

Flat Colorectal Lesions: Colonoscopic Detection Without Dye Spray or Magnification and Clinical Significance

Kutt-Sing Wong, Wei-Chong Chua,¹ Denis Mun-Onn Cheong,¹ Richard Sim¹ and Wai-Ming Yap,²

Division of Colorectal Surgery, Department of Surgery, National University Hospital, ¹Department of General Surgery, Section of Colorectal Surgery, and ²Department of Pathology, Tan Tock Seng Hospital, Singapore.

OBJECTIVE: The detection of flat colorectal lesions with possible malignant potential has been described by Japanese endoscopists. This study looks at the detection of flat lesions using standard colonoscopic techniques and examines the clinical significance of these lesions.

METHODS: The records of patients who underwent complete colonoscopy by a single colorectal surgeon in an outpatient setting over a 4-year period were reviewed. The site and number of flat lesions and their histology were noted. Patients with incomplete intubation of the colon were excluded.

RESULTS: A total of 491 patients underwent 593 colonoscopic examinations. There were 236 flat lesions identified in 91 patients: 24% (56/236) were adenomas showing mild or moderate dysplasia, and 63% (148/236) were hyperplastic.

CONCLUSIONS: Flat colorectal lesions are common and can be detected without the aid of dye spray and magnification. One-quarter of these lesions are adenomatous and we recommend routine hot biopsy or polypectomy of these lesions. [*Asian J Surg* 2004;27(4):299–302]

Introduction

Controversy exists about the frequency of flat colorectal lesions in non-Japanese populations. Flat lesions are reported frequently by Japanese authors^{1–3} but rarely encountered in Western studies. Scarcity of reports originating from non-Japanese Asian populations have also led to the suggestion that flat colorectal lesions may be unique to Japanese populations.

Although the clinical significance of flat colorectal lesions has been questioned,⁴ reports from Japanese studies consistently assert that such lesions have an increased malignant potential, often harbouring dysplasia or foci of intramucosal carcinoma.^{5–7}

The protective impact of screening colonoscopy in co-

lorectal cancer risk reduction is well accepted. Morson estimated that approximately two-thirds of colorectal carcinomas arise from pre-existent adenomatous polyps.⁸ However, this leaves the origins of the remainder still unaccounted for. In recent years, Japanese authors have proposed that flat colonic polyps might be an alternate pathway for colorectal carcinogenesis.⁹ If so, endoscopists need to pay attention to and look out for such lesions.

Our study aimed to determine the significance of flat colorectal lesions detected by standard colonoscopic techniques.

Patients and methods

Endoscopic and pathology records of all patients who under-

Address correspondence and reprint requests to Dr. Kutt-Sing Wong, Department of Surgery, National University Hospital, 5 Lower Kent Ridge Road, Singapore 119074.

E-mail: kutts_shen@hotmail.com • Date of acceptance: 12 March, 2004

went elective outpatient colonoscopy by a single colorectal surgeon over a 4-year period were retrospectively reviewed. Patients who had incomplete examinations were excluded. Bowel preparation included two 45 mL doses of Phospho-Soda® (Fleet Pharmaceuticals, Lynchburg, VA, USA) or polyethylene glycol 3–4 L on the evening before the examination.

All examinations were performed by the same endoscopist using a standard non-magnifying Olympus 200L colonoscope (Olympus Corporation, Tokyo, Japan). Examinations were carried out with minimal air insufflation to avoid over-distension of the bowel lumen. Intravenous sedation with midazolam was given selectively together with intranasal oxygen administration and pulse rate, blood pressure and continuous pulse oximetry monitoring during the procedure.

For the purpose of this study, a flat lesion was defined as one with a flat mucosal change or flat minimal mucosal elevation (height less than half the diameter of the lesion), which may or may not have a central depression.

The number and location of all identified flat colorectal lesions were determined by the endoscopist and the lesions removed either piecemeal or with hot biopsy or snare polypectomy. All histology specimens were reviewed by a single dedicated pathologist (WMY) to ensure consistency in reporting.

Results

A total of 491 patients underwent 593 complete elective outpatient colonoscopic examinations by a single colorectal surgeon between January 1994 and June 1998. The median age of the study population was 62 years (range, 18–88 years). There were 252 female and 239 male patients. The indications for colonoscopy in the study population included screening, bleeding per rectum, abdominal pain, change in bowel habit, post-operative cancer surveillance, evaluation of anaemia and raised serum carcinoembryonic antigen levels, and polyp surveillance. In none of these patients were flat lesions thought to be the cause of the symptoms. The average time taken for each colonoscopy was 15.9 minutes (range, 5–45 minutes). There were 16 incomplete examinations yielding an incomplete examination rate of 2.6% (16/609).

During the study period, 91 patients (19%) were found to have 236 flat colorectal lesions (Table 1). The median age of patients with flat colorectal lesions was 65 years (range, 27–89 years). Men were more affected than women (55 male:36 female).

Flat lesions were predominantly found in the sigmoid colon and rectum (about 80% of all flat colorectal lesions) (Table 2). Although 63% of lesions ($n = 148$) were hyperplastic or metaplastic, almost one-quarter ($n = 56$) were adenomatous. These adenomas showed varying degrees of dysplasia. Inflammatory, lymphoid and other polyps made up the rest of the histological findings (Table 3).

Discussion

Whether adenomas are detected or missed during routine colonoscopy is of paramount concern. Japanese investigators have argued that special techniques of high magnification and dye spray are essential in detecting adenomas occurring in flat

Table 1. Colonoscopic findings in 491 patients

Finding	Number of patients
Normal	135
Flat lesion	91
Benign polyp	85
Haemorrhoids	54
Diverticular disease	54
Colitis	37
Cancer	27
Miscellaneous (including radiation proctitis, rectal ulcer)	8
Total	491

Table 2. Distribution of flat colorectal lesions

Location within large bowel	<i>n</i> (%)
Rectum	53 (22.5)
Sigmoid colon	138 (58.5)
Descending colon	16 (6.8)
Transverse colon	22 (9.3)
Ascending colon and caecum	7 (3.0)
Total	236

Table 3. Histology of flat colorectal lesions

	<i>n</i> (%)
Hyperplastic	148 (62.7)
Adenomatous	56 (23.7)
Others	32 (13.6)
Total	236

lesions. They contend that failure to apply these techniques may be the primary reason why flat adenomas are not widely recognized in Western populations. Dye spray with magnification allows characterization of a flat lesion and picks out those that are likely to be adenomatous. Using these techniques, Rembacken et al identified 117 flat adenomas in 1,000 consecutive British patients.¹⁰ In a similar study carried out in 211 American patients using dye-spray techniques, Saitoh et al found 66 flat lesions, of which 82% were adenomas.¹¹ Therefore, flat adenomas may be more prevalent in Western populations than previously assumed, but cannot be detected without using Japanese colonoscopic techniques.

Our study confirms the presence of flat adenomas in an urban Asian metropolis with a multi-ethnic population, and destroys the myth that flat colorectal lesions only exist in Japanese patients. Instead, it is probable that these lesions are commonly found among all racial and ethnic groups. Lack of widespread recognition of the existence of flat colorectal lesions may be due, in part, to the endoscopist's bias rather than to actual differences in the incidence of such lesions among different populations.

With optimal bowel preparation and meticulous colonoscopic examination, flat lesions can be detected without the additional expense of high magnification colonoscopes and dye spray. One method is to minimize air insufflation and to periodically remove excess air during endoscopy so as not to overdistend the bowel lumen and efface diminutive flat lesions. Our detection rate of 56 flat adenomas in 491 patients (11.4%) was similar to that of Rembacken et al (11.7%), who used dye-spray and magnification techniques.

However, because standard colonoscopy cannot reliably predict histology based on macroscopic appearance, the caveat is that, by adopting this approach, it is essential that all flat lesions detected are biopsied. Our biopsy results showed that 13.6% of flat colorectal lesions detected by standard colonoscopy have little clinical significance. This is where we believe selective use of dye spray and magnification may play a role in directing biopsy of flat lesions that are detected by standard colonoscopy. By showing up pit patterns with dye-spray and magnification techniques, only lesions with patterns characteristic of either adenomas or hyperplastic lesions need to be biopsied. Those that do not exhibit these patterns may be left alone. Instead of "indiscriminate" use of dye-spray and magnification techniques, their selective use may potentially reduce the number of biopsies and the "negative" biopsy rate of standard colonoscopy and, at the same time, the costs of these techniques will be reduced. Further studies compar-

ing standard colonoscopy and routine biopsy of all flat lesions versus standard colonoscopy and dye-spray/magnification-directed biopsy are required to adequately address issues of cost-effectiveness and patient safety.

Data from the National Polyp Study in the USA show that, despite a policy of repeat colonoscopy to clear all polyps in 1,418 patients, up to 24% of the study cohort subsequently developed colorectal cancer.¹² In that study, five cancers were unusually small (range, 6–25 mm). It had been hypothesized that some of these interval colorectal cancers may have originated from flat lesions along an accelerated adenoma-carcinoma pathway. It could be argued that a number of these interval cancers may have been prevented if flat colorectal lesions had been actively sought and destroyed.

Flat cancers are reportedly more aggressive than their more polypoid counterparts, and have a higher likelihood of full-thickness wall invasion and nodal metastases.¹³ Thus, it is vital to obtain histology and remove these lesions when they are detected. In our study, 56 flat adenomas were detected and removed and, consequently, up to 56 index cases of biologically aggressive flat colorectal cancers may have been prevented.

The prevalence of flat colorectal lesions would render radiographic techniques such as computed tomography colography less desirable than colonoscopy in screening. Decreased sensitivity of radiographic techniques for flat lesions would mean that a significant number of such lesions would be missed. Moreover, histological assessment is precluded with the application of such technology.

Our study population had a high proportion of flat hyperplastic lesions (63%). Although hyperplastic polyps have previously been regarded as non-neoplastic and without malignant potential, Jass has recently demonstrated that genetic aberrations such as *K-ras* mutation, DNA microsatellite instability and DNA methylation are frequently present within such polyps.¹⁴ These findings suggest the possibility that the development of interval cancers might not be the result of an unknown *de novo* alteration in the mucosa, but may, in fact, be along the "hyperplastic or serrated pathway" described by Jass. Therefore, there may be no such thing as an "innocent" flat lesion. Alternatively, the presence of flat hyperplastic lesions may serve as a marker of mucosal instability, and flat cancers may arise *de novo* in the non-polypoid intervening mucosa. Certainly, the significance of this high proportion of flat hyperplastic lesions deserves further investigation.

In the past, Japanese workers who used dye-spray and

magnification techniques have advocated that flat lesions exhibiting pit patterns suggestive of hyperplastic lesions can be disregarded. In the light of Jass' data and emerging evidence that hyperplastic lesions may not be innocuous, this practice needs to be re-evaluated. At present, we are closely following patients with flat hyperplastic lesions (as well as those with flat adenomas), and follow-up data will be reported at a later date. We would recommend routine hot biopsy of such lesions to minimize the risk of subsequent malignant change, and remove any false-negative reading of pit patterns by the dye-spray technique.

Conclusions

Flat colorectal lesions are common and may be found in up to 20% of the population undergoing colonoscopy. Approximately one-quarter of these lesions are premalignant adenomas while 60% are hyperplastic. The application of dye-spray and high-magnification colonoscopy, while useful, is not essential. Good bowel preparation, minimal air insufflation, and meticulous colonoscopic examination and hot biopsy should be cornerstones in the management of such lesions.

References

1. Muto T, Kamiya J, Sawada T, et al. Small "flat adenoma" of the large bowel with special reference to its clinicopathologic features. *Dis Colon Rectum* 1985;28:847-51.
2. Kuramoto S, Mimura T, Yamasaki K, et al. Flat cancers do develop in the polyp-free large intestine. *Dis Colon Rectum* 1997;40:534-42.
3. Trecca A, Fujii T, Kato S, et al. Small advanced colorectal adenocarcinoma: report on three cases. *Endoscopy* 1998;30:493-5.
4. Bond JH. Small flat adenomas appear to have little clinical importance in Western countries. *Gastrointest Endosc* 1995;42:184-7.
5. Kasumi A, Kratzner GL, Tateda M. Observations of aggressive, small, flat and depressed colon cancer. Report of three cases. *Surg Endosc* 1995;9:690-4.
6. Tada S, Iida M, Matsumoto T, et al. Small flat cancer of the rectum: clinicopathologic and endoscopic features. *Gastrointest Endosc* 1995;42:109-13.
7. Matsumoto T, Edo M, Yao T, et al. Role of nonpolypoid neoplastic lesions in the pathogenesis of colorectal cancer. *Dis Colon Rectum* 1994;37:450-5.
8. Morson B. The polyp-cancer sequence in the large bowel. *Proc R Soc Med* 1974;67:451-7.
9. Muto T, Nagawa H, Watanabe T, et al. Colorectal carcinogenesis: historical review. *Dis Colon Rectum* 1997;40(Suppl):S80-S85.
10. Rembacken BJ, Fujii T, Cairns A, et al. Flat and depressed colonic neoplasms: a prospective study of 1000 colonoscopies in the UK. *Lancet* 2000;355:1211-4.
11. Saitoh Y, Waxman I, West AB, et al. Prevalence and distinctive biologic features of flat colorectal adenomas in a North American population. *Gastroenterology* 2001;120:1657-85.
12. Winawer SJ, Zauker AG, Ho MN, et al. Prevention of colorectal cancer by colonoscopic polypectomy. The National Polyp Study Workgroup. *N Engl J Med* 1993;329:1977-81.
13. Leong AF, Seow-Choen F, Tang CL. Diminutive cancers of the colon and rectum: comparison between flat and polypoid cancers. *Int J Colorectal Dis* 1998;13:151-3.
14. Jass JR. Hyperplastic polyps of the colorectum - innocent or guilty? *Dis Colon Rectum* 2001;44:163-6.