

Clinical Experience with Flexible Sigmoidoscopy in Asymptomatic and Symptomatic Patients

CHRISTOPHER T. MEYER, D.O., WILLIAM McBRIDE, M.D.,
ROBERT S. GOLDBLATT, M.D., JONATHAN BORAK, M.D.,
PIERLUIGI MARIGNANI, M.D., HENRY R. BLACK, M.D., AND
RICHARD W. McCALLUM, M.D.

*Departments of Medicine, West Haven VA Medical Center, and the Griffin Hospital,
Derby, Connecticut, and Yale University School of Medicine, New Haven,
Connecticut*

Received May 8, 1980

The purpose of this study was to evaluate the diagnostic yield of flexible sigmoidoscopy when performed as a routine procedure in asymptomatic patients over the age of 40 being referred for a complete physical examination. The preliminary results of this ongoing program are presented together with the diagnostic yield in 408 patients with symptoms and signs suggestive of colorectal disease who were of similar age (56.6 vs. 56.5 years) and sex distribution (79 percent male) to the asymptomatic population, and who underwent flexible sigmoidoscopy as an indicated part of their evaluation. In the 122 asymptomatic patients, the mean distance examined by the procedure was 50.8 cm with the instrument being advanced beyond the optimal rigid sigmoidoscopy distance of 20 cm in 100 percent of patients. Adenomatous and hyperplastic polyps were identified in 16 patients, 13.1 percent, in the asymptomatic group, a similar percentage to the symptomatic population, 15.4 percent. Adenomatous polyps were diagnosed in 7.4 percent of the asymptomatic subjects and 9.1 percent of the symptomatic group. Colonic cancer was diagnosed in 0.8 percent of asymptomatic patients vs. 3.2 percent of the symptomatic group ($p < 0.05$). Seventy-seven percent of the neoplastic polyps detected in the asymptomatic patients and 60 percent in the symptomatic group were beyond 20 cm from the anus. Diverticulosis was diagnosed in a similar percentage of patients, 13.1 percent in the asymptomatic and 10.0 percent in the symptomatic group. No complications were encountered and the procedure was well tolerated without analgesia. It is concluded that: (1) in an asymptomatic population over the age of 40, flexible sigmoidoscopy, as a routine examination, results in a diagnostic yield not possible with rigid proctosigmoidoscopy and which approaches that observed in a symptomatic population of similar age; (2) for the internist trained in this procedure, flexible sigmoidoscopy has a future role in the detection of colorectal lesions and as an interval screening examination for premalignant lesions and colorectal cancer in asymptomatic and symptomatic patients.

INTRODUCTION

Flexible sigmoidoscopy is superior to rigid sigmoidoscopy in the evaluation of patients with suspected colorectal disease [1,2]. In symptomatic patients, flexible sigmoidoscopy has increased the diagnostic yield in terms of distance examined and pathology identified, while maintaining a similar bowel preparation and patient acceptance as the rigid procedure [1,2]. Although the role of flexible sigmoidoscopy in asymptomatic patients has not been defined, the procedure would seem to be

ideally suited for screening patients over age 40 for colorectal cancer and premalignant lesions.

The purpose of this study was to define the diagnostic yield of flexible sigmoidoscopy in asymptomatic patients over the age of 40 being referred for complete physical examination, and we report here the preliminary results of this ongoing program.

METHODS

All patients were examined in Gastroenterology Diagnostic Units at the West Haven VA Medical Center, Yale-New Haven Medical Center, or Griffin Hospital. Asymptomatic patients were randomly referred for flexible sigmoidoscopy from the Primary Care Center, University specialty clinics, inpatient divisions, or private physicians. Only patients over age 40 were included in the present report. Prior to examination, all patients were interviewed by a participating physician-investigator concerning the presence or absence of signs and symptoms of gastrointestinal disease. A detailed history was obtained regarding a previous personal or family history of colonic polyps or cancer. In addition, guaiac stool testing was performed, and hemoglobin and hematocrit determinations were obtained when indicated. Patients were excluded from the asymptomatic group if subjective or objective evidence for active colonic disease, or a personal or family history of colonic cancer or polyps was obtained.

Preparation consisted of either two Fleet enemas within two hours of the examination or a Fleet enema the preceding evening and an enema within an hour of the procedure. All patients maintained a regular diet up to the time of the examination. No analgesic pre-medications were administered. Informed consent was obtained in each case. The procedure was performed by a Gastroenterology fellow or staff member of the Section, with the patient in the left lateral position. A standard 60 cm flexible sigmoidoscope was used. The distance the instrument was advanced was guided by patient tolerance. Where possible, it was inserted to its maximum distance. The following observations were made: (1) distance the instrument was advanced; (2) patient discomfort graded as mild, moderate, or severe; (3) time required for the entire examination; (4) location and description of any abnormalities found; (5) complications of the procedure. Biopsies were performed, as indicated, for observed abnormalities and histology was also available from the polyps that were later removed during total colonoscopy and polypectomy. Histological results were correlated with macroscopic findings. In some patients in whom insertion to 60 cm was achieved, radiographic documentation of the site and position of the instrument in the colon was obtained.

While this study was in progress, patients with symptoms or signs of colonic or rectal disease were also being referred for flexible sigmoidoscopy. The procedure was performed by the same Gastroenterology fellow and/or staff attending physician, and these patients were similarly interviewed by the physician-investigator. In this symptomatic group of patients, flexible sigmoidoscopy was the initial step in a work-up that would later include barium enema and probably total colonoscopy. The diagnostic yield in this group of patients served as a comparison for the results in the asymptomatic population. Indications for flexible sigmoidoscopy in the symptomatic group included the following: rectal bleeding, guaiac positive stools, change in bowel habits, abdominal pain, anemia, and a multiple category which included more than one of these symptoms or signs. Patients in the symptomatic group were excluded from this study if they had a personal or family history of colonic cancer or polyps.

Student's *t*-tests and correlation coefficients were used in the statistical analysis of the data [3].

RESULTS

One hundred twenty-two asymptomatic and 408 symptomatic patients were examined with flexible sigmoidoscopy. The age and sex distribution in both groups of patients were similar. In the asymptomatic group, the mean age was 56.6 ± 1.1 years (SEM) and 79 percent of these patients were male; in the symptomatic group, the mean age was 56.5 ± 0.8 years (SEM), and 79 percent of the patients were male (Table 1). Eighty percent of both patient populations graded pain associated with the procedure as mild. The preparation of two Fleet enemas was regarded as adequate to very good in 95 percent of both patient groups. No complications occurred as a result of the procedure. The typical anatomic location of the flexible instrument, when maximally inserted, is illustrated radiographically in Fig. 1.

Diagnostic Findings in Asymptomatic Patients

The mean distance examined in the asymptomatic patients was 50.8 ± 1.0 cm (SEM). The examiner was successful in advancing the flexible instrument beyond the average rigid sigmoidoscopy distance of 20 cm [4] in 100 percent of patients, >40 cm in 76 percent, >50 cm in 44 percent, and to its full 60 cm length in 32 percent of patients. The average time required to perform the entire examination was 8.8 ± 0.4 minutes (SEM), including use of biopsy and photography.

In 122 asymptomatic patients, 20 adenomatous and hyperplastic polyps were

TABLE 1
Comparison of Flexible Sigmoidoscopy in Asymptomatic and Symptomatic Patient Populations

Parameter	Asymptomatic	Symptomatic	t	<i>p</i> <	S or NS
Patient sample	122	408	—	—	—
Age (\bar{x} + SEM)	56.6 ± 1.1	56.5 ± 0.8	0.06	0.95	NS
Sex (% males)	79%	79%	—	—	—
Distance examined (\bar{x} + SEM)	50.8 ± 1.0	48.7 ± 0.6	1.64	0.10	NS
Time taken (\bar{x} + SEM) (min)	8.8 ± 0.4	11.9 ± 0.3	5.28	0.001	S
<i>Patients with</i>					
Hyperplastic and adenomatous polyps					
Hyperplastic polyps	16 (13.1%)	63 (15.4%)	0.63	0.60	NS
Hyperplastic polyps	7 (5.7%)	26 (6.4%)	0.25	0.70	NS
Adenomatous polyps	9 (7.4%)	37 (9.1%)	0.58	0.60	NS
Cancer	1 (0.8%)	13 (3.2%)	1.68	0.05	S
Diverticuli	16 (13.1%)	41 (10.0%)	0.96	0.40	NS
Inflammatory bowel disease	0 (0.0%)	10 (2.5%)	1.75	0.05	S
Hemorrhoids	6 (4.9%)	60 (14.7%)	2.87	0.01	S
Lesions (all types)	39 (32.0%)	187 (45.8%)	2.72	0.01	S
<i>Adenomatous Polyps</i>					
	12	43	—	—	—
1 cm and over (size)	10 (83%)	19 (44%)	—	—	—
1.5 cm and over (size)	7 (58%)	9 (21%)	—	—	—
20 cm and beyond (location)	10 (83%)	26 (60%)	—	—	—
<i>Neoplastic Polyps</i>					
(Cancer and adenomatous polyps)	13	56	—	—	—
20 cm and beyond (location)	10 (77%)	33 (60%)	—	—	—



FIG. 1. The radiographic appearance of the flexible sigmoidoscope when advanced to its full insertion length of 60 cm. Its anatomic location is just beyond the junction of the sigmoid and descending colon.

identified in 16 patients (13.1 percent) (refer to Table 1). Eight hyperplastic polyps were found in 7 patients (5.7 percent). Twelve adenomatous polyps were detected in 9 patients (7.4 percent). Three adenomatous polyps were diagnosed in one patient and 2 in another. Ninety-two percent of the adenomatous polyps were equal to, or greater than, 1 cm in size and 58 percent were equal to or greater than 1.5 cm. Cancer was found in one asymptomatic patient, and the tumor was located at 10 cm. This indicates that neoplastic polyps (adenomatous lesions and cancer) were present in 8.2 percent of this population.

Figure 2 demonstrates the location of polypoid lesions in the asymptomatic population. Eighty-six percent were beyond the average rigid sigmoidoscopy examination of 20 cm, and specifically 10 of the 12 adenomatous polyps were beyond 20 cm. Eighty percent of the adenomatous and hyperplastic polyps identified were located from 21 to 40 cm from the anal verge thus affording easy identification during the average flexible sigmoidoscopy examination of 50 cm.

Additional findings included diverticulosis in 16 (13.1 percent) patients and internal hemorrhoids in 6 (4.9 percent). In summary, colonic pathology was identified in 39 (32 percent) of the asymptomatic patients (Table 1) undergoing flexible sigmoidoscopy.

Diagnostic Findings in Symptomatic Patients

Indications for flexible sigmoidoscopy in the 408 symptomatic patients were as follows: rectal bleeding (106 patients); guaiac positive stools (84); change in bowel habits (60); abdominal pain (17); and multiple category (130). The mean distance examined was 48.7 ± 0.6 cm (SEM). The instrument was advanced to 25 cm in 99 percent of patients, to 35 cm in 88 percent and up to 50 cm in 52 percent of patients. The average time required to complete the examination was 11.9 ± 0.3 minutes (SEM), including use of photography and biopsies when indicated.

Seventy-four adenomatous and hyperplastic polyps were identified in 63 (15.4

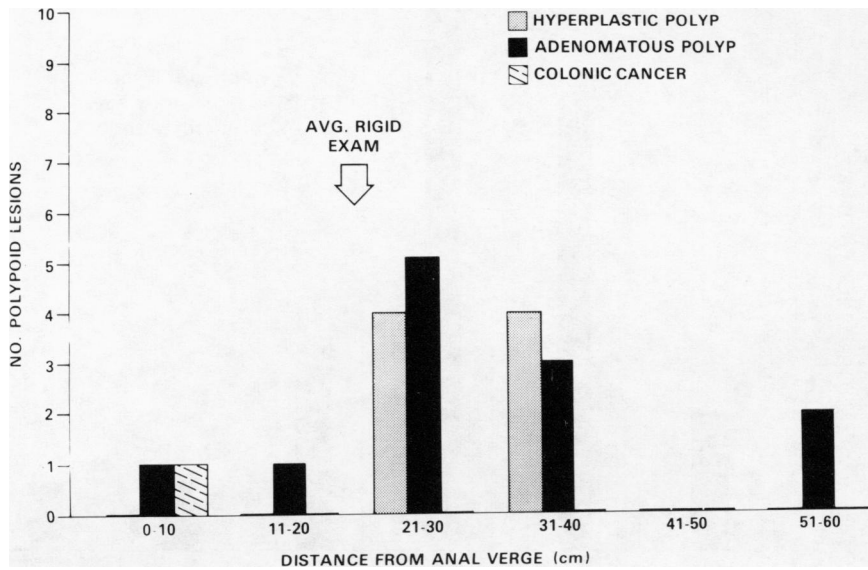


FIG. 2. The location of polypoid lesions and colonic cancer identified in the asymptomatic patients population ($N = 122$) during flexible sigmoidoscopy examination. The usual distance visualized during rigid proctosigmoidoscopy (20 cm) is included for comparison.

percent) patients (Table 1). Thirty-one hyperplastic polyps were found in 26 patients (6.4 percent). Forty-three adenomatous polyps were detected in 37 patients (9.1 percent). Five patients had more than one adenomatous polyp diagnosed. Forty-four percent of the adenomatous polyps were equal to, or greater than, 1 cm and 21 percent were equal to or greater than 1.5 cm. Cancer was identified in 13 (3.2 percent) of the symptomatic patients, indicating that neoplastic polyps (adenomatous lesions and cancer) were present in 12.3 percent of this population.

Figure 3 demonstrates the location in the colon of polypoid lesions diagnosed in the symptomatic population; 48.3 percent of polypoid lesions diagnosed were located from 21 to 40 cm from the anal verge. Sixty percent of the 43 adenomatous polyps and 55 percent of the cancers found were beyond the average rigid sigmoidoscopic exam of 20 cm.

Additional findings included: diverticulosis in 41 patients (10.0 percent), inflammatory bowel disease in 10 (2.5 percent); and internal hemorrhoids in 60 (14.7 percent). In summary, 187 (45.8 percent) of 408 symptomatic patients had colonic pathology identified with flexible sigmoidoscopy (Table 1).

When compared to the asymptomatic group, the percentage of symptomatic patients with adenomatous (9.1 vs. 7.4 percent) or hyperplastic polyps (6.4 vs. 5.7 percent), or diverticuli (10.0 vs. 13.1 percent) was not significantly different (Table 1). In the symptomatic population, the identification of cancer was significantly greater ($p < 0.05$). The overall diagnostic yield, including polypoid lesions, diverticulosis, inflammatory bowel disease, and internal hemorrhoids, was significantly greater than in the asymptomatic patients ($p < 0.01$).

COMMENT

In the United States, 100,000 new cases of colorectal cancer are diagnosed each year, and the overall five-year survival rate of 41 percent has been unchanged for the

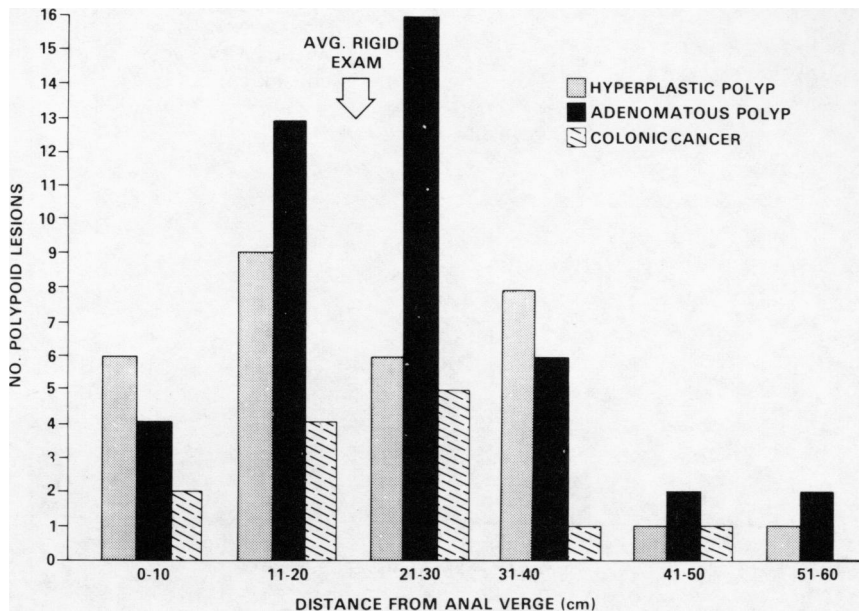


FIG. 3. The location of the polypoid lesions and colonic cancer diagnosed in the patient population with symptoms and signs suggestive of colorectal disease during flexible sigmoidoscopy examination ($N = 408$). The average distance visualized during rigid proctosigmoidoscopy (20 cm) is included for comparison.

previous 25 years [5,6]. The use of rigid sigmoidoscopy has been advocated as a screening procedure in the hope that the earlier detection of colorectal cancer might lead to an increased survival in this disease. The expected yield of benign polyps on rigid sigmoidoscopy ranges from 2–7 percent, depending on the population screened [7,8]. The yield for cancer in an asymptomatic population has been shown on routine sigmoidoscopy to be 0.1 to 0.2 percent [9,10]. Recent surveys have indicated that physicians use rigid sigmoidoscopy in only 11.6 to 14 percent of asymptomatic patients, and that its use on a more regular annual or biennial basis is even less [11,12]. In a recent survey of women, approximately 90 percent had breast and gynecologic examinations (including Pap smears) on a routine basis, while only 42.7 percent had ever undergone sigmoidoscopy [11]. Information exists, however, demonstrating that intensive surveillance using routine sigmoidoscopy on a periodic basis can have a significant impact on colorectal cancer. Internal sigmoidoscopy examinations performed in patients over a period of 25 years have demonstrated a lower incidence, and a higher percentage of Duke's A lesions [13,14].

Rigid sigmoidoscopy was once considered able to diagnose 67–75 percent of large bowel cancer [13], but recent epidemiological studies have indicated that these percentages may not be accurate because of the proximal movement of cancer and polyps in the colon [14,15]. The diagnostic yield of rigid sigmoidoscopy is also limited by the practical realities of the procedure which result in a consistent examination of up to 20 cm of the large bowel with only 40 percent of examinations extending above 20 cm [4]. In many cases, only "rectoscopy" is performed [2,16]. This is related to patient discomfort and inability to maneuver sharp angulations of the rectosigmoid.

Since its introduction clinically in 1975, flexible sigmoidoscopy has been demonstrated as superior to rigid sigmoidoscopy in the diagnosis of gastrointestinal disease.

These studies have been conducted largely in symptomatic populations. Bohlman et al. [1] examined three times more colon and significant lesions were found in 39 percent of patients with the flexible instrument compared to 13 percent with the rigid. McCallum et al. [2] demonstrated that the average flexible sigmoidoscopy examination was 50 cm compared to 20 cm for the rigid instrument and the yield of polypoid lesions was 10.8 percent for flexible versus 1.7 percent for rigid. In both studies, the time required for examination was approximately twice that of the rigid instrument. The patient tolerance with the flexible instrument was similar to that with the rigid and no analgesia was used [1,2]. Our data indicated that 77 percent of the neoplastic polyps identified in the asymptomatic group and 60 percent in the symptomatic patients were not accessible to rigid sigmoidoscopy. We feel that the Sims position is more comfortable for patients and is ideally suited for examination with the flexible instrument. The bowel preparation of two Fleet enemas with no fasting provided excellent visual results and emphasized the routine nature of the flexible examination, well suited for office or hospital clinic settings. It would seem that a procedure which visualizes the distal 50 cm of the bowel and hence, up to 80 percent of colon cancer, offers great potential for cancer screening.

The role of flexible sigmoidoscopy in asymptomatic patients has not been adequately explored; 5.3 percent of 1000 asymptomatic patients receiving flexible sigmoidoscopy were reported to have polyps ranging in size from 3 mm to 2.5 cm and there was no cancer found [17]. However, this study at a Kaiser Permanente Medical Center included patients under 40 years of age. In a recent study, 200 asymptomatic patients underwent flexible sigmoidoscopy and 11.9 percent over the age of 50 had polyps greater than 0.5 cm [18]. In the present study, the overall yield for polypoid lesions in the asymptomatic population, 13 percent, was similar to that in the symptomatic group (15.4 percent). We found adenomatous polyps in 7.4 percent of the asymptomatic group and in a similar incidence (9.1 percent) in a symptomatic group of similar age and sex ratio. This yield approaches the autopsy incidence for adenomatous colonic polyps greater than 0.5 cm of 12 percent [19]. The incidence of colonic diverticuli was also not significantly different in our two populations (10.0 percent in symptomatic and 13.1 percent in asymptomatic). These data imply that the aging bowel can be expected to harbor polypoid lesions and diverticular disease independent of the presence of symptoms or signs suggestive of these lesions.

The finding that 86 percent of polypoid lesions and 83 percent of adenomatous polyps were beyond the average rigid examination distance of 20 cm highlights the diagnostic value of flexible sigmoidoscopy in asymptomatic patients. Based on the doubling time of colonic cancers, three to four years would be required for premalignant adenomas that begin *de novo* to reach a critical size for developing into malignant lesions [20]. The frequency of flexible sigmoidoscopy can probably be reduced to every three to five years, consistent with the most recent American Cancer Society recommendations [21], and, as necessary, coupled with interval fecal occult blood testing.

No complication occurred and our experience now is in excess of 1,000 cases. Most colonoscopic perforations tend to occur in the sigmoid colon and are related to forces generated by mechanical stretching and bowing of the antimesenteric wall during attempted advancement of the instrument tip more proximally in the colon. These additional forces are usually not generated in the limited insertion required for flexible sigmoidoscopy. One perforation has, however, been reported in the literature and occurred in the setting of an elderly patient with a fibrostenotic diverticular lesion [22].

Our results were achieved by physicians skilled in this examination. The procedure should only be performed after physicians have undertaken appropriate training. The impressive findings demonstrated in our study suggest that a wide clinical application of flexible sigmoidoscopy may be indicated. This would require that provisions should be made for adequate training opportunities for internists and surgeons so that they may become adept in the use of the instrument.

ACKNOWLEDGEMENTS

The authors thank the Gastroenterology Trainee physicians who assisted in the performance of these studies; Carolyn Contino, Bonnie Kuljian, and Laurie Huntoon for technical support; Emanuel Lerner, M.A., for statistical advice; Fleet Company for providing a supply of enemas; and Frances Taylor for secretarial assistance.

REFERENCES

1. Bohlman TW, Katon RM, Lipshutz GR, et al: Fiberoptic pansigmoidoscopy: an evaluation and comparison with rigid sigmoidoscopy. *Gastroenterology* 72:644-649, 1977
2. Winnan G, Berci G, Panish J, et al: Flexible fiberoptic proctosigmoidoscopy versus rigid proctosigmoidoscopy as a routine diagnostic procedure. *New Eng J Med* 302:1011-1012, 1980
3. Snedecor SW, Cochran WG: *Statistical Methods*. Sixth Edition. Ames, Iowa, Iowa State University Press, 1971
4. Nivatvongs S, Fryd D: How far does the procto sigmoidoscope reach? A prospective study of 1000 patients. *New Eng J Med* 303:380-382, 1980
5. Winawer SJ, Sherlock T, Schottenfeld D, et al: Screening for colon cancer. *Gastroenterology* 70:783-789, 1976
6. Welch JP, Donaldson GA: Recent experiences in the management of cancer of the colon and rectum. *Am J Surg* 127:258-266, 1974
7. Cameron AB, Thabet RJ: Sigmoidoscopy as part of routine cancer clinic examinations with correlated fecal chemistry and colon cytology studies. *Surgery* 48:344-350, 1960
8. Crumpacker EL, Baker JP: Proctosigmoidoscopy in periodic health examinations. *JAMA* 178:1033-1035, 1961
9. Christianson HW, Tenner RJ: Results of sigmoidoscopic examination at a cancer detection center: a two year study. *Am J Surg* 1:14-17, 1951
10. Enquist IF: The incidence and significance of polyps of the colon and rectum. *Surgery* 52:681-688, 1967
11. Abramson DJ: *Cancer J Clin*, No. 4:202-210, 1978
12. Hoelleb AL: Editorial: Public awareness of cancer detection tests: Results of a recent Gallup poll. *Cancer* 27:255-256, 1977
13. Rubin P: Cancer of the gastrointestinal tract: colon, rectum, anus. Introduction. *JAMA* 231:513-516, 1975
14. Cady B, Persson AU, Monson DO, et al: Changing patterns of colorectal carcinoma. *Cancer* 33:422-426, 1974
15. Synder CN, Heston JH, Meigs JW, et al: Changes in site distribution of colorectal carcinoma in Connecticut 1940-1973. *Am J Dig Dis* 22:791-797, 1977
16. Madigan MR, Halls JM: The extent of sigmoidoscopy shown on radiographs with special reference to the rectosigmoid junction. *Gut* 9:355-362, 1968
17. Goldsmith O, Frankel H, Gerety D, et al: Fiberoptic sigmoidoscopy in an asymptomatic population. *Gastroin Endo* 23:228, 1977 (Abst)
18. Lipshutz GR, Katon RM, McCool MF, et al: Flexible sigmoidoscopy in an asymptomatic population: an effective screening program for polyps. *Gastroin Endo* 24:204, 1978 (Abst)
19. Arminski TC, McClean DW: Incidence and distribution of adenomatous polyps of the colon and rectum based on 1000 autopsy examinations. *Dis Colon Rectum* 7:249-261, 1974
20. Spratt JS, Ackerman LV: Pathologic significance of polyps of the rectum and colon. *Dis Colon Rectum* 3:330-335, 1960
21. ACS report on the cancer-related health checkup. *Cancer* 30:208-215, 1980
22. Marks G, Boggs HW, Castro AF, et al: Sigmoidoscopy examinations with rigid and flexible fiberoptic sigmoidoscopes in the surgeon's office: A comparative prospective study of effectiveness in 1,012 cases. *Dis Colon Rectum* 22:162-168, 1979