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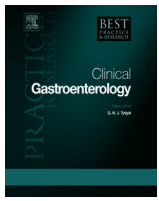

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Diagnosis by endoscopy and advanced imaging

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A B S T R A C T

Evaluation of patients with Barrett's oesophagus (BO) using dye-based chromoendoscopy, optical chromoendoscopy, auto-fluorescence imaging, or confocal laser endomicroscopy does not significantly increase the number of patients with a diagnosis of early neoplasia compared with high-definition white light endoscopy (HD-WLE) with random biopsy analysis. These newer imaging techniques are not more effective in standard surveillance of patients with BO because the prevalence of early neoplasia is low and HD-WLE with random biopsy analysis detects most cases of neoplasia. The evaluation and treatment of patients with BO and early-stage neoplasia should be centralized in tertiary referral centers, where procedures are performed under optimal conditions, by expert endoscopists. Lesions that require resection are almost always detected by HD-WLE, although advanced imaging techniques can detect additional flat lesions. However, these are of limited clinical significance because they are effectively eradicated by ablation therapy. No endoscopic imaging technique can reliably assess submucosal or lymphangio-invasion. Endoscopic resection of early-stage neoplasia in patients with BO is important for

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staging and management. Optical chromoendoscopy can also be used to evaluate lesions before endoscopic resection and in follow-up after successful ablation therapy.

Introduction

The incidence of oesophageal adenocarcinoma (OAC) in the western world has increased sixfold over the past three decades and has a dismal prognosis when detected at a symptomatic stage [1]. Adenocarcinoma develops through a precursor lesion called Barrett's oesophagus (BO) in a sequence of gradually evolving, histologically recognizable steps: intestinal metaplasia, low-grade dysplasia (LGD), high-grade dysplasia (HGD), intramucosal carcinoma (IMC) and eventually invasive carcinoma. These intermediate grades of dysplasia offer a window of opportunity for curative therapy.

In the last decade, endoscopic therapy has been become the treatment of choice for early Barrett's neoplasia (*i.e.* HGD and IMC), with an excellent prognosis and safety profile compared to surgical resection [2]. A prerequisite for endoscopic therapy is adequate patient selection; only patients with HGD and IMC have a virtual absent risk of lymph node metastasis and are therefore amendable for endoscopic therapy [3].

In patients with known BO, regular surveillance endoscopy with random biopsies is recommended to detect early neoplastic lesions at a curable stage [4]. However, these lesions are often small, focally distributed and endoscopically poorly visible (Fig. 1). Random four-quadrant biopsies may easily miss early lesions, since only about 5% of the Barrett's segment is sampled [5]. Moreover, this process is laborious and many endoscopists do not adhere to the protocol [6]. In recent years, many advanced imaging techniques have been developed to improve the detection of early Barrett's neoplasia.

In this review we will discuss how to endoscopically diagnose early neoplasia during BO surveillance and how advanced imaging techniques may affect clinical management of BO either by improving the primary detection of early neoplastic lesions, allowing real-time diagnosis and decision making during endoscopy, or guiding the endoscopic work-up and treatment. Parts of this review have been published earlier in specific publications on endoscopic work-up of early Barrett's neoplasia and advanced imaging techniques by our group [7,8].

Endoscopic diagnosis of early neoplasia in Barrett's oesophagus

The goal of endoscopic surveillance of patients with Barrett's oesophagus is the detection of early neoplastic lesions. To ensure the detection of early neoplastic lesions there are three rules that should be followed. These rules relate to the endoscopic equipment used, the 'detecting eye' of the endoscopist, and a systematic, meticulous approach.

Use best endoscope available

High-resolution endoscopy using high-definition (HD) systems improve image resolution and reduce artifacts. The addition of magnification (zoom) endoscopy optically magnifies 150-fold without losing image quality, for optimally scrutinizing fine surface details [9,10]. Most recent innovation enables the endoscopist to switch between two focus settings (dual focus, Evis Exera III 190, Olympus Inc., Tokyo, Japan): normal and near mode featuring close mucosal observation. Since early Barrett's oesophagus neoplasia often presents as flat lesions with only subtle mucosal abnormalities, most experts agree that high-resolution endoscopy is the preferred method for the endoscopic evaluation of Barrett's oesophagus.