Endoscopic Grading of Atrophic Gastritis is Inversely Associated with Gastroesophageal Reflux and Gastropharyngeal Reflux

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Background: Reflux esophagitis is inversely associated with the presence of atrophic gastritis, and endoscopic grading of atrophic gastritis correlates with histological evaluation. The aim of this study was to investigate the association of the endoscopic grade of atrophic gastritis with gastroesophageal and gastropharyngeal reflux.

Methods: A total of 627 patients, who underwent endoscopy and ambulatory 24-hour dual-probe pH monitoring, were included in this study. The grade of atrophic gastritis was endoscopically classified into 2 types with the atrophic pattern system: the closed-type (C-type) and the open-type (O-type). We compared the findings from endoscopy and ambulatory pH monitoring for these 2 types.

Results: The O-type was significantly associated with a lower prevalence of reflux esophagitis ($p=0.001$). All variables showing gastroesophageal reflux in the distal probe were significantly lower in the O-type than in the C-type ($p<0.05$). Similarly for the proximal probe, all variables, except the supine time of pH<4, were significantly lower in the O-type than in the C-type ($p<0.05$). The frequency of gastroesophageal reflux disease and gastropharyngeal reflux disease was in significantly lower in the O-type than in the C-type ($p<0.001$, $p=0.012$, respectively).

Conclusions: Endoscopic grading of atrophic gastritis is easy and is inversely associated with gastroesophageal and gastropharyngeal reflux.

Key Words: Atrophic gastritis, Endoscopy, Gastroesophageal reflux, Gastropharyngeal reflux

INTRODUCTION

Risk factors for reflux esophagitis include the presence of hiatal hernia$^1$, transient relaxation of the lower esophageal sphincter$^2,3$, and impaired clearance of regurgitated gastric contents in the esophagus$^4$. Therefore, esophageal acidity contributes to the pathogenesis of reflux esophagitis, with gastritis influencing gastric acid secretion$^5-7$.

There is a higher prevalence of Helicobacter pylori ($H. pylori$) infection in Korea than in Western populations$^8$. $H. pylori$ infection is the major cause of chronic gastritis, which leads to atrophic changes in the gastric mucosa$^9$. Atrophic gastritis may affect gastroesophageal reflux in Korean patients, since reflux esophagitis is inversely associated with the presence of atrophic gastritis$^{10–12}$.

Since 1969, Japanese physicians have used endoscopy to directly visualize changes in the gastric mucosa of gastritis patients, and they developed an endoscopic grading system for atrophy with using the endoscopic atrophic border$^{13,14}$. The atrophic border is the boundary between the antral and fundic glandular territories, which is endoscopically recognized by discriminating between the differences in the color and height of
the gastric mucosa. The area of atrophy is pale yellowish in color, with transparent blood vessels, while the area of non-atrophy is homogeneously reddish and smooth. Gastric atrophy, as evaluated with an endoscopic grading system, showed a good correlation with histological evaluation\textsuperscript{15, 17, 18}.

The aim of this study was to retrospectively investigate the association of the grade of atrophic gastritis with gastro-esophageal and gastropharyngeal reflux in patients who underwent both endoscopy and ambulatory 24-hour dual-probe pH monitoring.

**MATERIALS AND METHODS**

**Study population**

We reviewed the medical records and the findings from endoscopy and ambulatory 24-hour dual-probe pH monitoring in an unselected group of consecutive patients who were referred to our motility laboratory from January 2004 to June 2006. Six hundred and eighty-nine patients received both of these examinations due to extraesophageal symptoms such as asthma, chronic cough, hoarseness, globus sensation or chronic sinusitis, but 62 patients were excluded due to incomplete medical records or endoscopic information. So, a total of 627 patients were included: 475 men and 152 women, and with a mean age of 50.9±11.8 years.

**Assessment by endoscopy**

The presence or absence of reflux esophagitis and hiatal hernia were determined, with atrophic gastritis graded by one endoscopist (Kim GH), according to the criteria listed below. The endoscopist was kept “blind” to the information of the ambulatory 24-hour dual-probe pH monitoring.

**Reflux esophagitis**

If esophagitis was present, it was graded according to the Los Angeles classification\textsuperscript{18}.

**Hiatal hernia**

Hiatal hernia was defined as a circular extension of the gastric mucosa above the diaphragmatic hiatus greater than 2 cm in axial length.

**Atrophic gastritis**

Atrophic changes in the gastric body on endoscopy were diagnosed on the basis of the atrophic area displaying discoloration with or without blood vessels transparency. The grade of atrophic gastritis was assessed endoscopically using the atrophic pattern system described by Kimura \textit{et al}\textsuperscript{13, 14}. This classification divides the extent of atrophy into a closed type (C-type) and an open type (O-type). The C-type indicates that the atrophic border remains on the lesser curvature of the stomach, while the O-type means that the atrophic border no longer exits on the lesser curvature but extends along the anterior and posterior walls of the stomach (Figure 1). The C-type is subdivided by where the atrophic border crosses: C1, the angulus on the lesser curvature; C2, the lower and middle parts of the corpus; or C3, the upper part of the corpus. The O-type is also subdivided by the location of the atrophic border, which is parallel to the vertical axis of the stomach: O1, on the lesser curvature; O2, on the anterior and posterior walls; or O3, on the greater curvature.

**Ambulatory 24-hour dual probe pH monitoring**

Prolonged ambulatory pH monitoring was performed immediately after the standard esophageal manometry\textsuperscript{19}, with a single-use, mono-crystalline antimony, dual-site pH probe (Zinetics 24, Medtronic Inc., Minneapolis, MN, USA) with electrodes placed at the tip and 15 cm proximal to the tip. A cutaneous reference electrode placed on the upper chest was also used. All electrodes were calibrated in buffer solutions of pH 7 and then pH 1. The pH catheter was introduced...