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Advanced endoscopic imaging for gastric cancer assessment: New insights with new optics?

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A B S T R A C T

The most immediate strategy for improving survival of gastric cancer patients is secondary prevention through diagnosis of early gastric cancer either through screening or follow-up of individuals at high risk. Endoscopy examination is therefore of paramount importance and two general steps are to be known in assessing gastric mucosa – detection and characterization. Over the past decade, the advent of advanced endoscopic imaging technology led to diverse descriptions of these modalities reporting them to be useful in this setting. In this review, we aim at summarizing the current evidence on the use of advance imaging in individuals at high-risk (i.e., advance stages of gastric atrophy/intestinal metaplasia) and in those harbouring neoplastic lesions, and address its potential usefulness providing the readers a framework to use in daily practice. Further research is also suggested.

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Introduction

Gastric cancer (GC) is the third most common cause of cancer deaths worldwide [1]. Although advanced GC is associated with poor prognosis and high mortality rates, early detection and treatment can result in 5-year survival rates as high as 96% [2]. *Helicobacter pylori* (*H. pylori*) is considered the most important risk factor for GC, by promoting a multi-step process of chronic gastritis, atrophy, intestinal metaplasia (IM), dysplasia and, finally, intestinal-type adenocarcinoma [3].

Secondary prevention through diagnosis of premalignant lesions and early gastric cancer (EGC) and screening or follow-up of individuals at high risk, are probably the most immediate strategies for improving survival [4,5]. Endoscopy examination is therefore of paramount importance. Identification of EGC, however, is difficult because of the lack of gross endoscopic signs. Moreover, despite the ability of experienced endoscopists to detect abnormalities, accurate differentiation among these gastric lesions for therapeutic decision making (ie, endoscopic resection, surgery, or follow-up) is extremely difficult [6,7], and it is not surprising that ancillary techniques such as chromoendoscopy have been used for an accurate diagnosis of precancerous lesions and/or invasiveness of cancerous lesions [8–10], but it lengthens the time of the endoscopic procedure and is not very popular among endoscopists, particularly in Western countries.

Over the past decade, the advent of new advanced endoscopic imaging technology, namely high-resolution with narrow band imaging (NBI) and flexible spectral imaging color enhancement (FICE), with or without magnification has revolutionized the endoscopic examination of the stomach. Diverse descriptions of these modalities have been published, reporting them to be useful for the accurate diagnosis and characterization of gastric precancerous conditions and lesions [11–17].

Recently, the development of confocal laser endomicroscopy (CLE), endocytoscopy and molecular endoscopy enabled microscopic tissue analysis of the gastric mucosa at real time during endoscopy. This not only aims at imitation of histopathology, but is used to target few biopsies to regions of interest by multiple optical biopsies, and to guide endoscopic interventions [18].

In this review, we will assess GC detection and characterization in individuals at high-risk (i.e., advance stages of gastric atrophy/IM) and in those harbouring neoplastic lesions, and address the usefulness of advanced imaging techniques on that task.

Assessment means first detect and then characterize

Individuals at high-risk

Whether screening, especially that of the mass population, should be done remains controversial because the incidence of GC varies substantially among countries and within the same ethnic group. Even in a very high risk area, there is only some evidence that mass screening reduces mortality from GC [19]. Therefore, identification of high-risk populations to undergo screening is fundamental for the early detection of GC in countries with medium to low incidence [20].

Patients who have established precursor conditions such as mucosal atrophy or IM caused by chronic *H. pylori* infection are at high risk for developing GC [21]. A Dutch nationwide cohort study indicated that the annual incidence of GC was 0.1% for patients with atrophic gastritis, 0.25% for IM, 0.6% for mild to moderate dysplasia, and 6% for severe dysplasia within 5 years after diagnosis [4]. The potential benefits of endoscopic surveillance of gastric IM patients was suggested by a cancer incidence of 11% and improved survival in a retrospective study from the United Kingdom [22]. At present, the diagnosis of atrophy and IM is based on histology. Some studies have evaluated whether conventional white light endoscopy (WLE) can reliably distinguish *H. pylori* gastritis and gastric preneoplastic lesions from normal mucosa. In a pioneer study Atkins & Benedict concluded that correlation between endoscopy and histology was poor [23]. This was confirmed in a subsequent prospective study [24]. There is inconsistent evidence that new high resolution endoscopes are more reliable. Some studies show low accuracy for the diagnosis of atrophy and metaplasia [25], but others suggests the contrary [26]. In addition to low accuracy, endoscopy findings were associated with low reproducibility [27]. Therefore current evidence suggests that conventional endoscopy cannot be relied upon to correctly identify patients with atrophy or IM. Studies have suggested that chromoendoscopy, particularly with