Available online at www.sciencedirect.com

ScienceDirect

EJSO xx (2017) 1–13

EJSO the Journal of Cancer Surgery

www.ejso.com

Review

Past, present and future of Barrett's oesophagus

W.K. Tan, M. di Pietro, R.C. Fitzgerald*

MRC Cancer Unit, University of Cambridge, Cambridge, United Kingdom

Accepted 6 February 2017
Available online ■ ■ ■

Abstract

Barrett's oesophagus is a condition which predisposes towards development of oesophageal adenocarcinoma, a highly lethal tumour which has been increasing in incidence in the Western world over the past three decades. There have been tremendous advances in the field of Barrett's oesophagus, not only in diagnostic modalities, but also in therapeutic strategies available to treat this premalignant disease. In this review, we discuss the past, present and future of Barrett's oesophagus. We describe the historical and new evolving diagnostic criteria of Barrett's oesophagus, while also comparing and contrasting the British Society of Gastroenterology guidelines, American College of Gastroenterology guidelines and International Benign Barrett's and CAncer Taskforce (BOBCAT) for Barrett's oesophagus. Advances in endoscopic modalities such as confocal and volumetric laser endomicroscopy, and a non-endoscopic sampling device, the Cytosponge, are described which could aid in identification of Barrett's oesophagus. With regards to therapy we review the evidence for the utility of endoscopic mucosal resection and radiofrequency ablation when coupled with better characterization of dysplasia. These endoscopic advances have transformed the management of Barrett's oesophagus from a primarily surgical disease into an endoscopically managed condition.

Keywords: Barrett's oesophagus; Diagnosis; Management; Guidelines; Endoscopy; Cytosponge

Introduction

Population studies have suggested that up to 1.6% of Europeans have Barrett's oesophagus (BO), a condition in which the native squamous epithelial lining of the distal oesophagus undergoes metaplastic change to a columnar epithelium due to chronic damage caused by gastro-oesophageal reflux disease (GORD).[1,2] Barrett's oesophagus and its predisposing condition, GORD is a major risk factor for the development of oesophageal adenocarcinoma (OAC), a highly malignant cancer which has been increasing in the Western population over the past three decades.[3–6]

Ever since the relationship between BO and OAC was established in the 1970s, there has been a rapid increase in research activity in the field of BO particularly in its diagnosis and management. The common goal among investigators is to curb the progression of this precancerous condition before incurable malignancy sets in.[7–9] However, with advancing knowledge has come misconception and controversy, particularly with regards to the definition and the diagnostic criteria of BO. Even today there remains no universally adopted definition of BO among authorities in this field.

In this review, we describe the past, present and future of BO. We further explore the evolving definition and diagnostic criteria of BO and try to understand where there is consensus and which areas still require resolution. In addition, we describe developments in therapeutic modalities and how this has the potential to impact on the mortality of OAC in the future.

Diagnosis of Barret's oesophagus

Historical perspective and evolution of the diagnostic criteria for Barrett's oesophagus

BO bears its name from the pioneering British surgeon, Norman Barrett who in 1950 published his seminal paper –

* Corresponding author. MRC Cancer Unit, University of Cambridge, Box 197, Cambridge Biomedical Campus, Cambridge CB2 0XZ, United Kingdom. Fax: +44 (0)1223763241.
E-mail address: rcf29@mrc-cu.cam.ac.uk (R.C. Fitzgerald).

http://dx.doi.org/10.1016/j.ejso.2017.02.004

Please cite this article in press as: Tan WK, et al., Past, present and future of Barrett's oesophagus, Eur J Surg Oncol (2017), http://dx.doi.org/10.1016/j.ejso.2017.02.004

'Chronic peptic ulcer of the oesophagus and 'Oesophagitis'' in which he described the columnar-lined oesophagus.[10,11] However, it was Wilder Tileston who first reported three cases of 'peptic ulcer of the oesophagus' in 1906 wherein he described the histology of the ulcer and adjacent epithelium which resembled a gastric ulcer in columnar epithelium.[12] Over the next four decades, disagreements regarding the distal oesophageal histology were prevalent, with some arguing that the ulcers in the distal oesophagus were not oesophageal, but gastric ulcers within an intrathoracic stomach in patients with congenital short oesophagus.[13–16] In fact, this notion was supported by Barrett in his paper in 1950.[10]

In 1953, Allison and Johnstone published an influential report rejecting Barrett's hypothesis, and suggesting that the tubular structure within the distal thorax could not be stomach since it: 1) lacked an outer peritoneal lining; 2) had musculature identical to oesophagus; 3) consisted of columnar epithelium interspersed with squamous islands; 4) lacked mucosal oxyntic cells; and 5) had mucosal glands typical of the oesophagus.[17] Subsequent reassessment of these 'gastric' ulcers by Barrett led him to acknowledge his prior misjudgement, and he published a revised report in 1957, redefining this tubular structure as 'lower oesophagus lined by columnar epithelium'.[18]

Between 1960 to the mid-1970s, there were varying histological descriptions of the columnar subtypes in the distal oesophagus including junctional (gastric cardiac epithelium), gastric-fundal, and intestinal epithelium with goblet cells.[19–21] This histologic conundrum was clarified in 1976 by Paull et al., who performed biopsies on 11 patients with a columnar-lined distal oesophagus and elucidated the presence of a histologic spectrum which from most proximal to distal comprised: columnar epithelial containing villi and goblet cells (now known as intestinal metaplasia, IM and sometimes referred to as Specialised Intestinal Metaplasia); followed by junctional epithelium; and finally, atrophic gastric fundal epithelium with chief and parietal cells.[22]

In the 1980s it was established that GORD and the presence of a hiatal hernia were risk factors for BO and it grew to be appreciated that these could distort the anatomic landmarks of the GOJ during endoscopy making a precise diagnosis difficult.[23,24] To avoid error, diagnostic criteria for BO were established by Skinner et al. who proposed that a minimum of 3 cm columnar lining is required to diagnose BO and for enrolment into clinical studies.[25] By the mid-1980s, the association between BO and OAC was well established[7–9] and it became clear that IM had a mosaic distribution with strong predisposition to dysplasia which led to IM becoming the defining feature for BO.[26,27]

In the mid-1990s, Spechler et al. challenged the conventional practice of only performing biopsies on BO ≥3 cm because he demonstrated that 18% of patients with endoscopically apparent BO measuring less than 3 cm still contained IM.[28] Furthermore, there were reports of OAC developing from BO <3 cm.[29,30] These results, coupled with the categorization of BO into short (≤3 cm) and long segments (≥3 cm) have proved essential in shaping the diagnostic criteria for BO over the years.[31]

Current diagnostic criteria for Barrett's oesophagus

The quality of endoscopic images has improved significantly with the advent of high resolution endoscopes making it easier to discern the landmarks. Today, a diagnosis of BO requires endoscopic visualization of columnar epithelium ≥1 cm above the gastro-oesophageal junction (GOJ) in addition to histological confirmation of columnar metaplasia.[32]

Endoscopic diagnosis of Barrett's oesophagus

Endoscopy remains the gold standard to diagnose BO. During endoscopy, three important landmarks need to be recognized: 1) the GOJ, 2) the diaphragmatic pinch and 3) the squamo-columnar junction (SCJ). The GOJ signals the end of the oesophagus and the start of the stomach and is best identified as the most proximal margin of the gastric folds.[33] The diaphragmatic pinch is the point at which the diaphragmatic crura constricts or 'pinches' the oesophagus and is an important landmark to denote the presence of a hiatal hernia. The SCJ is the transitional point between stratified squamous and columnar epithelial of the stomach. Visually, squamous epithelial has a pale glossy colour while columnar epithelial adopts a darker reddish appearance due to its increased vasculature. In normal oesophagus, the GOJ and SCJ coincide. However, when the SCJ lies ≥1 cm above the GOJ at the level of its most proximal extension, then this suggests the presence of BO.

Histological diagnosis of Barrett's oesophagus

Histologic criteria for BO still remain a contentious issue. The recent American College of Gastroenterology (ACG) requires biopsies confirming IM as a pre-requisite to diagnose BO.[34,35] However, the British Society of Gastroenterology (BSG) guideline stipulates that in the context of visible columnar epithelium with biopsy confirmation, IM is not a pre-requisite and hence gastric metaplasia is also regarded as a type of BO[32] (Table 1). The recent International *B*enign *B*arrett's and *CA*ncer *T*askforce (BOBCAT) consensus defines BO as presence of columnar epithelial but stipulates that it should be clearly stated whether IM is present above the GOJ.[36] The BSG and ACG difference hinges on the differential risk of malignant transformation between columnar epithelium with and without IM. The emphasis on IM as a defining feature of BO is based on increasing number of studies that have demonstrated a stronger association between IM and OAC than non-IM. For example, a study of 8522 patients with BO reported that the risk for malignant progression

Please cite this article in press as: Tan WK, et al., Past, present and future of Barrett's oesophagus, Eur J Surg Oncol (2017), http://dx.doi.org/10.1016/j.ejso.2017.02.004