Endoscopic evaluation of celiac disease

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Although serology-based diagnosis of celiac disease (CD) in children recently has been legitimized [1], small bowel biopsy remains the gold standard for diagnosis of the condition [2,3]. Upper endoscopy, therefore, takes on paramount importance in management of CD for several reasons, including serendipitous discovery of endoscopic markers of CD, assessment of "patchy" villous atrophy, targeting of biopsy sampling, and evaluation of CD-related complications.

Macroscopic markers of CD, estimable with white light endoscopy, include the "scalloped" appearance of duodenal folds, nodular pattern of the mucosa (the so-called "mosaicism"), evidence of submucosal vessels, and epithelial fissurations [4]. The diagnostic accuracy of these findings is largely variable, according to different reports [5, 6], and they are associated with a significant rate of underdiagnosis of CD [7,8]. Because standard endoscopy is unreliable, other endoscopic tools have been investigated for diagnosis opf CD, which fall into two categories based on their working principle: *machine-independent techniques* and *machine-dependent techniques*; the latter include software- and hardware-dependent techniques [9,10]. The water-immersion technique (WIT) and dye-staining chromoendoscopy and machine-independent. Software-dependent techniques include Narrow-Band Imaging (optical dye-less chromoendoscopy), Fujinon Intelligent Chromo Endoscopy (virtual dye-less chromoendoscopy) and i-SCAN, which are dyeless chromoendoscopy tools. Hardware-dependent techniques such as optical coherence tomography, confocal laser endomicroscopy, video capsule endoscopy, and enteroscopy can be performed only with dedicated tools that are different from regular gastroscopes, or with the use of probes [9,10]. The combination of these techniques has been suggested to improve the detection of duodenal villous abnormalities [11].

In this issue of Endoscopy International Open, Iacucci et al [12] present a retrospective cohort study of 58 patients with clinical suspicion of CD and positive serology testings who underwent upper endoscopy and duodenal evaluation with both white light endoscopy (WLE) and a combination of i-SCAN and WIT (iSCAN-HDWI). The duodenal view was respectively classified as normal, reduction of folds, mosaic pattern, scalloping and atrophy with visible vessels with WLE, and as normal, mild, moderate, patchy or severe villous atrophy with iSCAN-HDWI.

The authors found a significant correlation between the endoscopic grade evaluated by iSCAN-HDWI and the histology score. Assessment with WLE showed a lower but significant grade of correlation. In particular, iSCAN-HDWI achieved 96% sensitivity, 63% specificity, and 100% accuracy for predicting duodenal damage (excluding Marsh I lesions), whereas WLE showed 78% sensitivity, 50% specificity, and 72% accuracy for the same gold standard. Respectively, WLE identified no abnormalities in 55.6% of patients diagnosed with patchy villous atrophy and in 33.3% of patients diagnosed with mild villous atrophy after iSCAN-HDWI evaluation.

WIT is an easy technique that allows real-time enhancement of duodenal villous pattern during upper endoscopy. After aspiration of air from the duodenal lumen, the operator injects 100 mL to 150 mL of water to highlight villi [13]. WIT achieved high levels of accuracy in diagnosing total villous atrophy (TVA), with only slightly less accurate results in identifying partial villous atrophy (PVA) [14–17].

i-SCAN is a digital tool developed by Pentax Medical. It enhances images through three different modalities: contrast enhancement, which highlights mucosal abnormalities, particularly those of depressed areas; surface enhancement, which increases contrast between light and dark; and tone enhancement, which groups and recom-

bines blue, red, and green components of images. i-SCAN produced results similar to WIT in assessment of TVA and PVA [18]. The combination of iSCAN technology with WIT both highlights vascular and mucosal pattern and allows direct visualization of villi. Such a "joint-venture" can be of help in evaluating the duodenal villous pattern, especially in the case of partial or patchy villous atrophy, and in targeting biopsy sampling; therefore, it is advocated to decrease the number of CD misdiagnoses and related unnecessary costs. Further studies, combining other modalities for imaging enhancement, are therefore welcome to improve our knowledge of the diagnostic potential of endoscopic tools in CD.

Competing interests: None

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