

RAPID COMMUNICATION

Conventional colonoscopy and magnified chromoendoscopy for the endoscopic histological prediction of diminutive colorectal polyps: A single operator study

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Abstract

AIM: To accurately differentiate the adenomatous from the non-adenomatous polyps by colonoscopy.

METHODS: All lesions detected by colonoscopy were first diagnosed using the conventional view followed by chromoendoscopy with magnification. The diagnosis at each step was recorded consecutively. All polyps were completely removed endoscopically for histological evaluation. The accuracy rate of each type of endoscopic diagnosis was evaluated, using histological findings as gold standard.

RESULTS: A total of 240 lesions were identified, of which 158 (65.8%) were non-neoplastic and 82 (34.2%) were adenomatous. The overall diagnostic accuracy of conventional view, and chromoendoscopy with magnification was 76.3% (183/240) and 95.4% (229/240), respectively ($P < 0.001$).

CONCLUSION: The combination of colonoscopy and magnified chromoendoscopy is the most reliable non-biopsy method for distinguishing the non-neoplastic from the neoplastic lesions.

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Key words: Colorectal polyps; Colonoscopy; Chromoendoscopy; Magnifying endoscopy

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INTRODUCTION

Recently, colorectal polyps have been identified with increasing frequency as a result of the wide use of colonoscopy for screening. The detection and subsequent removal of neoplastic colorectal lesions, including adenomatous polyps and early cancers can reduce the incidence and mortality of colorectal cancers. Although initial data suggest that 80%-90% of diminutive colorectal polyps (≤ 5 mm) are histologically hyperplastic, more recent data indicate that 40%-60% of such polyps are neoplastic^[1-5]. The ability to accurately differentiate the adenomatous from the non-adenomatous polyps is useful because it obviates the need for biopsies during colonoscopy and for removal of all diminutive polyps^[6-8]. Some investigators suggest that the combination of magnified chromoendoscopy and colonoscopy can make the histopathological diagnosis of colorectal polyps. However, how this technique increases the accuracy of differential diagnosis of adenomatous from non-adenomatous polyps over conventional colonoscopy is unclear.

This study was to compare the observations by conventional colonoscopy to these obtained by magnified chromoendoscopy in a group of patients with diminutive colorectal polyps (≤ 5 mm), using histopathology as a "gold standard".

MATERIALS AND METHODS

Patients and exclusion criteria

Patients were eligible to participate in the study if they were scheduled to undergo flexible colonoscopy in our center. Patients with polyps larger than 5 mm were excluded from this study. Patients with inflammatory bowel disease (IBD), hereditary non-polyposis colorectal cancer (HNPCC) and familial adenomatous polyposis (FAP) were also excluded.

The study protocol was approved by the institutional review board of our hospital. An informed consent was

Table 1 Characteristics of patients and indications for chromoendoscopy

Characteristics of patients	
Patients (<i>n</i>)	150
Gender (males/females)	93/57
Age (yr), mean (range)	58.9 (37-85)
Indications for chromoendoscopy	
Screening	58
Family history	50
Lower GI bleeding	26
Altered bowel habit	16

obtained from each patient for the inclusion in the study.

Diagnostic procedures

A zoom-colonoscope (Olympus CF-Q160ZL, Olympus Optical Co., Ltd., Tokyo, Japan) providing both conventional and magnified images was used. The colonoscope was introduced up to the cecum. Subsequently, while the instrument was retracted, the colorectal mucosa was scrutinized in detail. When a polyp was detected, the mucus on the surface of the lesion was washed away and the polyp was first examined with the conventional view. Then 0.5% indigo carmine dye was sprayed over the lesion with a special catheter and observation was carried out. On conventional view, the key endoscopic findings for distinguishing non-neoplastic from neoplastic lesions were based on the gross appearance at visual inspection, namely the size, shape, overlying mucus, and color of the lesions. Macroscopic appearance was reported according to the Paris endoscopic classification of superficial neoplastic lesions^[9].

The polyps were categorized as neoplastic or non-neoplastic as previously described^[10]. The diagnosis at each step was recorded consecutively and all polyps were completely removed endoscopically. The accuracy rate of each type of endoscopic diagnosis was evaluated, using histological findings as gold standard. Morphology, size, and anatomical location of all lesions were documented. The diameter of each lesion was estimated using standard fully open biopsy forceps (4 mm) with the height estimated by placing the closed forceps tip adjacent to the lesion (2 mm). A single colonoscopist who was well trained in magnified colonoscopy, performed all procedures.

Statistical analysis

The number of patients in each group to demonstrate statistical significance with 5% alpha error and 90% power was estimated to be 47 and calculated on the basis of previous data^[11-14], assuming a 25% difference in negative predictive value (NPV) for adenomatous polyps between the two groups. A chi-square analysis was performed for comparisons. $P < 0.05$ was considered statistically significant.

RESULTS

Of the 1982 consecutive patients attending for routine colonoscopy, 150 (93 men and 57 women with a mean age of 58.9 years) with polyps smaller than 5 mm in diameter were recruited between December 2004 and July 2005. Characteristics of the patients enrolled and indications for

Table 2 Characteristics and distribution of colonic lesions

No. of lesions	240
0-Ip (protruded, pedunculated)	18
0-Is (protruded, sessile)	122
0-IIa (superficial, elevated)	100
Adenomatous polyps	82
Non-adenomatous polyps	158
Distribution of colonic lesions	
Rectum	76
Sigmoid	96
Left colon	22
Transverse	6
Right colon	40

Table 3 Actual and predicted histology of 240 polyps by conventional colonoscopy

	AP ¹	Histology non-AP ¹
Endoscopic prediction: AP	75/82	50/158
Endoscopic prediction: non-AP	7/82	108/158

¹AP= adenomatous polyps; non-AP= non-adenomatous polyps.

endoscopy are shown in Table 1. Total colonoscopy and histological evaluation were carried out in all patients without complications. A total of 240 lesions were identified. A single lesion was found in 101 (67.3%) cases, and 35 (23.3%) and 14 (9.3%) patients had two or more than three lesions, respectively.

A total of 158 lesions (65.8%) were non-neoplastic (including hyperplastic polyps, inflammatory polyps, and lymphoid aggregates) and 82 (34.2%) were adenomatous. Of these lesions, 194 (80.8%) were located in the distal colon (below the splenic flexure) and 46 (19.2%) in the proximal colon. The mean size of the non-neoplastic and neoplastic lesions was 3.46 mm and 3.83 mm, respectively. Although the neoplastic lesions might be larger than the non-neoplastic ones, the difference was not significant. The characteristics and distribution of colonic lesions are shown in Table 2.

The surface pattern of the lesion could be obtained and interpreted adequately in all cases. The overall diagnostic accuracy for distinguishing the neoplastic from the non-neoplastic lesions at each step (that is, conventional colonoscopy and magnified chromoendoscopy) was 76.3% (183/240), and 95.4% (229/240), respectively. The method of magnified chromoendoscopy with indigo carmine dye was significantly better for distinguishing the neoplastic from the non-neoplastic lesions, compared with conventional colonoscopy ($P < 0.0001$).

Fifty-seven of 240 lesions were misdiagnosed by conventional colonoscopy, including 38 hyperplastic polyps, 8 inflammatory polyps and 4 lymphoid aggregates which were overdiagnosed and 7 adenomas with mild atypia which were underdiagnosed. For the detection of adenomatous and non-adenomatous polyps, conventional colonoscopy had a sensitivity of 91.4%, specificity of 68.3%, NPV of 93.9% and PPV of 60.0% (Table 3). Eleven of 240 lesions were misdiagnosed by magnified chromo-

Table 4 Actual and predicted histology of 240 polyps by high-resolution chromoendoscopy

	Histology	
	AP ¹	non-AP ¹
Endoscopic prediction: AP	80/82	9/158
Endoscopic prediction: non-AP	2/82	149/158

¹AP= adenomatous polyps; non-AP= non-adenomatous polyps.

endoscopy, including 5 hyperplastic polyps, 2 inflammatory polyps and 2 lymphoid aggregates which were over-diagnosed and 2 adenomas with mild atypia which were underdiagnosed. For the detection of adenomatous and non-adenomatous polyps, high-resolution chromoendoscopy had a sensitivity of 97.5%, specificity of 94.3%, NPV of 98.69% and PPV of 89.9% (Table 4).

DISCUSSION

Given the incidence of colorectal cancer in the Western population and the recent thrust to implement broad-based screening methods, the issue of endoscopic resection of potentially cancerous or precancerous lesions assumes immense practical importance. It has been estimated that approximately two thirds of colorectal cancers arise from adenomatous polyps. The endoscopic detection and removal of polypoid tumors, therefore, have been emphasized to prevent the development of advanced colorectal cancers^[2,15,16]. Since 10%-30 % of all colorectal polyps are non-neoplastic, it is very important to distinguish non-neoplastic from neoplastic lesions by colonoscopy, because removal or biopsy of non-neoplastic lesions would not only waste time and money but may also increase procedure-associated complications^[6-8]. In particular, since reported data suggest that 80%-90% of diminutive colorectal polyps (≤ 5 mm) are histologically hyperplastic, the ability to establish an immediate endoscopic diagnosis that is virtually consistent with the histology would be useful because it would obviate the need for biopsies during colonoscopy and also the need to remove all diminutive polyps, which is time consuming, expensive, and associated with risk.

Various data have been reported on the diagnostic abilities of conventional colonoscopy and magnified chromoendoscopy for such differentiation^[11-15]. However, to the best of our knowledge, there is no prospective study on the accuracy for the differential diagnosis of non-neoplastic from neoplastic colorectal lesions using conventional colonoscopy and high-resolution chromoendoscopy consecutively.

In the present study, the diagnostic accuracy by conventional endoscopy and magnified chromoendoscopy using indigo carmine was 72.0% and 95.6%, respectively, with statistically significant difference ($P < 0.0001$). Fifty-seven of 240 lesions were misdiagnosed by conventional endoscopy, including 38 hyperplastic polyps, 8 inflammatory polyps and 4 lymphoid aggregates which were over-diagnosed and 7 adenomas with mild atypia which were underdiagnosed. For the detection of adenomatous and non-adenomatous polyps, conventional colonoscopy could

show over 90% of the neoplastic lesions, but less than 70% of the non-neoplastic lesions, suggesting the possibility of excessive treatment, waste of time and resources (Table 3). Eleven of 240 lesions were misdiagnosed by magnified chromoendoscopy, including 5 hyperplastic polyps and 2 inflammatory polyps, 2 lymphoid aggregates which were over-diagnosed and 2 adenomas with mild atypia which were underdiagnosed. Magnified chromoendoscopy displayed 97.5% of the neoplastic lesions and 94.3% of the non-neoplastic lesions. Two (0.8%) false negative cases due to mixed polyps were diagnosed by magnified chromoendoscopy.

Because the NPV was 98.6% indicating that some polyps were overlooked, it could be argued that high-resolution chromoendoscopy is not completely useful in clinical practice. Since no screening tests currently used have a NPV of 100%, the combination of magnified colonoscopy and dye spraying is the most reliable non-biopsy method for distinguishing the non-neoplastic from the neoplastic lesions at present. Moreover, with improved dyes and higher resolution chromoendoscope, better results might be obtainable. In this study all procedures were performed by a single operator who was well trained in magnified chromoendoscopy. The problem of a single operator study can represent the difficulty in deciding whether such results can be generalized. The time necessary for learning to recognize the mucosal crypt patterns is important, but has not been precisely reported. The endoscopist in this study had 5 years of experience in magnified endoscopy. In our previous experience, a foreign doctor without knowledge of pit patterns took only 3 months to acquire a differential diagnostic accuracy of over 90 %, which was similar to that of the well-trained endoscopists in this study (unpublished data). We believe that the time for learning could be shortened by showing trainees numerous typical endoscopic pictures of pit patterns before they perform the diagnostic procedure. However, this should be confirmed by future prospective studies including a large number of endoscopists.

Further questions include whether magnified endoscopy is as effective as total colonoscopy, how much time this adds to per case, and what is the cost associated with this procedure. In this study, with an instrument that was slightly more difficult to handle, intubation of the cecum was achieved for all patients without complications. Therefore, our results support the conclusion that magnified endoscopy is safe and can be used routinely. In our experience, the procedure usually only takes about 10-20 seconds for one polyp, and is less troublesome and time-wasting than colonoscopy.

In conclusion, the combination of colonoscopy and magnified chromoendoscopy is the most reliable non-biopsy method for distinguishing non-neoplastic from neoplastic lesions. The use of this technique could decrease the time and resources required during colonoscopy by reducing the need for biopsy and resection of non-neoplastic polyps.

REFERENCES

- 1 Opelka FG, Timmcke AE, Gathright JB Jr, Ray JE, Hicks TC.

- Diminutive colonic polyps: an indication for colonoscopy. *Dis Colon Rectum* 1992; **35**: 178-181
- 2 **Axelrad AM**, Fleischer DE, Geller AJ, Nguyen CC, Lewis JH, Al-Kawas FH, Avigan MI, Montgomery EA, Benjamin SB. High-resolution chromoendoscopy for the diagnosis of diminutive colon polyps: implications for colon cancer screening. *Gastroenterology* 1996; **110**: 1253-1258
 - 3 **Waye JD**, Lewis BS, Frankel A, Geller SA. Small colon polyps. *Am J Gastroenterol* 1988; **83**: 120-122
 - 4 **Weston AP**, Campbell DR. Diminutive colonic polyps: histopathology, spatial distribution, concomitant significant lesions, and treatment complications. *Am J Gastroenterol* 1995; **90**: 24-28
 - 5 **Tedesco FJ**, Hendrix JC, Pickens CA, Brady PG, Mills LR. Diminutive polyps: histopathology, spatial distribution, and clinical significance. *Gastrointest Endosc* 1982; **28**: 1-5
 - 6 **Wadas DD**, Sanowski RA. Complications of the hot biopsy forceps technique. *Gastrointest Endosc* 1988; **34**: 32-37
 - 7 **Waye JD**. Management of complications of colonoscopic polypectomy. *Gastroenterologist* 1993; **1**: 158-164
 - 8 **Jentschura D**, Raute M, Winter J, Henkel T, Kraus M, Mane-gold BC. Complications in endoscopy of the lower gastrointestinal tract. Therapy and prognosis. *Surg Endosc* 1994; **8**: 672-676
 - 9 The Paris endoscopic classification of superficial neoplastic lesions: esophagus, stomach, and colon: November 30 to December 1, 2002. *Gastrointest Endosc* 2003; **58**: S3-S43
 - 10 **Kudo S**, Tamura S, Nakajima T, Yamano H, Kusaka H, Watanabe H. Diagnosis of colorectal tumorous lesions by magnifying endoscopy. *Gastrointest Endosc* 1996; **44**: 8-14
 - 11 **Eisen GM**, Kim CY, Fleischer DE, Kozarek RA, Carr-Locke DL, Li TC, Gostout CJ, Heller SJ, Montgomery EA, Al-Kawas FH, Lewis JH, Benjamin SB. High-resolution chromoendoscopy for classifying colonic polyps: a multicenter study. *Gastrointest Endosc* 2002; **55**: 687-694
 - 12 **Kato S**, Fujii T, Koba I, Sano Y, Fu KI, Parra-Blanco A, Tajiri H, Yoshida S, Rembacken B. Assessment of colorectal lesions using magnifying colonoscopy and mucosal dye spraying: can significant lesions be distinguished? *Endoscopy* 2001; **33**: 306-310
 - 13 **Konishi K**, Kaneko K, Kurahashi T, Yamamoto T, Kushima M, Kanda A, Tajiri H, Mitamura K. A comparison of magnifying and nonmagnifying colonoscopy for diagnosis of colorectal polyps: A prospective study. *Gastrointest Endosc* 2003; **57**: 48-53
 - 14 **Norfleet RG**, Ryan ME, Wyman JB. Adenomatous and hyperplastic polyps cannot be reliably distinguished by their appearance through the fiberoptic sigmoidoscope. *Dig Dis Sci* 1988; **33**: 1175-1177
 - 15 **Gordon D**. Colon tumor precursors identified by magnifying endoscopy. *Gastroenterology* 1999; **116**: 235
 - 16 **Winawer SJ**, Zauber AG, O'Brien MJ, Gottlieb LS, Sternberg SS, Stewart ET, Bond JH, Schapiro M, Panish JF, Waye JD. The National Polyp Study. Design, methods, and characteristics of patients with newly diagnosed polyps. The National Polyp Study Workgroup. *Cancer* 1992; **70**: 1236-1245

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