

Computed Virtual Chromoendoscopy - Enhanced Videocapsule Endoscopy is of Potential Benefit in Gastric Antral Vascular Ectasia Syndrome Refractory to Endoscopic Treatment

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Abstract

Gastric antral vascular ectasia (GAVE) syndrome represents a rare cause of gastrointestinal bleeding. More extensive small-bowel involvement must be excluded in those patients with GAVE syndrome in whom aggressive endoscopic treatment of antral lesions results in lack of control of digestive bleeding, and for this subset of patients videocapsule endoscopy examination should be considered. However, since the dim angioectatic lesions, even if located in the gastric antrum, might be difficult to accurately outline with standard endoscopy, virtual chromoendoscopy techniques have been employed to aid in their detection, and the presented case illustrates how Fujinon intelligent color-enhancement (FICE) technology implemented in videocapsule endoscopy clearly emphasizes the vascular morphology and delineation of antral angioectasias, allowing better targeted endoscopic treatment and improving patient outcome.

Key Words

Gastric antral vascular ectasia – gastric intestinal vascular ectasia – videocapsule endoscopy – FICE – Fujinon intelligent color-enhancement – obscure gastrointestinal bleeding

Introduction

Gastric antral vascular ectasia (GAVE or watermelon stomach) syndrome represents a rare cause of gastrointestinal hemorrhage; the most common clinical profile of the patient with GAVE syndrome is an elderly female with slow GI blood loss (occult or overt) presenting with iron deficiency

anemia of varying degrees [1]. Its characteristic endoscopic appearance is of longitudinal rows of flat, reddish stripes radiating from the pylorus into the antrum [2], consisting of ectatic and sacculated mucosal vessels; in addition to that, a less frequent punctate form (in which the red stripes are not apparent) has also been described [2]. Multiple endoscopic treatment sessions using various techniques are reported to obliterate the vascular ectasias, decrease the degree of bleeding, reduce transfusion requirements and raise hemoglobin level in patients with GAVE syndrome [3]. Most of them require a maximum of three to four such sessions to achieve the desired clinical benefit. However, long-term follow-up data are limited and the attitude in front of a patient with no response to endoscopic treatment has not been established. Some consider that in such patients more extensive small-bowel involvement must be excluded – the term “gastric intestinal vascular ectasia” (GIVE) [4] having been proposed to describe the co-existence of small- or large-bowel ectasia with the classic antral changes seen in GAVE, and that videocapsule endoscopy (VCE) examination should be considered when gastrointestinal (GI) blood loss continues despite satisfactory endoscopic ablative therapy to the antrum [4].

The case

A 78-year-old woman suffering from ischemic heart disease (stable angina) presented with a history of recurrent melena and severe chronic sideropenic anemia that initially had responded to oral iron supplementation. She had no history of chronic liver disease and in the last few months she had not been taking antiplatelet drugs. Her hemoglobin level at presentation was 4.9 g/dL. Other laboratory blood tests including platelet count, prothrombin time, and liver function tests, were within normal limits.

She was investigated with upper digestive endoscopy and found to have a classic watermelon appearance with visible columns of red ectatic vessels in the antrum. Histopathologically there was superficial hyperplasia of the gastric antral mucosa and capillary ectasia with intravascular fibrin deposits in the lamina propria, also compatible with the diagnosis of GAVE.

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The decision was made to treat the lesions and the patient underwent serial argon plasma coagulation (APC) of the angioectasias in the antrum. After three sessions the effect of the endoscopic treatment seemed to have been achieved, as the upper standard GI endoscopy showed only minimal remanence of ectatic vessels, but the patient was still anemic despite continuing oral iron supplementation, necessitating frequent blood transfusions.

Investigating the possibility of coexistence of angioectatic lesions throughout the small bowel, a VCE examination was performed (PillCam SB2, Given Imaging, Yokneam, Israel). It revealed the presence of faint red petechiae in the gastric antrum and on the duodenal side of the pylorus. Examining the VCE findings with the FICE 1 and 2 settings (Rapid 7 software, Given Imaging, Yokneam, Israel), these antral and pyloric vascular lesions became clearly visible (Fig.1 a-f)

and, as no other angioectasias were identified in the rest of the small bowel and colorectum (colonoscopy being also performed), the patient underwent treatment of the remanent antral and duodenal vascular lesions with two more sessions of argon plasma coagulation, with good results – she did not repeat episodes of overt GI bleeding and her hemoglobin level remained above 10 g/dL during 6 months of follow-up without receiving further blood transfusions or endoscopic therapy.

Discussion

The most reliable means of evaluating GAVE is by direct endoscopic visualization [5]. However, GAVE appearance may be atypical and could be missed at gastroscopy, as illustrated by one series of 128 patients with obscure GI

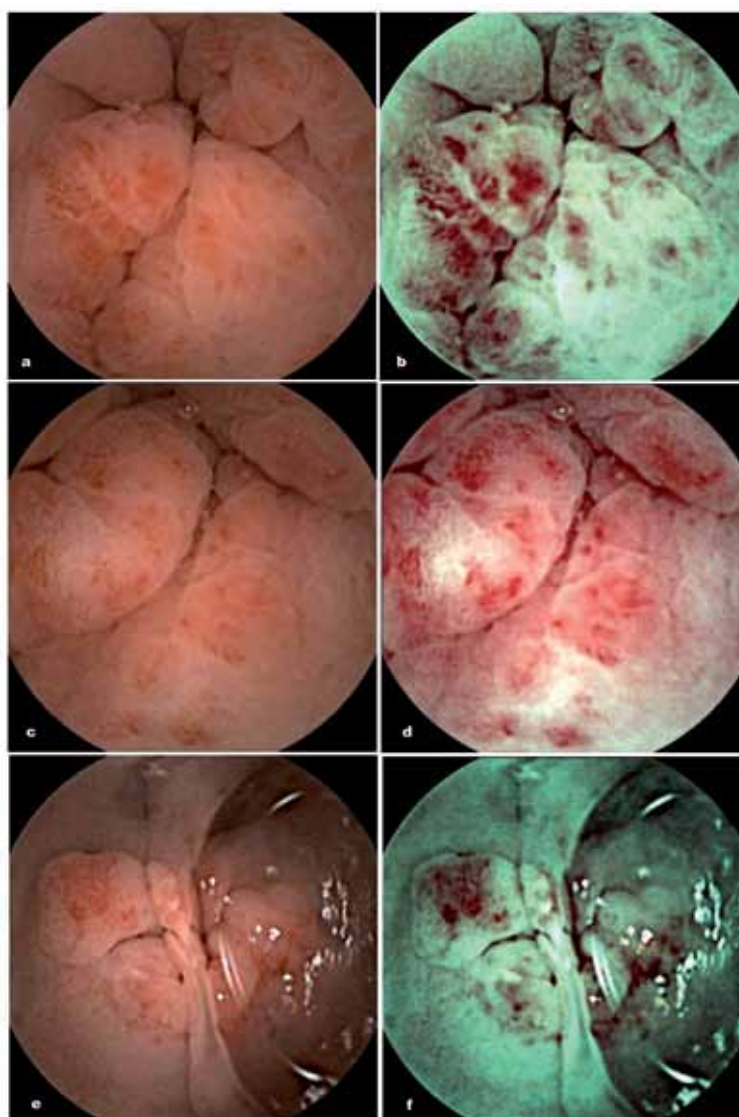


Fig 1. Influence of the spectral specifications of Fujinon intelligent color enhancement (FICE) implemented in videocapsule endoscopy on the vascular contrast of angioectatic lesions in the stomach (a-d) and duodenum (duodenal side of the pylorus, e-f) (a, c, e = imaging with the conventional system; b, f = images with FICE preset 2; d = image with FICE preset 1).

bleeding, of whom, despite the fact that all had previously had numerous GI investigations, 4.7% were diagnosed as having GAVE on the basis of the VCE findings [6]. Indeed, the close proximity of the capsule to the mucosa [6] and its higher degree of magnification compared to standard GI endoscopy allows better definition of the lesions even when the changes are subtle, the findings at VCE being usually striking and easily identified. It has even been suggested that VCE rather than conventional endoscopy is more likely to detect the antral ectasias in GAVE syndrome [6]. In the presented case, however, after three therapeutic endoscopic sessions, the changes in the antrum were faint and hard to recognize in the conventional endoscopic examinations (including VCE), despite the examiner being aware of the patient's history.

As in GI endoscopy, the major agent responsible for the absorption of visible light is represented by hemoglobin; there might be a lower contrast of the blood vessels [7] depending on the size of the vascular lesion, hemoglobin level and mucosal blood flow. Therefore, the dim angioectatic lesions could be underestimated in standard endoscopic imaging. To overcome this problem, aiming to facilitate color differences and thus enhance microvascular contrast, virtual chromoendoscopy techniques have been devised, and very recently the Fujinon intelligent color-enhancement (FICE) software has been implemented within the workstation of a video capsule system (Given Imaging, Yokneam, Israel). This computed virtual chromoendoscopy technique is based on the narrowing of the bandwidth of white light to narrowed red, blue and green light [7], being executed by external software and, as the virtual chromoendoscopy image is reconstructed instantaneously [8], allowing the processing of ordinary endoscopic images in real-time. With this innovation, for optimal mucosal imaging the assessor can flexibly select between standard viewing and four different FICE patterns with different wavelength selections (FICE 1, 2, 3 and Blue) by a simple push of a button in the Given workstation [7] (Fig. 2). From these four types of FICE sets with different dedicated wavelengths, presets 1 (wavelengths red 595, green 540, blue 535nm) and 2 (wavelengths red 420, green 520, blue 530nm) [8] achieve the preferred appearance of the vascular structures. In our experience with the technique, at these presets the contrast between the GI mucosal blood vessels and the background mucosa is increased, the overall color turning reddish (preset 1) and bluish (preset 2), respectively (Fig. 1); a great advantage is represented by the possibility of the alternate viewing of the virtually constructed and standard images.

Whilst the focus of this VCE technology is on the small bowel, there is also an opportunity for the VCE reader to assess the rest of the GI tract and high quality images are also obtained for the proximal GI tract, especially the antrum, where similarly to FICE application in gastroscopy and colonoscopy, FICE-enhanced VCE improves the delineation and morphology of the lesions [9]. Therefore, in a persistently anemic GAVE patient in whom, after several

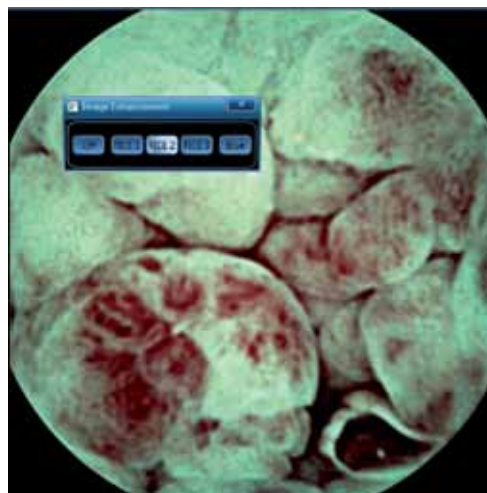


Fig 2. Switchover between the standard and FICE image (in this case preset 2) by a simple push of a button in the Given workstation.

endoscopic treatment sessions, conventional endoscopic examinations show only minimal remanence of angioectatic lesions in the gastric antrum, FICE-enhanced VCE could better outline the incompletely treated antral lesions. On the other hand, this technology has the potential to disclose the presence of other lesions throughout the small bowel and in regions inaccessible to standard endoscopic viewing (behind the valvulae conniventes or, as in the presented case, on the duodenal side of the pyloric ring), that, if present, could explain the continuing blood loss, thus allowing better targeted endoscopic treatment.

In conclusion, one of the improvements offered by the Rapid software-integrated FICE technique is highlighting of the vascular lesions, and this novel imaging tool can easily be selected when evaluating VCE adding useful information to conventional imaging [10] and possibly improving diagnostic yields. A novel and interesting indication could be the investigation of the GAVE patients unresponsive or incompletely responsive to standard endoscopic treatment, where it might improve the detection of angioectatic lesions, located in the gastric antrum or elsewhere in the GI tract. However, although preliminary studies suggest that modified imaging with enhanced vascular contrast is capable of contributing substantially to the analysis of angioectasias throughout the GI [9, 10], the superiority of the virtual chromoendoscopic image over the standard endoscopic image of the mucosa has not been demonstrated in a randomized comparative study [8, 9]. The results of currently ongoing studies [10] are awaited and probably further trials will be necessary to gain more evidence of the expected benefits of this technology, as illustrated by a few cases so far.

Conflicts of interest

The authors have nothing to disclose.

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