

Gastroesophageal Acid Reflux in Elderly Patients

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The clinical profiles and pathogenesis of reflux esophagitis in elderly patients are not fully understood. To clarify the pathogenetic mechanisms of reflux esophagitis of the elderly, clinical profiles and the results of 24-h pH monitoring study were compared between 12 non-elderly (< 65 years) and 24 elderly (65 years) cases with esophagitis. Female patients were more frequently observed in elderly than in non-elderly. Body mass index, presence of hiatus hernia, kyphosis, habitual smoking and resistance to the treatment of H₂-receptor antagonists of the elderly patients were similar to those of the non-elderly patients. In addition, there was no significant difference in all parameters (gastro-esophageal reflux, percent time of pH < 4.0 of esophagus, esophageal and gastric pH and esophageal acid clearance time) obtained by 24-h pH monitoring study between elderly and non-elderly patients. In summary, the pathogenesis of reflux esophagitis in the elderly is similar to that in the non-elderly.

Key words: reflux esophagitis, aging, pathogenesis, 24-h pH monitoring

INTRODUCTION

Reflux esophagitis is mainly caused by gastroesophageal acid reflux with resulting exposure of esophageal mucosa to the acid (1, 2). Although the incidence of reflux esophagitis in the non-elderly has been repeatedly investigated, little information is available concerning the incidence and clinical features of reflux esophagitis in the elderly patients (3-6).

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The high prevalence of hiatus hernia with decreased lower esophageal sphincter pressure is reported to be an important factor as a causative mechanism of gastroesophageal reflux in the elderly patients (7-11). On the other hand, gastric acid secretion of the elderly is lower than that of the non-elderly, which would decrease the exposure of the esophageal mucosa to acid (12, 13). Thus, clinical profiles and gastroesophageal functions may be different between the elderly and non-elderly patients with reflux esophagitis.

In this study, therefore, to clarify the causative mechanisms of reflux esophagitis in the elderly, clinical profiles and 24-h pH monitoring study were investigated in patients with reflux esophagitis.

MATERIALS AND METHODS

Thirty-six with reflux esophagitis (grade II ~ IV by Savary-Miller's grading) were diagnosed in 2,032 cases studied by gastrointestinal endoscopy in our clinics for one year period from January to December of 1998. None of the cases was previously treated for the eradication of *Helicobacter pylori* (*H. pylori*) infection. The number of non-elderly (< 65 years old) and elderly (65 years old) patients were 12 and 24, respectively. Gender, body mass index (BMI=body weight (in kilograms)/ height (in meters)²), presence or absence of hiatus hernia, kyphosis, habitual smoking, and resistance to the treatment with H₂-receptor antagonists were compared between the elderly and the non-elderly patients.

The subjects with reflux esophagitis were initially treated by 12-week treatment with 800 mg cimetidine or 40 mg famotidine and further subdivided into H₂-receptor antagonist-resistant group and non-resistant group. The H₂-receptor antagonist-resistant group consisted of patients whose reflux esophagitis was not

cured by the treatment of 12 weeks-long H₂-receptor antagonist. After 12 weeks-long H₂-receptor antagonist treatment, the 8 weeks-long proton pump inhibitor was administrated in the H₂-receptor antagonist-resistant cases, and the cure of reflux esophagitis was endoscopically proven in all cases. Twenty (8 non-elderly and 12 elderly cases) of these 36 cases agreed to be further investigated by a 24-h pH-monitoring study. 24-h pH monitoring was performed according to our previous publication (15). In brief, Microdigitrapp (Synetics Medical, Sweden) and a pH catheter with two sensors were employed for the measurement. A pH catheter was passed through the nose, and the proximal sensor was positioned in the esophagus 5 cm above the esophago-gastric junction under fluoroscopic guidance with the aid of contract medium swallowing, while the distal tip of the catheter was placed in the corpus of the stomach. In majority of cases, the position of pH sensors was confirmed by measuring lower esophageal high pressure zone by a pressure sensing catheter. All patients remained without any anti-reflux or anti-acid medication during the pH monitoring study and the preceding one-week period.

Acid reflux was defined as whenever the pH in the esophagus dropped to 4.0 or less. The analysis of pH tracing was done as follows (15-17):

1. Total number of reflux episodes was calculated by counting the number of reflux episodes occurring over the total recording time (24-h) (normal value < 5~7/24 hr).
2. Percentage time with esophageal pH less than 4.0 was calculated as the proportion of the period studied during which reflux episodes brought the pH below 4.0 as a percentage of total recording time (normal value < 4.7 %).
3. Mean esophageal pH and mean gastric pH were calculated as an average of all the pH values during the total recording period.
 - 1) Mean esophageal acid clearance time was calculated as an average of the period during which lowered esophageal pH returned to a value above 5.0 (normal value < 2.6 min).

Written informed consent was obtained from all patients for this study, which was carried out in accordance of Declaration of Helsinki.

All values are expressed as means \pm S.E. Statistical analysis of the data was performed by non-parametric

Mann-Whitney U-test. Chi-square test was also used. Differences were considered significant if $p < 0.05$. Stat View 4.0 software (Abacus Concepts, Inc. Berkeley, CA) was employed for the calculation.

RESULTS

Difference of Clinical Profiles between the Elderly and the Non-Elderly with Reflux Esophagitis

Clinical profiles in the non-elderly and elderly patients are shown in Table 1. Interestingly, 14 out of 16 female cases were elderly with only two non-elderly females being found in this study. On the other hand, 10 of 20 male cases were non-elderly. Although kyphosis was more frequently found in elderly patients, it did not reach the statistically significant level. It may also be emphasized that as many as 83.8% and 66.7% of the elderly and non-elderly patients, respectively, had hiatus hernia of the esophagus.

Table 1. Clinical Profiles of the Elderly and Non-Elderly with Reflux Esophagitis

	Non-Elderly	Elderly	
Number of Subjects	12	24	
Gender (M: F)	10:2	10:14	P<0.05
BMI	23.5 \pm 1.1	22.7 \pm 1.2	N.S.
Hiatus hernia	66.7%	83.3%	N.S.
Kyphosis	16.7%	41.7%	N.S.
Habitual smoking	33.3%	16.7%	N.S.
Resistant to H ₂ -receptor antagonist	33.3%	29.2%	N.S.

BMI: body mass index, N.S.: statistically not significant.

Considering the fact that approximately 70 % of both the elderly and non-elderly were cured by the treatment with H₂-receptor antagonists, the reflux of gastric acid is the major cause of esophagitis even in the elderly.

Twenty-four-hour pH monitoring study of the elderly and non-elderly with reflux esophagitis

Twenty-four-hour pH-monitoring study clarified that both the number of acid reflux episodes and percentage time with esophageal pH less than 4.0 (% time pH < 4.0) in elderly patients was not different from that in non-elderly patients. Similarly, there was no significant difference in the esophageal

acid clearance time and the intragastric acidity between elderly and non-elderly patients. (Table 2)

Clinical profiles and 24-h pH monitoring study of H₂-receptor antagonist-curable and -resistant patients with reflux esophagitis

Table 2. Twenty-four hour pH monitoring study of the elderly and non-elderly with esophagitis

	Non-elderly	Elderly	
No of cases	8	12	
Age	49 ± 2	74 ± 2	
No of reflux	73.9 ± 19.0	73.0 ± 14.2	N.S.
% time pH <4.0	30.7 ± 11.5	30.8 ± 5.8	N.S.
Esophageal pH	5.0 ± 0.6	4.9 ± 0.2	N.S.
Gastric pH	2.1 ± 0.3	2.8 ± 0.4	N.S.
Esophageal acid clearance (min)	3.6 ± 0.7	3.9 ± 0.3	N.S.

No of reflux: total number of reflux episodes, % time pH<4.0: percent time with esophageal pH less than 4.0, esophageal pH: mean esophageal pH, gastric pH: mean gastric pH, esophageal acid clearance, mean esophageal acid clearance time in minute. N.S.: statistically not significant.

Gender, age, BMI, presence of hiatus hernia, kyphosis, and habitual smoking were compared between H₂-receptor antagonists-curable and -resistant patients with esophagitis. Although no significant difference was found in sex, age, BMI, kyphosis, and habitual smoking, hiatus hernia was more frequently found in patients with H₂-receptor antagonist-resistant esophagitis (Table 3).

Table 3. Clinical profiles of the cases with H₂-receptor antagonist-curable and -resistant esophagitis

	H ₂ RA curable	H ₂ RA resistant	
Number of Subjects	25	11	
Gender (M: F)	15:10	5:6	N.S.
Age	64 ± 3	68 ± 3	N.S.
BMI	22.8 ± 0.5	22.8 ± 1.4	N.S.
Hiatus hernia	68.0%	100.0%	P<0.05
Kyphosis	24.0%	54.5%	N.S.
Habitual smoking	20.0%	27.3%	N.S.

N.S.: statistically not significant.

The twenty-four hour pH-monitoring study clarified that number of acid reflux and % time pH <

4.0 in patients with H₂-receptor antagonist-resistant esophagitis were significantly greater than those with curable esophagitis (Figure 1). There was no difference in these parameters between in non-elderly and elderly patients with resistant reflux esophagitis (number of acid reflux 111 ± 13 vs. 122 ± 43, % time pH < 4.0 55.8 ± 15.2 vs. 66.0 ± 4.9). Mean intra-gastric pH was not statistically different between H₂-receptor antagonist-resistant and -curable patients.

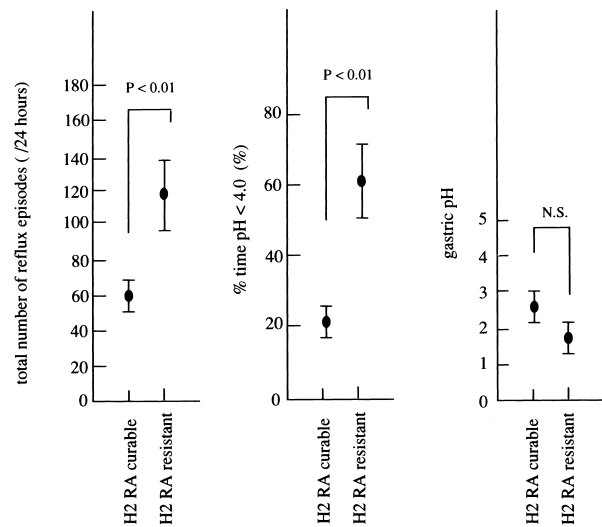


Fig. 1. Results of 24-h pH-monitoring study in subjects with H₂-receptor antagonist-curable and -resistant esophagitis. Although there is no difference in intragastric pH, cases with H₂-receptor antagonist-resistant esophagitis show exaggerated gastroesophageal acid reflux. Vertical lines represent means ± S.E.

DISCUSSION

Gastric acid secretion is reported to decrease with aging both in Japan and in western countries (12, 13, 18, 19). Therefore, it might be considered that the esophagitis caused by the gastric acid reflux into the esophagus is more frequently found in the non-elderly. Reflux esophagitis, however, is more prevalent in the elderly than in the non-elderly (20). To clarify the causative mechanism of reflux esophagitis in elderly patients, which may be different from that of the non-elderly, the clinical profiles and gastroesophageal acidity were investigated in this study.

Although obesity, habitual smoking, and the

presence of kyphosis are known to aggravate reflux esophagitis (21-23), these factors are equally found in the elderly and non-elderly. The interesting thing to be noted, however, is that the majority of the patients, particularly in the elderly, had hiatus hernia. The presence of hiatus hernia may interfere with the function of lower esophageal sphincter and may facilitate gastroesophageal acid reflux (11). Furthermore, in this study, we found that the elderly cases had similar intragastric acidity to those of the non-elderly. Therefore, the elderly with the added factor of hiatus hernia may increase the incidence of acid reflux with resulting formation of reflux esophagitis.

When the exposure of the esophagus to acid was compared, it was found that not only the non-elderly but also the elderly with esophagitis show increased gastroesophageal reflux. Furthermore, there was no difference in the number of gastroesophageal acid reflux, % time pH < 4.0, mean esophageal and gastric pH between the elderly and non-elderly with esophagitis. These results suggest that similar causative mechanisms are working in the formation of reflux esophagitis of the elderly and non-elderly. Thus, reflux esophagitis of the elderly patients, which is more prevalent in females than in males in Japan (20), may be caused by the gastric acid reflux because of the maintained gastric acid secretion and the hiatus hernia with resulting malfunction of lower esophageal sphincter.

The reaction of patients to H₂-receptor antagonist divides patients with reflux esophagitis into two groups: one successfully responds to treatment, the other does not (24, 25). Not only in the non-elderly but also in elderly, approximately 30% of the cases with esophagitis cannot be cured by the H₂-receptor antagonists. An important factor for the resistance to this treatment has been reported to be high-grade gastroesophageal acid reflux (26, 27). Confirming previous reports, our present data demonstrated that the increased gastroesophageal reflux with hiatus hernia might be important in forming H₂-receptor antagonist-resistant esophagitis irrespective of age. Furthermore, since our results did not show the difference of intragastric acidity between patients with H₂-receptor antagonist-resistant and -curable esophagitis, the disturbed motor function of the esophagus with resulting increased acid reflux may be an important

factor in the development of resistant esophagitis.

H. pylori infection, which is reported to induce the gastric mucosal atrophy resulting the decreased gastric acid secretion (28, 29) and increase the efficacy of anti-secretory treatment for the patients with reflux esophagitis (30), was not investigated in this study. Further study is recommended to clarify that *H. pylori* infection affects the cure of reflux esophagitis after treatment of H₂-receptor antagonist in our cases.

In summary, reflux esophagitis was more frequently observed in the elderly with hiatus esophageal hernia. By using a 24-h pH-monitoring system, the pathogenetic mechanism of reflux esophagitis in the elderly was found to be similar to that of the non-elderly, that is, increased and prolonged gastroesophageal acid reflux.

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