Behavior of the Infection by *Helicobacter pylori* of the Gastric Remnant After Subtotal Gastrectomy and Roux-en-Y Anastomosis for Benign Diseases

Attila Csendes · Gladys Smok · Ana María Burgos

Abstract

Introduction Reinfection by *Helicobacter pylori* of the gastric remnant after partial gastrectomy has been implicated in the development of gastric cancer at the gastric stump.

Objective The aim of this study is to determine the rate of infection by *H. pylori* after partial gastrectomy and Roux-en-Y anastomosis for benign disease.

Materials and Methods A total of 79 patients with long segment Barrett's esophagus were submitted to vagotomy, anti-reflux surgery, two thirds distal gastrectomy, and Roux-en-Y anastomosis 70 cm long. In all preoperative biopsy samples were taken from the antrum. After surgery, four endoscopic studies were performed in different periods of time. Mean follow-up was 98 months after operation (60–240).

Results Three groups of patients were identified: (a) group 1, 43 patients (54%) who had no preoperative infection by *H. pylori* and remained so late after surgery; (b) group 2, 21 patients (27%) who had no preoperative infection by *H. pylori* but presented infection of the gastric remnant that increased parallel to the length of follow-up; (c) group 3, 15 patients (19%) who presented infection by *H. pylori* before surgery. From them, 11 showed reinfection of the gastric remnant, while four patients had no reinfection.

Conclusion After partial gastrectomy and Roux-en-Y anastomosis for benign disease, there are three different patterns of behavior regarding reinfection or not by *H. pylori*. A total of 41% of patients presented *H. pylori* reinfection at the gastric remnant after Roux-en-Y anastomosis, which increased parallel to the length of follow-up.

Keywords *Helicobacter pylori* · Subtotal gastrectomy · Roux-en-Y loop

Several authors have implicated a significant role for *H. pylori* infection of the gastric remnant after partial or subtotal gastrectomy for benign or malignant diseases in the development of gastric cancer late after surgery.[1–4] Even an eradication therapy has been proposed in order to decrease this eventual complication.[1,5] This was specially seen in patients submitted to Billroth I (BI) or Billroth II (BII) anastomosis.

After Roux-en-Y reconstruction, conflicting results have been published. There are authors who reported increased rate of infection after Roux-en-Y anastomosis,[2] similar proportion to BI or BII gastrectomy,[6] or less infection than Billroth anastomosis.[7]

The purpose of this prospective study was to determine the role of infection by *H. pylori* of the gastric remnant after partial or subtotal gastrectomy for benign disease, evaluated several times by biopsy samples after surgery.

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Material and Methods

1. *Patients studied*. Patients included in this study are part of a prospective clinical trial that begun on 1987 and was related to the surgical treatment of patients with Barrett's esophagus.[8,9] They were selected from patients who had at least five or more years of follow-up.

All patients gave their consent to be included in this investigation. There was no special exclusion in this study except that they had to have preoperative evaluation also.

2. *Endoscopic procedure*. As part of the serial endoscopic control performed to these patients with Barrett's esophagus,[10] two or three biopsy samples from the gastric remnant were taken.
3. *Histological analysis*. The biopsy samples were immediately fixed in paraffin and stained by hematoxylin–eosin. For this particular study, only the presence or absence of *H. pylori* will be reported. The complete and complex histological findings are not the purpose of the present study and have been reported elsewhere.[11]
4. *Surgical technique*. The complete details of the surgical steps have been extensively published previously.[8,9] Basically, patients are submitted to vagotomy, antireflux procedure, two thirds distal gastrectomy, and Roux-en-Y anastomosis 70 cm long.

Results

A total of 79 patients followed more than 5 years and all with preoperative evaluation were included in this study. All details respect to symptoms, and laboratory findings including manometry, 24-h pH monitoring, and 24-h bile monitoring have been extensively reported elsewhere.[10] They had a mean age of 47.9 years (16–70). They were 40 women and 39 men. The mean follow-up of the whole group was 98 months after operation (60–240).

According to the preoperative findings of *H. pylori* at the antrum and the behavior of reinfection or not of the gastric remnant after surgery, patients were divided in three groups, with their main clinical characteristics shown in Table 1.

a. Group 1, 43 patients (54%) who had no preoperative infection by *H. pylori* and remained in the same situation of the late follow-up.
b. Group 2, 21 patients (27%) who showed no preoperative infection by *H. pylori* but presented infection of the gastric remnant at different moments of the follow-up.
c. Group 3, 15 patients (19%) who presented infection by *H. pylori* before operation.

There were no differences in age and gender comparing the three groups. The length of follow-up was similar, up to 20 years. Almost four postoperative endoscopies and biopsy samples were taken in each group, but all had at least three postoperative endoscopies, and 16 patients (20%) had five or more postoperative endoscopies.

Table 2 shows the rate of infection of the gastric remnant in the three groups of patients. Group 1 showed no infection of the gastric remnant late after surgery. Group 2, patients who had no *H. pylori* infection before surgery, showed a progressive increase in the rate of infection by *H. pylori*, according to the follow-up. At 96 months after surgery, 90% had presence of *H. pylori* at the gastric remnant. Two patients presented infection by *H. pylori* 168 and 240 months after surgery. Group 3 of 15 patients corresponded to those with presence of *H. pylori* before operation. Among 11 of them, reinfection occurred, while four patients persisted free of infection late after surgery. The curve of reinfection is similar to patients of group 2. Figure 1 shows the behavior of all three groups according to the length of follow-up.

Discussion

The results of the present study suggest that, after partial of subtotal gastrectomy, with resection of the antrum, where *H. pylori* is mainly located, three different patterns of behavior can be seen in respect to the probability of reinfection by *H. pylori* or not. The purpose of the present study was neither to evaluate the complex and different histologic changes of fundic mucosa after gastrectomy with or without the presence of *H. pylori*, which has been analyzed extensively elsewhere,[11] nor to report clinical and laboratory results after this operation of vagotomy, antrectomy, and Roux-en-Y loop for Barrett's esophagus, which also have been published extensively.[8,9,11] Therefore, we focused only in the behavior of the infection by *H. pylori* after partial gastrectomy.

Table 1 Main Characteristics of Patients with Partial Gastrectomy and Roux-en-Y Anastomosis According to Presence or Not of *H. pylori* Infection Before Surgery

	H. pylori infection before surgery			
	Group 1 (−)	Group 2 (−, +)	Group 3 (+)	*p* value
No. of patients	43	21	15	
Mean age (range)	49.5 (24–70)	44.9 (16–68)	49.7 (36–72)	n.s.
Women	25	8	7	n.s.
Men	18	13	8	
Length of follow-up (months)	99 (60–206)	95 (60–240)	96 (60–180)	n.s.
No. of postop endoscopies/patient	3.7	3.6	4.2	n.s.

n.s. not significative, *postop* postoperative

Table 2 Behavior of the Rate of Infection of Gastric Remnant by *H. pylori* After Partial Gastrectomy

Infection by *H. pylori*	Group 1, *n*=43	Group 2, *n*=21	Group 3, *n*=15
Before operation	0	0	100%
After operation (months)			
12	0	2 (10%)	5 (33%)
24	0	4 (19%)	6 (40%)
48	0	10 (48%)	8 (53%)
60	0	14 (67%)	11 (73%)
96	0	19 (90%)	11 (73%)
>120	0	21 (100%)	11 (73%)

Previous studies are very few and have the same problems: (a) The majority of the publications are related to partial gastrectomy after early or advanced cancer,[1,2,4–7,12] (b) all studies refer to only one endoscopy and biopsy samples after surgery, and (c) the majority of the studies are done 3 to 12 months after surgery, and very few have been performed years after surgery for benign diseases.[3,4,13]

We have tried to overcome some of the difficulties. First, we performed a prospective consecutive evaluation before and late after surgery in a homogenous group of patients with benign disease. Second, we performed nearly four postoperative endoscopic and bioptic studies, which we believe is the major strength of this study.

The first author to postulate some pathogenic effect of *H. pylori* after partial gastrectomy was Dixon in 1989.[14] He postulated that bile reflux was universally related to the presence of *H. pylori* because this organism does not tolerate the presence of bile reflux; therefore, he thought that gastritis due to bile reflux and gastritis due to *H. pylori* infection were different entities. O'Connor[15] demonstrated that *H. pylori* may reinfect gastric remnant after partial gastrectomy. Later, there has been a long debate whether the presence of bile reflux promotes or avoids the probability of reinfection by *H. pylori*. Some authors postulate more reinfection after Roux-en-Y anastomosis,[2] some similar proportion,[6] and some less reinfection compared to Billroth I or II.[7] However, the majority of the studies are related to Billroth I or II anastomosis and the possibility of developing cancer of the gastric remnant late after surgery. The rate of reinfection of the gastric remnant after partial gastrectomy and Billroth II anastomosis has been 39%,[2] 29%,[3] 59%,[5] 65%,[6] and 55%.[7]

Even some authors have postulated that *H. pylori* is responsible of the appearance of cancer of the gastric remnant late after surgery.[3,4] Giuliani et al.[3] performed in 151 gastrectomized patients an endoscopic and histologic study 25 years after surgery. They found 29% of *H. pylori* infection after Billroth II and postulate that both *H. pylori* and enterogastric reflux may have a synergistic causal role in the development of gastric cancer. Sloane et al.[4] studied a very selected group of 73 patients after partial gastrectomy 32 years after surgery and found 20% of carcinoma in the gastric remnant. Obviously, this was a very selected group and does not represent the total group of patients operated for benign disease. Due to this hypothesis, some authors have postulated to perform eradication of *H. pylori* if it is found in an endoscopic study.[1,5] They published 70% eradication with dual therapy and between 83% and 90% with triple therapy.

However, we disagree with this hypothesis. Patients with Roux-en-Y reconstruction have almost the same rate of infection by *H. pylori* than after Billroth II reconstruction.[2,6,11] In our previous study, we observed 57% of infection by *H. pylori* after Billroth II and 42% after Roux-en-Y loop, which was not statistically significantly.

In the present study, we found again 41% of reinfection of the gastric remnant after partial gastrectomy. Therefore, the main difference with Billroth II is the absence of intestinal reflux into the gastric remnant, which is able to produce intestinal metaplasia and probably carcinoma at the gastric remnant. We believe that bacterial overgrowth of enteric fecal bacteria together with bile reflux may be the responsible of the appearance of gastric stump carcinoma. Up to now, after more than 20 years of follow-up, we have never seen carcinoma of the gastric remnant after Roux-en-Y reconstruction, similar to what has been published by other authors.[16,17] Therefore, the question whether to treat or not the infection by *H. pylori* on these patients is open. Up to now, due to the fact that no cases with gastric stump cancer after Roux-en-Y anastomosis have been described, either in the literature or in our patients, our policy has not been to eradicate it 100%, and there are serious collateral effects of the antibiotics in nearly 30% of the patients.[18]

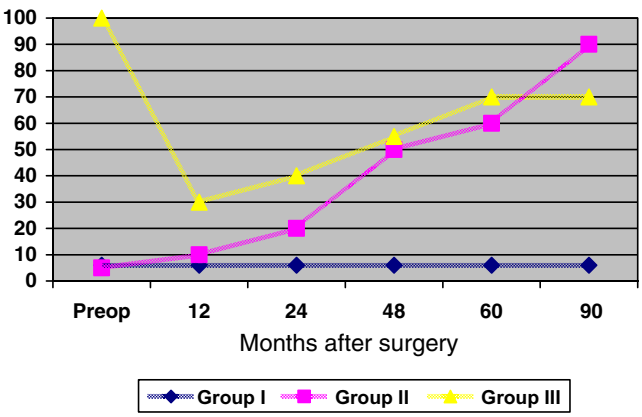

Figure 1 Behavior of the infection or not of the gastric remnant by *Helicobacter pylori* before and late after surgery.

Probably, the most interesting finding that has never been published before is the behavior of the "re-infection" or not by *H. pylori*, according to whether it was present before surgery or not. This was possible due to the performance of nearly four endoscopic and histological studies in all patients after surgery. In our study, a total of 39% of patients had reinfection by *H. pylori* after surgery. However, we could demonstrate three different behaviors:

a. Nearly 55% of the patients had no *H. pylori* infection before surgery and remained negative along the late follow-up.
b. Nearly 27% of the patient who had no infection before surgery and showed a progressive increase in the rate of infection of the gastric remnant after surgery, reaching 90% of the infection 8 years after surgery. This shows a parallel increase of reinfection according to the length of follow-up.
c. Nearly 19% of the patients had presence of *H. pylori* before surgery at the antrum. They were not treated by eradication because 60% distal gastrectomy was performed, including the antrum and therefore, eliminating the infection by *H. pylori*. In these patients, the presence of *H. pylori* at the remaining fundus was 33% 1 year after surgery, and reinfection rate increased progressively up to 5 years after surgery, when it remained stable, because four patients showed no *H. pylori* at the gastric remnant. This behavior has not been described before; therefore, we neither have comparison with other publications nor know if these findings will be reproducible or not in other surgical units. We urge that other groups could perform such a study in order to delucidate the real role of *H. pylori* infection at the gastric remnant and the possible carcinogenetic role, which we do not believe.

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