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Pyloric Motility after Pylorus-preserving Gastrectomy with or without the Pyloric Branch of the Vagus Nerve

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Abstract. **An attempt was made to examine gastropyloric motility after pylorus-preserving gastrectomy (PPG) and to determine the influence of the pyloric branch of the vagus nerve in the dog. Fifteen dogs were divided into three groups of five. PPG with preservation (PPPG) and resection of the pyloric branch of the vagus (RPPG) were performed, and controls were prepared. Interdigestive and digestive gastropyloroduodenal motility was recorded after a 2-week recovery period using strain-gauge force transducers (SG). Radiopaque markers (ROMs) were used to assess gastric emptying. No significant differences were found between PPPG and RPPG in terms of gastropyloroduodenal motility during either the interdigestive or the postprandial state. During phase III of the interdigestive state, pyloric relaxation correlated with contraction of the gastric body after both PPPG and RPPG. During the first month it was accompanied by tonic and phasic pyloric contractions after feeding and delayed gastric emptying in two groups. By the end of the first month these pyloric contractions had diminished, and the rate of gastric emptying was similar to that of the controls. We concluded that it is not necessary to preserve the pyloric branch of the vagus for gastropyloroduodenal motility after PPG. Gastric stasis during the early postoperative period is due to tonic and phasic contractions of the pylorus.**

Because of the better diagnostic techniques today, gastric cancer is diagnosed at an earlier stage; and without violating oncologic safety criteria, function-preserving surgeries followed by a better quality of life can be attempted. Pylorus-preserving gastrectomy (PPG) was first used by Maki et al. in 1967 to treat gastric ulcers [1]. PPG for gastric ulcers is superior to Billroth I gastrectomy because the postoperative dumping syndrome is eliminated, and the procedure provides for better physiologic function of the gastric remnant [1]. Recently, PPG has been performed to treat early gastric cancer located in the middle third of the stomach in an attempt to prevent the postoperative dumping syndrome and duodenal juice reflux [2, 3]. However, gastric stasis was observed in these patients during the early postoperative period [2, 3]. It is well known that gastric emptying of digestible solids is mainly a function of the antrum and pylorus, and indigestible solids are emptied during phase III in the interdigestive state [4]. How digestible and indigestible solids are emptied after PPG has not been investigated. Therefore it was necessary to investigate gastropyloric motor activity after PPG.

It has been generally believed that the pyloric branch of the vagus nerve and the right gastric artery are necessary for normal pyloric function [5]. Distal gastrectomy with group 2 lymph node dissection (along the celiac artery and the common hepatic artery) is a common operation in Japan for early gastric cancer located in the middle third of the stomach. Radical lymph node resection requires transection of both the vagal supply and the right gastric artery, which are closely associated with the suprapyloric lymph nodes because lymph flow from the middle third of the stomach is toward the suprapyloric lymph nodes [6]. Therefore in patients with early gastric cancer the indications for PPG have been limited to cases selected by tumor size and histologic classification [3, 6]. The extent to which resection of the pyloric branch of the vagus impairs pyloric function has not been investigated in detail. The indications for PPG in the treatment of early gastric cancer would be extended if it were shown that resection of the pyloric branch of the vagus does not influence pyloric function.

The aims of the present study were to examine gastropyloric motor activity after PPG and to determine the influence on pyloric motor activity of the pyloric branch of the vagus nerve in the dog. Furthermore, it is to investigate the cause of gastric stasis during the early postoperative period after PPG.

Materials and Methods

Animal Preparations

Fifteen adult dogs (10–15 kg) were divided into three groups: control; pylorus-preserving gastrectomy with preservation of the pyloric branch of the vagus (PPPG); and pylorus-preserving gastrectomy with resection of the pyloric branch of the vagus (RPPG). They were anesthetized with an intravenous injection of pentobarbital sodium 30 mg/kg (Nembutal; Abbott Laboratories, North Chicago, IL, USA). Before the abdominal surgery, a Silastic tube (602-205; Dow Corning, Midland, MI, USA) was placed

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in the superior vena cava through a branch vein of the right external jugular, and the outer end was sutured to the adjacent skin. This tube was used as the route for intravenous infusion. The abdominal cavity was opened by a midline incision.

In the control group ($n = 5$), strain-gauge force transducers (SG) (F-12IS, Star Medical, Tokyo, Japan) were sutured onto the serosa of the gastrointestinal tract in a direction so the contractions of the circular muscle could be measured. Sites of SG placement were the gastric body at the level of the splenic hilus, the gastric antrum 1.5 cm proximal to the pylorus, the pylorus, and the mid-duodenum at the level of the opening of the main pancreatic duct. The size of the SG sutured onto the gastric body, antrum, and the mid-duodenum was 14 × 7 mm, and that sutured onto pylorus was 8 × 4 mm.

In the PPPG ($n = 5$) and RPPG ($n = 5$) groups the proximal transection line of the stomach was the line connecting the bifurcating point of the left gastric artery on the lesser curvature and the most distal short gastric artery on the greater curvature. The distal transection line of the stomach was 2.0 cm proximal to the pylorus. The branches of the vagus innervating the gastric lower body and the antrum on the lesser curvature were dissected, and the hepatic branches of the vagus were carefully preserved. The right gastroepiploic artery and the left gastric artery were dissected. For PPPG the pyloric branches of the vagus and the right gastric artery were identified by inspection and were carefully preserved to prevent ischemia and compression of pyloric nerves. For RPPG the pyloric branch of the vagus and the right gastric artery were transected. The skeletonization was done from the prepylorus to the pylorus on the lesser curvature. After transecting the stomach, a gastrogastrostomy was done by end-to-end anastomosis. Sites of SG placement were the gastric body at the level of the splenic hilus, the prepylorus (1.5 cm proximal to the pylorus), the pylorus, and the mid-duodenum at the level of the opening of the main pancreatic duct (Fig. 1).

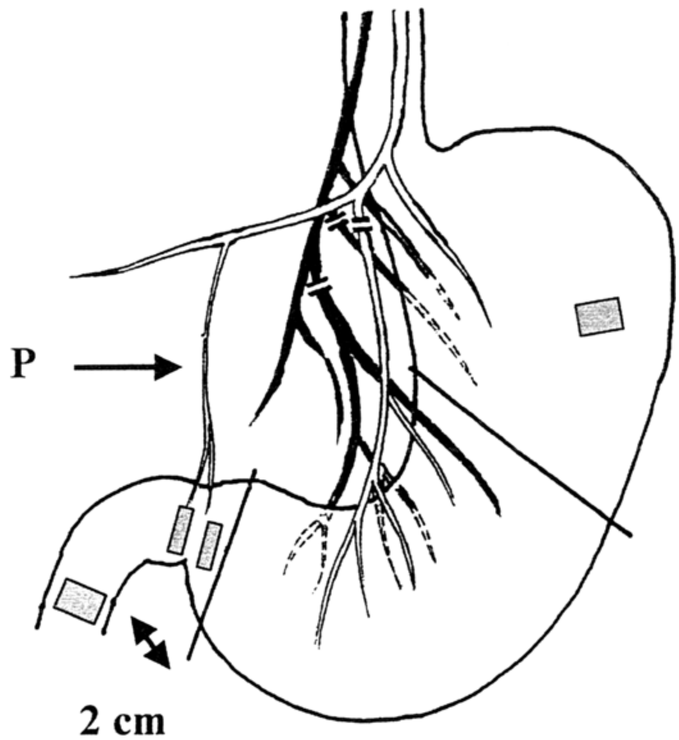

Fig. 1. Stomach transection line and vagal resection line. The branches of the vagus innervating the gastric lower body and antrum on the lesser curvature were dissected and the hepatic branches of the vagus carefully preserved. PPPG preserved the pyloric branch of the vagus and the right gastric artery; RPPG transected these vessels. In addition, skeletonization was done from prepylorus to pylorus on the lesser curvature during RPPG. A gastrogastrostomy was done by end-to-end anastomosis. Double-headed arrow shows distance from the pylorus to the distal transection line of the stomach. P: pyloric branch of the vagus; PPPG: pylorus-preserving gastrectomy with preservation of the pyloric branch of the vagus; RPPG: pylorus-preserving gastrectomy with resection of the pyloric branch of the vagus.

After the operation the lead wires from the SG and the Silastic tube were together taken out through a skin incision between the scapulae. The dogs were housed in individual cages, and each was fitted with a jacket that protected the jugular tube and the SG lead wires. For 5 days after surgery the dogs were maintained with intravenous infusion of Lactec G solution 50 ml/kg (Na 140 mEq/L, Cl 140 mEq/L, glucose 50 g/L) (Ohtsuka Pharmaceutical, Tokyo, Japan). At 6 days the dogs were gradually given meals. This study was approved by the Ethical Committee on Animal Investigations of the Faculty of Medicine, Gunma University.

Monitoring of Gastropyloroduodenal Contractions

The cable leads from the amplifier (UG-6; Nihon Kohden Kohgyo, Tokyo, Japan) were connected to the lead wires of the SG under the protector, and gastropyloroduodenal motor activity was continuously recorded on a multichannel pen-writing recorder (ME-175D; Nihon Kohden Kohgyo) at a paper speed of 10 mm/min. The chart recorder was utilized to identify each phase of contractile activity in the stomach. Each phase was visually determined according to the following criteria: The quiescent period was defined as phase I; phase II consisted of clusters of irregular contractions that followed phase I and preceded phase III; phase III was the period during which a group of strong contractions lasting more than 15 minutes occurred; and phase IV was a short period of subsiding contractions immediately following phase III contractions. The data were also recorded on a computer (Adif1412. dll; Star Medical, Tokyo, Japan) for analysis.

Experimental Protocol

For each dog the experiments were started after a 2-week recovery period and were performed until gastropyloroduodenal motor activity could not be measured. Before monitoring the interdigestive state, the dogs were fasted for 12 hours but were given water freely. Gastropyloroduodenal motor activity was recorded for at least 8 hours. Then, after the dogs were given a solid meal, digestive gastropyloroduodenal motor activity was recorded for at least 4 hours. The total meal contained 358 kcal and consisted of 6.8% proteins, 10.2% lipids, and 59.6% carbohydrates.

Each gastric emptying study was performed twice during the month following PPG and twice after 1 month. After 12 hours of fasting, all dogs were given a solid meal and a gelatin capsule containing 20 ring-shaped radiopaque markers composed of polyvinyl chloride (1.0 × 4.5 mm) (Sitzmarks, Konsyl Pharmaceuticals, Fort Worth, TX, USA). The ROMs evacuated from the stomach were counted fluoroscopically every hour for 6 hours or until gastric emptying was completed (Fig. 2).

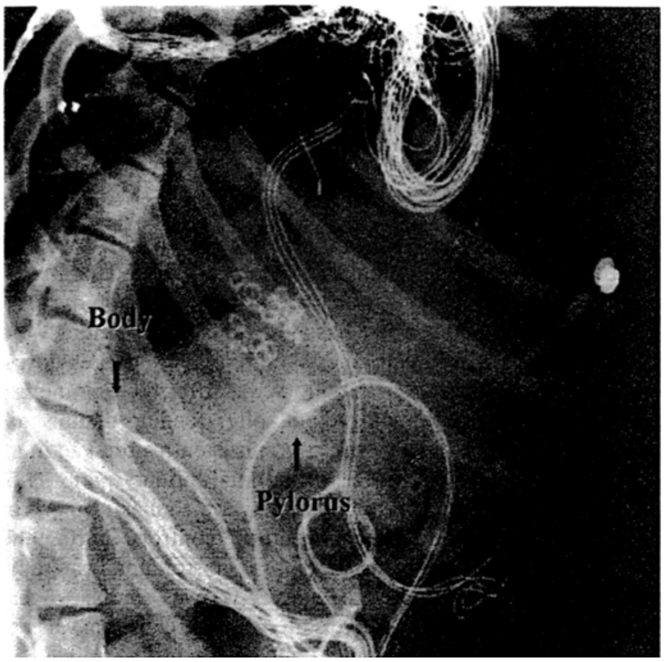

Fig. 2. Left lateral radiograph obtained 2 hours after ingestion of a meal and 20 radiopaque markers (ROMs) during the first month after PPPG. The ROMs evacuated from the stomach were counted fluoroscopically, referring to sites of strain-gauge force transducers sutured on the gastric body and pylorus. One ROM (*) has emptied from the stomach.

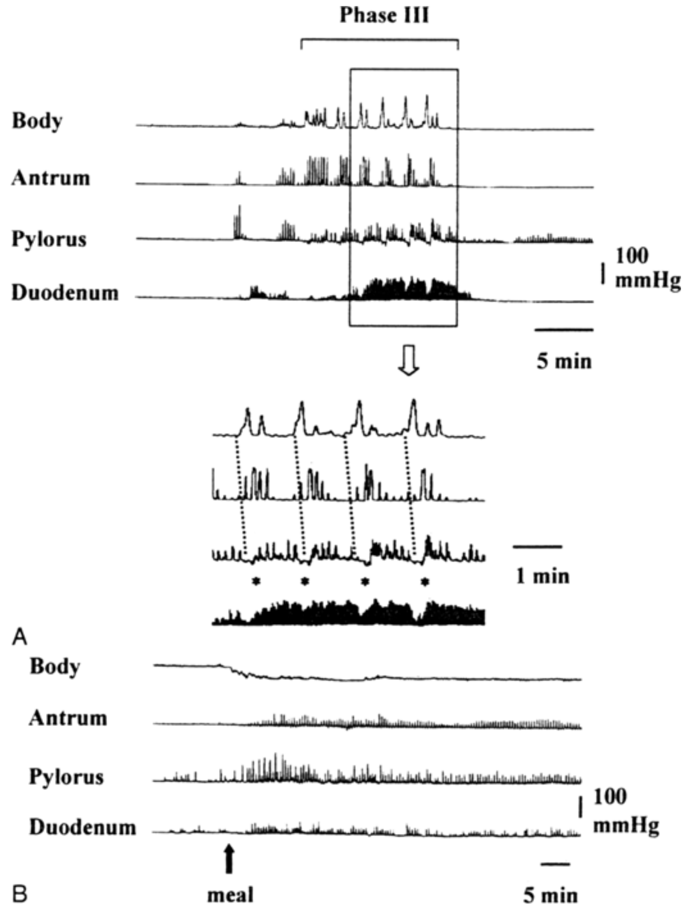

Fig. 3. A. Spontaneous phase III in the control dog. Pyloric relaxation (*) was observed and was synchronized with antral contractions. **B.** After feeding, the gastric body relaxed. Rhythmic contractions appeared in the antrum, pylorus, and duodenum. Pyloric relaxation was not observed.

Data Analysis

In the fasted state the frequency of contractions in the gastric body, antrum or prepylorus, and pylorus was counted as the number per 5 minutes during phase III. To assess gastropyloroduodenal motor activity, the motility index (MI) was determined. The signals from the force transducers, which were stored by the data recorder, were digitized at a sampling frequency of 500 ms by an analog-to-digital converter (ADX-98E; Canopus, Kobe, Japan) and analyzed by the same system, which was controlled by a computer (Adif1412. dll; Star Medical). The MI given by the processing system corresponded to measurements of the area surrounded by the contraction wave and baseline, that is, the product of amplitude and time (in minutes) during a certain fixed period. Interdigestive MI was calculated for each sequential 20 minutes of phase III. In the fed state, the MI of the prepylorus, pylorus, and duodenum for PPG and that of the antrum, pylorus, and duodenum in the control were calculated during the 60 minutes after feeding.

Statistical Analysis

All values are expressed as means ± standard error of the mean. Each test was performed twice in each dog. The data were subjected to detailed statistical analysis to obtain repeated measures of analysis of variance (ANOVA). When significant differences were detected, differences between means were checked for significance by Fisher's protected least significant difference. Differences at $p < 0.05$ were considered significant.

Results

Gastropyloroduodenal Motility in the Control

Pyloric relaxation, synchronized with contractions of the antrum, was observed during phase III in all dogs (Fig. 3A). The recovery time of spontaneous phase III contractions was 7.2 ± 1.4 days. After feeding, relaxation of the gastric body was observed. Rhythmic phasic contractions appeared in the antrum, pylorus, and duodenum (Fig. 3B). Pyloric relaxation was not observed in the digestive state.

Gastropyloroduodenal Motility after PPPG and RPPG in the Fasted State

After PPPG, phase III-like contractions were observed in the fasted state. Pyloric cluster contractions were synchronized with prepyloric cluster contractions. Pyloric relaxation correlated with contraction of the gastric body in all dogs (Fig. 4A). After RPPG the contractile activity pattern in phase III was identical to that of the PPPG-treated dogs (Fig. 4B). The recovery time of spontaneous phase III after PPPG was 24.4 ± 3.8 days, and that after

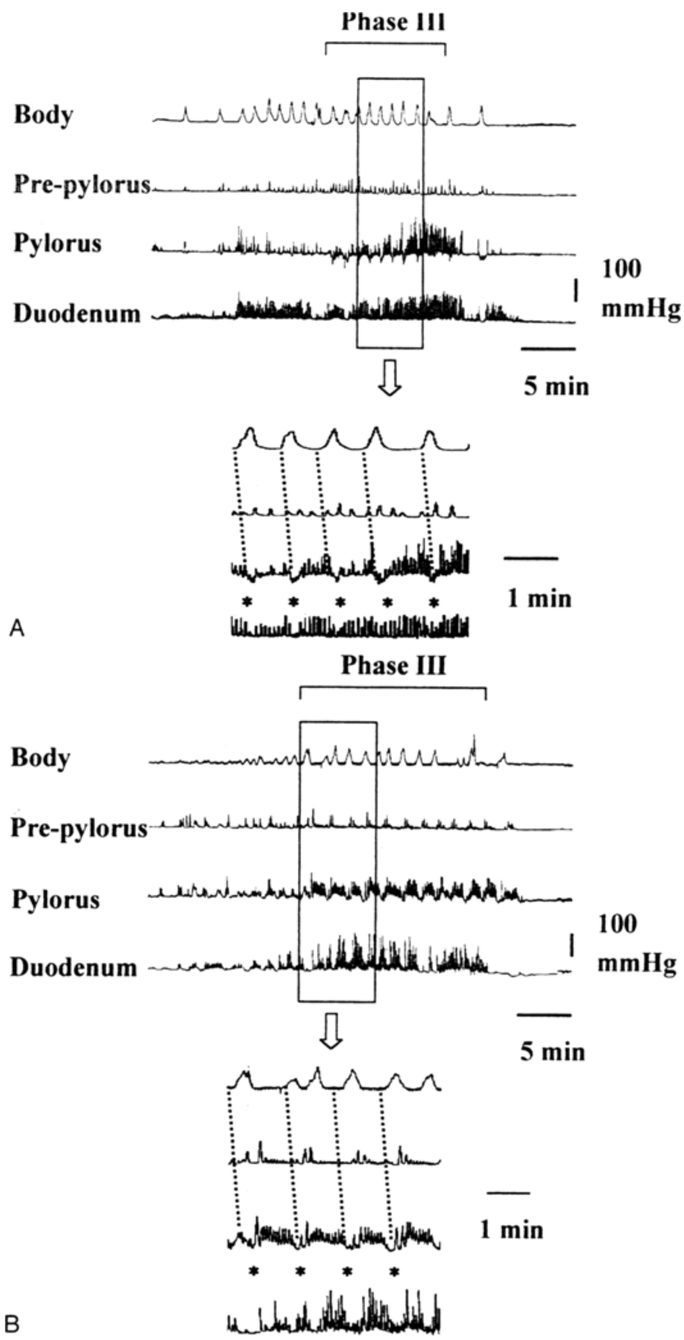

Fig. 4. A. Spontaneous phase III after PPPG. **B.** Spontaneous phase III after RPPG. Pyloric relaxation (*) coupled a contraction of the gastric body after PPPG and RPPG. Pyloric cluster contractions were synchronized with prepyloric cluster contractions in both groups.

RPPG was 25.8 ± 3.0 days. There was no significant difference in recovery time between the two groups.

Comparison of PPPG and RPPG in the Fasted State

With regard to the frequency of contractions in the gastric body, prepylorus, pylorus, and duodenum during phase III, no significant differences were found between PPPG and RPPG (Table 1). The frequency of the gastric body in both PPPG and RPPG were significantly smaller than in the controls. No significant differences were found in the MI of the body, prepylorus, pylorus, or duodenum between PPPG and RPPG dogs in phase III (Table 2).

Postprandial Gastropyloroduodenal Motility after PPPG and RPPG

During the first month after PPPG relaxation of the gastric body was observed, and tonic and phasic pyloric contractions appeared immediately after feeding in all dogs (Fig. 5A). After the occurrence of tonic and phasic pyloric contractions, cessation of relaxation of the gastric body as well as appetite loss or vomiting were observed in all dogs. Postprandial motility of the prepylorus, pylorus, and duodenum was initially weak. After the first month, tonic and phasic pyloric contractions after feeding diminished, and relaxation of the gastric body was consistently observed in all dogs (Fig. 5B). Moreover, the postprandial motility patterns of the prepylorus, pylorus, and duodenum were similar to those of the antrum, pylorus, and duodenum of the controls. During and after the first month following RPPG, the postprandial gastropyloroduodenal motility pattern (Fig. 5C, D) was similar to that after PPPG. During the digestive state, pyloric relaxation was not observed for either group (PPPG or RPPG).

Postprandial Gastropyloroduodenal Motility Index

Figure 6 shows the postprandial MI. Following PPPG, postprandial MI values after the first month (prepylorus 472.7 ± 31.0; pylorus 479.7 ± 31.5; duodenum 518.1 ± 43.4) were significantly higher than those obtained during the first month (prepylorus 276.9 ± 30.2; pylorus 282.0 ± 33.8; duodenum 267.1 ± 19.2). Following RPPG, postprandial MI values after the first month (prepylorus 490.1 ± 32.4; pylorus 510.0 ± 40.8; duodenum 479.0 ± 48.3) were significantly higher than those obtained during the first month (prepylorus 249.6 ± 27.0; pylorus 254.5 ± 28.1; duodenum 283.4 ± 30.4). No significant differences were found in the prepyloric, pyloric, and duodenal postprandial MIs of the PPPG and RPPG groups either during or after the first month. After the first month there were no significant differences in the pyloric and duodenal MIs among the three groups or between the MI of the antrum in the control and the prepyloric MI in the PPPG or RPPG animals (Fig. 6).

Gastric Emptying of Radiopaque Markers

No significant differences were found in gastric emptying rates between PPPG and RPPG. Compared with the control, delayed gastric emptying was observed during the first month after PPPG and RPPG ($p < 0.05$ at 2, 3, 4, 5, and 6 hours) (Fig. 7A). After the first month, gastric emptying rates for the PPPG and RPPG animals were similar to those of the controls (Fig. 7B).

Discussion

Distal gastrectomy with group 2 lymph node dissection is a common technique for treating early gastric cancer in Japan. During PPG for early gastric cancer the pyloric branch of vagus along the right gastric artery is spared to preserve the normal function of the pylorus [5]. Indications for PPG have been limited to selected cases, such as those not requiring radical resection of the lymph nodes [3] because lymph flow from the middle third of the stom-

Table 1. Frequency of contractions in each lesion of the stomach and duodenum during phase III.

Condition	Contractions (no./5 min) Body	Antrum or prepylorus	Pylorus	Duodenum
Control	6.3 ± 0.4	11.6 ± 0.5	31.3 ± 2.3	101.4 ± 3.4
PPPG	5.1 ± 0.3*	11.8 ± 0.8	40.2 ± 4.1	98.8 ± 4.2
RPPG	4.8 ± 0.2*	12.4 ± 0.6	35.9 ± 2.4	97.6 ± 3.9

PPPG: pylorus-preserving gastrectomy with preservation of the pyloric branch of the vagus; RPPG: pylorus-preserving gastrectomy with resection of the pyloric branch of the vagus.
Results are expressed as means ± SE.
*$p < 0.05$ vs. control.

Table 2. Motility index during phase III for each lesion of the stomach and the duodenum.

Condition	Motility index (mmHg · min) Body	Antrum or prepylorus	Pylorus	Duodenum
Control	238.3 ± 37.2	285.6 ± 12.6	293.9 ± 11.1	383.1 ± 12.8
PPPG	275.2 ± 34.7	338.6 ± 23.5	360.5 ± 35.7	366.0 ± 53.1
RPPG	248.8 ± 15.1	267.8 ± 24.8	325.3 ± 24.3	320.9 ± 19.2

Results are expressed as means ± SE.

ach is toward the suprapyloric lymph nodes [6]. In our study, no significant difference was found in gastropyloroduodenal motility after either PPPG or RPPG. This study demonstrated that it is not necessary to preserve the pyloric branch of the vagus for gastropyloroduodenal motor activity after PPG. These findings suggest that the indication for PPG in the treatment of early gastric cancer can be extended to radical resection of a group 1 lymph node.

It has been reported that pyloric relaxation, recorded under a baseline by the experiment using SG, is observed only in phase III and is synchronized with antral contractions in normal dogs [7]. Our observations in normal dogs are consistent with this finding. However, several weeks after PPPG and RPPG pyloric relaxation synchronized with contraction of the gastric body during phase III. It is suggested that indigestible solids are emptied by coordination of the gastric body and pylorus after PPG. The reasons for this are not well understood. It has been reported that mechanoreceptors, excited by distension, are present in the pylorus and duodenum of the cat [8, 9]. Malbert and Leitner reported that flow sensory receptors are present in the duodenum [10]. Arnold et al. showed that only 0.3% of phase III activities propagated through an end-to-end anastomosis of the small intestine within 45 days after surgery, but 66% propagated after 60 days [11]. This finding suggests that mysenteric plexus is regenerated at an end-to-end anastomosis. The existence of descending inhibitory intramural pathways between the antrum and pylorus has been demonstrated by antral transection [12]. These findings suggest that pyloric relaxation is mediated by gastric intramural nerves or by flow sensory receptors. Pyloric relaxation may be determined by the perception of chyme flow after contractions of the gastric body because pyloric relaxation after PPG is observed only during phase III.

Caloric intake was lower early after PPG than after conventional distal gastrectomy, which may reflect delayed gastric emptying [3]. We measured postprandial gastropyloroduodenal motility to determine the mechanism of gastric emptying after PPPG and RPPG. During the first month tonic and phasic pyloric contractions appeared in the two groups after feeding. It has been reported that after transection of the canine stomach abnormal excitation of the smooth muscle occurs in the distal portion [13]. It is known that pyloric motility is modulated by excitation from the duodenum and inhibition from the antrum [12]. We believe that tonic and phasic pyloric contractions were the result of transection of the wall of the stomach itself and not the result of severing the pyloric branch of the vagus. It is generally believed that the adaptation-relaxation phenomenon of the gastric body is mediated by the vagus [14]. In PPG dogs without vagotomy, the adaptation-relaxation phenomenon of the gastric body was observed after PPG [15], and the results were consistent with our observations. These results suggest that the adaptation-relaxation phenomenon was mediated by preserved vagal nerves of the gastric body. However, relaxation of the gastric body ceased after these pyloric contractions, and oral intake was impaired in the two groups. Gastric accommodation in response to gastric distension is mediated by the stimulation of gastric mechanoreceptors [16]. Therefore cessation of relaxation of the gastric body may result from the elevation of intragastric pressure by tonic and phasic pyloric contractions. These data suggest that pyloric dysmotility and cessation of relaxation of the gastric body caused impaired food intake after surgery. Our study may be the first to clarify the recovery course of the delayed gastric emptying during the early post-PPG period.

We used ROMs to assess gastric emptying. This method measures gastric emptying directly in a simple, noninvasive way [17–19]. Although it has been reported that ROMs are emptied in the interdigestive state [18], polyethylene tubes (2.0 mm diameter × 5.0 mm length) [20] and plastic spheres (1.4 mm diameter) [21] were expelled together with a solid meal during the digestive state in humans. Our gastric emptying study seems to reflect the emptying of a solid meal because a postprandial motor pattern was observed over 4 hours after feeding, and some ROMs were emptied during this study. In our study, delayed gastric emptying was observed during the first month after PPPG and RPPG. Postprandial prepyloric MI after PPPG and RPPG during the first month was significantly less than the antral MI of the control. However, after the first month gastric emptying rates for both PPPG and

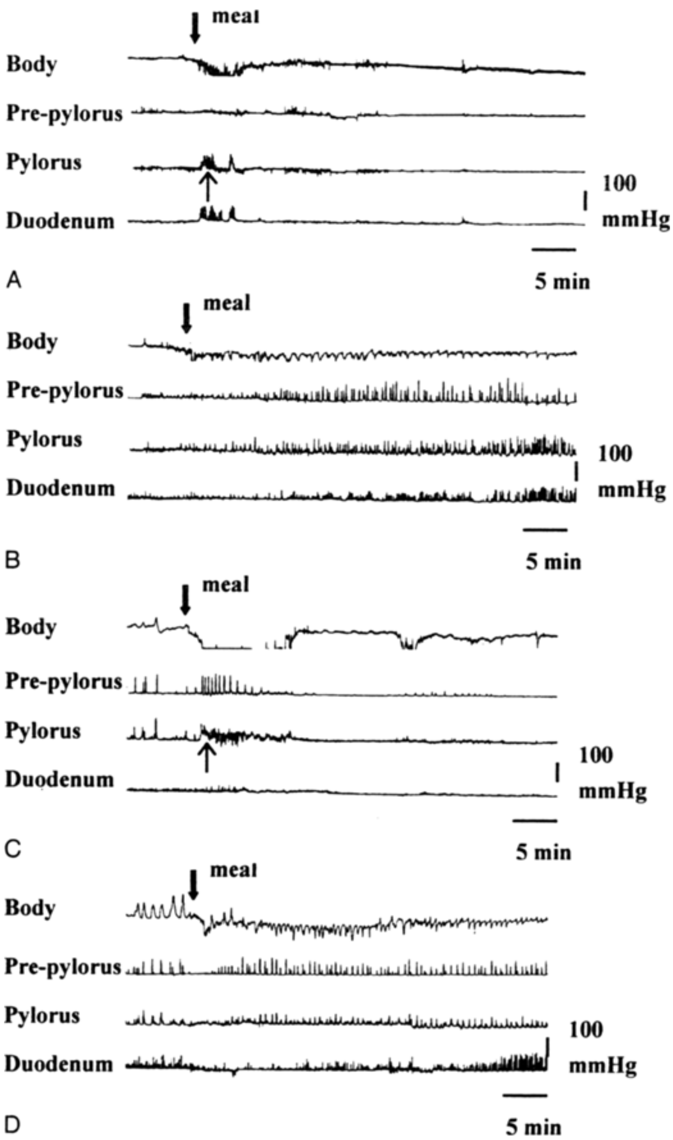

Fig. 5. Postprandial gastropyloroduodenal motility patterns during the first month (**A**) and after the first month (**B**) following PPPG. During the first month tonic and phasic pyloric contractions (up arrow) appeared in the pylorus immediately after feeding. Cessation of relaxation of the gastric body was observed after the occurrence of tonic and phasic pyloric contractions. After the first month tonic and phasic pyloric contractions after feeding diminished, and relaxation of the gastric body was consistently observed in all dogs. Postprandial gastropyloroduodenal motility patterns during the first month (**C**) and after the first month (**D**) following RPPG. Postprandial motility patterns of RPPG were similar to those of PPPG both during and after the first month. During the digestive state, pyloric relaxation was not observed in either PPPG- or RPPG-treated animals.

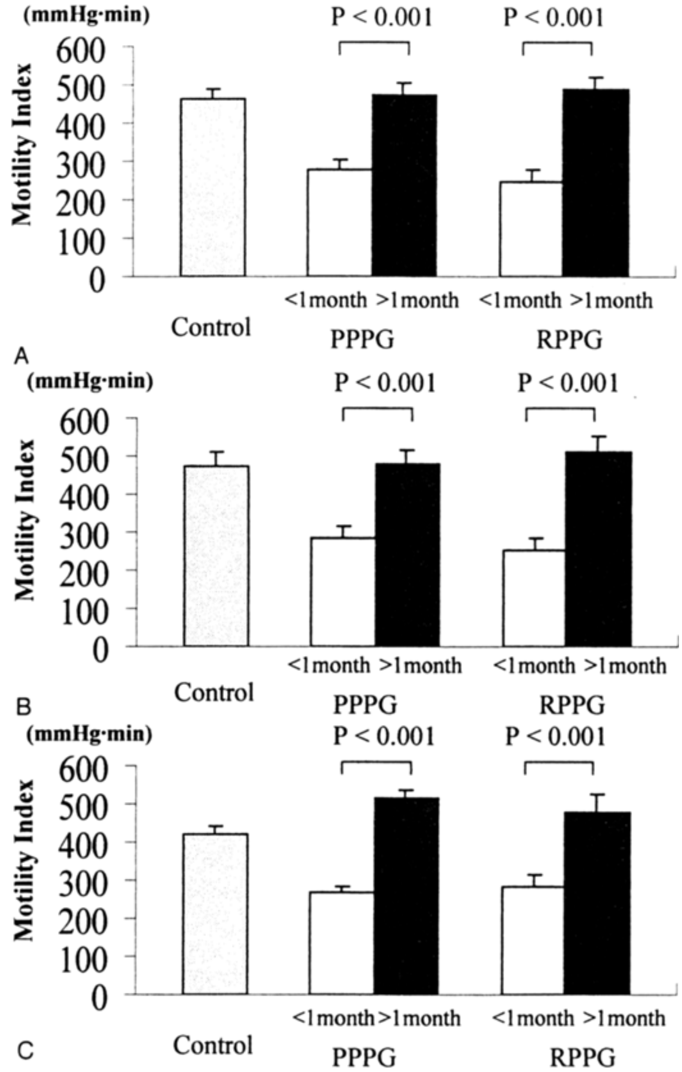

Fig. 6. A. Postprandial motility index (MI) of the antrum in controls and the prepylorus in PPPG- and RPPG-treated dogs. Postprandial MI of the pylorus (**B**) and duodenum (**C**). In the PPPG and RPPG groups, prepyloric, pyloric, and duodenal MIs after the first month were significantly higher than during the first month. No significant differences were found in gastropyloroduodenal MI for the two groups during and after the first month. < 1 month: during the first month following surgery; > 1 month: after the first month following surgery.

RPPG groups were similar to that of the controls. Additionally, prepyloric MI values after PPPG and RPPG were identical to the antral MI of the controls. These data suggest that the particles were propelled by the coordination between prepyloric and pyloric actions. Furthermore, gastric stasis during the early postoperative period is due to the impaired motility of the gastric remnant and pylorus after PPG.

Conclusions

It is not necessary to preserve the pyloric branch of the vagus after PPG. After the first month following PPG, gastropyloric contractions during both the interdigestive and postprandial states restore a normal pattern. The gastric stasis during the early postoperative period is due to tonic and phasic contractions of the pylorus. By the end of the first month after PPG, the rate of gastric emptying and gastric motility were similar to those of the normal controls. However, these findings should be considered with caution because it could be misleading to extrapolate experimental results obtained in animals to humans. Indeed, in view of the potential benefit of such procedures, long-term clinical trials involving patients who have undergone them should be conducted to try to answer such questions.

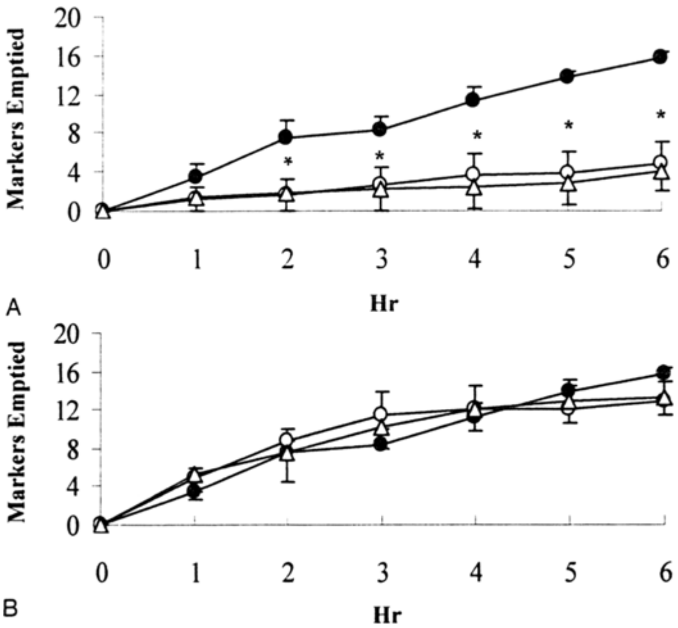

Fig. 7. Gastric emptying of ROMs during the first month (A) and after the first month (B) following PPPG and RPPG. No significant differences were found in the gastric emptying rate between the PPPG and RPPG groups during or after the first month. A. Compared with the controls, delayed gastric emptying was observed during the first month after PPPG and RPPG (*$p < 0.05$). B. Gastric emptying rates for PPPG- and RPPG-treated dogs after the first month following surgery were similar to those in the controls. Filled circles: control; open circles: PPPG; triangles: RPPG.

Résumé. On a examiné la motilité gastropylorique après gastrectomie avec conservation du pylore (GCP) et notamment, le rôle de la branche pylorique du nerf vague chez le chien. Quinze chiens ont été divisés en trois groupes de cinq, un groupe de contrôle, un deuxième groupe de GCP et un troisième avec résection de la branche pylorique du nerf vague (RBPV). On a enregistré la motilité gastropyloroduodénale interdigestive et digestive après une période de deux semaines à l'aide de transducteurs «strain gauge force» (SGF). Des marqueurs radio-opaques ont été utilisés pour évaluer la vidange gastrique. On n'a observé aucune différence statistiquement significative entre les groupes GCP et RBPV en ce qui concerne la motilité gastropyloroduodénale pendant la période interdigestive ou postprandiale. Pendant la phase III de l'état interdigestif, la relaxation pylorique était couplée à une contraction du corps gastrique après la GCP et la RBPV. Pendant le premier mois, elle était accompagnée de contractions pyloriques toniques et phasiques après l'alimentation et un retard de la vidange gastrique dans les deux groupes. Cependant, après un mois, ces contractions avaient diminué et la prévalence de vidange retardée était similaire aux contrôles. En conclusion, il ne semble pas nécessaire de conserver la branche pylorique du vague pour la motilité gastropyloroduodénale après GCP. La stase gastrique postopératoire précoce est en rapport avec des contractions toniques et phasiques du pylore.

Resumen. Se realiza un estudio experimental en perros para dilucidar la acción de la rama pilórica del n. Vago en la motilidad gastro-pilórica, tras una gastrectomía con preservación del píloro (PPG). Se utilizaron 15 perros divididos en 3 grupos de cinco. El grupo control, el grupo PPG, con preservación de la rama pilórica del vago (PPPG), y el grupo con resección de dicho nervio (RPPG). Se registró, transcurridas dos semanas de la operación, la motilidad gastropilórica-duodenal interdigestiva y digestiva, utilizando un transductor que mide la fuerza de necesaria para modificar el calibre (SG). Para evaluar el vaciamiento gástrico se emplearon marcadores radiopacos (ROMs). No se registró diferencia alguna entre los grupos PPPG y RPPG, por lo que se refiere a la motilidad gastropilórica-duodenal tanto interdigestiva como postprandial. En la fase III del estadio interdigestivo, la relajación del píloro se asociaba a una contracción del cuerpo gástrico tanto en el grupo PPPG como en el RPPG. Durante el primer mes (tras la operación) se constataron tras la ingesta, tanto en un grupo como en el otro, contracciones tónicas y fásicas del píloro, con retraso en el vaciamiento gástrico. Sin embargo, al finalizar el primer mes, las contracciones pilóricas disminuyeron y el vaciamiento gástrico fue similar al observado en el grupo control. Conclusión: Por lo que a la motilidad gastropilórica-duodenal tras PPG se refiere, no se precisa conservar la rama pilórica del n. Vago. La estasis gástrica durante el periodo postoperatorio precoz se debe a las contracciones tónicas y fásicas del píloro.

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