SCREENING FOR COLORECTAL CANCER IN SINGAPORE

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ABSTRACT

The incidence of colorectal cancer in Singapore has risen relentlessly since 1955. Today, the large bowel is the most frequent gastrointestinal cancer site among both men and women. Survival with this cancer has shown little improvement during this period. The prospects for further reduction in mortality through more radical surgery, adjuvant radiotherapy, chemo- or immunotherapy remain limited. Theoretically, detection of colorectal cancer at an earlier stage or detection of its precursors will reduce mortality. Screening for colorectal cancer is advocated to achieve this end. Success with screening programmes will depend on the diffusion of current knowledge about this disease to both health professionals and the general public.

Keywords: Screening, asymptomatic persons, colorectal cancer

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INTRODUCTION

There have been remarkable changes in disease patterns in Singapore over the last forty years. Improvement in the health care delivery system has led to a decline in mortality, especially from infectious and cardiovascular disease. However, mortality from cancer has been rising steadily. The age standardized mean annual cancer death rate in Singapore increased from 96.4 per 100,000 in 1955 to 146.9 per 100,000 in 1982 and continues to rise. An important component of this rising trend is the rapid increase in incidence of large bowel cancer in both sexes; in females, this malignancy is now the second commonest cancer in Singapore. The age-standardized incidence rate per 100 000 per year rose from 19.9 during the period 1968-72 to 26.8 in 1978-82 for males, and for females it rose from 15.7 to 24.9 over the same time frames[1].

Over the last few decades, mortality from colorectal cancer has not improved significantly. Survivals with this cancer is dependent on the stage of the disease at diagnosis. Five year survival rates are as high as 85-90% for Dukes stage A and B_1 lesions but as low as 5% to 30% for Dukes C and D[2]. Treatment of advanced cancer by surgery, radiotherapy, chemo- and immunotherapy adds little to survival. The most promising approach to reducing mortality from this cancer is early detection.

The adenoma-carcinoma sequence is well established as the dominant mode of large bowel carcinogenesis[3]. Detection and removal of adenomatous polyps can reduce colorectal cancer incidence. Detection of cancer at early stages also may prevent cancer mortality[4-11]. Screening trials have consistently demonstrated effectiveness in detection of colorectal polyps and cancer at early stages (Table I). Whether or not screening reduces mortality, however, remains unanswered.

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COLORECTAL CANCER SCREENING METHODS

There is at present no widely accepted screening test for colorectal cancer. Screening methods must be acceptable to patients and must also meet professional standards. They must be rapid, safe, sensitive and inexpensive. Several methods have been studied extensively, but the search for a simple and more accurate means of cancer detection continues.

(a) Faecal Occult Blood Testing (FOBT)

FOBT is simple and easy to carry out. Previous tests based on either benzidine or orthotolidine (Haematest) were abandoned because they were too sensitive and were feared to be carcinogenic when handled. These have been replaced more recently by guaiac (Haemoccult). As these tests detect an elevation apart from the normal daily loss of blood of 0.6-1.2ml/day, testing over several days increases the chances of detecting lesions that bleed intermittently[12,13]. Testing for occult blood, in many studies, has been limited by

Table I
Distribution of Colorectal Cancer Detected on Screening by Dukes' Staging

	Source	Screened population				Control population			
		Dukes' Staging							
		A	B	C	D	A	B	C	D
1.	Gilbertsen(4) 1980	65%	13%	16%	5%	---- N.A. ----			
2.	Hardcastle(5) 1986	60%	20%	10%	10%	0%	47%	35%	18%
3.	Kronberg(6) 1987	39%	33%	14%	13% unclass. 1%	5%	50%	18%	22% unclass. 5%
4.	Kewenter(7) 1988	21%	25%	36%	18%	15%	25%	35%	25%
5.	Hardcastle(8) 1989	31%	30%	19%	19%	11%	32%	32%	21%
6.	Fujita(9) 1989	49%	21%	30%	--	14%	19%	67%	--
7.	Khubchandani(10)	33%	37%	26%	4%	---- N.A. ----			
8.	McGarrity(11) 1989	27%	27%	16%	3% insitu = 24% unclass. = 3%	---- N.A. ----			

N.A. – not available
unclass. – unclassified

poor compliance with both specimen collection and dietary restrictions. Newer immunological methods, including radioimmunoassays, that are specific for the detection of human haemoglobin are recently advocated. Although these tests do not require any dietary restrictions, they are more difficult to perform[14,30].

Haemoccult screening in asymptomatic patients has been reported in several studies to have a positive rate of 9.0 to 17.1 per 1000 although false positive results reduced the positive predictive value[14]. In patients with colorectal cancer, the sensitivity of guaiac-based tests has ranged from 65% to 90%; false negative rates vary inversely with sensitivity[15]. In a study by Farrands and Hardcastle (1983) of patients with known colorectal cancer, the sensitivity of FOBT testing over 3 days using Haemoccult was 72%[16]. When testing was extended to 6 days, sensitivity was increased to 90%. To maximise specificity, patients are instructed to follow a meat free, high residue diet during the 2 days prior to testing and to avoid oral iron and vitamin C supplements, aspirin and nonsteroidal anti-inflammatory drugs[16].

Simons[17] reviewed Haemoccult test screening studies and found that the reported positive rates were 0.5 -14% (median 3%) with associated positive predictive values for cancer of 0-16% (median 6%) and for adenomatous polyps of 1-35% (median 14%). The chance of detecting a colorectal cancer with a single test for occult blood is less than 50%[18].Therefore a negative FOBT should not be taken as a conclusive result in an asymptomatic person; digital anorectal examination and endoscopy may be necessary for completeness.

The FOBT is not essential for patients who are symptomatic for bowel complaints as they should be screened by Barium enema study/colonoscopy.

(b) Barium Enema Study and Endoscopic Assessment of the Large Bowel

Eddy (1987) has used operation analysis to determine that barium enema with proctosigmoidoscopy and colonoscopy are equal in value in detecting life threatening disease[19]. Several studies have indicated that colonoscopy is superior to double contrast barium enema[20,21]. Barium study may not reveal lesions located at certain areas, such as the flexures or smaller lesions, and is less reliable in diagnosing mild inflammation or assessing the extent of disease. Endoscopy has the advantage of permitting removal and biopsy of adenomatous polyps, other benign lesions, and abnormal and suspicious areas of mucosa. The choice between these procedures should be based on specific circumstances including cost, availability, accessibility, and physician judgement.

As endoscopic instrumentation improves, sigmoidoscopy and total colonoscopy are becoming simpler and cheaper. However, total colonoscopy is not recommended for assessing asymptomatic patients as it is still not cost-effective. For symptomatic patients, colonoscopy serves as both a diagnostic and therapeutic tool for more complete assessment of the large bowel.

(i) Flexible and rigid sigmoidoscopy

Sigmoidoscopy has been advocated as an initial screening tool because about 40-60% of colorectal cancers and polyps occur within the reach of the 30cm sigmoidoscope[22, 23]. The value of the rigid scope is limited by the frequent inability to pass the instrument beyond 20cm[24]. The flexible sigmoidoscope is a better screening tool because it can be used without sedation or meticulous bowel preparation and permits assessment of the left colon up to 60cm[23, 25]. Bolt (1971) found one cancer out of every 435 individuals in a review of 18,335 procto-sigmoidoscopies in asymptomatic patients and noted that the 5 year survival was higher in cancer detected by screening[26]. A recent study in the United States yielded polyps in 5.5% of asymptomatic patients[27]. Foley (1987) identified adenomatous polyps in 17.2% of 500 asymptomatic patients; 2.8% of these polyps were > 1 cm in size, and cancer was found in 0.6%[28].

(ii) Colonoscopy

Undoubtedly, colonoscopy is the best means of accurately assessing the entire large bowel and provides access for biopsy of abnormalities and endoscopic excision of polyps. However, it is invasive, time-consuming and heavily expertise-dependent. The patient must undergo an uncomfortable bowel preparation. Colonoscopy has a slightly higher rate of complications the barium enema[29]. It is thus most suitable for screening those at high risk or asymptomatic patients with a positive FOBT.

Secondary Benefits of Screening for Colorectal Cancer

In addition to facilitating detection of early colorectal cancer or its precursors, screening has other benefits. It permits diagnoses of other colorectal diseases, such as diverticular disease, vascular malformation, inflammatory bowel disease, parasitic infestation and anorectal conditions (eg. haemorrhoids). Futher workup of asymptomatic patients with a positive FOBT may lead to detection of peptic ulcer disease and benign/malignant lesions of the upper gastrointestinal tract.

The digital rectal examination during screening also may help the physician to detect abnormalities of the prostate in males or of the cervix, uterus or pouch of Douglas in females.

GUIDELINES FOR COLORECTAL CANCER SCREENING

Both the public and the medical community need to be made aware of the clinical presentation of this disease and be encouraged to participate in effective screening programmes for asymptomatic persons.

(a) Asymptomatic Persons

Asymptomatic persons who are aged 40-50 years should have a careful digital examination of the anorectum and a faecal occult blood test annually. Positive findings lead to follow-up assessment including a barium enema study and/or total colonoscopy.

For persons over age 50 years, screening should have a barium enema/proctosigmoidoscopy repeated every 3-5 years if two consecutive annual examinations are normal.

(b) Asymptomatic Persons at High Risk For Colorectal Cancer

Persons who have first-degree relatives with colorectal cancer or who previously have had cancer of the genito-urinary tract or breast are considered to be at slightly increased risk of colorectal cancer. They should begin screening at age 40, with annual digital anorectal examination, annual faecal occult blood testing and barium enema/colonoscopy every 3-5 years, after 2 negative yearly examinations.

Those at moderately increased risk are persons with a previous history of colorectal cancer/adenomatous polyps or with a family history of cancer family syndrome or heredofamilial breast cancer with colon cancer. Those with a previous history of colorectal cancer or polyps should begin screening at the time of diagnosis of the colorectal neoplasm. Where there is a family history of an inherited cancer syndrome, screening should begin at age 20 and consist of yearly faecal occult blood test, rectal examination and barium enema/colonoscopy every 1-3 years after 2 negative yearly examinations. Persons with a family history of a familial polyposis syndrome (familial adenomatous polyposis, Turcot and Gardner's syndromes) or inflammatory bowel disease are at high risk for the development of colorectal cancer. Screening should begin at puberty (12 years) for those in the polyposis syndromes and after 8 years of pancolitis. A yearly sigmoidoscopy with total colonoscopy every 1-3 years is recommended. Colectomy is strongly recommended at the onset of polyposis or diagnosis of dysplasia in patients with colitis.

CONCLUSION

Several controlled studies of population screening are currently in progress and these are likely to make definite contributions to the debate on the value of screening for colorectal cancer[4,6-8]. These also will address the question of reduction of mortality through detection of earlier stage cancers. Although screening studies may be affected by length and lead-time bias, screening brings to light at least some early cancers that are amenable to curative resections. Large bowel cancer differs from lung cancer, with its very low 5 year survivals, and from breast cancer with its treatment failures after 5 years. The effectiveness of screening in detecting earlier-stage colorectal lesions has been shown consistently. It is therefore reasonable to expect screening to result in a downward shift in the stage at which cases are detected in Singapore. Screening may thus lead to a reduction in mortality from colorectal cancer. A screening programme in Singapore is definitely needed to achieve this end.

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