

## Decreased numbers of vascular networks and irregular vessels on narrow-band imaging are useful findings for distinguishing intestinal lymphoma from lymphoid hyperplasia

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**Background:** No method for sufficiently making the differential diagnosis of intestinal lymphoma resembling lymphoid hyperplasia (LH) on endoscopy has yet been established.

**Objective:** The aim of this study was to evaluate the usefulness of narrow-band imaging (NBI) in diagnosing intestinal lymphoma.

**Design:** Prospective study.

**Setting:** Single-center study.

**Patients:** Sixty-one patients with primary or systemic lymphoma were enrolled in this study.

**Interventions:** The terminal ileum and entire colon were observed by using conventional endoscopy. NBI was subsequently performed when small polypoid lesions were detected. A decrease in the number of vascular networks (DVNs) and the presence of irregular vessels on the surface of the epithelia were defined as characteristic findings of intestinal lymphoma. The diagnostic accuracy of these 2 findings in distinguishing intestinal lymphoma from LH was examined.

**Main Outcome Measurements:** The ability to use NBI to distinguish intestinal lymphoma from LH.

**Results:** Two hundred ninety-four small polypoid lesions, including 59 lymphomas and 235 LH lesions, were detected. The rates of detecting DVNs and the presence of irregular vessels were significantly higher in the lymphoma samples (81.4% and 62.7%) than in the LH samples (25.5% and 4.7%). Based on these findings, the diagnostic accuracy, sensitivity, specificity, and positive and negative predictive values for differentiating intestinal lymphoma from LH were 88.8%, 62.7%, 95.3%, 77.1%, and 91.1%, respectively, which are significantly higher than those of conventional endoscopy.

**Limitations:** Single-center study.

**Conclusion:** DVNs and the presence of irregular vessels on NBI are thus considered to be useful findings for differentiating intestinal lymphoma from benign LH. (*Gastrointest Endosc* 2014;80:1064-71.)

*Abbreviations:* DVNs, decreased number of vascular networks; LH, lymphoid hyperplasia; NBI, narrow-band imaging; NPV, negative predictive value; PET, positron emission tomography; PPV, positive predictive value; WHO, World Health Organization.

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The GI tract is a major organ affected by both primary and secondary lymphoma. The number of patients with extranodal lymphoma has been increasing,<sup>1-3</sup> and the stomach and small intestine are the most commonly involved sites, followed by the large intestine and esophagus. GI lymphomas are generally detected by using conventional endoscopy and subsequently are assessed based on the histologic diagnosis of the biopsy specimens. However, obtaining a histologic diagnosis is not always appropriate because of the small sampling size and difficulty of differentiating intestinal lymphoma from a hyperplastic response of the immune system.<sup>4</sup> Furthermore, it is difficult to obtain biopsy samples from all lesions because numerous elevated lesions are detected in the small intestine and colon, particularly in the terminal ileum. The number of patients who are taking anticoagulants has been increasing, and obtaining biopsy specimens should be minimized in such patients. Making the differential diagnosis of intestinal lymphoma by using conventional endoscopy is difficult because no characteristic findings for discriminating intestinal lymphoma from benign lymphoid hyperplasia (LH) have been established,<sup>5-8</sup> thus causing delays in detection and/or incorrect staging followed by inadequate treatment of intestinal lymphomas.

Narrow-band imaging (NBI) is a new system in which spectral features are modified by narrowing the bandwidth of spectral transmittance by using optical filters. NBI can be used to assess the capillary architecture and microvessels at the touch of a button.<sup>9,10</sup> This modality is useful for detecting colon polyps<sup>11-13</sup> and for differentially diagnosing adenomas from hyperplastic polyps.<sup>14-22</sup> Recently, the NBI findings of intestinal lymphoma were described in several case reports.<sup>23-27</sup> According to these case reports, abnormal vessels on the surface of the lesions are characteristic findings of intestinal lymphoma. However, there are no comparative studies assessing the efficacy of NBI for diagnosing intestinal lymphoma. The present study examined the relationship between the endoscopic and histologic findings and then prospectively investigated the usefulness of NBI for making a differential diagnosis of intestinal lymphoma resembling LH.

## METHODS

### Patients

This study was registered with the University Hospital Medical Information Network (R000002463). Written informed consent was obtained from all enrolled patients, and the study was approved by the institutional review board of Asahikawa Medical University. Sixty-one patients who were diagnosed as having primary intestinal (n = 5) and systemic (n = 56) lymphoma between 2008 and 2011 were enrolled in this study. Regardless of abdominal symptoms, 35 of 61 patients had suspected malignant lymphoma by CT, and 22 were diagnosed by use of positron

### Take-home Message

- A decrease in the number of vascular networks and the presence of irregular vessels on the surface of the epithelia on narrow-band imaging are considered to be useful findings for differentiating intestinal lymphoma from benign lymphoid hyperplasia.

emission tomography (PET) and 4 by gastroduodenoscopy. Of these 61 patients, 2 were diagnosed with Hodgkin's lymphoma and 59 with non-Hodgkin lymphoma, including 27 cases of follicular lymphoma, 13 cases of diffuse large B-cell lymphoma, 8 cases of mucosa-associated lymphoid tissue lymphoma, 7 cases of mantle cell lymphoma, 3 cases of anaplastic large-cell lymphoma, and 1 case of T-cell lymphoma, according to the World Health Organization (WHO) classification of tumors<sup>28</sup> (Table 1).

### Assessment of NBI images of lymphoma and LH

An endoscope that exhibits conventional and NBI features (FH260AZI; Olympus Co, Ltd, Tokyo, Japan) was used to obtain the endoscopic images in this study. The terminal ileum and entire colon were observed by using conventional endoscopy with NBI. The lesions were assessed and photographed by using conventional endoscopy first, followed by NBI. Thereafter, biopsy specimens were obtained from the observed sites. Endoscopists who took photographs and biopsy specimens knew only the diagnosis of lymphoma but not the sites of lesions, the findings of other examinations including CT, PET, and gastroduodenoscopy. The biopsy specimens were histologically assessed by a pathologist who had no knowledge any of the patients' clinical information. The endoscopic images were assessed by an endoscopist who had performed more than 5000 conventional colonoscopic and 500 NBI procedures (S.K.). The image reader knew only the diagnosis of lymphoma but not the sites of lesions, the findings of other examinations including CT, PET, and gastroduodenoscopy, or histologic findings.

The NBI images of 348 lesions in the intestines were assessed. Of 348 photographs, 50 were excluded because of the unclear origin of the biopsy specimen and/or insufficient magnification on NBI. In the remaining 298 photographs, the histologic samples obtained from 4 lesions were not adequately examined (Fig. 1). Finally, 294 lesions were evaluated based on the characteristic findings of lymphoma as follows: a decreased number of vascular networks (DVNs) on the surface of the villi in the small intestine or epithelia in the colon and the presence of irregular capillary loops along the villi in the small intestine or irregular vessels on the surface of the epithelia in the colon. The images obtained with conventional endoscopy were assessed based on the color and irregularity of the lesions as follows: red, irregularly arranged polyps and white,

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