

# Endoscopic evaluation of celiac disease

## Authors

Giovanni Cammarota, Gianluca Ianaro

## Institution

Internal Medicine, Gastroenterology and Liver Unit; "A. Gemelli" University Hospital, Rome, Italy

## submitted

19. February 2016

## accepted after revision

14. March 2016

## Bibliography

DOI <http://dx.doi.org/10.1055/s-0042-105435>

Published online: 15.4.2016

Endoscopy International Open

2016; 04: E547–E548

© Georg Thieme Verlag KG

Stuttgart · New York

E-ISSN 2196-9736

## Corresponding author

**Prof. Giovanni Cammarota,**

**MD**

Gemelli University Hospital

Internal Medicine,

Gastroenterology and Liver Unit

Largo A. Gemelli

8, 00168 – Roma

Italia

Fax: +39-06-35502775

[giovanni.cammarota@unicatt.it](mailto:giovanni.cammarota@unicatt.it)

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 of 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-

## License terms



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

## References

- Husby S, Koletzko S, Korponay-Szabó IR. European Society for Pediatric Gastroenterology, Hepatology, and Nutrition guidelines for the diagnosis of coeliac disease. et al. ESPGHAN Working Group on Coeliac Disease Diagnosis; ESPGHAN Gastroenterology Committee; European Society for Pediatric Gastroenterology, Hepatology, and Nutrition. *J Pediatr Gastroenterol Nutr* 2012; 54: 136–160
- Rubio-Tapia A, Hill ID, Kelly CP. American College of Gastroenterology. et al. ACG clinical guidelines: diagnosis and management of celiac disease. *Am J Gastroenterol* 2013; 108: 656–676
- Ludvigsson JF, Bai JC, Biagi F. BSG Coeliac Disease Guidelines Development Group; British Society of Gastroenterology. et al. Diagnosis and management of adult coeliac disease: guidelines from the British Society of Gastroenterology. *Gut* 2014; 63: 1210–1228
- Brocchi E, Tomassetti P, Misitano B et al. Endoscopic markers in adult coeliac disease. *Dig Liver Dis* 2002; 34: 177–182
- Maurino E, Capizzano H, Niveloni S et al. Value of endoscopic markers in celiac disease. *Digestive diseases and sciences* 1993; 38: 2028–2033
- Leclaire S, Di Fiore F, Antonietti M et al. Endoscopic markers of villous atrophy are not useful for the detection of celiac disease in patients with dyspeptic symptoms. *Endoscopy* 2006; 38: 696–701
- Barada K, Habib RH, Malli A et al. Prediction of celiac disease at endoscopy. *Endoscopy* 2014; 46: 110–119
- Robson K, Alizart M, Martin J et al. Coeliac patients are undiagnosed at routine upper endoscopy. *PLoS one* 2014; 9: e90552
- Ianiro G, Gasbarrini A, Cammarota G. Endoscopic tools for the diagnosis and evaluation of celiac disease. *World J Gastroenterol* 2013; 19: 8562–8570
- Cammarota G, Fedeli P, Gasbarrini A. Emerging technologies in upper gastrointestinal endoscopy and celiac disease. *Nat Clin Pract Gastroenterol Hepatol* 2009; 6: 47–56
- Fedeli P, Gasbarrini G, Cammarota G. The combined application of advanced endoscopic imaging techniques may increase the duodenal villous morphology definition in suspected celiac disease. *Dig Liver Dis* 2010; 42: 595–596
- Iacucci M, Poon T, Gui XS et al. High definition iSCAN endoscopy with water immersion technique accurately reflects histological severity of Celiac Disease. *Endoscopy International Open* 2016
- Gasbarrini A, Ojetti V, Cuoco L et al. Lack of endoscopic visualization of intestinal villi with the “immersion technique” in overt atrophic celiac disease. *Gastrointestinal Endoscopy* 2003; 57: 348–351
- Cammarota G, Pirozzi GA, Martino A et al. Reliability of the “immersion technique” during routine upper endoscopy for detection of abnormalities of duodenal villi in patients with dyspepsia. *Gastrointestinal Endoscopy* 2004; 60: 223–228
- Cammarota G, Cuoco L, Cesaro P et al. A highly accurate method for monitoring histological recovery in patients with celiac disease on a gluten-free diet using an endoscopic approach that avoids the need for biopsy: A double-center study. *Endoscopy* 2007; 39: 46–51
- Cammarota G, Cesaro P, La Mura R et al. Role of the “immersion technique” in diagnosing celiac disease with villous atrophy limited to the duodenal bulb. *Journal of Clinical Gastroenterology* 2007; 41: 571–575
- Cammarota G, Cazzato A, Genovese O et al. Water-immersion technique during standard upper endoscopy may be useful to drive the biopsy sampling of duodenal mucosa in children with celiac disease. *Journal of Pediatric Gastroenterology and Nutrition* 2009; 49: 411–416
- Cammarota G, Ianiro G, Sparano L et al. Image-enhanced endoscopy with i-scan technology for the evaluation of duodenal villous patterns. *Dig. Dis. Sci* 2013; 58: 1287–1292