Review Article

Barrett's Esophagus: Diagnosis and Management

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Abstract

Barrett's esophagus is a complication caused by Gastro Esophageal Reflux Disease (GERD). It is a premalignant condition with an increased risk of developing esophageal adenocarcinoma. The carcinogenic sequence may progress through several steps, from normal esophageal mucosa through Barrett's esophagus (BE) to esophageal adenocarcinoma (EAC). A recent advent of functional esophageal testing (particularly multichannel intraluminal impedance and pH monitoring) has helped to improve our knowledge about GERD pathophysiology, including its complications and its neoplastic progression. Over the last few decades, the incidence of EAC has continued to rise in Western populations. Thus, major efforts in clinical and research practice are focused on new methods for optimal risk assessment that can stratify BE patients at low or high risk of developing EAC. Furthermore, the area of BE therapeutic management is rapidly evolving. Endoscopic eradication therapies have been shown to be effective, and new therapeutic options for BE and EAC have emerged. The aim of the present review article is to highlight the pathophysiology, diagnosis and the current progress of BE therapy.Moreover, we discuss the new mucosal ablative techniques that can be used in the esophagus have emerged over the past two decades.

Keywords: Barrett, GERD, Endoscopy, pH monitoring

Introduction

Barrett's esophagus (BE) is a premalignant condition in which the normal stratified squamous epithelium of the distal esophagus is replaced by columnar mucosa of intestinal type as a metaplastic process. However, metaplasia alone does not predispose to malignancy. The presence of low-grade or high-grade dysplasia within the metaplastic intestinal epithelium is of greater concern. BE is a common complication of gastro-esophageal reflux disease (GERD) with incidence rates higher among white males. However, fewer than 10% of GERD patients are likely to progress to a diagnosis of BE at 5 years.

Barrett's esophagus increases the risk of esophageal cancer approximately 10 times and esophageal adenocarcinoma (EAC) approximately 30 times.[1] The incidence of EAC in non-dysplastic BE is around 1 per 300 patients per year.[2] The incidence of EAC in short-segment BE is under 1 per 500 patients per year. There is a well-established association between GERD, obesity and BE.

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Proposed Pathogenesis[3]

Prolonged recurrent GE reflux

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Inflammation and ulceration of squamous epithelial lining of the lower segment of esophagus

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Re-epithelization and in growth of pluripotent stem cells to metaplastic columnar cells of intestine

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Due to sustained low pH, cells become dysplastic

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Low Grade High Grade

Diagnosis

The new recommended definition of BE requires a combination of macroscopic and microscopic identification. In the latest definition, in order to have Barrett's mucosa, one has to be able to see it with an endoscope. This, therefore, excludes ''ultra-short Barrett's'' and also does not require a >3 cm length. In contrast, histological confirmation still requires the presence of a columnar lined esophagus (CLO) but does not require areas of intestinal metaplasia (IM).[2] It is agreed that adenocarcinoma usually originates from a segment containing IM. It is stated that ''if a sufficient number of biopsies are taken over an adequate period of time, IM can be demonstrated (as initial endoscopies can miss IM areas)." According to American guidelines, if a patient has an endoscopy and only areas of CLO without IM are found, the patient would not have BE due to sampling errors. Nevertheless, this decision may well be a major issue in future meta-analyses. Currently, the gold standard for the evaluation of BE is high-resolution white-light endoscopy (HRWLE) with biopsy sampling performed according to the Seattle protocol. High-resolution endoscopes have high sensitivity for detecting dysplasia and BE-related early neoplasia. The Prague classification represents a reliable and validated endoscopic classification of BE, which records the length of the esophagus involved circumferentially (C) in addition to the maximal length (M) involved at any point. Recently, probe-based confocal laser endomicroscopy combined with HRWLE has been introduced. The American College of Gastroenterology recommends routine surveillance endoscopy for patients with chronic GERD symptoms and multiple risk factors (i.e., 50 years of age or older, white race, male gender, obesity, history of smoking, family history for BE or EAC or in men older than 60 years with reflux symptoms for 10 years. New methods for BE screening are transnasal endoscopy and cytosponge (a non-endoscopic esophageal sampling device coupled with immunocytochemistry)

Management

Patients with a history of chronic GERD should have at least a one-time upper endoscopy beginning at the age of 50. If BE is confirmed, the patient should have two surveillance endoscopies (four quadrant biopsies, 2 cm apart) 1 year apart. If no dysplasia is detected in either endoscopy, endoscopies should be repeated at 3-year intervals. If low-grade dysplasia is detected, surveillance should be performed at 1-year intervals. If high-grade dysplasia (HGD) is detected and confirmed by a second expert pathologist and is multifocal, any of the three primary options are indicated.[4] Patients can undergo aggressive surveillance endoscopy using the Seattle protocol (four quadrant biopsies using jumbo biopsy forceps at 1 cm intervals and biopsy of any mucosal irregularity with a therapeutic endoscope) at 3-month intervals until cancer is identified, or esophagectomy or ablative therapy can be performed. Ablation using photodynamic therapy is good alternative to esophagectomy, because esophagectomy is a highly morbid surgery with a mortality rate of 5%.

Ablative Techniques

Ablation therapy is based on four principles. First, ablation therapy is carried out because BE does not spontaneously resolve via treatment with proton pump inhibitors (PPI) or after a surgical anti-reflux procedure except on rare occasions. Second, the BE mucosa is intentionally damaged or ablated in a controlled fashion. Third, either a high-dose PPI (omeprazole) or surgical anti-reflux procedure is used to permit esophageal healing in an anacid or hypochlorhydric environment. Fourth, control of GERD is maintained to prevent the return of BE through recurrent injury.[5]

Photodynamic Therapy

Photodynamic therapy involves the administration of a chemical photosensitizer, which becomes concentrated in the abnormal esophageal mucosa (5-aminolevulinic acid) and some in the stroma (porfimer sodium). Activation of the photosensitizer by an endoscopically applied light source at the appropriate wavelength results in the generation of singlet oxygen and other cytotoxic species that contribute to destruction of the abnormal esophageal mucosa. Of all the ablative techniques, only photodynamic therapy using

Photofrin® is approved by the FDA for the treatment of precancerous lesions in BE.

Laser Therapy

Various lasers have been used in gastroenterology for mucosal ablation, including the neodymium (Nd): yttrium-aluminum-garnet (YAG) laser, the potassium titanyl phosphate (KTP) laser, the KTP:YAG laser and the argon laser. The laser generates an intense beam of light, which is directed at the abnormal mucosa and used to heat it until it is destroyed.

Argon Plasma Coagulation

The most studied of all ablative modalities is APC. High-frequency monopolar current is conducted to tissue via ionized argon gas flowing through a catheter placed in the accessory channel of an endoscope. Its depth of injury is purported to be less than that of PDT or laser.

Endoscopic Mucosal Resection

EMR, or mucosectomy, is an ablative technique that removes mucosa by resecting through the middle or deeper part of the submucosa. Unlike the other ablative techniques, a tissue specimen is obtained that can be evaluated for staging and histology

Multimodality Therapy

Rapidly emerging in the field of ablative therapy is multimodality therapy. Combinations of the above modalities have been used by many investigators in an attempt to optimize treatments by exploiting the uniqueness of each technique.

Conflict of Interest: None

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