
Flexible Sigmoidoscopy in Asymptomatic Patients with Negative Fecal Occult Blood Tests

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Background. Although the American Cancer Society and others have established guidelines for colorectal cancer screening, questions of who and how to screen still exist.

Methods. A 60-cm flexible sigmoidoscopy was performed on 1000 asymptomatic patients, 45 years of age or older, with negative fecal occult blood tests, who presented for routine physical examinations. Patients with clinically significant lesions were referred for colonoscopy. The proportion of lesions that would not have been found if the 24-cm rigid or the 30-cm flexible sigmoidoscopy had been used was identified.

Results. Using the 60-cm flexible sigmoidoscopy, lesions were found in 3.6% of the patients. Eighty percent of the significant lesions were beyond the reach of the 24-cm rigid sigmoidoscopy and 37% were beyond the reach of the 30-cm sigmoidoscopy. Thirty-six pa-

tients with lesions were referred for colonoscopy; additional lesions were found in 14%. A total of 62 lesions were discovered, including tubular adenomas, villous adenomas, tubular villous adenomas (23 of the adenomas with atypia), and one adenocarcinoma. The highest percentage of lesions discovered were in the sigmoid colon and the second highest percentage were in the ascending colon.

Conclusions. The 60-cm flexible sigmoidoscopy was able to detect more lesions than either the 24-cm or 30-cm sigmoidoscopy when used in asymptomatic patients, 45 years of age and over, with negative fecal occult blood tests. When significant lesions are discovered by sigmoidoscopy, colonoscopy should be performed.

Key words. Sigmoidoscopy; colonoscopy; preventive medicine. *J Fam Pract* 1992; 34:281-286.

Colorectal cancer is a common lethal cancer, afflicting both men and women. In 1991, 157,500 new cases and nearly 60,500 deaths from colorectal cancer were expected to occur in the United States.¹

In 1980, the American Cancer Society (ACS) advocated annual fecal occult blood testing for men and women over the age of 50 years and a sigmoidoscopic screening at age 50 years and every 3 to 5 years after two initial examinations (performed 1 year apart) in which no disease is found.² In 1988, the ACS modified part of their former guideline: "sigmoidoscopy every 3 to 5 years beginning at age 50." This meant that the National Cancer Institute (NCI) and the ACS now had identical guidelines.³ Similar recommendations have been issued

by the American Gastroenterological Association, the American Society of Gastrointestinal Endoscopy, and other groups.^{4,5}

The United States Preventive Services Task Force stated that there was insufficient evidence either for or against conducting fecal occult blood tests or sigmoidoscopy in asymptomatic patients.⁶ Discontinuation or withholding of a procedure or test from persons who request it, therefore, would be inappropriate.

Frame⁷ has taken an opposing view, stating that it is premature to recommend flexible sigmoidoscopy as a routine screening examination for colorectal cancer primarily because of the lack of patient acceptability and cost. Yet, he states that early cancer will be detected during an initial examination in about 4% of asymptomatic patients. Rodney⁸ has taken the affirmative view. He believes that flexible sigmoidoscopy screening should be offered by family physicians primarily because of the value of early detection of disease, the natural history of colorectal cancer, and the adenoma-carcinoma sequence.

Many studies have been forwarded as providing evidence that fecal occult blood testing can detect both

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adenomas and cancers in asymptomatic patients.⁹⁻¹⁷ Several studies have shown that occult blood testing is less sensitive for detecting polyps than in detecting cancers.¹⁸⁻²⁰ This is predictable when one considers the histopathological differences in sites of hemorrhage from polyps and cancers.

It is generally accepted that adenomas are precursors of colon cancer just as dysplasias are precursors to cervical cancer.^{21,22} Approximately 55% of adenomas and de novo cancers develop within the typical reach of the 60-cm flexible sigmoidoscope.²³ To reduce the cost and increase patient acceptance of flexible sigmoidoscopy, a 30-cm flexible sigmoidoscope has been developed.²⁴ This sigmoidoscope is said to detect an estimated 40% of the neoplastic lesions as compared with the estimated 30% of adenomas and cancers within the reach of the rigid sigmoidoscope.²³ In spite of the obvious 15% difference in the number of lesions visualized, some authors have gone on record stating that no significant difference exists in the detection rate between the 30-cm and the 60-cm instruments.²⁵

The specific aims of this study were to determine (1) the prevalence of lesions in asymptomatic patients, 45 years of age and over, with negative fecal occult blood tests, by using a 60-cm flexible sigmoidoscope, and to study the histopathology of colorectal lesions in terms of type, size, and location; (2) what proportion of the lesions found were beyond the reach of a 24-cm rigid or a 30-cm flexible sigmoidoscope; (3) what proportion of these patients with significant lesions had additional lesions beyond 60 cm as detected by colonoscopy; and (4) what proportion of these patients with significant lesions would have been referred for colonoscopy if either the 24-cm or the 30-cm sigmoidoscope had been used rather than the 60-cm sigmoidoscope.

Methods

This study was conducted in a family practice with approximately 36,000 patients at the Kaiser Permanente Medical Group, Sunset location, in Los Angeles. The practice providers consisted of 12 physicians, 24 residents, and 45 paramedics.

Early in 1985, the principal investigators developed a personal and family health form to be completed by physicians at the time they conducted routine physical examinations. In addition to selected variables from nine health record forms already being used by Kaiser, the form included new variables related to the specific aims of this study.

The Kaiser health maintenance organization (HMO) serves a typical cross-section of the Los Angeles urban

community. This prevalence study involved both male and female subjects. Patients in the plan were encouraged to come to the Family Practice Department for routine physical examinations every 3 years.

The investigators were aware that in 1980 the ACS recommended that colon cancer screening using fecal occult blood tests and sigmoidoscopic examinations should begin at 50 years of age. For this study, however, the investigators modified the ACS recommendations, using 45 years of age as the point to initiate screening. Since the practice served an older population, about 14,000 patients would be eligible for 60-cm flexible sigmoidoscopy. From 1985 through 1989, the sample that was selected for this study consisted of 1000 consecutive patients who met the study criteria, that is, asymptomatic, presenting for routine physical examinations, having negative occult blood stools, 45 years of age or older, and agreeable to having a flexible sigmoidoscopic examination. Thirty patients declined having a sigmoidoscopy.

At the time of routine physical examinations, patients were told that a cancer screening test of the large intestine should be performed. The patients were given letters that identified colorectal cancer as the second most common cancer and stated that it had a good cure rate if detected early. They were informed about the risks and benefits of sigmoidoscopy and given preparation instructions.

Family physicians filled out consultation slips for the 60-cm flexible sigmoidoscopic examinations.

One thousand forms were completed by family physicians, and pathology report forms were obtained for those patients who were referred to gastroenterologists for colonoscopies and biopsies.

Throughout the data-gathering phase of this project, the study investigators held regular conferences with other Kaiser physicians and supervised the collection of data to ensure that procedures were consistent. Information on the data collection forms was verified against original source documents to ensure accuracy and completeness. All family physicians had extensive training and experience in performing sigmoidoscopic examinations using the 60-cm instrument.

Chi-square and Student's *t* tests were performed on selected data.

Results

Patient characteristics are described by age, sex, and race in Table 1. The mean age was 61 years and the standard deviation was 9 years. There were 529 women and 471

Table 1. Demographic Characteristics of 1000 Asymptomatic Patients, 45 Years of Age and Older with Negative Fecal Occult Blood Tests, and the Prevalence of Lesions Among 36 of These Patients*

Variables	Total Patients		Cases with Lesions	
	No.	%	No.	%
Age (y)†				
45 to 54	175	17.5	4	2.3
55 to 64	402	40.2	12	3.0
65 to 74	295	29.5	18	6.1
75 and over	128	12.8	2	1.6
Sex‡				
Female	529	52.9	11	2.1
Male	471	47.1	25	5.3
Race‡§				
Asian and Pacific Islander	128	12.8	3	2.3
Black	207	20.7	7	3.4
Hispanic origin	148	14.8	2	1.4
White	517	51.7	24	4.6

*Lesions include tubular adenomas, villous adenomas, tubular villous adenomas and an adenocarcinoma.

†Not significant.

‡Significant at $P < .01$.

§Race characteristics from the US Department of Commerce, Bureau of the Census, 1983.²⁶

men in the cohort. Each race represented at least 12.8% of the total sample.

Using a 60-cm flexible sigmoidoscope, lesions were found in 36 (3.6%) patients. The age, sex, and race of these patients are shown in Table 1. With respect to age, the highest proportion of lesions were found within the group of patients 65 to 74 years of age (6.1%); however, the differences by age were not significant. The sex prevalence ratio was 2.5. This was a somewhat higher male-to-female ratio than reported in another Los Angeles cancer study.²⁷ The ratio of men to women was significantly different between those with and without lesions ($P < .01$). The highest prevalence by race was among white patients (4.6%). When the data on race were collapsed into white compared with nonwhite, there was not a significant difference at the $P = .05$ level, but the P value is less than .10. The typical patient with lesions was a white man between 65 and 74 years of age.

Of the 1000 patients in this study, 688 had had no previous sigmoidoscopic examination, 217 had had a previous rigid sigmoidoscopic examination, and 94 had had a previous flexible sigmoidoscopic examination. There were no available data for one patient. No significant relationship was found between the prevalence of lesions and the patients' previous examination statuses.

The number of lesions found by the 60-cm sigmoidoscope and the lesions that would have been found by a 30-cm sigmoidoscope and a 24-cm rigid sigmoidoscope

Table 2. Lesions Found by Sigmoidoscopy on 1000 Asymptomatic Patients, 45 Years of Age and Older, with Negative Fecal Occult Blood Tests, and by Colonoscopy on 36 of These Same Patients Whose Sigmoidoscopy Results Were Positive

Types of Lesions	Within Reach of Sigmoidoscopy			Follow-up Colonoscopy (n = 36)
	24-cm Rigid Scope	30-cm Flexible Scope	60-cm Flexible Scope	
Polypoids				
Tubular adenomas				
Without atypia	6	15	23	28
With atypia	3	10	12	13
Villous adenomas				
Without atypia	0	2	6	6
With atypia	0	0	1	1
Tubular villous adenomas				
Without atypia	1	2	3	4
With atypia	1	5	8	9
Adenocarcinomas	0	0	1	1
Total	11	34	54	62

are given in Table 2. It must again be emphasized that the 60-cm flexible sigmoidoscopic examinations were all conducted on individuals with negative fecal occult blood tests. Fifty-four lesions (23 with atypia) were found: 35 tubular adenomas, 7 villous adenomas, 11 tubular villous adenomas, and one adenocarcinoma.

Eighty percent of the lesions found by the 60-cm flexible sigmoidoscope were beyond the reach of the rigid sigmoidoscope. Twenty-six of the patients (72%) had lesions (7 of these with multiple lesions) that would not have been detected with the rigid sigmoidoscope. Thirty-seven percent of the lesions found were beyond the reach of the 30-cm flexible sigmoidoscope. Ten of the patients (28%) with lesions (three with multiple lesions) would not have had any lesions discovered if only the 30-cm flexible sigmoidoscope had been used.

Thirty-six patients with lesions were referred for colonoscopy. Five (14%) of the 36 patients were found to have 8 lesions beyond 60 cm. Six of these lesions were tubular adenomas, one with atypia, and two were tubular villous adenomas, one with atypia (Table 2).

The distribution (frequency and percentages) and size (mean diameters) of lesions located within the segments of the colorectal system are shown in Figure 1. Over three fourths (76%) of all lesions were located in the sigmoid colon. The second colorectal area with the highest percentage (10%) of lesions was the ascending colon. The mean diameters of the lesions within the segments of the colorectal system ranged from 0.6 cm to 0.8 cm. The two lesions with the greatest diameters (5.3 cm and 3.0 cm, respectively) were found in the sigmoid

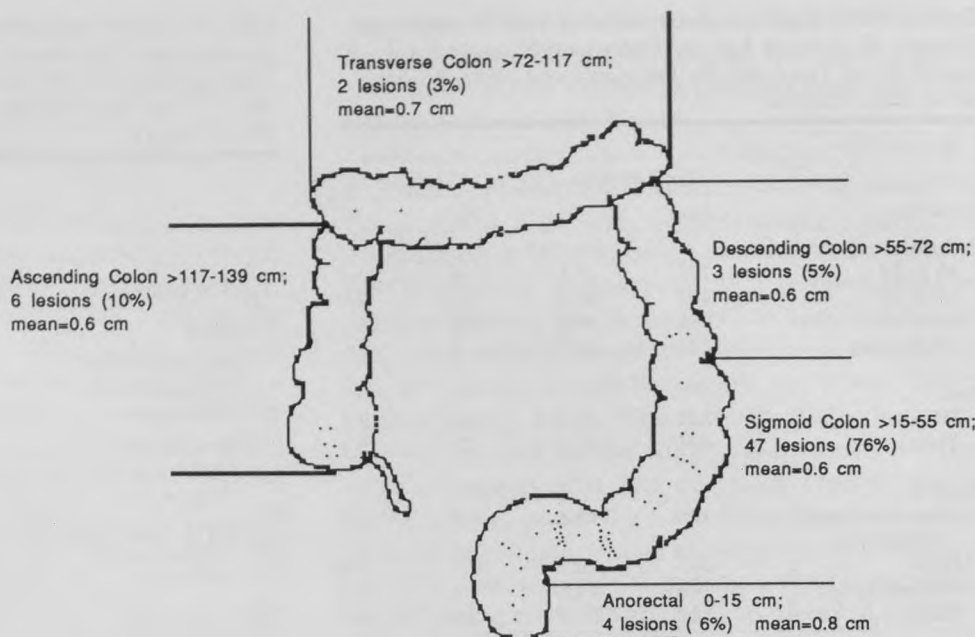


Figure 1. Distribution and size (diameter) of lesions within the colorectal system discovered by performing 60-cm flexible sigmoidoscopy on 1000 asymptomatic patients, 45 years of age or older, with negative fecal occult blood tests, and by following up with colonoscopy in 36 of these patients whose sigmoidoscopy results were positive.

colon. The 5.3-cm lesion was a villous adenoma with marked atypia, and the 3.0-cm lesion was a tubular villous adenoma with mild atypia.

The most serious lesion discovered was an adenocarcinoma (diameter of 0.1 cm) in the sigmoid colon. This patient also had five other lesions in the same area; one was a tubular adenoma without atypia and four were villous adenomas without atypia. None of these lesions would have been found if, because of a negative fecal occult blood test, the patient had not been examined using a 60-cm flexible sigmoidoscope. All of these findings were beyond the reach of the 30-cm flexible sigmoidoscope.

Discussion

Whereas fecal occult blood testing has reasonable sensitivity and specificity for colorectal cancer screening, it is not very sensitive for the detection of adenomas.^{6,23} If one accepts the concept that adenomas represent precursor lesions, then failing to identify adenomas would be like failing to find dysplasia on a Papanicolaou smear when screening for uterine cervical cancer.

Rasgon²⁸ has reported two visually identical lesions measuring 5 mm in diameter that were excised from a 45-year-old asymptomatic white woman. One specimen was identified as an adenocarcinoma and the other as a benign adenoma. More recently, Varma and Melcher²⁹ reported a case of a diminutive lesion, 0.6 cm × 0.5 cm

× 0.4 cm, with atypia and mitotic activity consistent with early adenocarcinoma.

Rodney, Hocutt, and Johnson and their co-workers^{8,30-33} have provided convincing evidence to document the value of aggressive colorectal screening by properly trained family physicians using the 60-cm and 65-cm flexible sigmoidoscopes. Their earlier research supports the findings of this study; namely, that the 60-cm flexible sigmoidoscope is more effective in detecting lesions than either the shorter rigid or the shorter flexible sigmoidoscope.

It cost the Kaiser HMO an estimated \$70 per patient to perform each examination using a 60-cm flexible sigmoidoscope, or \$70,000 for the 1000 patients involved in this study. Of the lesions found, 35 were tubular adenomas, 7 were villous, and 11 were tubulovillous. Twelve of the tubular lesions, 1 of the villous lesions, and 8 of the tubulovillous lesions demonstrated atypia. In fact, 4 adenomas demonstrated marked atypia. Had the adenocarcinomas in this study been missed, it would have cost a minimum of between \$50,000 and \$100,000 to treat each patient. This is not to mention the 21 adenomas that were already in evolution at the time they were detected. It is highly likely that several of these adenomas would have become carcinomas had they not been removed.

Fenoglio-Preiser et al³⁴ state that the risk of invasive cancer being present within an adenoma "increases directly with increasing size of the polyp and becomes notably higher when an adenoma reaches about 1.5 cm

in diameter." Further, they state that invasive cancer is more likely to be present if the adenoma has a villous morphology. Five adenomas found by the 60-cm flexible sigmoidoscope in this study were between 2.0 cm and 5.3 cm in size, and four of these had villous morphology.

In the early 1970s Morson²¹ reported that most cancers of the colon were preceded by a polyp. As stated by Winawer and colleagues,¹⁶ this theory now has been generally accepted. Determining the natural history of colorectal cancer has provided a basis for intervention. One likely intervention is the early detection of colorectal cancer, and another is the removal of adenomas.¹⁶ Both of these interventions were followed in this study. The patients were asymptomatic and candidates for early detection. For colorectal cancer, early detection is particularly important because the natural history of this disease is a long one, with considerable time clapsing between the premalignant and malignant stages.¹⁶ All patients who had adenomas were referred for colonoscopy to search for synchronous lesions and to perform polypectomies. Eight additional frank adenomas were found.

While the data presented in this report do not demonstrate a reduction in the incidence of colorectal cancer among subjects with polyps, it is not unreasonable to anticipate that there may well be a reduction in colorectal cancer incidence and mortality in the future. Preliminary data from the National Polyp Study were reported by Winawer et al³⁵ during the Digestive Disease Week in May of 1991 in New Orleans. They said: "The preliminary data support the concept that removal of polyps with cleaning of the entire colon and follow-up surveillance is effective in reducing the incidence of colorectal cancer. A mortality reduction from colorectal cancer would be expected to follow."

This study demonstrates that there was a significant yield of lesions using the 60-cm sigmoidoscope in clinically asymptomatic patients 45 years of age or older who had negative fecal occult blood tests. Further, when the patients in whom lesions were found were given a full colonoscopic study, additional lesions were discovered. The investigators believe that there is a role for screening with the 60-cm flexible sigmoidoscope even in clinically asymptomatic individuals who are over 45 years of age and have negative fecal occult blood tests. We also believe that colonoscopy should be performed on asymptomatic individuals with negative fecal occult blood tests in whom significant lesions are discovered by sigmoidoscopy. As a testing tool to detect colorectal lesions, fecal occult blood testing is insufficient by itself, without a follow-up examination using the sigmoidoscope.

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