Narrow band imaging (NBI) is a newly developed technology that uses optical filters for RGB sequential illumination and narrows the bandwidth of spectral transmittance. NBI enables the observation of the fine capillaries in the superficial mucosa of the gastrointestinal tract. In this report, the authors assessed the clinical usefulness of NBI magnification in pit pattern diagnosis for colorectal neoplasia. A total of 90 colorectal lesions including nine cases of hyperplasia, 60 of tubular adenoma and 21 of early carcinoma were analyzed. Histologic diagnosis was undertaken according to World Health Organization classifications. Magnified observation of the lesions was performed using NBI without chromoendoscopy, and pit pattern diagnosis was then recorded. After endoscopic or surgical resection of the lesion, the authors performed stereoscopic examination to confirm the pit pattern. From these data, the authors estimated the ability to diagnose pit patterns using NBI magnification without chromoendoscopy. The correspondence rate of pit pattern diagnosis between NBI magnification without chromoendoscopy and stereoscopic findings was 100% (9/9) for type II, 100% (56/56) for type III-L, 100% (3/3) for type IV, 80% (12/15) for type VI, and 57% (4/7) for type VN. NBI magnification without chromoendoscopy demonstrated good results for pit pattern diagnosis of colorectal neoplasia, especially for lesions with regular pit pattern.

Key words: colorectal neoplasia, magnification, narrow band imaging, pit pattern.

INTRODUCTION

Narrow band imaging (NBI) is a newly developed technology that uses optical filters for RGB sequential illumination and narrows the bandwidth of spectral transmittance. It enables observation of the fine capillaries in the superficial mucosa of the gastrointestinal tract. The clinical usefulness of NBI has been reported previously in detailed endoscopic observations of head/neck carcinoma, superficial esophageal carcinoma, early gastric carcinoma and colorectal neoplasia. In the colorectal field, Machida et al. reported that NBI observation is useful for differential diagnosis between neoplasia and non-neoplasia, being as good as standard magnification or chromoendoscopic examination. Recently, pit pattern diagnosis using a magnifying colonoscope has been established. The clinical significance of pit pattern diagnosis in the colorectal field is the differential diagnosis between neoplasia and non-neoplasia, diagnosis of the degree of histologic atypia of a tumor, invasion depth diagnosis of early carcinomas, detection of minute residual tumors after endoscopic resection, estimation of the degree of histologic inflammation in ulcerative colitis, and the diagnosis of dysplasia/colitis associated carcinomas in ulcerative colitis. Usually, standard magnifying observation needs the use of chromoagents in the diagnostic procedures, such as indigo carmine or crystal violet, to clarify the pit structure. More simple and convenient procedures are desirable for the magnifying procedures.

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In this report, the authors assessed the clinical usefulness of magnification using NBI in pit pattern diagnosis for colorectal neoplasia.

**NARROW BAND IMAGING MAGNIFICATION**

When a lesion was detected by ordinary observation, surface mucus was washed away with lukewarm water. Magnified observation was then performed using NBI and pit pattern diagnosis (classification of Kudo & Tsuruta; Fig. 1) was recorded (Figs 2–4). The magnifying videoendoscope used in this study was a CF-Q260AZI (Olympus Optical Co. Ltd, Tokyo, Japan). The NBI system was provided by the Olympus Optical Co. Ltd. After NBI magnification, lesions were resected endoscopically or surgically.

**STEREOSCOPIC EXAMINATION**

After each lesion was resected, specimens were fixed in 10% buffered formalin for 12–48 h after extension by pinning on a board. Fixed specimens were rinsed thoroughly and stained for 2–3 min with Carazzi hematoxylin. The pit pattern at the surface of the lesions was observed and photographed with a stereomicroscope. With these photographs, the pit pattern was compared to the magnifying colonoscopic findings using NBI. After examination of the pit pattern, the resected tumor was cut into 2–3 mm blocks. Microscopic examination was performed on hematoxylin–eosin-stained sections by one pathologist unaware of other features of each case. A total of 90 colorectal lesions analyzed in this report include nine cases of hyperplasia, 60 of tubular adenoma and 21 of early carcinoma.

**DISCUSSION**

The rate of correspondence of the regular pit pattern between NBI magnification and stereoscopic examination was 100%. There were no lesions that could not be observed by magnification with NBI. Even if there was thin mucus covering the lesion surface, NBI magnification obtained a good picture through the mucus. By detecting the microvessels under the standing mucosa among pits, NBI magnification can indirectly detect pit structure. In contrast, the rate of correspondence for the VN pit pattern was only 57%, which is low compared with the regular pit pattern.
Fig. 3. Case 2: colonoscopic imaging; IIa + IIc type lesion 12 mm in diameter. (a) Standard colonoscopic findings. (b) Standard colonoscopic findings with Narrow Band Imaging (NBI). (c) Magnifying view using NBI (middle power view). (d) Magnifying view using NBI (high power view). This picture shows irregular arrangements of microvessels under the standing mucosa among pits, which indicates irregular pit pattern (VI type pit pattern).

Table 1. Corresponding rate of pit pattern diagnosis

<table>
<thead>
<tr>
<th>Diagnosis by NBI magnification</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>VI</th>
<th>VN</th>
</tr>
</thead>
<tbody>
<tr>
<td>II</td>
<td>9 (100)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>56 (100)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td></td>
<td></td>
<td>2 (13)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IIIa</td>
<td></td>
<td></td>
<td></td>
<td>3 (100)</td>
<td></td>
</tr>
<tr>
<td>IIIb</td>
<td></td>
<td></td>
<td></td>
<td>12 (80)</td>
<td>3 (43)</td>
</tr>
<tr>
<td>VI</td>
<td></td>
<td></td>
<td></td>
<td>1 (7)</td>
<td>4 (57)</td>
</tr>
<tr>
<td>Invisible</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>9 (100)</td>
<td>56 (100)</td>
<td>0 (0)</td>
<td>3 (100)</td>
<td>15 (100)</td>
</tr>
</tbody>
</table>

Total accuracy rate of pit pattern diagnosis: 84/90 (93%).
NBI, narrow band imaging.
Therefore, while NBI magnification is useful for regular pit pattern diagnosis, it might not be so useful for VN pit patterns. Lesions with VN pit pattern do not preserve a superficial pit structure, so NBI magnification could not distinguish between an amorphous state and exudation adhesion. Regarding V1 pit patterns, 80% of lesions were diagnosed precisely, however, in 20% it was difficult to detect the irregular pit pattern; maybe due to the influence of the state of preservation of the pit orifice. Especially, higher grade irregular pit patterns are more difficult to detect by NBI magnification than lower grade irregular ones are.

Generally, angiogenesis is considered to correlate with carcinoma development. In the esophageal field it has been reported that intrapapillary capillary loop detected using magnified observation is a useful indicator for invasion depth diagnosis for superficial esophageal carcinoma. As well as for esophageal carcinomas, for diagnosis of VN pit pattern of early colorectal carcinomas, which is an indicator for massive submucosal invasion, evaluation of the state of superficial microvessel formation will be very important. Further study with an accumulation of various cases will be needed to confirm this point.

Finally, NBI magnification is indeed useful for regular pit pattern (from II to IV) diagnosis of colorectal neoplasia. NBI magnification for V-type pit patterns should be estimated in more detail, especially from the perspective of microangio-logical findings. However, as the NBI method is very easy and does not need chromoendoscopy, it should find widespread acceptance in the near future.

REFERENCES


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