c) allele compared with children who had none. This receives support from a study that compared the XbaI gene polymorphism with the apoB c/g polymorphism, which showed a strong association between the apoB(c) allele and the smaller molecular weight XbaI allele in Finnish subjects (Dunning *et al*, unpublished). The smaller molecular weight XbaI allele is reportedly associated with an increased serum concentration of apolipoprotein B.[3] An explanation for the lack of a gene dosage effect for the apoB(c) allele is not evident from the present results. As suggested for apolipoprotein B gene polymorphisms,[4] mapping of additional variations at the gene locus (haplotype analysis) may be necessary to clarify such apparent inconsistencies. Studies along these lines are in progress with antibodies specific for other allotypes.

The present report links apolipoprotein B allotype with apolipoprotein B concentration and differs from another study that used antibody MB-19, which showed no such association in adults in southern California.[5] Subtle