A 2008 Questionnaire-Based Survey of Gastroesophageal Reflux Disease and Related Diseases by Physicians in East Asian Countries

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Key Words

Gastroesophageal reflux disease • Barrett's esophagus • Esophageal adenocarcinoma • Nonerosive reflux disease • Proton-pump inhibitor • Heartburn

Abstract

Background/Aims: Gastroesophageal reflux disease (GERD) is a common gastrointestinal disease. This study was designed to examine current epidemiology, diagnosis, management, and treatment of patients diagnosed with GERD by surveying physicians in several East Asian countries. **Methods:** A questionnaire-based survey was completed in six countries including China, Indonesia, Japan, Korea, the Philippines, and Thailand between July 2008 and December 2008. **Results:** In total, 876 physicians participated in the

study. Most physicians in all countries, except Japan, frequently used international guidelines for the care of GERD patients, whereas approximately half of Japanese physicians did not use such guidelines. GERD was common among many patients, but Barrett's esophagus, particularly the long-segmental type, was rare. The incidence of esophageal cancer, particularly adenocarcinoma, was high in China, but low in other countries. Most physicians diagnosed GERD based on symptoms, followed by endoscopy in Japan and Korea, or in other countries, by the proton-pump inhibitor (PPI) test. Heartburn was recognized as the chief complaint in all countries except Korea. Most physicians in all countries used PPI as the first-line of treatment for GERD. Increasing the PPI dose was the treatment of choice for PPI-refractory erosive esophagitis in Korea, the Philippines, and Thailand. In contrast, in other countries, physicians used a combina-

tion of PPI and other drugs to treat PPI-refractory erosive esophagitis. Prescription of antidepressant drugs increased for PPI-refractory nonerosive reflux disease compared with PPI-refractory erosive esophagitis. **Conclusion:** The findings in the present survey are useful to understand the current epidemiology, diagnosis, and treatment of GERD in East Asian countries.

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Introduction

Gastroesophageal reflux disease (GERD), and other related diseases, are caused by abnormal reflux of gastric contents into the esophagus. GERD is a common gastrointestinal (GI) disease in Western countries, as well as in Asia [1, 2]. GERD is divided into two subtypes: erosive esophagitis and nonerosive reflux disease (NERD; defined as troublesome reflux symptoms without a break in the esophageal mucosa upon endoscopy) [3, 4]. Barrett's esophagus and esophageal adenocarcinoma are proposed to be GERD-related diseases [4], but their prevalence is believed to be lower in East Asia compared with Western countries [5].

There are several national and international guidelines for GERD diagnosis and management, such as the Asian-Pacific consensus [3], the Montreal definition [4], and the ACG guidelines [5]. These guidelines, textbooks, medical journals, and symposia or lectures, may affect the decisions that physicians make regarding the diagnosis and treatment of GERD. However, current epidemiology, diagnosis, management, and treatment of patients diagnosed with GERD and other related diseases in East Asian countries are not well known.

Using a questionnaire-based survey, we examined various aspects of GERD, as well as NERD, in East Asia. These aspects included the use of guidelines, epidemiology, diagnosis, treatment, and its relation to Barrett's esophagus and esophageal cancer. In addition, we analyzed the differences in epidemiology, diagnostic tools, and patient management that exist between countries from a physician's perspective.

Subjects and Methods

Methods

This is the second East Asian questionnaire-based survey done by the International Gastrointestinal Consensus Symposium (IGICS), which is the international section of the Japanese Gastroenterological Association. The first survey was done in

2007 and focused on the use of nonsteroidal anti-inflammatory drugs and prevention of GI damage [6]. Representative members from the IGICS committee provided a questionnaire to physicians in each country studied starting at the beginning of July 2008. Responses were collected at the end of December 2008. Each physician was asked to complete a questionnaire about GERD and its related diseases. The questionnaire focused on the following items: (1) the use of guidelines for the care of GERD patients; (2) the epidemiology of GERD, NERD, Barrett's esophagus and its subtypes, and esophageal cancer (including squamous cell carcinoma and adenocarcinoma); (3) the diagnosis of GERD and NERD, and (4) first-line treatment of erosive esophagitis, NERD, or proton-pump inhibitor (PPI)-refractory cases.

Statistical Analysis

The proportion of gastroenterologists that participated in each country was analyzed by the χ^2 test. Differences in the prevalence of GERD patients treated, the proportion of GERD patients presenting with NERD, and the prevalence of Barrett's esophagus were compared using the Wilcoxon signed-rank test. The number of patients with esophageal cancer encountered by physicians was expressed as a median at the 25th and 75th percentiles. Differences between countries were compared using one-way ANOVA followed by the Fisher's paired least-significant difference test. Comparisons between esophageal squamous cell carcinoma and esophageal adenocarcinoma within the same country were analyzed by paired t test. $p < 0.05$ was considered significant.

Results

Participants

In total, 876 physicians participated in this survey. The overall completion response rate was of 74.8%. Among the physicians surveyed, 625 (71%) were gastroenterologists. In China, 158 (91%) of the 173 respondents were gastroenterologists. Similarly, 82 (75%) out of the 109 respondents in Indonesia were gastroenterologists, as were 126 (68%) out of the 185 Japanese respondents, 151 (82%) out of 184 respondents from Korea, 68 (44%) out of 153 respondents from the Philippines, and 40 (56%) out of 72 respondents from Thailand. A significantly higher proportion of the gastroenterologists were from China, while a lower proportion was from the Philippines.

Use of Guidelines

The guidelines used by physicians for the care of GERD patients in East Asia are shown in table 1. Overall, the most frequently used guideline used by physicians was the Asian-Pacific consensus report (33%), followed by the Montreal definition (31%) and the ACG guideline (20%); 15% of physicians did not use any guidelines for the care of GERD patients. The three most frequently

Table 1. Use of guidelines for the care of GERD patients in East Asia

	Total	Asian-Pacific consensus [3]	Montreal definition [4]	ACG guidelines [7]	Genval Workshop Report [37]	Others	No use
China	173	108 (62)	23 (13)	36 (21)	1 (1)	6 (3)	2 (1)
Indonesia	109	39 (36)	47 (43)	9 (8)	4 (4)	16 (15)	7 (6)
Japan	181	17 (9)	40 (22)	18 (10)	3 (2)	5 (3)	100 (55)
Korea	178	56 (20)	82 (46)	34 (19)	16 (9)	3 (2)	7 (4)
Philippines	135	56 (41)	41 (30)	37 (27)	3 (2)	4 (3)	5 (4)
Thailand	71	23 (32)	30 (42)	34 (48)	0 (0)	1 (1)	9 (13)
Total	847	279 (33)	263 (31)	168 (20)	27 (3)	35 (4)	130 (15)

Values indicate the number (%) of physicians using the indicated guidelines in each country.

Table 2. Prevalence of GERD patients in East Asia

	Total	Frequency of GERD patients among the total number of patients			
		<10%	10–25%	25–50%	>50%
China	172	27 (16)	119 (69)	24 (14)	1 (1)
Indonesia	108	36 (33)	56 (52)	9 (8)	1 (1)
Japan	183	124 (68)	51 (28)	6 (3)	2 (1)
Korea	184	64 (35)	86 (47)	28 (15)	0 (0)
Philippines	152	21 (14)	78 (51)	38 (25)	1 (1)
Thailand	72	29 (40)	29 (40)	12 (17)	0 (0)
Total	871	301 (35)	419 (48)	117 (13)	5 (1)

Values indicate the number (%) of physicians in each country according to the frequency of GERD patients treated among the total number of patients.

used guidelines were similar in all five countries; however, 55% of Japanese physicians did not use any guidelines.

Epidemiology of GERD, NERD, Barrett's Esophagus, and Esophageal Cancer

The prevalence of GERD patients among the total patients treated is shown in table 2. More than half of the physicians surveyed treated GERD patients, which accounted for >10–25% of total patients, suggesting that GERD is a common disease in East Asian countries. A significantly lower prevalence of GERD patients was observed in Japan, yet a higher prevalence was seen in the Philippines (table 2). Analysis of the prevalence of NERD among GERD patients showed that 336 (39%) out of 856

Table 3. Prevalence of Barrett's esophagus patients in East Asia

	Total	Frequency of Barrett's esophagus patients among the total number of patients			
		<1%	1–5%	5–10%	>10%
China	161	47 (29)	81 (50)	32 (20)	1 (1)
Indonesia	107	76 (71)	27 (25)	3 (3)	1 (1)
Japan	179	104 (58)	54 (30)	10 (6)	11 (6)
Korea	184	131 (71)	44 (24)	6 (3)	3 (2)
Philippines	140	89 (64)	40 (29)	8 (6)	3 (2)
Thailand	70	40 (57)	30 (43)	0 (0)	0 (0)
Total	841	487 (58)	276 (33)	59 (7)	19 (2)

Values indicate the number (%) of physicians in each country according to the frequency of Barrett's esophagus patients treated among the total number of patients.

physicians answered that they observed NERD in <25% of GERD patients; 286 (33%) physicians observed a rate of 25–50%; 186 (22%) a rate of 50–75%, and 48 (6%) a rate of >75%. More than half of physicians in Thailand stated that the proportion of NERD among GERD patients was >50%, whereas more than half of physicians in other countries said that the prevalence rate was of <50%. Statistical analysis revealed that the prevalence of NERD among GERD patients in Thailand was significantly high, while in Japan the prevalence rate was lower when compared with other countries.

The frequency of patients with Barrett's esophagus observed by physicians is shown in table 3. More than half of physicians in all countries, except China, treated patients with Barrett's esophagus at a rate of <1% of total

Fig. 1. Number of cases of esophageal squamous cell carcinoma or esophageal adenocarcinoma encountered by each physician during 1 year. □ = Esophageal squamous cell carcinoma; ■ = esophageal adenocarcinoma. Data represent the median at the 25th and 75th percentiles. * $p < 0.01$ versus other countries. ** $p < 0.01$ versus prevalence of esophageal squamous cell carcinoma within the same country.

Fig. 2. Diagnostic tools used for the identification of GERD in East Asian countries. **a** Diagnostic tools used for the identification of GERD. **b** Diagnostic tools used for the identification of GERD, excluding the presence of GERD symptoms, in the East Asian countries shown.

patients, suggesting that Barrett's esophagus is more rare than GERD. In contrast, the prevalence of Barrett's esophagus in Chinese patients was significantly higher compared with other countries. Analysis of the subtypes of Barrett's esophagus indicated that long segmental Barrett's esophagus (defined as affecting >3 cm of the esophageal length) was rare, since 750 (91%) out of 818 physicians stated that only $<5\%$ or 5–10% of the total patients with Barrett's esophagus were diagnosed with this subtype.

The number of cases of esophageal cancer encountered by each physician per year is shown in figure 1. The number of cases of esophageal squamous cell carcinoma and adenocarcinoma in China was significantly higher compared with other countries. The incidence of esophageal cancer in the other five countries was low, accounting for a median of 1–2 cases per physician per year for

squamous cell carcinoma and 0–1 case for adenocarcinoma. In Japan, Korea, and Thailand, the incidence of esophageal adenocarcinoma was significantly lower compared with that of squamous cell carcinoma (fig. 1).

Diagnosis of GERD and NERD

The diagnostic tools used by physicians to identify GERD are shown in figure 2. The data show that most physicians (61%) diagnose GERD based on symptoms, followed by esophagogastroduodenoscopy (EGD) (31%), the PPI test (21%), a questionnaire specific for GERD (such as QUEST; 10%), pH monitoring (7%) and impedance (3%; fig. 2a). The presence of GERD symptoms was the most common diagnostic tool used in all countries. If we exclude diagnosis based on GERD symptoms, physicians in Japan and Korea preferred EGD, whereas those in other countries preferred the PPI test (fig. 2b).

Fig. 3. First-choice drugs for the treatment of GERD. **a** Erosive esophagitis. **b** NERD. Values indicate the percentage of physicians that prescribed the indicated drugs for the treatment of GERD.

Table 4. Diagnostic tools used by physicians for the identification of NERD in East Asia

	Total	Negative EGD only	Negative EGD and PPI test	Negative EGD and pH study	Negative EGD with biopsy	pH-impedance
China	159	24 (15)	54 (34)	55 (35)	26 (16)	4 (3)
Indonesia	109	56 (51)	39 (36)	6 (6)	15 (14)	0 (0)
Japan	178	165 (93)	9 (5)	1 (1)	3 (2)	0 (0)
Korea	165	94 (57)	64 (39)	6 (4)	0 (0)	1 (1)
Philippines	143	74 (52)	50 (35)	17 (12)	4 (3)	2 (1)
Thailand	68	35 (51)	13 (19)	4 (6)	19 (28)	0 (0)
Total	822	448 (55)	229 (28)	89 (11)	19 (8)	7 (1)

Values indicate the number (%) of physicians using the indicated diagnostic tools to identify NERD in each country.

Sixty-one percent of physicians stated that heartburn was the chief complaint of GERD patients, followed by acid regurgitation (41%), epigastric pain (20%) and chest pain (4%). Heartburn was the most frequent chief complaint recognized by physicians in all five countries, but acid regurgitation was more frequent (47%) than heartburn (27%) in Korea.

The diagnostic tools used by physicians for the identification of NERD are shown in table 4. About half of physicians used EGD only, while others used a combination of EGD and other tools (e.g. PPI test, pH monitoring) for the diagnosis of NERD. Ninety-three percent of Japanese physicians made a diagnosis of NERD by negative EGD only, whereas 85% of Chinese physicians chose a combination of EGD and other tools for the diagnosis of NERD (table 4).

Treatment of GERD

Figure 3 shows the first-line treatment used for erosive esophagitis and NERD. Most (92%) physicians used a PPI as the first choice for erosive esophagitis (fig. 3a) and 82% of physicians chose a PPI for NERD (fig. 3b). In China, a relatively lower rate of physicians used a PPI as the first-choice treatment for erosive esophagitis (75%) and for NERD in both China (65%) and Indonesia (75%). Treatment of PPI-refractory erosive esophagitis and NERD is shown in figure 4. Physicians chose increasing the PPI dose (53%) or a combination of a PPI and other drugs (48%), including prokinetics, H2RA and mucoprotective drugs, for the treatment of PPI-refractory erosive esophagitis (fig. 4a). Within Korea, the Philippines and Thailand, physicians preferred to increase the PPI dose versus using a combination of a PPI and other drugs as follows: 68 versus 28%, 63 versus 50%, 63 versus 39%, for each respective country. In contrast, physicians in China, Indonesia, and Japan preferred to use a combination of PPI and other drugs rather than increasing the PPI dose as follows: 55 versus 40%, 60 versus 54%, 54 versus 39%, for each respective country. Analysis of the treatment of PPI-refractory NERD indicated that the choice of increasing the PPI dose decreased, while use of antidepressant drugs increased compared with PPI-refractory erosive esophagitis (fig. 4b).

Discussion

The present study is the first to address various aspects of GERD. We provide a point-by-point discussion of the current guidelines, epidemiology, diagnosis, symptoms, and treatment for patients with GERD based on the re-

Fig. 4. Treatment of PPI-refractory GERD. **a** Erosive esophagitis. **b** NERD. LARS = Laparoscopic antireflux surgery.

sponses of physicians in East Asian countries to a questionnaire-based survey.

The Asian-Pacific consensus [3], the Montreal definition [4], and the ACG guidelines [7] were the most frequently used guidelines in all countries, except Japan. The exact reasons why more than half of Japanese physicians did not use any guidelines for the care of GERD patients are unknown. Some possible reasons include the following: (1) that the GERD guidelines established by the Japanese Society of Gastroenterology will be published in spring 2009 (after the completion of this survey); (2) several international guidelines, except for the Montreal definition and the global consensus, are not translated into the Japanese language, and (3) Vakil et al. [8] reported that 9 (18%) out of 49 Japanese primary care

physicians used national guidelines established by the Japanese GERD society. The use of national guidelines was not provided as an option to answer in the present questionnaire, which may affect the lower rate of guideline use observed among Japanese physicians.

Several epidemiological studies have demonstrated that the prevalence of GERD is relatively lower in East Asia compared with Western countries, ranging from 2.5 to 6.7% of patients reporting symptoms of heartburn and acid regurgitation on at least a weekly basis [2, 9–14]; however, the prevalence of GERD in Asia is on the rise [5, 15, 16]. The present survey showed that in 2008 GERD was most common among patients treated by physicians in East Asia. In Japan, a relatively lower prevalence of GERD was observed, whereas a higher prevalence was

observed in the Philippines; however, the precise reasons for these differences are unknown. It has been reported that >60% of Asian patients with reflux symptoms do not present with erosive esophagitis, defined as NERD [5, 15]. In fact, the proportion of NERD among Asian patients was found to be unexpectedly low in the present study. This result may be due to inadequate identification of NERD, particularly by physicians not specialized in this field.

The present study has demonstrated that the prevalence of patients with Barrett's esophagus, particularly the long segmental type, was low. This is further supported by several studies done in Asia which showed that the prevalence of Barrett's esophagus ranges from 0.06 to 0.22% in the general population [17–19], and 0.5–2% in patients with upper GI symptoms [5, 20–22]. Moreover, a study by the Japanese GERD society demonstrated that the prevalence of long segmental Barrett's esophagus, among the total number of patients with Barrett's esophagus, was 0.2% [23]. It should be noted that there is no uniform consensus between East Asian countries, as well as worldwide, on the definition of Barrett's esophagus and on the endoscopic confirmation of the gastroesophageal junction. Esophageal cancer, including squamous cell carcinoma and adenocarcinoma, was found to be higher in China. This may be due to greater participation of gastroenterologists in China. In addition, it is well known that China has the highest incidence of esophageal cancer in the world [24]. The other five countries showed a lower incidence of esophageal cancer compared with China. In Japan, Korea, and Thailand, esophageal adenocarcinoma was significantly lower compared with esophageal squamous cell carcinoma within the same country, suggesting a different pattern of epidemiology for esophageal cancers in Western countries [25, 26].

The most frequent tool used by physicians to diagnose GERD was the presence of reflux symptoms. This is reasonable given that EGD has low sensitivity of diagnosis due to the presence of NERD. Excluding GERD symptoms, there were differences in the use of other diagnostic tools among the countries investigated. Physicians in Korea and Japan preferred EGD, but those in other countries preferred the PPI test. This may be due to differences in the availability or ease of use of EGD in these countries, or because physicians in China, Indonesia, the Philippines, and Thailand consider the precise definition of GERD symptoms to be essential for the effectiveness of the empirical PPI test. Although there is no equivalent term for 'heartburn' in most Asian languages, and be-

cause this term is poorly understood by >80% of Asians [27], most physicians recognize heartburn as the chief symptom of GERD, followed by acid regurgitation. This finding suggests that most physicians rely on a detailed explanation of heartburn during medical interviews for the diagnosis of GERD. Only in Korea was acid regurgitation a more frequent (47%) chief complaint than heartburn (27%). This is further supported by a recent study of approximately 25,536 Koreans that showed that acid regurgitation is more common than heartburn in patients with GERD, particularly among women [28]. Similar findings were also observed in other Korean studies [29–31].

There were differences between the countries in the tools used for the diagnosis of NERD. Overall, about half of physicians used only EGD, whereas the other half used a combination of EGD and other tools for the diagnosis of NERD. This pattern was mostly observed in Indonesia, Korea, the Philippines, and Thailand. However, a different pattern was observed among physicians in China and Japan. This may be due to differences in the concept or definition of NERD by physicians in each country. Most physicians who participated in this survey diagnosed NERD based on the presence of typical symptoms of reflux, including acid regurgitation and heartburn, and/or the relief of symptoms with a PPI (or H₂-blocker) therapy. The definition of NERD is controversial. In addition, the definition of functional heartburn proposed by Rome III criteria [32] can also produce much confusion.

PPIs remain the 'gold standard' for therapy in the initial and long-term treatment of GERD [3, 4, 7, 33]. The present study showed that most physicians use a PPI as the first-line treatment for erosive esophagitis. The reasons for the relatively lower rate of PPI use as the first-line treatment for NERD are unknown; however, one reason may be because some physicians consider NERD to be a mild form of erosive esophagitis. In PPI-refractory cases with erosive esophagitis, half of the physicians chose increasing the PPI dose, but others chose using a combination of a standard dose of a PPI in combination with other drugs (particularly prokinetics). The reasons why physicians in Korea, the Philippines, and Thailand preferred increasing the PPI dose, while those in China, Indonesia and Japan preferred a combination of a PPI and other drugs, are unknown. The low rate of laparoscopic antireflux surgery observed may be due to only a few surgeons participating in this survey. Among the countries studied, there were similarities in the treatment of PPI-refractory NERD. Compared with erosive esophagitis, the in-

crease in the number of physicians who prescribed antidepressant drugs suggests that physicians recognize a link between esophageal hypersensitivity [34] or psychosomatic pathogenesis and PPI-refractory NERD [35, 36].

This study has some potential biases. First, there were differences in the number of physicians and the proportion of gastroenterologists that participated among the countries. The proportion of gastroenterologists in China was significantly high, with most physicians working at hospitals, while in the Philippines the proportion of gastroenterologists was significantly low. In addition, selection bias may have affected the present results. However, it is difficult to maintain all physician variables uniform (i.e. specialty, years of experience, and quality of institution where they work) because medical conditions are different in each country. Second, the present study relied on a questionnaire-based survey answered by physicians, so the data are not representative of the patient's perspective, particularly with respect to the epidemiology of GERD, Barrett's esophagus, and esophageal cancer. Given that this study was evaluated from a physician's perspective, the results reflect the practical patterns and processes of care for GERD patients, by physicians, in each country.

In conclusion, we present the first questionnaire-based survey analyzing GERD in East Asia. Similarities were found across the regions, such as in the percentage of GERD patients with Barrett's esophagus, the diagnostic tools used, the first-line treatment for GERD, and the treatment of PPI-refractory NERD. However, there were also differences with respect to the use of guidelines, the prevalence of esophageal cancer, the symptoms of GERD, the diagnostic tools used for NERD, and the treatment of PPI-refractory erosive esophagitis.

Appendix

Questionnaire used in the present survey.

Q1 Which guidelines do you use for care of GERD* patients?
*GERD includes erosive and nonerosive reflux disease (NERD).

- 1 Asian-Pacific Consensus (J Gastroenterol Hepatol, 2008)
- 2 Montreal Definition and Global Consensus (Am J Gastroenterol, 2006)
- 3 ACG guideline (Am J Gastroenterol, 2005)
- 4 Genval Workshop Report (Gut, 1999)
- 5 Others (please enter name)_____
- 6 None

- Q2 How many patients with GERD do you treat? Please answer according to the percentage of total patients.
- 1 <10%
 - 2 10–25%
 - 3 25–50%
 - 4 >50%
- Q3 Among GERD patients, what is the percentage of NERD?
- 1 <25%
 - 2 25–50%
 - 3 50–75%
 - 4 >75%
- Q4 How many patients with Barrett's esophagus do you treat? Please answer according to the percentage of total patients.
- 1 <1%
 - 2 1–5%
 - 3 5–10%
 - 4 >10%
- Q5 What is the percentage of long-segmental Barrett's esophagus (>3 cm) among Barrett's esophagus patients?
- 1 <5%
 - 2 5–10%
 - 3 10–25%
 - 4 >25%
 - 5 >50%
- Q6 How many patients with esophageal squamous cell carcinoma did you encounter during the last year?_____patients
- Q7 How many patients with esophageal adenocarcinoma (Barrett's cancer) did you encounter during the last year?_____patients
- Q8 How do you diagnose GERD? Please check most frequently used tool.
- 1 Symptoms
 - 2 Questionnaire specific for GERD
 - 3 PPI test
 - 4 EGD
 - 5 pH monitoring
 - 6 Multi-channel impedance
- Q9 What type of symptom do your GERD patients complain about?
- 1 Heartburn
 - 2 Acid regurgitation
 - 3 Epigastric pain
 - 4 Chest pain
 - 5 Others (enter symptoms)_____
- Q10 How do you diagnose NERD? Please check the most frequently used tool.
- 1 Negative EGD only
 - 2 Negative EGD and pH study
 - 3 Negative EGD with biopsy
 - 4 Negative EGD and PPI test
 - 5 pH-impedance
- Q11 What is the first-line treatment for erosive esophagitis?
- 1 PPI (standard dose)
 - 2 H2RA
 - 3 Antacid
 - 4 Prokinetics
 - 5 Mucoprotective drugs
 - 6 Others (enter drug name)_____

Q12 What is the first-line treatment for NERD?

- 1 PPI (standard dose)
- 2 H2RA
- 3 Antacid
- 4 Prokinetics
- 5 Mucoprotective drugs
- 6 Others (enter drug name)_____

Q13 How do you treat PPI-refractory erosive esophagitis?

- 1 PPI double dose or more
- 2 Combination of PPI and other drugs (enter drug name)_____
- 3 GABA_B agonist
- 4 Antidepressant
- 5 Endoluminal surgery
- 6 Laparoscopic antireflux surgery
- 7 Others (enter treatment)_____

Q14 How do you treat PPI-refractory erosive esophagitis?

- 1 PPI double dose or more
- 2 Combination of PPI and other drugs (enter drug name)_____
- 3 GABA_B agonist
- 4 Antidepressant
- 5 Endoluminal surgery
- 6 Laparoscopic antireflux surgery
- 7 Others (enter treatment)_____

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