

Linked Color Imaging Technology for Diagnosis of Gastric Mucosa-associated Lymphoid Tissue Lymphoma

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Mucosa-associated lymphoid tissue (MALT) lymphoma has previously been diagnosed only by a histological examination of gastric specimens, which made the diagnosis of MALT lymphoma very difficult. Endoscopic findings of gastric MALT lymphoma are variable, and current conventional white-light endoscopy cannot distinguish the cancerous tissue of MALT lymphoma from inflammation due to its histomorphological similarities. A new endoscopic modality known as linked color imaging (LCI) has been developed that may help in the diagnosis of gastric MALT lymphoma. Here, we reported a case of MALT lymphoma diagnosed by LCI.

A 66-year-old male underwent upper gastrointestinal endoscopy at the Affiliated Hospital of Academy of Military Medical Sciences. The results revealed a longitudinal, hypertrophic gastric fold approximately 15 mm in size in the greater curvature of the gastric body with a normal white-light imaging [WLI; Figure 1a]. Compared with the WLI, the lesion was more easily recognizable on the LCI, on which it appeared as a bright reddish area [Figure 1b]. Additionally, a flat lesion, approximately 2 cm in diameter, was observed in the greater curvature of the gastric body in LCI [Figure 1c]. The demarcation of the lesion was easily visualized due to the striking color contrast between the lesion and the normal mucosa, which accentuated the distinction between the flat and the marginal elevation. The lesion appeared slightly erythematous in LCI compared to WLI, and was more clearly and easily recognizable [Figure 1d]. A target biopsy of the reddish area performed during LCI produced a specimen that was immunohistochemically positive for CD20(+) and negative for CyclinD1(-) and CD5(-), resulting in a pathological diagnosis of gastric MALT lymphoma [Figure 2a–2d].

MALT lymphoma is characterized by infiltration of the lamina propria by lymphomatous, centrocyte-like cells that invade the glandular epithelium, sometimes forming

lymphoepithelial lesions and spreading into the surrounding mucosal layers. Recent studies have found that the lesions appearing on WLIs are often misleading, especially during follow-up for MALT lymphoma, since mucosal abnormalities such as erythema or scarring can still be seen in many patients after successful eradication of MALT lymphoma.^[1] In addition, some lesions in the gastric mucosa undergo a pale color change, which is similar to that seen in the surrounding atrophic mucosa on WLIs.^[2] Such lesions do not tend to be recognized by simple white-light visualization but may be enhanced by LCI, like this case, resulting in potentially easy recognition. Targeted biopsy using LCI can improve the discovery rate and diagnostic accuracy. LCI can also provide a reference for observing changes in the scope and size of a lesion and for high-resolution endoscopic magnification to observe the vascular morphology of the lesion. Another advantage of LCI is that it can shorten the operation time and reduce the pain experienced by patients.

The newly developed LCI system (Fujifilm Co., Tokyo, Japan) has two lasers with different wavelengths.^[3] It offers both clear and intense white light as well as color images, in contrast to the monochrome images afforded by conventional image-enhanced endoscopy. Thus, this report showed that LCI enhances differences in hue, making red areas appear redder and white areas appear whiter. This enhancement enables easier recognition of slight differences in the color of the mucosa. Therefore, LCI may facilitate the detection of gastric MALT lymphomas that are undetectable on WLIs.

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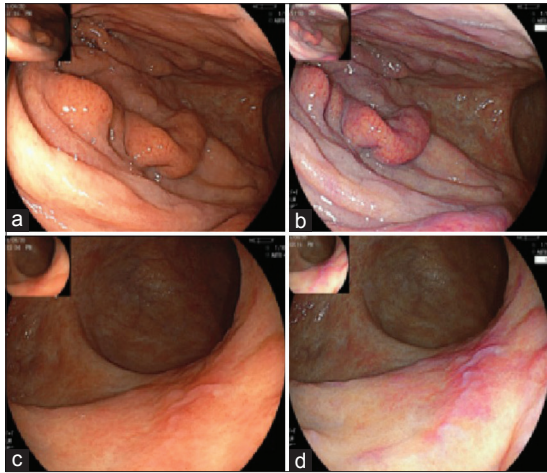


Figure 1: (a) A longitudinal hypertrophic gastric fold about 25 mm in size is visible in the greater curvature of the gastric body. (b) The lesion is easily recognizable as a bright reddish area on link color imaging. (c) A flat lesion, approximately 2 cm in diameter on the greater curvature of the gastric body. (d) The lesion was observed with linked color imaging, which clarifies the demarcation of the lesion, thanks to the striking color contrast between the lesion and the normal mucosa, accentuating the distinction between the flat and the marginal elevation.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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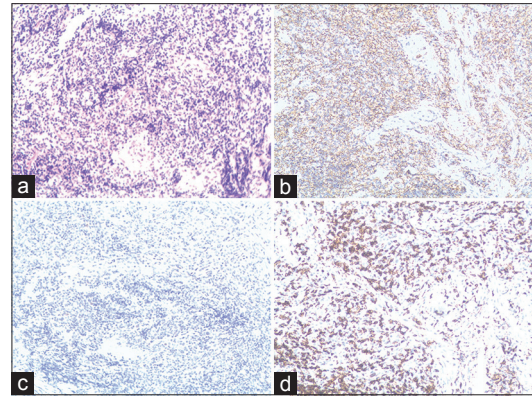


Figure 2: (a) Biopsy specimen showing the dense pleomorphic lymphocytic infiltration (H & E, $\times 10$). (b) Immunohistochemical staining revealing diffuse positive for CD20 of the biopsy specimen, suggesting B-cell lymphoma (immunohistochemical, $\times 10$). (c and d) Immunohistochemical staining revealing negative for CyclinD1, CD5, suggesting the lesion is mucosa-associated lymphoid tissue lymphoma (immunohistochemical, $\times 10$).

Conflicts of interest

There are no conflicts of interest.

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