Journal of Crohn's and Colitis (2014) 8, 261–269

Available online at www.sciencedirect.com

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REVIEW ARTICLE

Advanced endoscopic imaging techniques in Crohn's disease

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Received 4 August 2013; received in revised form 5 September 2013; accepted 5 September 2013

KEYWORDS
Inflammatory Bowel Disease;
Crohn's disease;
Confocal laser endomicroscopy;
Chromoendoscopy;
Small-bowel capsule endoscopy;
Device-assisted enteroscopy

Abstract

Background: Endoscopy is of pivotal importance in Crohn's disease (CD) patients for diagnosis, surveillance and assessment of disease activity and extent. Device-assisted enteroscopy (DAE) and small-bowel capsule endoscopy (SBCE) have recently changed our endoscopic approach to small-bowel imaging. Furthermore, new advanced endoscopic imaging techniques have been implemented into clinical practice to improve both characterization of mucosal inflammation and detection of dysplastic lesions.
Aim: To provide readers with a review about the concept of advanced endoscopic imaging for the diagnosis and characterization of CD.
Methods: A literature search on the use of advanced endoscopy techniques in IBD patients was performed.
Results: DAE and SBCE allow for deep enteroscopy with high diagnostic yields and low complication's rate but their collocation in the diagnostic algorithm is still not clearly defined. Dye-based chromoendoscopy (DBC) and magnification chromoendoscopy improved dysplasia's detection in long standing colitis and prediction of inflammatory activity and extent. Dye-less chromoendoscopy (DLC) might offer the potential to replace conventional DBC for surveillance. However, both narrow band imaging and i-scan have already shown to significantly improve activity and extent assessment in comparison to white-light endoscopy. Confocal laser endomicroscopy (CLE) can detect more dysplastic lesions in surveillance colonoscopy and predict neoplastic and inflammatory changes with high accuracy compared to histology. Moreover, CLE-based molecular imaging may anticipate the therapeutic responses to biological therapy. Endocytoscopy can identify in vivo inflammatory mucosal cells harboring a new method to assess the mucosal activity.

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1873-9946/$ - see front matter
http://dx.doi.org/10.1016/j.crohns.2013.09.004

Conclusions: Recent progresses in small-bowel enteroscopy offer several potential benefits to improve both diagnosis and characterization of CD. New advanced endoscopic imaging techniques can improve detection of dysplasia and refine mucosal healing assessment, even looking beyond the morphological parameters revealed by conventional endoscopic imaging.

Contents

1. Introduction

Inflammatory Bowel Disease (IBD) encompasses ulcerative colitis (UC), Crohn's disease (CD) and IBD type unclassified (IBDU).[1] These three entities have several aspects in common but their peculiarities are critical for a correct and tailored clinical management.[2,3] The differential diagnosis between IBD and other gastrointestinal disorders is based on clinical evaluation and combination of endoscopic, histological, radiologic and biochemical investigations.[3–8] Patients with IBD associated colitis may present with clinical and endoscopic unspecific features, often requiring additional diagnostic work-up. It is well accepted that chronic inflammation involving the large bowel of patients with IBD represents a major risk factor for the development of colitis-associated cancer (CAC).[9–12] While all patients with IBD suffer from an increased risk for developing CAC, it was shown that the duration and anatomical extent of disease are well-established risk factors for cancer development.[13,14] In addition, one retrospective case–control study assessed the severity of inflammation as a risk factor for CAC in UC and found that inflammation measured by endoscopy, which was significant at univariate analysis, was not a significant determinant of cancer risk in a multivariate model.[11] Only the degree of inflammation over time as assessed by histopathology was considered to be an independent risk factor for CAC development.[11] This finding was confirmed by Mathy and co-workers, who demonstrated that histological, rather than endoscopic assessment of inflammation, serve as a better determinant for CAC risk.[10] Moreover, in a recent a prospective case–control study, Rubin et al. have reported a positive association between histological activity and CAC in patients with UC.[12]

CAC may occur in elevated protruded lesions but may also develop in normal-appearing mucosa (i.e. "flat"). Data from the literature indicate that in 50%–80% of cases with colitis-associated neoplasms, the lesions are overlooked upon pan-colonoscopy.[15] This aspect limits the usefulness of colonoscopic visualization and mandates the need for multiple random biopsies, which is a time consuming, costly and ineffective endeavor.[16–22] Therefore, most guidelines recommend surveillance colonoscopy with multiple random biopsies every 10 cm as the reference standard for diagnosis of intraepithelial neoplasia and cancer in either UC or CD with long standing and extensive involvement.[5,23–27] Nevertheless, to date, no randomized controlled study could show a reduced risk of CAC development by surveillance colonoscopy in IBD.[14,28] Thus, it becomes obvious that there is a need for new and more advanced endoscopic imaging techniques for surveillance in IBD.[16] In recent years new emerging endoscopic imaging techniques were introduced, allowing a detailed analysis of subtle endoscopic findings and revealing microscopic features. Furthermore, recent introduced endoscopic imaging techniques have enriched the available equipment for deep small-bowel imaging, offering a more tailored approach for patients with suspected or established CD.

This review describes the concept of advanced endoscopic imaging for the diagnosis and characterization of Crohn's disease.

2. Deep small-bowel enteroscopy for Crohn's disease

2.1. Device-assisted enteroscopy

Although standard small-bowel endoscopy plays a pivotal role in the management of patients with IBD, its collocation