Abdominal Obesity as a Risk Factor for the Development of Erosive Esophagitis in Subjects with a Normal Esophago-Gastric Junction

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Background/Aims: Obesity is reported to be associated with erosive esophagitis (EE). However, the temporal association of obesity and abdominal obesity with EE is unclear. We conducted this study to investigate the temporal association of obesity, especially abdominal obesity with EE.

Methods: Among 1,182 subjects who underwent health screening examinations including upper endoscopy in both 2003 and 2006, a total 1,029 subjects with a normal esophagogastric junction on upper endoscopy in 2003 were enrolled. All subjects completed questionnaires and anthropometric measurements were obtained twice by trained personnel. The patients with newly developed EE were compared to the subjects without newly developed EE.

Results: Among 1,029 subjects, 42 (4.1%) were newly diagnosed with EE and 82 (8.0%) with hiatal hernia. The mean body mass index (BMI) in both examinations was significantly different between the two groups based on the development of erosive esophagitis ($p<0.05$ in both examinations).

The mean waist circumference (WC) in both examinations was also significantly different between the two groups ($p<0.01$ in both examinations). The multivariate analysis demonstrated that EE was not associated with the BMI in 2003 and the increase of BMI; however, it was associated with the WC in 2003 (Odds ratio, 7.21; 95% CI, 1.78 to 29.19; $>90$ cm vs $<80$ cm).

Conclusions: Our study showed that abdominal circumference is an independent risk factor for EE, demonstrating a temporal relationship between abdominal obesity and EE. (Gut and Liver 2009;3: 276-284)

Key Words: Abdominal obesity; Erosive esophagitis; Causality

INTRODUCTION

Gastroesophageal reflux disease (GERD) is a major health problem in Western countries; the prevalence of at least weekly episodes of heartburn and/or acid regurgitation has been reported to be 14-24%. By contrast, GERD is less prevalent in Korea and other Asian countries, ranging from 2.5% to 7.1% for at least weekly symptoms. In addition, the prevalence of endoscopic erosive esophagitis in Asian populations has been reported to range from 3.4% to 9%, lower than in the West. GERD is increasing in Korea, which might be attributed to a longer life expectancy, westernized diet, and the increasing prevalence of obesity.

Previous studies have shown a positive association between GERD and obesity in both the Western populations and Asians populations. Obesity is also a major risk factor for reflux-associated esophageal lesions such as erosive esophagitis, Barrett’s esophagus, and esophageal adenocarcinoma. A large cohort study reported a consistent association between abdominal diameter (independent of BMI) and GERD symptoms in a white male population; however, no such association has been found in Asians. A meta-analysis of several studies showed that the findings of overweight and obesity satisfied several criteria for
a causal association with GERD and its complications, including esophagitis and esophageal carcinoma. However, most of the prior studies used cross-sectional and case-control designs, which make it difficult to assess a temporal association between obesity and events, such as GERD and erosive esophagitis.

In this study, we investigated the development of endoscopically proven erosive esophagitis in the subjects with a normal esophagogastric junction during the three years of follow-up; we evaluated the risk factors for erosive esophagitis and the temporal association between obesity and the development of erosive esophagitis.

MATERIALS AND METHODS

The study subjects were those who participated in health screening examinations at the health promotion center, Korea University Ansan Hospital from January to December in both 2003 and 2006. These examinations were performed to 4,316 subjects in 2003 and 5,116 in 2006. Among 1,182 subjects who had health check-ups including upper endoscopy in both 2003 and 2006, the exclusion of patients with a previous gastric surgery (n=3), a previous history of GERD (n=5), and medications (n=7) such as proton pump inhibitors, H2-receptor antagonists, and prokinetic drugs was needed. The patients having abnormal endoscopic findings of lower esophagus in 2003 were also excluded; these findings include erosions and ulcers diagnosed as erosive esophagitis (n=24), Barrett’s esophagus (n=5), hiatal hernia (n=66), and minimal changes (n=43) such as distal esophageal erythema or hyperemia, congestion, edema, granularity, friability, prominent vascularity, and irregularity in the squamocolumnar junction. A total of 1,029 subjects were finally enrolled in this study.

After obtaining written informed consent the subjects agreed that the information gathered during the study can be used in this study, all subjects were given a self-administered questionnaire prior to endoscopy. The questionnaires inquired about current smoking, alcohol intake, education level, occupation, exercise, and medical history of chronic disease such as hypertension and diabetes mellitus. The education level was classified as low (high school or less) or high (college or more). Exercise was categorized according to total exercise time a week: none, low (less than 2 hours a week), middle (2-3 hours a week), or high (more than 3 hours a week). The serum levels of fasting glucose, cholesterol, triglycerides, high-density lipoprotein (HDL), and low-density lipoprotein (LDL) were measured. Helicobacter pylori (H. pylori) infection was confirmed by histological examination of the endoscopic biopsy specimens.

Anthropometric parameters including height, weight, waist circumference (WC), and hip circumference were measured at each examination. The body mass index (BMI) was calculated as the ratio of weight (kg) to the square of the height (m²), and according to the modified WHO criteria for the Asia-Pacific guidelines categorized as follows: normal (less than 23 kg/m²), overweight (23-24.9 kg/m²), and obese (more than 25 kg/m²). The WC was measured at the midpoint between the lower border of the rib cage and the iliac crest by trained personnel and categorized as follows: less than 80.0 cm, 80.0 to 89.9 cm, and more than 90.0 cm.

Upper endoscopy was performed using a gastroscope (Q240; Olympus Optical Co. Ltd., Tokyo, Japan) on two occasions by the investigators who had finished fellowships of gastroenterology in university hospital and were experts in endoscopy. The endoscopic findings of erosive esophagitis in lower esophagus were based on the longest length of a mucosal break and the confluence of erosions, and were classified using the Los Angeles (LA) classification as grades A-D. Minimal changes were not considered to represent erosive esophagitis. The patients with more than LA-A were diagnosed with erosive esophagitis. The presence of hiatal hernia and gastro-duodenal lesions including atrophic gastritis, gastric ulcer, and duodenal ulcer were recorded. The study design was reviewed and approved by the Institutional Review Board of Korea University Ansan Hospital (AS09056-001).

The Pearson’s chi-square test and independent t-test were used to assess the difference in risk factors between the two groups based on the development of erosive esophagitis. We also examined the difference between the two groups using the chi-square test with respect to the following factors: endoscopic findings, chronic medical disease, blood glucose, lipid, and education level. A paired t-test and analysis of covariance were performed to examine the change in the BMI and WC between the two groups. For the BMI subgroups, the patients with a BMI less than 23.0 kg/m² were used as a reference group. For the WC subgroups, the patients with a WC of less than 80.0 cm were used as a reference group. Multivariate logistic regression analysis was performed to evaluate the risk factors of erosive esophagitis and several confounding factors. We conducted all analyses using SPSS version 14.0 (SPSS Inc., Chicago, IL, USA). Two-sided p values of less than 0.05 were considered to indicate statistical significance.