

Open Access

The Role of Colonoscopy in Inflammatory Bowel Disease

Yong Gil Kim¹ and Byung Ik Jang²

¹Institute for Digestive Research, Digestive Disease Center, Department of Internal Medicine, Soonchunhyang University Gumi Hospital, Soonchunhyang University College of Medicine, Gumi, ²Department of Internal Medicine, Yeungnam University College of Medicine, Daegu, Korea

An endoscopic evaluation, particularly ileocolic mucosal and histological findings, is essential for the diagnosis of inflammatory bowel disease (IBD). The introduction of antitumor necrosis factor agents has changed the therapeutic paradigm of patients with IBD, but an endoscopic evaluation is more important to guide therapeutic decision-making. In the future, endoscopy with a histological evaluation will be increasingly used in patients with IBD. Both Crohn colitis and ulcerative colitis result in an increased incidence of colorectal carcinoma. Thus, surveillance colonoscopy is important to detect early neoplastic lesions. Surveillance ileocolonoscopy has also changed recently from multiple random biopsies to pancolonial dye spraying with targeted biopsies of abnormal areas.

Key Words: Endoscopy; Inflammatory bowel diseases; Crohn disease; Colitis, ulcerative

INTRODUCTION

Inflammatory bowel disease (IBD), which is a heterogeneous group of diseases that can be broadly classified into Crohn disease (CD) and ulcerative colitis (UC), is a chronic idiopathic inflammatory disorder affecting the gastrointestinal tract. Until the late 1990s, the therapeutic goal for IBD was clinical remission.¹ However, the introduction of antitumor necrosis factor (TNF) agents has changed the IBD therapeutic paradigm. Accumulated evidence regarding anti-TNF agents in patients with IBD indicates that mucosal healing is an important therapeutic endpoint in clinical trials, and is also used in clinical practice.² This altered therapeutic paradigm is changing the role of endoscopy in IBD. Additionally, improvements in endoscopy and other devices are changing the methods of assessing response to treatment and surveillance. Herein, we review the recent role of colonoscopy in IBD.

Received: June 20, 2013 Revised: June 26, 2013

Accepted: July 16, 2013

Correspondence: Byung Ik Jang

Department of Internal Medicine, Yeungnam University College of Medicine, 170 Hyeonchung-ro, Nam-gu, Daegu 705-717, Korea

Tel: +82-53-620-3830, Fax: +82-53-654-8386, E-mail: jbi@med.yu.ac.kr

© This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/3.0>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

THE ROLE OF COLONOSCOPY IN IBD

Initial diagnosis

Endoscopy, particularly ileocolonoscopy, is the method of choice for initial diagnosis and assessment of the extent of bowel involvement. It allows classification of disease based on endoscopic extent, severity of mucosal disease, and histological features. It also allows an assessment of suspected stenoses in the distal ileum or colon.

The primary reason for endoscopy is to obtain tissue.³ The four histological criteria of IBD are: distortion in crypt architecture, pyloric metaplasia in the terminal ileum, Paneth cells in the left or distal colon, and basal cell plasmacytosis. These criteria define chronic inflammation and are necessary for IBD to be considered. The presence of a granuloma is not necessary for the diagnosis of IBD. However, because a sarcoid-like granuloma is highly specific for CD, the presence of a granuloma has been used to distinguish between UC and CD.⁴

A full colonoscopy is rarely needed in cases of acute severe colitis and may be contraindicated.⁵ A rectal biopsy should be taken for histology even if there are no macroscopic changes. An upper gastrointestinal endoscopy should be considered when dyspepsia coexists. However, the role of small bowel endoscopy remains to be defined.⁶

Evaluation of therapeutic effect

Mucosal healing on endoscopy is a key prognostic param-

eter in the management of IBD after introducing anti-TNF agents. Thus, the role of endoscopy for monitoring IBD activity has been highlighted.

Mucosal healing is usually defined as the resolution of visible ulcers on endoscopy. However, no validated definition of mucosal healing exists with respect to endoscopic response or remission of either UC or CD. Mucosal healing has long been recognized as a therapeutic goal in patients with UC because UC is associated with only mucosal inflammation and affects the colon. Mucosal healing is generally defined by the Mayo Clinic endoscopy subscore of 0 (normal, or inactive), as presented in Table 1.⁷ Endoscopy subscores of 0 or 1 at week 8 have a significantly lower risk of colectomy over the next year, compared to patients with scores of 2 or 3 ($p=0.0004$). An endoscopy subscore of 0 at week 8 predicted symptom relief at weeks 30 and 54 in 71% and 74%, respectively, compared to 51% and 47% for a score of 1 at week 8. Patients with an endoscopy subscore of 0 at week 8 have a higher rate of steroid-

free remission at week 54 than those with a score of 1.⁸ The mucosal findings on endoscopy, particularly proctosigmoidoscopy, in clinically improved patients with UC are important for therapeutic decision-making.⁹ Thus, endoscopy with a histological evaluation will be increasingly used in patients with UC.

The Crohn's disease endoscopic index of severity (CDEIS) is the gold standard for assessing CD endoscopic activity (Table 2).¹⁰ Definitions of mucosal healing are generally based on the CDEIS, which is presented in Table 2.¹¹ The threshold for endoscopic remission has been set as a CDEIS <6, with other criteria for response (a decrease in CDEIS >5), complete endoscopic remission (CDEIS <3), and mucosal healing (absence of ulcers). The prognosis of CD is independently affected by the presence of deep and extensive ulceration at index colonoscopy.¹² Mucosal healing on ileocolonoscopy in patients with CD reduces the likelihood of clinical relapse, the risk of surgery, and hospitalization.^{13,14} Recently, deep remission has been suggested as a treatment goal in CD, following its use in rheumatoid arthritis.¹⁵ Deep remission includes not only symptom control, but also alteration of the biological processes that contribute to the disease, such as progressive structural damage and functional decline. Accomplishing deep remission might be a method of altering the course of CD. The Extend the Safety and Efficacy of Adalimumab through Endoscopic Healing trial empirically defined deep remission as a Crohn's Disease Activity Index <150 and complete mucosal healing.¹⁶

Table 1. Mayo Score Endoscopic Subscore⁷

An endoscopic scoring system for ulcerative colitis	
Score 0	Normal or inactive disease
Score 1	Mild disease (erythema, decreased vascular pattern, mild friability)
Score 2	Moderate disease (marked erythema, absent vascular pattern, friability, erosions)
Score 3	Severe disease (spontaneous bleeding, ulceration)

Table 2. The Crohn Disease Endoscopic Index of Severity¹¹

The four endoscopic variables described below are scored for each of the following locations: rectum; sigmoid and left colon; transverse colon; right colon; and ileum. Total score is divided by the number of locations explored 1-5. An additional three points are given if ulcerated stenosis is present, and a further three points are given if nonulcerated stenosis is present. CDEIS scores range from 0 to 44.	
Deep ulcerations	Score 0 if absent or 12 if present
Superficial ulcerations	Score 0 if absent or 6 if present
Length of ulcerated mucosa (0-10 cm)	Score 0-10 according to length in cm
Length of diseased mucosa (0-10 cm)	Score 0-10 according to length in cm

Table 3. Surveillance Recommendations for Colitic Cancer^{20,21}

Risk	Surveillance intervals	Risk factors
Lower	5-Yearly	Extensive colitis with no active endoscopic/histological inflammation or Left-sided colitis or Crohn colitis of <50% colon
Intermediate	3-Yearly	Extensive colitis with mild active endoscopic/histological inflammation or Postinflammatory polyps or Family history colorectal cancer in first degree related aged >50
Higher	Every-yearly	Extensive colitis with moderate/severe active endoscopic/histological inflammation or Stricture in past 5 yr or Dysplasia in past 5 yr declining surgery or Primary sclerosing cholangitis or Family history colorectal cancer in first degree related aged <50

In the Stop Infliximab in Patients with Crohn's Disease trial, deep remission was defined as a CDEIS of 0, a calprotectin level >250 mg/g, and an high sensitivity C-reactive protein <5 mg/L.¹⁷ These emerging concepts in CD have included mucosal healing as an essential requirement. However, the definitions of deep remission have not been validated.

Ileocolonoscopy might not be enough to evaluate mucosal healing because CD can affect any part of the gastrointestinal tract—from the mouth to the anus—and typically features transmural inflammation. Thus, transectional imaging is needed to evaluate mucosal healing in cases of CD. A prospective study showed that the magnitude of various quantitative magnetic resonance imaging changes, such as wall thickening, contrast signal intensity, and relative contrast enhancement, are correlated with the severity of endoscopic lesions in patients with CD.¹⁸

Surveillance colonoscopy for colitic cancer

Both Crohn colitis and UC increase the incidence of colorectal carcinoma and the need for surveillance colonoscopy. Generally, the incidence of colorectal cancer in patients with UC is 2- to 5-fold higher than that in general population.¹⁹ It is widely accepted that patients with Crohn colitis, with a similar extent and duration of colonic involvement, have a similar risk to those with UC.²⁰

Surveillance colonoscopy is important to detect early neoplastic lesions. The surveillance intervals are stratified based on colitic cancer risk. The colitic cancer risk is estimated based on the duration and extent of colitis, coexistence of primary sclerosing cholangitis, family history of colorectal cancer, colonoscopic findings, and histological findings. The surveillance intervals are shown in Table 3.^{20,21} As surveillance colonoscopy becomes more critical in detection, the technique has evolved. Recently, pancolonoscopic dye spraying or confocal microendoscopy with targeted biopsies of abnormal areas has been recommended.²¹ However, to use these newer colonoscopic techniques effectively, specialized training is needed. If chromoendoscopy is not used, multiple random biopsies should be taken at regular intervals.

CONCLUSIONS

Endoscopic evaluations for assessment of the response to treatment and for prediction of the course of IBD have remained controversial. An endoscopic examination with histological evaluation allows a careful objective surveillance for colorectal cancer. Endoscopic evaluation of the response to treatment is reasonable if the objective is to guide therapeutic decision-making. Chromoendoscopy with targeted biopsies of abnormal lesions is more appropriate than multiple random

biopsies for colorectal cancer surveillance. Monitoring mucosal healing is promising. However, long-term follow-up, prospective studies of anti-TNF agents in patients with IBD are needed.

Conflicts of Interest

The authors have no financial conflicts of interest.

REFERENCES

- Munkholm P, Langholz E, Davidsen M, Binder V. Disease activity courses in a regional cohort of Crohn's disease patients. *Scand J Gastroenterol* 1995;30:699-706.
- Sandborn WJ, Feagan BG, Hanauer SB, et al. A review of activity indices and efficacy endpoints for clinical trials of medical therapy in adults with Crohn's disease. *Gastroenterology* 2002;122:512-530.
- Yusoff IF, Ormonde DG, Hoffman NE. Routine colonic mucosal biopsy and ileoscopy increases diagnostic yield in patients undergoing colonoscopy for diarrhea. *J Gastroenterol Hepatol* 2002;17:276-280.
- Tanaka M, Riddell RH, Saito H, Soma Y, Hidaka H, Kudo H. Morphologic criteria applicable to biopsy specimens for effective distinction of inflammatory bowel disease from other forms of colitis and of Crohn's disease from ulcerative colitis. *Scand J Gastroenterol* 1999;34:55-67.
- Terheggen G, Lanyi B, Schanz S, et al. Safety, feasibility, and tolerability of ileocolonoscopy in inflammatory bowel disease. *Endoscopy* 2008;40:656-663.
- Bourreille A, Ignjatovic A, Aabakken L, et al. Role of small-bowel endoscopy in the management of patients with inflammatory bowel disease: an international OMED-ECCO consensus. *Endoscopy* 2009;41:618-637.
- Schroeder KW, Tremaine WJ, Ilstrup DM. Coated oral 5-aminosalicylic acid therapy for mildly to moderately active ulcerative colitis. A randomized study. *N Engl J Med* 1987;317:1625-1629.
- Colombel JF, Rutgeerts P, Reinisch W, et al. Early mucosal healing with infliximab is associated with improved long-term clinical outcomes in ulcerative colitis. *Gastroenterology* 2011;141:1194-1201.
- Pineton de Chambrun G, Peyrin-Biroulet L, Lémann M, Colombel JF. Clinical implications of mucosal healing for the management of IBD. *Nat Rev Gastroenterol Hepatol* 2010;7:15-29.
- Neurath MF, Travis SP. Mucosal healing in inflammatory bowel diseases: a systematic review. *Gut* 2012;61:1619-1635.
- Mary JY, Modigliani R. Development and validation of an endoscopic index of the severity for Crohn's disease: a prospective multicentre study. Groupe d'Etudes Thérapeutiques des Affections Inflammatoires du Tube Digestif (GETAID). *Gut* 1989;30:983-989.
- Allez M, Lemann M, Bonnet J, Cattan P, Jian R, Modigliani R. Long term outcome of patients with active Crohn's disease exhibiting extensive and deep ulcerations at colonoscopy. *Am J Gastroenterol* 2002;97:947-953.
- Ha C, Kornbluth A. Mucosal healing in inflammatory bowel disease: where do we stand? *Curr Gastroenterol Rep* 2010;12:471-478.
- Rutgeerts P, Vermeire S, Van Assche G. Mucosal healing in inflammatory bowel disease: impossible ideal or therapeutic target? *Gut* 2007;56:453-455.
- Mader R, Keystone E. Optimizing treatment with biologics. *J Rheumatol Suppl* 2007;80:16-24.
- Rutgeerts P, Van Assche G, Sandborn WJ, et al. Adalimumab induces and maintains mucosal healing in patients with Crohn's disease: data from the EXTEND trial. *Gastroenterology* 2012;142:1102-1111.
- Louis E, Mary JY, Vernier-Massouille G, et al. Maintenance of remission among patients with Crohn's disease on antimetabolite therapy after infliximab therapy is stopped. *Gastroenterology* 2012;142:63-70.
- Rimola J, Rodriguez S, García-Bosch O, et al. Magnetic resonance for

- assessment of disease activity and severity in ileocolonic Crohn's disease. *Gut* 2009;58:1113-1120.
19. Eaden JA, Abrams KR, Mayberry JF. The risk of colorectal cancer in ulcerative colitis: a meta-analysis. *Gut* 2001;48:526-535.
 20. Cairns SR, Scholefield JH, Steele RJ, et al. Guidelines for colorectal cancer screening and surveillance in moderate and high risk groups (update from 2002). *Gut* 2010;59:666-689.
 21. Mowat C, Cole A, Windsor A, et al. Guidelines for the management of inflammatory bowel disease in adults. *Gut* 2011;60:571-607.