Colorectal Cancer Screening

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KEYWORDS

• Colorectal cancer • Screening • Prevention • Colonoscopy • CT colonography

KEY POINTS

- Guaiac fecal occult blood testing is the only screening modality with high-quality evidence shown in randomized trials to decrease both the incidence and mortality in colorectal cancer.
- Endoscopic testing has the benefit of diagnostic and therapeutic tools, which allows for removal of premalignant adenomas in a 1-step procedure as well as being able to biopsy existing cancers.
- The best screening test is the one that individual patients complete and repeat as necessary.

INTRODUCTION

Colorectal cancer (CRC) is common in the United States. Based on data from 2010 to 2012, the lifetime incidence for average-risk individuals is 4.5%. Although it accounts for only 8% of all new cancers, it is the third leading cause of cancer death in men and women. Approximately 50,000 deaths in the United States are attributed to CRC each year.[1,2] Nearly all CRCs begin as small adenomatous polyps, so it is a disease in which screening, particularly with colonoscopy, is likely to be effective. The rates of screening for patients 50 to 75 years old from 2002 to 2010 increased from 52% to 65%,[3] and the annual incidence of new colon cancers in the same time period declined by 2% to 4%.[1]

It is important for surgeons to understand the rationale for screening, cancer risk stratification, available screening procedures, current guidelines, and the outcomes of screening. This understanding allows careful counseling of patients and their families. Cancers found during screening are typically earlier stage and more likely to be curable.

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CAUSE AND PATHOPHYSIOLOGY

Risk Factors

For most individuals, age is the most significant risk factor in developing CRC.[4,5] The average age of diagnosis is 68 years.[4] Between 2009 to 2013, 94.3% of new CRC cases were diagnosed in individuals more than the age of 45 years, with the highest percentage of cases, 24%, diagnosed in patients aged 65 to 74 years.[2] In the United States, male sex is associated with a higher incidence of CRC, with 47.1 per 100,000 men diagnosed per year compared with 36 per 100,000 in women.[2]

Race and ethnicity affect individuals' risk for CRC in the United States. There is a higher incidence of CRC in both male and female African Americans compared with white individuals.[2,5] Hispanic and Asian/Pacific Islander groups have a lower overall incidence compared with white Americans.[2]

There are several hereditary factors that contribute to risk of developing CRC. CRC caused by genetic factors is estimated to occur in approximately 30% of cases.[6] Not all of these genetic influences are well defined and understood.[7] Hereditary nonpolyposis CRC (HNPCC), also known as Lynch syndrome, and familial adenomatous polyposis (FAP) are the most common familial syndromes associated with the development of CRC. Despite being the most common, these two syndromes account for approximately 5% of CRC cases.[6,8] HNPCC is the result of mismatch repair gene mutations.[7] A mutation in the adenomatous polyposis gene (APC) is responsible for the development of FAP.[8]

Patients with a personal history of CRC or adenomas are at higher risk for the development of CRC. Individuals with a family history of CRC have also been well shown in the literature to have a higher incidence of CRC.[9] Population-based cohort studies have identified an increased risk of developing CRC in patients with first-degree relatives found to have adenomas on colonoscopy.[9–11]

Inflammatory bowel disease has been shown to increase the risk of developing CRC. This relationship has been best shown in ulcerative colitis (UC). Based on pooled estimates from a meta-analysis of 116 studies, the overall prevalence of CRC in patients with UC was 3.7%.[12] Risk of CRC in patients with UC is influenced by the duration, extent, and severity of the disease. Crohn colitis is associated with an increased risk of CRC, but the extent of the relationship is not as well understood.[5]

Diets high in processed and red meats have been shown in epidemiologic studies to be associated with an increased risk for CRC.[13,14] Alcohol use (2 or more drinks per day) and tobacco use are associated with an increased risk of CRC. Smoking has been associated with an almost 2-fold increase in diagnosis of an adenoma and a higher CRC mortality in active smokers.[13,14] Multiple prospective and case-control studies have supported an association between obesity and risk of CRC. The exact mechanism behind this is not known, but could be related to a proinflammatory states or insulin metabolism.[13]

Protective Factors

Physical activity has been well studied as showing a protective effect in risk of CRC development. In a meta-analysis of 52 studies, individuals who were physically active had a 20% to 30% lower risk of CRC compared with individuals who were less active. Maintaining a healthy body weight and routine physical activity has been supported as being associated with lower risks for CRC.[13]

Aspirin (acetylsalicylic acid [ASA]) and nonsteroidal antiinflammatory drugs (NSAIDs) have been studied for use in the prevention of CRC and several studies have shown their potential benefit. A Cochrane Review identified 9 randomized trials