ORIGINAL ARTICLE

Same-Day Examination by Gastric and Sigmoid Endoscopy for Multiphasic Health Testing and Services

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ABSTRACT

Purpose The endoscopic examination has been increasingly performed in the initial stage of the screening in medical checkups in Japan, but there were few studies with regard to same-day screening for gastric and colon cancers using endoscopy. The aim of the present study was to assess the usefulness and shortcomings of same-day examinations by endoscopy of the stomach and colon.

Materials and Methods The examination for gastric cancer was performed using a panendoscope in about 10 examinees in the morning. A new small caliber electronic panendoscope with outer diameter of 6 mm was used as a transnasal gastric endoscope because of the increased safety and decreased invasiveness. Immediately after gastric endoscopy, sigmoidoscopy carried out using a small-caliber videocolonoscope for detection of colon cancer. An immunological fecal occult blood test (FOBT) was also performed by a 2-day method for colon cancer screening. The subjects consisted of 3,218 examinees, 1,461 men and 1,757 women with a mean age of 46.8 years old. The questionnaire for evaluation of the same-day endoscopy was collected from consecutive 1,459 examinees.

Results Gastric endoscopy found early gastric cancer in 4 cases (0.12%) and esophageal cancer in 1. Colon cancer screening revealed colon cancer in 7 cases (0.22%); of these, intramucosal carcinoma was found in 6 cases and invasive cancer in 1. In addition, adenomatous polyp was detected in 209 cases (6.5%); of those 209 cases, FOBT was positive in only 10.5%. The results of the questionnaire indicated that the examination was generally acceptable as a mass screening.

Conclusion The same-day gastric and colon endoscopy system has an acceptable degree of accuracy and can be recommended as effective for routine screening of digestive tract cancer in relatively limited subjects coming to multiphasic health testing and services.

Key Words Gastric Cancer Screening; Colon Cancer Screening; Endoscopy; Sigmoidoscopy; Multiphasic Health Testing and Services

INTRODUCTION

Mass screening for colon cancer has been performed by a combination of the fecal occult blood test (FOBT) and flexible sigmoidoscopy at our institute, Coloproctology Center, Takano Hospital, for the past 16 years, at which more than 200,000 screenings were performed. A multiphasic health testing and service started in the department of the hospital which performs routine medical check-ups, that is, “Takano Human Dry Dock,” in 1992, which included the previous program of mass screening of colon cancer. Part of the testing consists of same-day examination by gastric and colon endoscopic procedures. Recently, endoscopic examinations have been increasingly performed as initial screening in medical checkups in Japan, but to our knowledge there has been no study with regard to same-day screening for gastric and colon cancers using endoscopy. Usually these procedures are performed on separate days. The aim of the present study was to assess the usefulness and shortcomings of same-day examinations by endoscopy of the stomach and colon.

MATERIALS AND METHODS

Study design

Mass screening was performed for gastric and colon cancers as a part of a multiphasic health testing and services at the Takano Human Dry Dock. About 10 persons per day were examined for gastric cancer in the morning using a panendoscope, immediately after which sigmoidoscopy was performed using a small-caliber endoscope for detection of colon cancer. An immunological FOBT (OC-Hemodia, Eiken Chemical Co., Ltd., Tokyo, Japan) was performed by the 2-day method for cancer screening (Fig. 1). Feces for the FOBT were kept in a refrigerator after samples were taken at home on the day before and the day of the examination as a rule.

Gastric cancer screening was performed using a routine panendoscope (GIF-XQ200, Olympus, Tokyo, Japan). However, since June, 1993, a small caliber panendoscope has been used as a transnasal gastric endoscopy for mass screening of the aged because of the increased safety and decreased invasiveness associated with this instrument. The small caliber panendoscope was employed at the option of the subjects after provision of informed consent.

Fig. 1 Screening for digestive tract cancer.

Fig. 2 Transnasal insertion of a small-caliber panendoscope.
Fig. 3 The same-day gastric and colon endoscopy system.

For endoscopy of the colon, a small caliber videocolonoscope (PCF-200 or PCF-230, Olympus, Tokyo, Japan) was used to observe the colon up to the sigmoid. Before colon examination immediately after gastric endoscopy, a glycerin enema was given as pretreatment. Digital examination of the rectum and anal examination with a proctoscope were performed to check for anal disease, such as internal hemorrhoids, immediately before the colon examination (Fig. 3). On average, only 3 minutes were required for the entire examination.

The endoscopists participating in this study were selected from among doctors who had experienced more than 1,000 cases for gastric endoscopy and 500 for sigmoidoscopy.

Table 1 Number and incidence of lesions detected by the same-day examination by gastric and sigmoid endoscopy.

<table>
<thead>
<tr>
<th>Lesion</th>
<th>No. of lesions</th>
<th>Incidence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early gastric cancer</td>
<td>4</td>
<td>0.12</td>
</tr>
<tr>
<td>Esophageal cancer</td>
<td>1</td>
<td>0.03</td>
</tr>
<tr>
<td>Gastric ulcer</td>
<td>125</td>
<td>3.88</td>
</tr>
<tr>
<td>Gastric polyp</td>
<td>46</td>
<td>1.43</td>
</tr>
<tr>
<td>Duodenal ulcer</td>
<td>42</td>
<td>1.31</td>
</tr>
<tr>
<td>Duodenal polyp</td>
<td>10</td>
<td>0.31</td>
</tr>
<tr>
<td>Colorectal cancer</td>
<td>7</td>
<td>0.22</td>
</tr>
<tr>
<td>Colorectal polyp</td>
<td>209</td>
<td>6.49</td>
</tr>
</tbody>
</table>

Subjects
The subjects consisted of 3,218 persons, 1,461 men and 1,757 women, who presented to the medical checkup department of our hospital for the 3 years from April, 1992 to March, 1995. Figure 4 shows the distribution of age and gender; mean age was 46.8 years and those in their forties were the largest age group examined, comprising 38.9% of subjects. The questionnaire for evaluation of same-day endoscopy was collected from 1,459 consecutive persons from April 1992 to August 1994.

RESULTS
The results of the examinations are shown in Table 1. Gastric endoscopy found early gastric cancer in 4 cases (0.12%) and esophageal cancer in 1. Colon cancer screening revealed colon cancer in 7 cases (0.22%); of these, intramucosal carcinoma was found in 6 cases and invasive cancer in 1. In addition, adenomatous polyp was detected in 209 cases (6.5%); of those 209 cases, FOBT was positive in only 10.5%.

Table 2 lists clinical and pathological findings in the 7 identified cases with colon cancer. The patient with invasive cancer (TNM classification: T3N0M0) had a positive FOBT. Of the 6 cases with intramucosal carcinoma (Tis), the FOBT was positive in only 2. Case 2 had a minute carcinoma (2mm in diameter), which was the smallest colon cancer among the minute carcinomas (less than 5mm in diameter) observed in our hospital. In case 3, a small polyp was found in the sigmoid colon by sigmoidoscopy, and a subsequent examination detected cecum cancer.

Table 3 shows the results of the questionnaire for evaluation of the subjects’ perception of the endoscopic examination. “Felt examination was easy” was the answer by 645 persons (44.2%), “abdominal distension and felt ill after the examination but no pain” by 455 cases (31.2%), “felt slight pain” by 261 persons (17.9%), “felt pain but bearable if once a year” by 98 (6.7%), and “would never have the examination again” by no examinee. These responses indicated that the examination was generally acceptable as mass screening.

DISCUSSION
In 1997, mortality was 49,732 for gastric cancer and 33,194 for colon cancer in Japan, which was equivalent to 18.1% and 12.1% of total cancer mortality, respectively, indicating that about one third of cancer deaths resulted from these cancers. Estimated morbidity from gastric cancer was 110,039 persons in 1990 and 134,268 persons in 2000, which was a 20% increase over the 10 years. On the other hand, that of colon cancer was 53,274 per-
sons in 1990 and 88,453 in 2000, which was a 70% increase for the same period. The sum of predicted morbidities for both gastric and colon cancers is estimated as 39.4% of that of total cancers for men and 33.1% for women. Thus, there is a trend toward increased morbidity from gastric and colon cancers with the recent remarkable aging of the population and westernization of the diet in Japan. Therefore, formulating policies for reducing both cancers is an important issue in health care. A more effective and accurate method is needed for mass screening of gastric and colon cancers.

In Japan, for more than 30 years, mass screening for gastric cancer has been performed chiefly by X-ray examination. The indirect X-ray method has played an important role in decreasing mortality from gastric cancer, but this method has been reevaluated because of the discrepancy between results and efficiency. Recently, endoscopic examination has been introduced in place of X-ray. Mass screening by endoscopy has been superior to X-ray for detection of gastric cancer, and especially of early cancer. It was reported that the detection rate of gastric cancer was 0.11% and the ratio of early cancer was 54.4% by X-ray mass screening, while the former was 0.33% and the latter 71.6% by endoscopy. Since the sensitivity of immunological FOBT for invasive cancer was reported to be 71.4% using the 1-day method and 84.7% with the 2-day method, 15% of invasive cancers are overlooked even if the latter method were applied. It is known that approximately three fourths of colon cancer is located in the rectum and sigmoid. Thus, sigmoidoscopy alone can detect about three fourths of colon cancer, but a lesion in the proximal colon may be overlooked because that region is out of the reach of the endoscope. Since it is known that about two thirds of middle stage cancer that is overlooked by FOBT is located in the rectum and sigmoid, the combination of FOBT and sigmoidoscopy will supplement the weak points of each method.

This combination has been in use as the initial examination in routine screening of colon cancer in our hospital since 1983. The detection rate of colon cancer, including intramucosal carcinoma and invasive cancer, was 0.55% in patients examined for the first time. Mitsushima et al. reported results of screening for colon cancer by total colonoscopy in 18,044 persons; colon cancer, including intramucosal carcinoma and invasive cancer, was found in 0.54% of subjects. These results cannot be simply compared with our data since the individuals in their group were younger than those in our group, but accuracy of the combination of FOBT and sigmoidoscopy may be comparable to the accuracy of total colonoscopy. It has been reported, on the other hand, that among the cases in whom polyp was detected in the distal colon up to the sigmoid, approximately 30% demonstrated another lesion in the proximal colon. One case with early cancer in the present study is an example of such a finding. Since with total colonoscopy troublesome pretreatment is unavoidable and much time and skill is required, it may be difficult to widely employ this method as a primary screening measure. However, the combination of FOBT and sigmoidoscopy would be preferable for primary screening of colon cancer because of the minimal pretreatment, simple technic and

### Table 2 Clinical and pathological features of colon cancer detected by the same-day gastric and colon endoscopy system.

<table>
<thead>
<tr>
<th>Cases</th>
<th>Location of Lesion</th>
<th>Configuration</th>
<th>Diameter (mm)</th>
<th>TNM Classification</th>
<th>Fecal occult blood test</th>
<th>Surgical procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Man</td>
<td>Rectum</td>
<td>2 type</td>
<td>65</td>
<td>T3N0M0</td>
<td>Positive</td>
<td>Operation</td>
</tr>
<tr>
<td>2 Man</td>
<td>Sigmoid</td>
<td>Sessile</td>
<td>2</td>
<td>Tis</td>
<td>Negative</td>
<td>Hot biopsy</td>
</tr>
<tr>
<td>*3 Man</td>
<td>Cecum</td>
<td>Flat</td>
<td>20</td>
<td>Tis</td>
<td>Negative</td>
<td>Polypectomy</td>
</tr>
<tr>
<td>4 Man</td>
<td>Descending</td>
<td>Pedunculated</td>
<td>40</td>
<td>Tis</td>
<td>Positive</td>
<td>Polypectomy</td>
</tr>
<tr>
<td>5 Man</td>
<td>Sigmoid</td>
<td>Sessile</td>
<td>7</td>
<td>Tis</td>
<td>Negative</td>
<td>Polypectomy</td>
</tr>
<tr>
<td>6 Man</td>
<td>Sigmoid</td>
<td>Sessile</td>
<td>12</td>
<td>Tis</td>
<td>Negative</td>
<td>Polypectomy</td>
</tr>
<tr>
<td>7 Woman</td>
<td>Sigmoid</td>
<td>Pedunculated</td>
<td>10</td>
<td>Tis</td>
<td>Positive</td>
<td>Polypectomy</td>
</tr>
</tbody>
</table>

(*: a small polyp was found in the sigmoid colon by sigmoidoscopy.)
short procedure time.

The same-day examination by gastric and sigmoid endoscopy was evaluated by a questionnaire administered to those examined. Nearly half (44.2%) answered “felt examination was easy” and about one third (31.2%) noted “abdominal distension and feeling ill after the examination but no pain.” No one answered “would never have the examination again”. Many of those answering “felt examination was easy” had undergone gastric endoscopy previously. This screening method is apparently acceptable to examinees.

Currently, one endoscopist is performing same-day gastric and sigmoid endoscopies in approximately 10 individuals per day, with the maximum capacity of one examiner being 15 per morning. It is desirable to limit the number of examinees to no more than 15 individuals per day to avoid the risk of pain and other complications and of overlooking concealed lesions. In response to recent concern over endoscope sterilization, we are performing a series of washings with water and disinfection with alcohol and 2% glutaraldehyde to prevent acute gastric mucosal lesion (AGML) and other infections after endoscopy. This procedure takes several minutes, which is one of the reasons the number of examinations is limited to no more than 15 individuals in the morning. We have experienced no cases of AGML after endoscopy.

Same-day gastric and sigmoid endoscopy will become one of the most effective screening strategies for digestive organ cancer, but there are some problems regarding the number of tests that can be realistically done in a clinical situation. To solve these problems, it is important to determine how to best use the merits of both X-ray examination and endoscopy for gastric cancer screening. Hamahata et al. compared direct X-ray examination and endoscopy for work-up examinations after cancer mass screening by indirect X-ray examination according to detection rates of gastric cancer and early gastric cancer and the ratio of early gastric cancer to total gastric cancer. The detection rate increased with aging in both the direct X-ray examination and endoscopy groups. Detection rates were higher with endoscopy than with direct X-ray for both gastric cancer and early gastric cancer, as was the ratio of early gastric cancer. Differences were not large, but became greater with aging, especially in persons over 65 years. The accuracy of X-ray examination in the aged is liable to decrease because of hearing problems, since instructions on change of body position and breath holding must be heard to achieve fine X-ray films; however, endoscopic examination is not dependent on those factors. On the other hand, the fact that those differences were minimal in young people may suggest that X-ray examination is by no means inferior to endoscopic examination in accuracy as a work-up examination, provided that patients do not have difficulty in carrying out instructions on change in body position. Kusano et al. advocated the importance of persuading persons in a high risk group for gastric cancer, which is defined as advanced age and male, to undergo a screening examination. Thus, it is likely that persons more than 60 years old, especially aged males and those undergoing a first examination, should have an endoscopic examination, particularly using the transnasal gastric endoscope characterized by minimal invasiveness, for primary screening of gastric cancer. In younger groups, however, it may be acceptable to use a routine X-ray examination for primary screening.

In colon cancer screening, the interval of sigmoidoscopic examinations has been extended. Guidelines in western countries recommended every year FOBT and every 5-year sigmoidoscopy. Rex et al. reported the results of the second sigmoidoscopy (3.4 years on the average after the first) in 259 asymptomatic subjects with average risk who were more than 50 years old and had no abnormality detected by the first sigmoidoscopy. The second sigmoidoscopy showed a significantly lower rate of adenoma detection compared with the first, and there were no cases of colon cancer and high-grade atypical adenoma. From these results, they proposed that the interval of sigmoidoscopy be extended to every 5 years, provided that the subjects had average risk and no abnormality at the first examination. Our previous report concluded that endoscopic surveillance of colon cancer can be extended to more than 5 years, based on the relationship between the interval and number of examinations and detection rate of cancer. Therefore, a program of colon cancer mass screening is considered to be effective and efficient in which the first examination is performed by sigmoidoscopy, especially in subjects more than 50 years old, that FOBT is done every year for 3 to 4 years, and the second endoscopy is performed 4 or 5 years after the first one. Problems related to the number of routine screenings and shortage of manpower for endoscopy will be solved by selecting either endoscopy or X-ray examination for gastric cancer screening and by establishment of an effective interval for performance of sigmoidoscopy for colon cancer screening.

CONCLUSION

The results of same-day gastric and sigmoid endoscopy were described as a system of routine screening for digestive tract cancer. This examination system seems to fully match the needs of a modern society, whereby accuracy of the screening examination is as good as possible and the time utilized as short as possible. One of many future tasks in multiphasic health testing and services is the switching over from mass screening to individual screening. The present system as described has an acceptable degree of accuracy and can be recommended as effective for routine screening of digestive tract cancer in relatively limited subjects coming to multiphasic health testing and services but is not suitable for large-scale screening.

REFERENCES


