

# Campylobacter-like organisms and heterotopic gastric mucosa in Meckel's diverticula

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**SUMMARY** To assess the possibility that *Campylobacter pylori* might colonise heterotopic gastric mucosa a detailed histological review of 69 cases of Meckel's diverticula resected over 17 years was undertaken. Twenty three were resected incidentally while 46 were excised as the suspected cause of symptoms. Gastric mucosa was found in 13 diverticula (19%), 10 from the symptomatic group and three from the incidental cases, of which eight showed active gastritis affecting the heterotopic mucosa. Specific staining showed spiral bacteria with the typical morphology of *C pylori* adherent to gastric mucosa in four of the diverticula showing active gastritis. Campylobacter-like organisms were not seen on normal heterotopic gastric mucosa or on adjacent intestinal epithelium.

The findings show that Campylobacter-like organisms, identical in appearance, staining, and distribution with *C pylori*, colonise and possibly inflame heterotopic gastric mucosa in Meckel's diverticulum.

Heterotopic gastric mucosa is found in a proportion of Meckel's diverticula, and may be associated with peptic ulceration either within the diverticulum itself, or in adjacent ileum.<sup>1,2</sup> The association between *Campylobacter pylori*, chronic gastritis, and peptic ulceration is now well established.<sup>3</sup> To assess whether gastritis occurs in heterotopic mucosa in Meckel's diverticula, or whether *C pylori* can colonise this gastric mucosa, we undertook a detailed histological review of a series of Meckel's diverticula in which we looked for evidence of active inflammation or ulceration in any heterotopic gastric mucosa present, and searched specifically for Campylobacter-like organisms.

## Material and methods

All cases of Meckel's diverticula resected since 1971 were traced from the files of the departments of histopathology at the Medical School, University of Birmingham, and the General Hospital, Birmingham. All of the histological sections were reviewed and the diverticula classified as normal or diseased, and those containing gastric mucosa identified. The gastric mucosa was classified as body or pyloric in type, and evidence of histological gastritis or ulceration noted. Further sections were cut and stained for Campylobacter-like organisms using the undifferentiated Giemsa<sup>4</sup> and the modified Steiner silver techniques<sup>5</sup>

and were examined independently of the original sections.

We divided the cases into two groups, termed "incidental" and "symptomatic". The former were diverticula resected incidentally during the course of laparotomy, while the latter were diverticula specifically resected as the suspected cause of symptoms.

The association between Campylobacter-like organisms and heterotopic gastric mucosa was tested for significance using  $\chi^2$  squared analysis.

## Results

There were 69 diverticula in all, of which 23 were in the incidental group. These were resected during surgery for appendicitis (n = 9), colonic carcinoma (n = 4), peritonitis (n = 4), Crohn's disease (n = 3), ulcerative colitis (n = 1), uterine fibroids (n = 1), and

Table 1 Histological findings in 46 Meckel's diverticula resected as a suspected cause of symptoms

Pathological findings	Number	No with gastric mucosa
Acute diverticulitis	12	2
Ulceration/perforation	5	5
Carcinoid tumour	2	
Leiomyoma	1	
Crohn's disease	2	
Normal diverticulum	24	3

Table 2 Association between pathological findings in diverticula and heterotopic gastric mucosa, and presence of Campylobacter-like organisms

Diverticulum	Gastric mucosa	Mucosal type	Presence or absence of Campylobacter
Incidental	Normal	Pyloric	-
Incidental	Normal	Body	-
Incidental	Gastritis	Mixed	+
Normal	Normal	Body	-
Normal	Normal	Body	-
Normal	Normal	Mixed	-
Diverticulitis	Gastritis	Body	+
Diverticulitis	Gastritis	Body	+
Ulcer/perforation	Gastritis/ulcer	Body	+
Ulcer	Gastritis/ulcer	Pyloric	-
Ulcer/perforation	Gastritis/ulcer	Body	-
Ulcer	Gastritis/ulcer	Mixed	-
Ulcer	Gastritis/ulcer	Body	-

staging of Hodgkin's lymphoma (n = 1). All the diverticula in the incidental group were histologically normal, although three contained heterotopic gastric mucosa that was normal in two cases, and showed evidence of a localised gastritis in the other.

The symptomatic group comprised 46 cases including 24 diverticula that were histologically normal. The histological findings in the 22 that were diseased, 10 of which contained gastric mucosa, are shown in table 1.

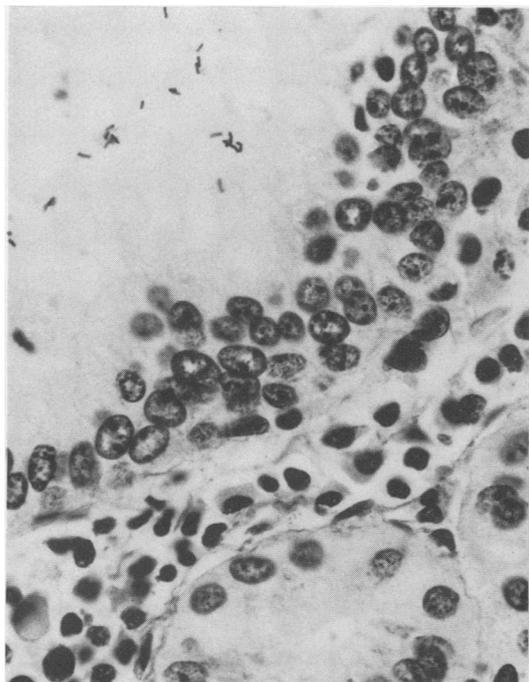


Fig 1 Campylobacter-like organisms on surface of heterotopic gastric mucosa. (Modified Steiner.)

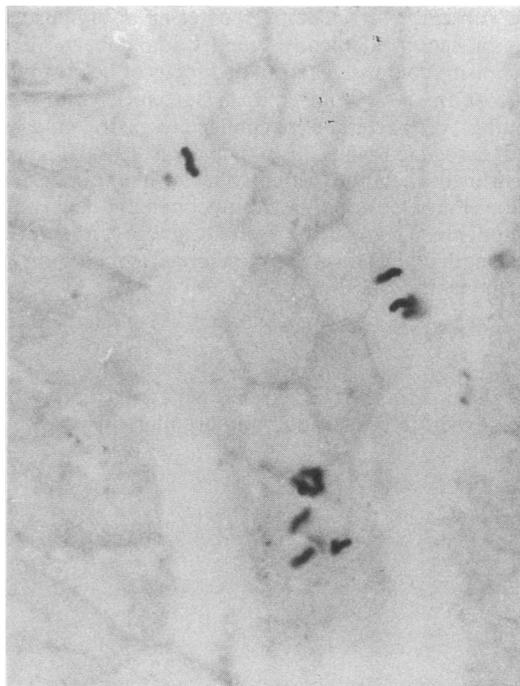


Fig 2 Characteristic S-shaped morphology of organisms seen under oil immersion. (Modified Steiner.)

Of the 13 diverticula (19%) with heterotopic gastric mucosa, eight showed evidence of a histological gastritis with neutrophil polymorph invasion of glands or surface epithelium (table 2). Campylobacter-like organisms, identical in appearance with *C. pylori*, were seen in four diverticula with heterotopic gastric mucosa (figs 1 and 2), but not in diverticula without gastric mucosa ( $\chi^2 = 14.63$ ,  $p < 0.005$ ). The organisms were scanty, though visible on sections stained by both methods. They were confined to the heterotopic foci, present on the mucosal surface and within gastric pits, and were not seen adhering to intestinal or goblet cell-containing epithelium. The four diverticula with Campylobacter-like organisms all showed histological gastritis and the organisms were not seen on normal heterotopic gastric mucosa.

## Discussion

We have shown, for the first time, that Campylobacter-like organisms, identical in appearance, staining, and distribution with *C. pylori*, colonise and possibly inflame heterotopic gastric mucosa in Meckel's diverticula. The organism showed remarkable selectivity for colonising gastric-type mucosa. It is evident from table 2, however, that gastritis and ulceration of heterotopic mucosa may also occur in

the absence of Campylobacter-like organisms. Pambianco *et al* recently found Campylobacter-like organisms colonising an isolated focus of heterotopic mucosa in the rectum<sup>6</sup> and, in agreement with our findings, the bacteria were confined to gastric mucosa and associated with histological gastritis. If it is confirmed that the Campylobacter-like organisms colonising heterotopic gastric mucosa in the ileum and rectum are *C pylori* it shows that *C pylori* can traverse the length of the bowel and may spread from person to person by the faecal-oral route.

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#### References

- 1 Diamond T, Russell CFJ. Meckel's diverticulum in the adult. *Br J Surg* 1985;72:480-2.
- 2 Pickard MA, Simpson CJ. Meckel's diverticula in an adult surgical unit: eleven years experience. *Scott Med J* 1985;30:175-6.
- 3 Blaser MJ. Gastric Campylobacter-like organisms, gastritis and peptic ulcer disease. *Gastroenterology* 1987;93:371-83.
- 4 Gray SF, Wyatt JJ, Rathbone BJ. Simplified techniques for identifying campylobacter pyloridis. *J Clin Pathol* 1986; 39:1279-80.
- 5 Garvey W, Fathi A, Bigelow F. Modified Steiner for the demonstration of spirochaetes. *J Histotechnol* 1985;8:15-17.
- 6 Pambianco DJ, Dye KR, Marshall BJ, *et al*. Gastritis in the rectum: campylobacter-like organisms in heterotopic inflamed gastric mucosa. *Gastroenterology* 1988;94:A340.

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