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Campylobacter pylori *Colonizing Heterotopic Gastric Tissue in the Rectum*

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Campylobacter pylori **specifically attaches to gastric epithelial cells and is the etiologic agent for type B gastritis. The authors report the case of a woman with the rare finding of heterotopic gastric mucosa in the rectum that was colonized with *C. pylori*. Histologic findings of the heterotopic mucosa revealed active chronic gastritis that resolved when *C. pylori* was eradicated with bismuth subsalicylate and antibiotics. This is the first report of *C. pylori* in a location distal to the duodenum. The presence of live *C. pylori* organisms in the rectum suggests that viable organisms are present in the stool and that *C. pylori* may be spread by the fecal–oral route. (Key words: Gastritis; Gastric metaplasia; Gastric heterotopia; Rectum; *Campylobacter pylori*; Bismuth therapy; Electron microscopy) Am J Clin Pathol 1990; 93:144–147**

CAMPYLOBACTER PYLORI has been shown to be a cause of active chronic gastritis.[11] It is able to survive in the acidic environment of the stomach by means of its urease enzyme, which converts urea into ammonia and CO_2, enabling *C. pylori* to neutralize acid in its immediate environment.[9] Thus, *C. pylori* may be able to colonize the gastric mucosa because of the absence of other acid-tolerant organisms that would provide effective competition. Alternatively, *C. pylori* may have a unique affinity for a receptor site on the gastric mucus cell.

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In support of the latter hypothesis, we wish to report a patient who had *C. pylori* infection within the rectum.

Report of a Case

A 35-year-old white female was evaluated for abdominal pain, nausea, and weight loss. She had previously undergone laparoscopic examination, which had normal findings apart from a tiny focus of endometriosis in the broad ligament. Physical examination revealed mild pain to palpation in the epigastrium and left lower quadrant. Colonoscopic examination revealed an irregular, pale plaque of tissue approximately 1 cm in diameter, located on the posterior rectal wall, 8 cm from the anal verge. The lesion had a central umbilication leading to a shallow diverticulum (5–10 mm). Biopsy specimens were obtained, fixed in formalin, and stained with hematoxylin and eosin.

Microscopically, body-type gastric epithelium was present adjacent to normal rectal mucosa (Figs. 1 and 2). The former was composed of glands with parietal cells and overlying mucus-secreting foveolar cells. An inflammatory infiltrate consisting of lymphocytes, plasma cells, and neutrophils was present in the gastric mucosa, but the adjacent rectal epithelium was normal. A Giemsa stain showed large numbers of curved and spiral bacteria with morphologic characteristics identical to *C. pylori*. The organisms were intimately associated with the gastric-type mucus cells but not with the rectal epithelium.

At a subsequent sigmoidoscopic examination, a rapid urease test (CLOtest®)[10] performed on tissue removed from the lesion was positive within 10 minutes, in contrast to a CLOtest of the surrounding rectal tissue, which only changed color after 12 hours.

For ultrastructural examination, biopsy specimens taken at the second examination were fixed in 2% glutaraldehyde (w/v) in 0.1 mol/L sodium phosphate buffer, pH 7.4, and postfixed for one hour at 24 °C in an

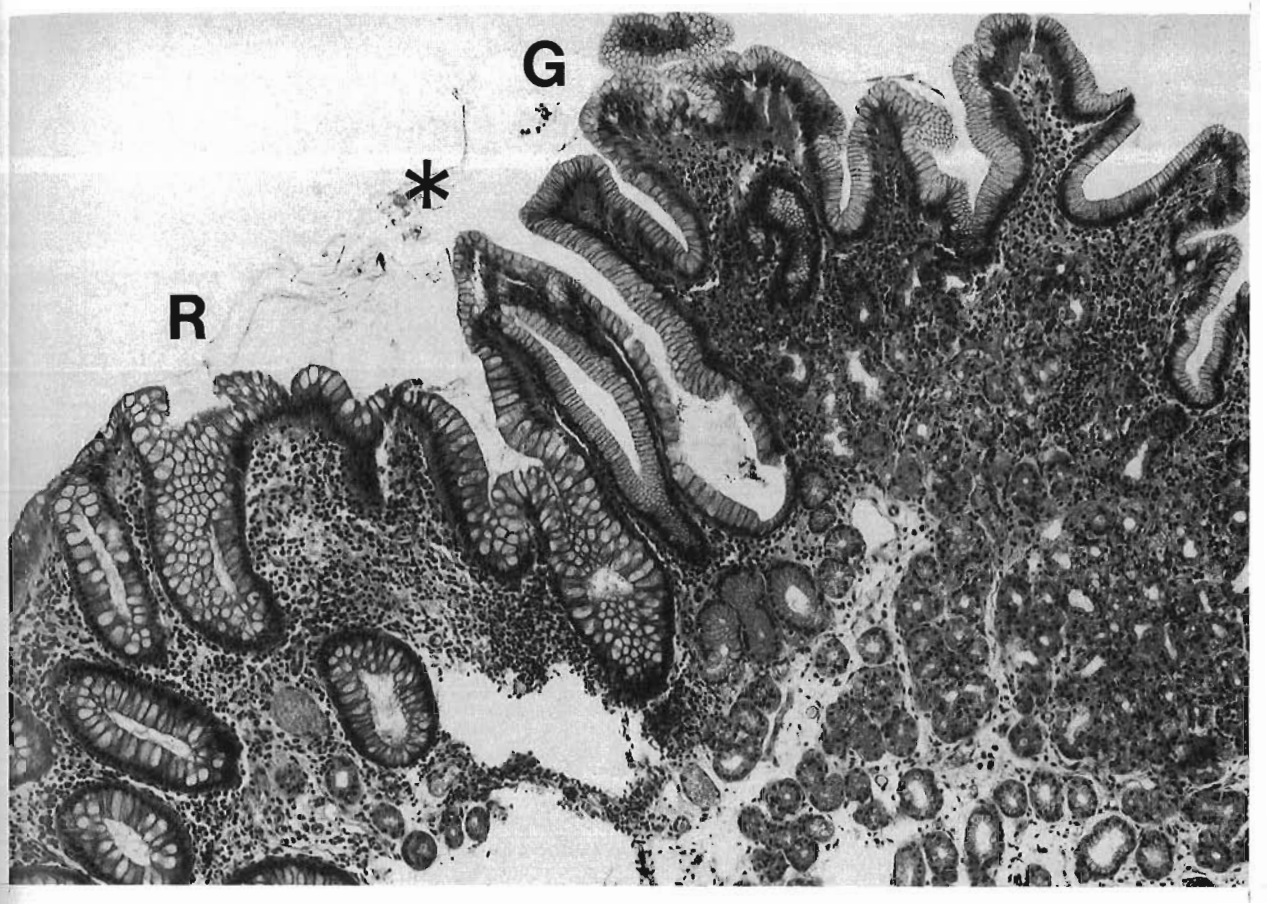

FIG. 1. Section of rectal lesion showing a junctional zone (*) between rectal epithelium (*R*) and gastric epithelium (*G*). Hematoxylin and eosin (×120).

aqueous solution of 2% osmium tetroxide at 4 °C. After dehydration in graded ethanol, tissues were *en block* stained overnight at 4 °C in a solution containing 10% uranyl acetate in absolute methanol. The blocks were embedded in Epon® by routine infiltration with propylene oxide. Ultrathin sections (60–70 nm) were further stained in 10% uranyl acetate in methanol for 15 minutes at 60 °C.

Electron microscopic examination confirmed the presence of curved organisms overlying the heterotopic gastric mucosa (Fig. 3) but not over the normal rectal tissue. Ultrastructurally, the organisms had sheathed flagella and smooth cell walls. Upon further inquiry, the patient admitted to having had symptoms of nausea, bloating, and burning epigastric pain.

An upper endoscopic examination revealed antral erythema and erosions. Samples of the antral mucosa were obtained for CLOtest, light microscopic examination, and culture for *C. pylori*. The CLOtest was positive within 15 minutes. The hematoxylin and eosin–stained sections revealed active chronic gastritis with neutrophils, lymphocytes, and plasma cells (Fig. 4). A Giemsa-stained section showed bacteria consistent with *C. pylori*. Culture of the gastric antral biopsy specimen confirmed the presence of *C. pylori*, which were identified as urease-positive, oxidase-positive, catalase-positive, Gram-negative curved rods.

The patient was treated initially with 21 days of bismuth subsalicylate (BSS; Pepto-Bismol®). Erythromycin 500 mg qid was added during the last 14 days of the treatment period. A partial symptomatic response was obtained. At follow-up gastroscopy and sigmoidoscopy one month after treatment, active chronic gastritis with *C. pylori* was present in the stomach, but the organisms were absent in the heterotopic gastric epithelium. The inflammatory changes previously seen in the gastric heterotopia had resolved. The patient was then given a second 21-day course of Pepto-Bismol 2 tabs qid with the addition of metronidazole 250 mg qid during days 11–21. One month after therapy we could not detect *C. pylori* in biopsy specimens of the heterotopic gastric mucosa or in gastric biopsy specimens taken at upper endoscopic examination. On this occasion the gastric histologic findings appeared normal by light microscopic examination. The patient reported gradual resolution of her upper gastrointestinal symptoms and gained weight after eradication of *C. pylori*.

She still felt pain in the left iliac fossa, however, which was often postprandial. The pain could not be reproduced with pentagastrin 6 μg/kg but could be induced by insufflation of the umbilicated rectal lesion with air by means of a flexible sigmoidoscope. The heterotopic mucosa was then ablated by carbon dioxide laser. There was subsequently a complete resolution of postprandial left iliac fossa pain.

Six months after this therapy the patient's condition was improved, without upper gastrointestinal symptoms. However, she complained of a new symptom, that of low-grade aching pain in the coccygeal and anal region. These symptoms resolved after local injection of the paracoccygeal region with lidocaine and prednisolone. It is thought they were of musculoskeletal origin.

Discussion

Heterotopic gastric epithelium occurs in all portions of the alimentary tract, but it is extremely rare in the rec-

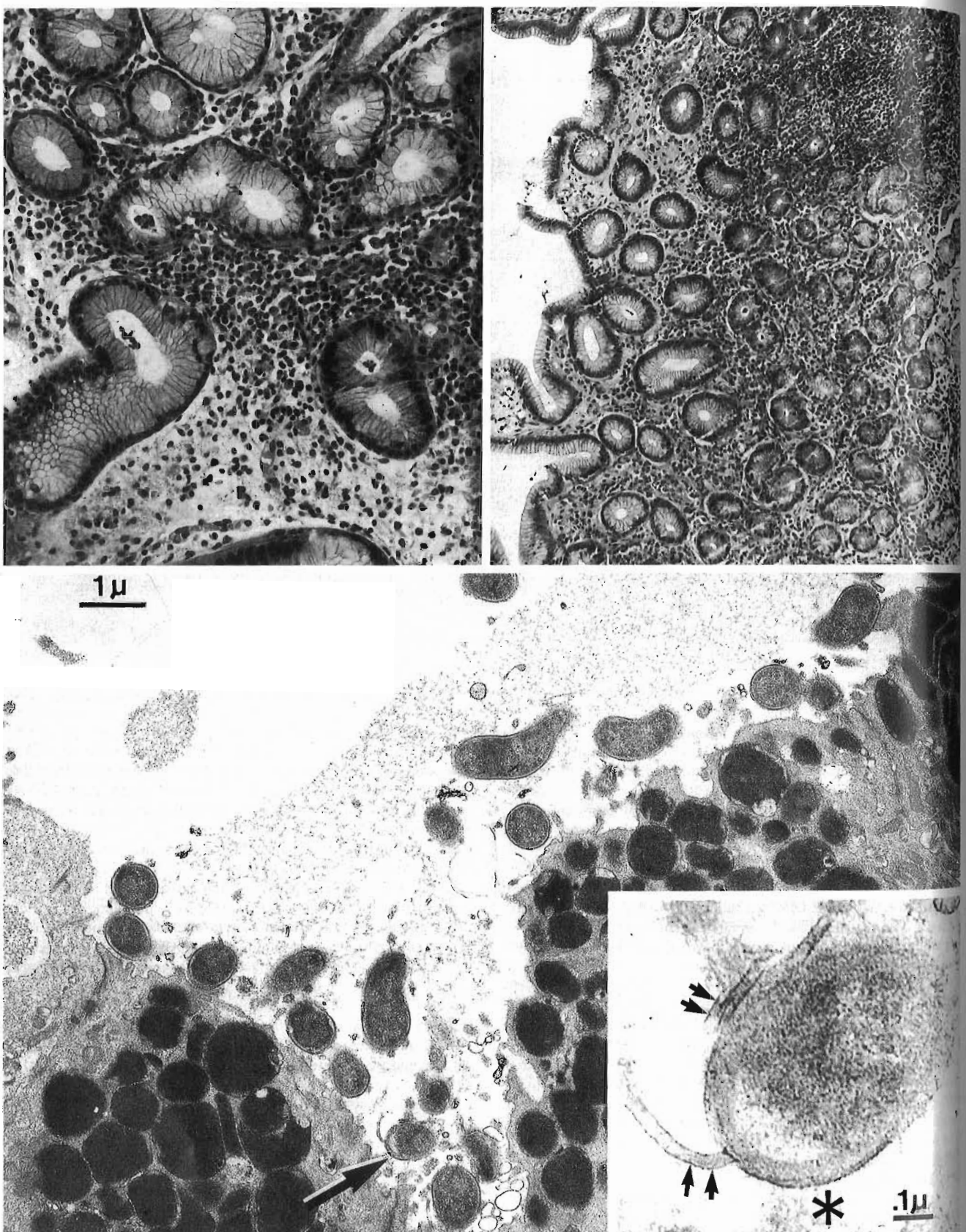
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FIG. 2 (*upper, left*). High-power view of gastric type epithelium infiltrated with mononuclear cells and polymorphs. Hematoxylin and eosin (×250).

FIG. 3 (*lower*). Electron micrograph shows *C. pylori* on heterotopic gastric mucosa. *Inset*. Ultrastructure of arrowed organism demonstrates the smooth cell wall (*) and sheathed flagella (*small arrows*) characteristic of *C. pylori*. (×12,000).

FIG. 4 (*upper, right*). Gastric antral mucosa showing active chronic gastritis. Hematoxylin and eosin (×125).

tum.[1,4,14,15] Ten cases of body-type gastric epithelium in the rectum have been described. Three of these have been associated with duplication cysts, as may have been the case with our patient, and nine of the cases were discovered during evaluation of rectal bleeding.[3,5,13,16] One lesion was found at the time of polypectomy.[6] Chronic pain is not usually associated with gastric heterotopia in the rectum, although the case reported by Cox[3] was in a 25-year-old woman who had rectal pain since age nine years.

Metaplastic gastric tissue in the small bowel and colon have been reported to arise in cases of chronic inflammation such as Crohn's disease and intestinal tuberculosis.[13] The metaplastic tissue in that situation is composed of pyloric (mucus-producing) tissue and lacks parietal cells.

True gastric heterotopia is believed to be a congenital anomaly, unassociated with chronic inflammatory conditions. The true prevalence and natural history of this lesion are unknown, however. Our patient's symptomatic improvement after ablative therapy suggests that functioning parietal cells in the rectum may have contributed to her symptoms.

The bacilli seen attached to the heterotopic gastric epithelium appeared identical to those seen in the stomach. Their curved, spiral shapes were typical of *C. pylori*. The presence of strong urease activity in the heterotopic gastric tissue is evidence that the rectal organisms were indeed *C. pylori*.[8] Ultrastructurally, the organisms seen in our patient were identical to *C. pylori*, having sheathed flagella and smooth cell walls. Thus, they could not have been *C. jejuni*.

We found that *C. pylori* had colonized heterotopic gastric tissue in the rectum, whereas the adjacent rectal epithelium was uninvolved. Although the heterotopic tissue may have had the ability to secrete acid, the mucosal surface was exposed to a neutral pH, which is typical for the rectum. This suggests that *C. pylori* does not obtain its specificity for the gastric mucosa from its ability to survive in an acid environment, but that it possesses a special affinity for the gastric epithelial cell possibly through a receptor site. The affinity of the organism for gastric epithelium also is seen in cases of gastric metaplasia of the duodenum[2,7] and in some cases of Barrett's esophagus.[12] The selective colonization of the heterotopic tissue by *C. pylori* was possible even though the tissue was exposed to fecal flora. Hence, *C. pylori* easily competes with fecal organisms and is able to selectively colonize the gastric epithelial cell.

Although *C. pylori* has never been isolated from feces, our case provides evidence that viable *C. pylori* organisms pass through the gastrointestinal tract and that fecal–oral spread might be a mode for transmission of the infection.

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