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Review

Gastrointestinal cancers in inflammatory bowel disease: An update with emphasis on imaging findings

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ABSTRACT

Inflammatory bowel diseases (IBD) are associated with an increased risk of gastrointestinal cancers depending on the specific type of IBD, the extent of the disease and its location. Patients with IBD and extensive colonic involvement are at increased risk of colorectal cancer whereas patients with Crohn disease have an increased risk for small-bowel and anal carcinoma. These cancers preferentially develop on

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sites of longstanding inflammation. In regards to colon cancer, several key pathogenic events are involved, including chromosomal instability, microsatellite instability and hypermethylation. The risk for colon cancer in IBD patients correlates with longer disease duration, presence of sclerosing cholangitis, pancolitis, family history of colorectal cancer, early onset of the disease and severity of bowel inflammation. Identification of increased colorectal cancer risk in individual IBD patients has led to formal surveillance guidelines. Conversely, although an increased risk for other types of cancer has been well identified, no specific formal screening recommendations exist. Consequently, the role of the radiologist is crucial to alert the referring gastroenterologist when a patient with IBD presents with unusual imaging findings at either computed tomography (CT) or magnetic resonance (MR) imaging. This review provides an update on demographics, molecular, clinical and histopathological features of gastrointestinal cancers in IBD patients including colorectal carcinoma, small bowel adenocarcinoma, neuroendocrine tumors and anal carcinoma, along with a special emphasis on the current role of CT and MR imaging.

1. Introduction

Inflammatory bowel diseases (IBD) including Crohn disease (CD) and ulcerative colitis (UC) are characterized by chronic inflammation of the gastrointestinal tract with acute episodes of the disease. Although rare, gastrointestinal cancers are of major concern in the follow-up of IBD patients (Ahmadi et al., 2009; Bernstein et al., 2001). The colon and the rectum are the most frequent locations of gastrointestinal cancer in patients with longstanding IBD whereas other cancers associated with IBD, such as small bowel adenocarcinoma, carcinoid tumor, and anal cancer are less common (Aust et al., 2002; Triantafillidis et al., 2009; Palascak-Juif et al., 2005; West et al., 2007; Vernava, 1999).

Cross-sectional imaging has emerged as a forefront screening modality for the diagnosis of complication in the follow-up of IBD patients as well as a diagnostic tool for patients presenting with unusual symptoms (Barral et al., 2014; Koh et al., 2001). Radiologists are therefore at the frontline of management of IBD patients in many instances. Because of the relative rarity of IBD in the general population, knowledge of these specific features results from case reports and studies including a few numbers of patients.

This review provides an update on demographics, molecular, clinical and histopathological features of gastrointestinal cancers in IBD patients along with a special emphasis on the current role of CT and MR imaging. In addition, the imaging features including computed tomography (CT) and magnetic resonance (MR) imaging of gastrointestinal cancers that occur in IBD patients are illustrated.

2. Colorectal cancers

2.1. Incidence, prevalence and risk factors

IBD-related colorectal cancers are responsible of less than 2% of all cases of colorectal cancer (Itzkowitz and Harpaz, 2004; Vagefi and Longo, 2005). The risk for colorectal cancer in IBD patients increases by 0.5–1% each year, after 8–10 years after the onset of the disease (Hersznyi et al., 2007). The relative risk for colorectal cancers in IBD patients with colonic involvement is approximately 2–3 times greater than that of the general population (Carter et al., 2004).

The overall prevalence of colorectal cancer in UC is between 3.7% and 5.4% in patients with pancolitis (Eaden et al., 2001). The relative risk ranges from 0.9 to 8.8, with marked variations among countries. By contrast, the prevalence of colorectal cancer in CD patients is less well known. Indeed, in the general population of patients with CD, the relative risk is not substantially increased (Bernstein et al., 2001; Mellemkjaer et al., 2000). However, in the more specific subgroup of patients with extensive, severe and longstanding colitis in the absence of bowel resection, the relative risk of colorectal cancer in CD is similar to that of UC (Eaden et al., 2001; Sachar, 1994).

Table 1
Factors in relation with increased risk for colorectal cancer in patients with IBD.

Longer duration of IBD
Greater extent of colonic inflammatory lesions[a]
Coexisting primary sclerosing cholangitis
Severity of endoscopically- or histologically-assessed colonic inflammation
Personal history of flat dysplasia
Young age at onset of IBD[b]
Anatomical abnormalities (colonic strictures, pseudopolyps, foreshortened colon)

Note: IBD indicates inflammatory bowel disease.
[a] In Crohn disease patients, the increased risk occurs when more than 30–50% of the colon surface is involves. In ulcerative colitis patients, the maximum risk occurs in those with pancolitis.
[b] Young age at diagnosis of IBD as an independent risk factor is being debated.

Several risk factors have been identified for the development of colorectal cancer in IBD patients. The strongest factor is the duration of the disease (Triantafillidis et al., 2009). IBD-related colorectal cancer is rarely found before seven years of colitis (Triantafillidis et al., 2009; Eaden et al., 2001; Rutter et al., 2004). The extent of colitis is an independent risk factor for the development of colorectal cancer (Triantafillidis et al., 2009; Xie and Itzkowitz, 2008). In this regard, patients with pancolitis due to UC have a standardized incidence ratio of 14.8 by comparison with an age-matched population without UC (Ekbom et al., 1990). Backwash ileitis may increase the risk for colorectal cancer (Heuschen et al., 2001). Patients with UC or CD and a first-degree relative with colorectal cancer have a relative risk of 2.5 and 3.7 for developing colorectal cancer, respectively, by comparison with those who do not have this specific family history (Bernstein et al., 2001; Triantafillidis et al., 2009). Young age at the onset of IBD as well as active inflammation is a risk factor for colorectal cancer (Eaden et al., 2001; Ekbom et al., 1990; Gupta et al., 2007; Itzkowitz and Yio, 2004). There is a strong relation between endoscopic or clinical inflammation scores and progression to dysplasia (Rutter et al., 2004; Lennard- Jones, 1985). One must note that patients with associated primary sclerosing cholangitis (i.e., less than 5% of all IBD patients) are at higher risk for colorectal cancer, with a cumulative index of colorectal cancer or dysplasia of 9% after 10 years, 21% after 20 years and 50% after 25 years after the diagnosis of colitis (Soetikno et al., 2002; Velayos et al., 2006; Broome and Bergquist, 2006). This increased risk is still present after orthotopic liver transplantation (Loftus et al., 1998). Table 1 summarizes the multiple factors that have been identified in relation with increased or decreased risk for colorectal cancer in IBD patients.