Significance of a white opaque substance under magnifying narrow-band imaging colonoscopy for the diagnosis of colorectal epithelial neoplasms CME

Keisuke Kawasaki, MD,[1,2] Koichi Kurahara, MD,[2] Shunichi Yanai, MD,[1] Yumi Oshiro, MD,[3] Makoto Eizuka, MD,[4] Noriyuki Uesugi, MD,[4] Kazuyuki Ishida, MD,[4] Shotaro Nakamura, MD,[1] Tadahiko Fuchigami, MD,[2] Tamotsu Sugai, MD,[4] Takayuki Matsumoto, MD[1]

Matsuyama, Ehime, Japan

Background and Aims: The aim of this study was to examine the significance of a white opaque substance (WOS) found on magnifying narrow-band imaging (M-NBI) for the diagnosis of colorectal neoplastic lesions.

Methods: We retrospectively reviewed colonoscopy records from 2006 to 2012 at our institution and identified cases of endoscopically or surgically resected colorectal epithelial neoplasms observed by M-NBI colonoscopy. The colonoscopic and histologic characteristics of the lesions were compared between WOS-positive and WOS-negative lesions. We further classified the WOS as regular or irregular and compared the histologic characteristics between the two types of lesions.

Results: There were 105 WOS-positive lesions and 451 WOS-negative lesions. The former were subdivided into lesions with regular and irregular WOS. The incidence of high-grade dysplasia or carcinoma was significantly higher in WOS-positive lesions (61.9%) than in WOS-negative lesions (28.6%) ($P < .05$). Among the WOS-positive lesions, massive submucosal invasion was more frequent in lesions with irregular WOS (82.4%) than in those with regular WOS (1.4%) ($P < .05$). Among cancers with massive submucosal invasion, lymph node metastasis was more frequent in cancers with irregular WOS (17.4%) than in those with regular WOS or without the WOS (0%) ($P < .05$).

Conclusions: A WOS in colorectal neoplasms may be an optical marker for high-grade dysplasia and cancer. An irregular WOS may be indicative of massive submucosal invasion and lymph node metastasis. (Gastrointest Endosc 2015;82:1097-104.)

A white opaque substance (WOS) visualized on magnifying narrow-band imaging (M-NBI) endoscopy was first described in 2008 as a substance in the superficial area of gastric neoplasia that masked the subepithelial microvascular architecture.[1] Yao et al[2] reported that the source of the WOS of the gastric lesions is the lipid droplets that accumulate in the superficial part of epithelial neoplasms. The literature contains some descriptions regarding the correlation between histologic findings and the WOS in gastric neoplastic lesions. To date, however, only a single study has investigated the significance of the WOS in colorectal epithelial neoplasms.[3] In that study, Hisabe et al[3] reported that the WOS in colorectal epithelial neoplasms was closely associated with the histologic degree of dysplasia and with the depth of invasion in submucosally invasive cancers. However, the endoscopic characteristics and the significance of the WOS in colorectal neoplasms remain unclear.

In this retrospective study, we conducted a single-center analysis to examine the role of the WOS in the prediction of histology among colorectal neoplasms. We also attempted to determine whether a subclassification of the WOS, either

Abbreviations: HGD, high-grade dysplasia; M-NBI, magnifying narrow-band imaging; mSM, massively invading the submucosa; sSM, slightly invading the submucosa; WOS, white opaque substance.

DISCLOSURE: *All authors disclosed no financial relationships relevant to this article.*

See CME section; p. 1105.

0016-5107/$36.00
http://dx.doi.org/10.1016/j.gie.2015.06.023

Received March 13, 2015. Accepted June 11, 2015.

Current affiliations: Division of Gastroenterology, Department of Internal Medicine, Iwate Medical University, Morioka (1), Division of Gastroenterology (2); Department of Pathology, Matsuyama Red Cross Hospital, Ehime (3), Department of Diagnostic Pathology, Iwate Medical University, Morioka, Japan (4).

Reprint requests: Keisuke Kawasaki, MD, Division of Gastroenterology, Department of Internal Medicine, Iwate Medical University, 19-1, Uchimaru, Morioka, 020-8505, Japan.

regular WOS or irregular WOS, has any clinical significance for the diagnosis and management of colorectal cancer.

PATIENTS AND METHODS

Study population

The present investigation was based on retrospective data collection. We reviewed the endoscopy database at Matsuyama Red Cross Hospital from 2006 to 2012 and identified all patients with a diagnosis of colorectal epithelial neoplasm, which included all types of adenoma and cancer removed endoscopically or surgically. We subsequently excluded colorectal epithelial neoplasms not observed by M-NBI colonoscopy, <5 mm in diameter, or containing serrated histology, including hyperplastic polyps, sessile serrated adenoma and/or polyps, and traditional serrated adenomas. Cancers invading the proper muscular layer also were excluded. The protocol of this retrospective study was approved by the Institutional Review Board at Matsuyama Red Cross Hospital.

Data collection

Demographics of the study patients were evaluated on the basis of chart review. The characteristics included age, sex, colonoscopic findings (size, location, and morphology), and M-NBI colonoscopy findings.

The location of each lesion was classified as right side (cecum to transverse colon) or left side (descending colon to rectum). The gross morphology was defined as the protruding type or the flat-elevated type, according to the Paris classification.[4] The WOS was defined in accordance with the gastric WOS.[1] In brief, it was regarded as an area of whitish substance under M-NBI colonoscopy, which obscures the microvascular pattern within the colorectal epithelial neoplasm (Fig. 1). When M-NBI colonoscopy depicted an area of the WOS, the lesion was regarded as being positive for the WOS. The WOS was further classified into regular and irregular WOS in accordance with the classifications proposed by Yao et al.[1] Regular WOS was defined as WOS that was observed as a well-organized and symmetrical distribution, with a regular, reticular, maze-like, or speckled pattern. Irregular WOS was defined as WOS that was depicted as a disorganized and asymmetrical distribution, with an irregular reticular or speckled pattern (Fig. 2).

For comparisons of diagnostic accuracy of the WOS under M-NBI colonoscopy, we applied 2 other M-NBI classification systems, namely Hiroshima classification and Sano classification.[5,6] Three experienced colonoscopists, who were not informed of histologic results, independently reviewed all of the endoscopic images of each lesion, and they determined the type of WOS, M-NBI type of Hiroshima classification (type A, B, C1, C2, or C3), and that of the Sano classification (type I, II, IIIA, or IIIB). As for lesions with discordant determinations, the 3 colonoscopists discussed until a common consensus was obtained.

Histologic diagnoses of the colorectal epithelial neoplasms were evaluated separately by two pathologists who specialized in GI pathology (Y.O., T.S.) according to the classification reported by the World Health Organization in 2000.[7] The grade of dysplastic change was classified as adenoma, high-grade dysplasia (HGD), or carcinoma. Carcinoma was defined as neoplastic glands that had invaded the submucosal layer. Carcinoma with a vertical invasion depth of >1000 μm was defined as massively invading the submucosa (mSM). Otherwise, the depth was regarded as slightly invading the submucosa (sSM).[4,8] Tumor budding was defined according to a previous report that used a single cancer cell or cancer clusters with <5 cancer cells observed in the invasive frontal region.[9,10] Tumors with <5 budding foci were classified as grade 1, tumors with 5 to 9 budding foci as grade 2, and tumors ≥10 budding foci as grade 3.[11] When there was any difference in histologic diagnosis between the 2 pathologists, they discussed the case until a common consensus was obtained. Furthermore, immunohistochemical stainings for vasculature were added when there was any dissociation in the assessment of lymphatic or venous permeations.

Statistical analysis

Parametric data are expressed as mean plus or minus standard deviation. Nonparametric data are expressed as numbers and percentages. Comparisons between any 2 or among any 3 groups were performed with the Tukey honestly significant difference test or with the Mann-Whitney test where appropriate. The McNemar test was used to evaluate differences in test results between the WOS and 2 other M-NBI classification systems. The diagnostic accuracy for the diagnosis of mSM cancer was calculated as sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV). Probabilities < .05 were considered to be significant. All statistical computations were performed with JMP version 11 (Statistical Discovery Program, Cary, NC, USA).

RESULTS

Demographic data of colorectal epithelial neoplasms

A total of 556 lesions in 412 patients were included in this retrospective study. Of these, 105 were WOS-positive, and 451 were WOS-negative (Fig. 1). WOS-positive lesions were found in 100 patients, whereas the remaining 312 patients did not have WOS-positive lesions. Neither age at the time of diagnosis of colorectal epithelial neoplasms (68.0 ± 10.4 years in patients with WOS-positive lesions and 65.5 ± 11.7 years in the remaining patients) nor sex (male percentage of 71.0% in patients with WOS-positive lesions and 62.2% in the remaining patients) differed between the 2 groups of patients.

Table 1 compares the endoscopic and histologic characteristics between WOS-positive and WOS-negative