

学位論文の要旨

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学位論文名 Magnification Endoscopy With Acetic Acid Enhancement and a Narrow-Band Imaging System for Pit Pattern Diagnosis of Colorectal Neoplasms

発表雑誌名 Journal of Clinical Gastroenterology, in press
(巻, 初頁～終頁, 年)

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論文内容の要旨

INTRODUCTION

Pit pattern (PP) analysis of colorectal neoplasms using magnification chromoendoscopy with crystal violet (CV-MCE) is useful for predicting histologic features, but it is time-consuming. Capillary pattern analysis via magnification endoscopy with narrow-band imaging (NBIME) is also believed to be useful, but its diagnostic accuracy may be inferior to that of CV-MCE. NBIME with acetic acid enhancement (A-NBIME) is effective for rapid detection of gastric mucosal microstructures. We performed a prospective study to compare the diagnostic reliability and feasibility of A-NBIME and CV-MCE in PP diagnosis of colorectal neoplasms.

MATERIALS AND METHODS

A total of 219 patients examined by colonoscopy at Tottori Municipal Hospital were enrolled in this study. The analysis consisted of three protocols (Studies 1, 2, and 3) approved by the medical ethics committee of the hospital, and informed consent was obtained from all participants.

Study 1: Diagnostic concordance of PP between A-NBIME and CV-MCE

A total of 51 patients with 56 colorectal lesions (7 hyperplasias, 28 adenomas, and 21 adenocarcinomas) were enrolled. PPs were photographed by A-NBIME and CV-MCE. A single expert endoscopist classified the PPs of CV-MCE images into eight types: type I, II, IIIs, IIIl, IV, VI-L, VI-H, and VN, according to the previously reported classifications. Lesions with a type I,

non-neoplastic standardized pattern were excluded from this study. Eight lesions each with type II, IIIs, IIIL, IV, VI-L, VI-H, and VN PPs diagnosed by CV-MCE (total of 56 cases) were enrolled. CV-MCE and A-NBIME images were independently reviewed by three expert endoscopists. The PPs of A-NBIME images were diagnosed principally according to that of CV-MCE images, but type V PPs were originally subclassified by our criteria via the slight difference of the appearance of PP. Kappa statistics with 95% confidence intervals were calculated as an interobserver agreement of PP diagnosis among reviewers for each modality, and intraobserver diagnostic agreement between modalities was also analyzed for each reviewer.

Study 2: Ability of PP recognized by A-NBIME to predict histological features

A total of 116 consecutive patients with colorectal lesions were enrolled and PPs were photographed by A-NBIME. Three expert endoscopists independently reviewed endoscopic images and diagnosed the PPs of the lesions. In addition, the kappa statistics with 95% confidence intervals were calculated as a measure of interobserver agreement of PP diagnosis among reviewers. When two or all three reviewers agreed upon PP, it was diagnosed as the inherent PP of the lesion. However, when the lesion was diagnosed as different patterns by all reviewers, it was excluded as a nonconsensus lesion. The correlation between PPs visualized by A-NBIME and histologic features was analyzed.

Study 3: Feasibility of A-NBIME and CV-MCE

A total of 100 patients with colorectal polyps were enrolled and alternately allocated to the A-NBIME and CV-MCE groups. For the A-NBIME group, acetic acid solution was injected directly from the forceps channel. For the CV-MCE group, a dedicated tube was inserted from the forceps channel to allow dripping of the crystal violet solution onto the lesions, after which the lesions were washed out to eliminate excess stain solution. The procedure time to diagnosis of PPs and the visible ratio of PPs were compared between groups.

RESULTS AND DISCUSSION

Study 1:

The kappa values for interobserver agreement for A-NBIME and CV-MCE were 0.71 (0.66-0.75) and 0.80 (0.75-0.85), respectively. Those for intraobserver agreement between modalities for each reviewer were 0.79 (0.70-0.88), 0.80 (0.71-0.90), and 0.74 (0.67-0.82), respectively.

Study 2:

Overall, 202 lesions, including 27 hyperplasias, 144 adenomas, and 31 adenocarcinomas, were analyzed. PP diagnosis was agreed upon by two or all three reviewers for all lesions, and the kappa value for interobserver agreement was 0.69 (0.65-0.73). Hyperplasias, adenomas, and

adenocarcinomas were statistically related to type II, type IIIs/IIIL/IV, and type V, respectively ($P < 0.01$). Mucosal or slightly invasive submucosal adenocarcinoma and massively invasive submucosal adenocarcinoma (submucosal invasion depth > 1 mm) were statistically related to type VI-L and type VI-H/VN, respectively ($P < 0.01$).

Study 3:

In total, 97 lesions in the A-NBIME group and 117 lesions in the CV-MCE group were analyzed. No statistical differences in macroscopic type, size, location, or histopathology of lesions were observed between groups. The median (range) procedure time was 31 (10-218) seconds with A-NBIME and 81 (43-349) seconds with CV-MCE; this difference was statistically significant ($P < 0.01$). The visible ratio of PPs was 98.9% (96/97) with A-NBIME and 98.3% (115/117) with CV-MCE ($P = 0.926$).

A-NBIME showed good interobserver diagnostic agreement both in Studies 1 and 2, suggestive of good applicability of this modality for PP diagnosis. In addition, the kappa value of the intraobserver agreement for PP diagnosis between A-NBIME and CV-MCE was statistically good for each reviewer, suggesting that PPs are similarly observed between the two modalities. Moreover, a good relationship between PP and histologic type was found by A-NBIME as previously proven by CV-MCE, which is suggestive of actual applicability of A-NBIME in the treatment of colorectal neoplasms. Above all, the primary advantage of A-NBIME was that this procedure was technically simpler and consequently less time-consuming than CV-MCE.

The kappa value of interobserver agreement for PP diagnosis by A-NBIME was good but somewhat smaller than that by CV-MCE in Study 1, just below statistical significance. We consider that the slight difference of PP appearance between modalities might have confused the reviewers who were well versed in CV-MCE but inexperienced in A-NBIME for PP diagnosis. Acetic acid is a hydrophilic carboxylic organic acid with a small molecular weight, and crystal violet is a hydrophobic dye with a large molecular weight. Acetic acid easily infiltrates crypts filled with mucus and quickly discolors the intervening region between crypts and the marginal crypt epithelium, so that pits are visualized as hollows of crypts in themselves. In contrast, crystal violet gradually infiltrates the crypts via its large molecular weight and hydrophobicity, and stains the intervening region, so that pits are visualized as unstained areas including crypts and marginal crypt epithelium. Therefore, the pits visualized by A-NBIME may be slightly smaller and more three-dimensional than those visualized by CV-MCE.

CONCLUSION

A-NBIME shows good interobserver agreement for PP diagnosis and good predictability of the histological features of colorectal lesions despite its simplicity relative to CV-MCE, suggesting that A-NBIME is a useful and feasible tool for PP diagnosis of colorectal neoplasms.