Abstract

Colorectal cancer (CRC) is a leading cause of cancer death around the world. An effective way to reduce colorectal cancer mortality is to screen for it and its precursor, the adenoma. In industrialized countries the mortality related to CRC is lowering probably due to screening programs in average-risk individuals as well as changes in risk factors. Screening procedures are various including fecal screening tests - which primarily detect colon cancer - and structural tests (endoscopy - flexible sigmoidoscopy or colonoscopy -, Barium enema, Computed Tomography Colonography) that may detect not only cancer but also precursors. Video colon capsule is a new tool for exploring the colon but needs further studies before becoming a screening test. There is a lack of specific studies based in the setting of screening. The current indications for colon capsule are: if colonoscopy is impossible for technical reasons, contraindications to colonoscopy or if the patient is reluctant to undergo high-definition colonoscopy. The choice of a screening tests include several factors as cost, invasiveness, acceptability, adherence to repeat test and to accept referral for colonoscopy for positive tests as well as local financial resources. Every screening program has advantages and limitations. Enhancing use and quality of CRC screening programs is mandatory.

Introduction

Colorectal cancer (CRC) is the second leading cause of cancer death in Western Europe and in North America. The lifetime risk of developing CRC is about 5% in industrialized countries; the mortality rate is 50% at 5 years after diagnosis. The risk of developing CRC mainly increased after the age of fifty years but probably later for women than men and is doubling after each decade up to the eighties. The majority of CRC cases are believed to arise from adenomatous polyps that progress over the course of many years to invasive adenocarcinoma.

It is estimated that 100 out of 1,000 adenomas could reach the size of 10 mm; one quarter of these last ones could progress up to adenocarcinoma.

Although life expectancy and obesity - that is considered as a risk factor for cancer - have increased during the last 3 decades, there was a decline in mortality and in incidence of CRC.
It is highly probable that the increased practice of CRC screening contribute to this trend; however, other factors might also have an impact on CRC incidence such as the use of hormone replacement therapy in women at the onset of menopause as well as the large use of low-dose aspirin and NSAIDs, that are expected to reduce the risk of colon polyps and CRC.\textsuperscript{4}

The prevalence of adenomas, advanced cancer (an adenoma \textgreater{} 1 cm in size or any adenoma with villous features or high-grade dysplasia) or CRC are 28%; 8.1% and 0.6%, respectively.\textsuperscript{2}

CRC screening should be adapted according to the risk. Indeed, large screening programs are proposed to average-risk individuals including persons older than 50 y.

The group of patients with moderate risk includes individuals with personal or familial history of colon polyps or colorectal cancer as well as patients with long-standing inflammatory bowel diseases (Crohn’s disease and ulcerative colitis), patients with acromegaly and patients with ureterosigmoidostomy.

There is also a group of diseases considered to be at high risk: hereditary non-polyposis colorectal cancer, familial adenomatous polyposis, Mutyh-associated polyposis, juvenile polyposis and Peutz-Jeghers syndrome.

Guidelines for CRC screening and surveillance in moderate and high risk group have been recently updated by the British Society of Gastroenterology.\textsuperscript{5}

In this paper we mainly underline the screening procedures in medium-risk patients.

\textbf{Methods for CRC screening tests}

\textbf{Fecal screening tests}

Fecal screening tests can be performed at home and include methods detecting fecal occult blood (fecal occult blood test or FOBT) or specific DNA in stool. These tests are expected to detect the presence of colon neoplasia. Colonoscopy is recommended for patients with positive tests.\textsuperscript{6,7}

Fecal tests can detect only stage cancer in asymptomatic patients who undergo repeat testing (every 1 or 2 years) but do no detect precursor lesion such as polyp. It has been shown that a systematic and repeated fecal testing may reduce the mortality related to CRC. The global results of screening campaign based of fecal testing are function of the population, adherence to repeat fecal testing and acceptability to undergo a total colonoscopy in patients with a positive test.

\textbf{Structural examinations of the colon}

1. \textit{Flexible sigmoidoscopy (FS)}

It is a direct endoscope of the distal part of the colon. If a polyp is discovered during FS, a complete colonoscopy is mandatory. Atkin et al recently reported the results of long-term follow-up (11.2 y) comparing a group of patients who undergone a FS screening between 55 and 64 y or no screening. FS was shown to be safe, practical test and offered only once between ages 55 and 64 years, confers a substantial and longstanding benefit.\textsuperscript{8}

However, studies of screening colonoscopy have shown that more than 30% of patients with advanced neoplasia have only proximal lesions that would not be identified by sigmoidoscopy.\textsuperscript{7} Indeed, the relative prevalence for right-versus left-sided tumors increases with increasing age, a differential effect most striking in women.\textsuperscript{9}
2. Colonoscopy

Colonoscopy is a complete examination of the colon that offers the possibility to resect polyps or to take biopsies. Colonoscopy requires a strict bowel preparation and in many countries is performed on general anesthesia as Propofol.

Although it is not totally proven, colonoscopy is considered as an accurate test for screening. The use of colonoscopy as screening must take into consideration the potential complications related to the method itself or to polypectomy of small polyps.

Over the last decade, substantial progress has been made in colonoscopy imaging including high chromoendoscopy or microscopic endoscopy. Performance issues of colonoscopy include the rate of interval cancers after colonoscopy, detection of flat polyps, adverse events, and indications of quality.

3. Capsule endoscopy

Videocapsule endoscopy has been launched 10 years ago for exploring the small bowel. This method has been adapted for exploring the colon. The Pillcam colon capsule (Given Imaging, Israel) of second generation has a dual cameras at both ends, has optics with a wide coverage of 172 degrees, automatic light control and provides an adaptive frame rate, alternating between 4 to 35 frames per second when in motion.

After 2 pilot studies, a large multicenter European trial with the first generation of colon capsule showed that sensitivity and specificity of the colon capsule for detecting polyps that were 6 mm in size or bigger were 64% and 84%, respectively. A recent study using the second generation of the colon capsule showed a sensitivity reaching 85%. That was confirmed in an multicenter European trial. Future studies are needed before proposing this method as a CRC screening procedure.

The colon capsule was also shown valuable in patients in whom colonoscopy failed or anesthesia was contraindicated.

4. CT colonography (CTC)

CTC is used for diagnostic imaging of the colon. Evidence for CTC effectiveness for CRC screening is indirect. CTC is less invasive than colonoscopy, does not require sedation, has a very low risk of perforation and takes only minutes to complete. However, CTC has some weakness: the detection rate of polyps 10 mm or larger is 90% with 14% false-positive rates; polyps less than 6 mm are not reported; in case of finding, a colonoscopy with a new colon preparation is needed; there is some concern about radiation exposure (median 8.8 - 10.2 mSv per examination). Moreover extracolonic structures were found in 27-69% of individuals screened inducing the risk of complementary work-up that are not clinically relevant. CTC could be proposed in frail elderly patients but not really as a screening procedure.

The USPSTF guidelines were stricter and believed that evidence was insufficient to recommend CTC and stool DNA.

Conclusion

Since the last 2 decades, there has been a decline in the incidence and mortality of CRC in Western countries. Although it is difficult to prove, there is probably an impact of the screening program. There is a new trend for distinguishing tests likely to detect early cancer from those that may detect early precursors of cancer.
In Asia and in Europe, CRC screening is now recommended and organized by Health Authorities in many countries, predominantly with fecal tests. In US but also in Germany, primary screening colonoscopy is now the most used test.

All CRC program have some advantages and limitations. Adherence to the program and quality control of performance are mandatory to be effective in detection and surveillance of CRC. The optimal CRC screening strategy remains a matter of debate.

Colon capsule needs further studies in the setting of screening but may be proposed when colonoscopy failed or is contraindicated.18-20

References