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Digestive Endoscopy

Narrow band imaging facilitates detection of inlet patches in the cervical oesophagus

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ABSTRACT

Background: Proximal esophageal heterotopic gastric mucosa or so-called inlet patch in the cervical oesophagus is easily missed on endoscopic examination because of its localisation, usually just below the upper oesophageal sphincter. We evaluated the clinical use of narrow band imaging for detection of inlet patches.

Methods: In this prospective, controlled observational study, 1407 subsequent patients underwent oesophagogastroduodenoscopy with or without narrow band imaging on withdrawal of the endoscope in the cervical oesophagus.

Results: One endoscopist who was not aware of the prospective observation documented 6 (1.17%) cases of inlet patches in 515 oesophagogastroduodenoscopies compared to 4 cases out of 382 (1.05%) performed by the endoscopist who paid special attention to the presence of inlet patches but did not routinely apply narrow band imaging (OR 0.89, CI 95% 0.25–3.20, $p = 0.85$). In comparison, 17 cases of inlet patches out of 510 (3.33%) were detected by the endoscopist who routinely applied narrow band imaging. The detection rate of proximal oesophageal heterotopic gastric mucosa using narrow band imaging was significantly higher compared to white light endoscopy only (OR 3.06, CI 95% 1.39–6.73, $p = 0.005$).

Conclusions: Withdrawal of the endoscope from the cervical oesophagus using narrow band imaging increased the detection of inlet patches about three-fold compared to standard white light endoscopy.

1. Introduction

Proximal oesophageal heterotopic gastric mucosa (PEHGM) or so called inlet patches are typically found in the posterior cervical oesophageal mucosa. In conventional white light endoscopy, these islands of heterotopic gastric mucosa appear more salmon-coloured and velvety compared to the normal brighter squamous epithelium of the oesophagus. Inlet patches are usually located within the proximal 3 cm of the oesophagus [1,2].

The majority of inlet patches are incidentally discovered and asymptomatic, however, in some individuals, an inlet patch might cause symptoms related to acid secretion such as dysphagia, globus sensation, odynophagia, throat irritation or chronic coughing [1]. Furthermore, complications such as strictures, ulceration, web formation, perforation, and adenocarcinoma [3] have been linked to the presence of inlet patches.

The prevalence of cervical inlet patches is reported to range between 0.1% and 11% in endoscopic studies using white light endoscopy [1,4,5]. Ectopic gastric mucosa in the cervical oesophagus is easily missed on endoscopic examination because of its localisation, usually just below the upper oesophageal sphincter. The value of using narrow band imaging (NBI) has not been previously assessed as a tool for the detection of PEHGM.

NBI is an optical filter technology that uses only narrowed bandwidths of blue (390–445 nm) and green (530–550 nm) light waves to compose the image. Blue light only penetrates superficially into the tissue and is highly absorbed by haemoglobin, which causes NBI to highlight mucosal surface patterns and microvascular details [6,7]. Hence, theoretically, this technology appears promising for improved detection of PEHGM and we hypothesised that the additional use of NBI during endoscopy of the upper oesophagus will increase the detection rate of inlet patches.

In this prospective, controlled, observational study, we investigated whether NBI during endoscopic inspection of the cervical oesophagus improves the visualisation of heterotopic gastric mucosa and increases the detection rate of inlet patches.

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2. Methods

Between 1/1/2010 and 1/1/2012, consecutive patients undergoing upper gastrointestinal endoscopy at the John Radcliffe Hospital in Oxford, UK on the lists of three experienced endoscopists were included into the study. Patients were referred for endoscopy for various indications, primarily for evaluation of dyspepsia, dysphagia and iron deficient anaemia.

2.1. Study design

Patients were consecutively assigned to the lists of three specialists in endoscopy by our administration team according to routine clinical care. One endoscopist was not aware of the prospective observational assessment of PEHGM detection rate and did not use NBI routinely during inspection of the upper oesophagus. The second endoscopist was informed about the prospective observational assessment of PEHGM detection rate and paid special attention to the presence of inlet patches on withdrawal of the endoscope, but did not routinely use NBI. The third endoscopist routinely applied NBI in addition to standard white light endoscopy on withdrawal of the endoscope from the oesophagus as part of the standard practice, and was informed about the prospective observational assessment of PEHGM detection rate.

2.1.1. Oesophagogastroduodenoscopy (OGD)

After a fasting period of at least 4 h, OGD was performed using topical throat spray anaesthesia or conscious sedation, depending on patient preference. Conscious sedation was performed with intravenous midazolam (2–5 mg). The video endoscopes (GIF-H260, Olympus, Tokyo, Japan) and videoprocessor (Evis Lucera CV 260 SL; Olympus, Tokyo, Japan) used in our endoscopy unit enable the rapid switching between white light and NBI mode by pressing a button at the handle of the scope.

The presence or absence of PEHGM, and patient characteristics was extracted from our electronic endoscopic database (GI view, Unisoft Medical Systems, Enfield, UK). The presence and size of an inlet-patch was documented by photo imaging (Fig. 1). The size of endoscopic findings is usually estimated in comparison to an open biopsy forceps.

The study adheres to the principles outlined in the Declaration of Helsinki. Informed consent was obtained from all subjects in written form. We seeked advice and the study was exempt from formal ethics approval and considered service evaluation by the health and research authority.

2.2. Statistics

All statistical analyses were performed using a statistical software package (SPSS, IBM, Version 21). For study size calculations, we assumed a detection incidence of 1.0% of inlet patches and hypothesised a fourfold increase using NBI. With a significance level of 5% (type I error 0.05) and power of 80% (type II error 0.2) for a two-sided test, this resulted in a calculated sample size of 424 procedures.

Variables analysed included patient characteristics, indications and detection rates of PEHGM. The outcome of interest was the detection of PEHGM. The univariate relationship between each clinicopathological variable and the detection of PEHGM was analysed using Fisher's exact test with two-tailed p-value. Variables were also evaluated by a multivariate linear regression model. Odds ratio including 95% confidence intervals are given. P values of less than 0.05 were considered statistically significant.

3. Results

1407 patients were included in this study, thereof 704 (50%) were males. The median age was 65 (53–76) years. In total, 27 (1.92%) PEHGM were detected, 13 (0.92%) in males and 14 (1.0%) in females.

The main indications for OGD and the prevalence of PEHGM in relation to the different indications are listed in Table 1. We found that patients who had an OGD for an indication of dysphagia (OR 4.7, CI 95% 2.1–10.4, $p = 0.0002$) or as a part of surveillance programme of Barretts oesophagus (OR 9.1, CI 95% 3.7–22.5, $p < 0.0001$) were more likely to have PEHGM compared to all other indications. In addition, the presence of PEHGM was significantly lower in patients who underwent endoscopy for reasons other than these common indications (OR 0.16, CI 95% 0.06–0.43, $p = 0.0004$).

The endoscopist who routinely used NBI to look for PEHGM performed significantly more gastroscopies for indications such as gastroesophageal reflux disease (GORD) ($p = 0.0001$), dyspepsia ($p = 0.02$) and Barrett's oesophagus surveillance ($p = 0.0001$) compared to the endoscopist unaware of the observational study

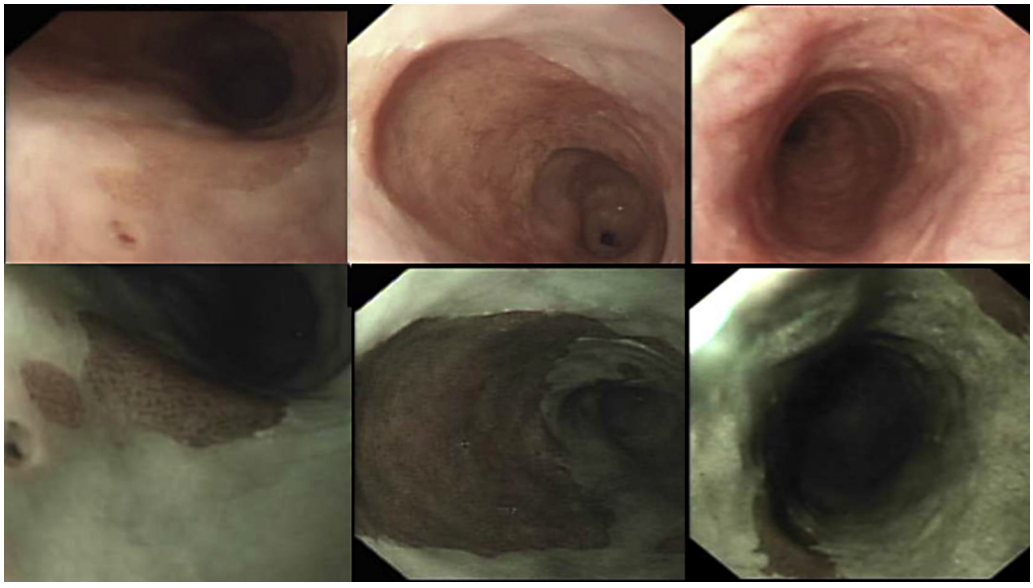

Fig. 1. Inlet patches using standard white light endoscopy (in the upper row) and the corresponding narrow band images (lower row).