Meckel's diverticulum in Crohn's disease

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HJ Freeman. Meckel's diverticulum in Crohn's disease. Can J Gastroenterol 2001;15(5):308-311. Meckel's diverticulum is a congenital abnormality of the distal ileum associated with failed vitelline duct closure. Detailed pathological studies have estimated its frequency to be about 2% of the general population, and it has been anecdotally recorded in patients with Crohn's disease. Most patients with Crohn's disease have imaging studies of the small intestine during the course of their disease, and often, an intestinal resection. Thus, it seems possible to estimate the prevalence of Meckel's diverticula in Crohn's disease. In addition, patient characteristics may be important, especially if management of Crohn's disease is altered. Of 877 patients with Crohn's disease, 10 (about 1%) had a Meckel's diverticulum diagnosed, including six men and four women. All were diagnosed with Crohn's disease before age 50 years and seven were diagnosed before age 30 years. There were five with ileocolonic disease, two with colon-only disease and three with ileum-only disease. The clinical behaviour of five patients could be classified as penetrating and two as stricturing. A total of 311 patients had an ileocolonic resection, including eight (about 2%) with a Meckel's diverticulum. In contrast to some case reports, no heterotopic mucosa was detected and the Meckel's diverticulum was incidental and, apparently, an unexpected finding. In each case, the diverticulum was not involved with Crohn's disease but was included in the ileal resection. These results suggest that the overall prevalence of a Meckel's diverticulum is not increased in Crohn's disease but may result in resection of additional small intestine.

Key Words: *Crohn's disease; Ectopic mucosa; Heterotopic gastric epithelium; Ileal resection; Meckel's diverticulum*

Diverticule de Meckel dans la maladie de Crohn

RÉSUMÉ : Le diverticule de Meckel est une anomalie congénitale de l'iléon distal associée à un défaut de fermeture du canal vitellin. Selon des études pathologiques détaillées, sa fréquence serait d'environ 2 % dans la population générale et il a été signalé de façon anecdotique chez des patients atteints de maladie de Crohn. La plupart des patients atteints de la maladie de Crohn subissent des épreuves d'imagerie du grêle durant leur maladie et la résection intestinale s'impose parfois. Il semble donc possible d'estimer la prévalence des diverticules de Meckel dans la maladie de Crohn. De plus, les caractéristiques des patients peuvent être importantes, surtout si l'on modifie le traitement de la maladie

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de Crohn. Parmi 877 patients atteints de la maladie de Crohn, dix (environ 1 %) présentaient un diverticule de Meckel dont six hommes et quatre femmes. Ces sujets avaient tous reçu leur diagnostic de maladie de Crohn avant l'âge de 50 ans et sept avant l'âge de 30 ans. On notait une atteinte iléo-colique chez cinq d'entre eux dont deux n'affectaient que le côlon et trois que l'iléon. L'évolution clinique de cinq patients pourrait être jugée pénétrante et deux stricturante. En tout, 311 patients ont subi une résection iléo-colique dont huit (environ 2 %) présentaient un diverticule de Meckel. Comparativement à certains rapports de cas, aucune muqueuse hétérotopique n'a été décelée et le diverticule de Meckel était d'importance secondaire et apparemment imprévu. Dans chaque cas, le diverticule était indépendant de la maladie de Crohn, mais inclus dans la résection iléale. Ces résultats donnent à penser que la prévalence globale du diverticule de Meckel n'est pas plus grande dans la maladie de Crohn, mais pourrait occasionner des résections d'autres portions du grêle.

Meckel's diverticulum has been estimated to occur in about 2% of the population (1). It is believed to result from failure of normal eradication of the vitelline duct. These diverticula are approximately two inches in length and usually located about two feet from the end of the ileum. At least two types of epithelium may be present in the diverticulum, including heterotopic gastric mucosa (1). In previous reports, an association with Crohn's disease has been described (2-4). In other reports, it has been suggested that acid secretion from heterotopic gastric mucosa results in coexistent inflammatory changes and ulceration in the distal ileum that could mimic Crohn's disease (5,6).

In the present report, the frequency of Meckel's diverticulum in Crohn's disease was evaluated. In addition, the features of Meckel's diverticulum in patients with Crohn's disease were examined. Moreover, the types of patients with Crohn's disease who might have a Meckel's diverticulum were explored. Finally, the role that a Meckel's diverticulum might play in the management of patients with these two disorders in the distal ileum was considered.

PATIENTS AND METHODS

A total of 877 patients with Crohn's disease were evaluated using a database that included patient records, operative records and pathology reports for consecutive patients seen from 1979 to 1998. All patients were directly investigated by the clinician. Crohn's disease was diagnosed based on clinical, radiological, endoscopic and histological criteria, as well as negative microbiological studies (7,8). Briefly, diagnosis of Crohn's disease was based on colonoscopic and/or histological studies showing a segmental or patchy inflammatory process in the colorectum, distal small intestine or both, with histological features of a focal and/or granulomatous inflammatory process. In addition, endoscopic mucosal biopsy, radiological evaluation of the upper gastrointestinal tract or both were done. Patients with other forms of inflammatory bowel disease including ulcerative colitis, 'indeterminate colitis' and microscopic forms of colitis (collagenous colitis, lymphocytic colitis) were excluded (7,8).

For the present study, radiological and surgical reports, as well as pathology specimens, were reviewed by the investigator. In addition, pathology sections of the Meckel's diverticulum were reviewed to define the types of epithelium present and to determine whether Crohn's disease was present in the resected diverticulum because in some very early reports, Crohn's disease in Meckel's diverticula were rarely described (9-12), with a single report describing Crohn's disease confined to the diverticulum only (13). Finally, serological evaluation for antineutrophil cytoplasmic antibodies was done using methods previously used in our laboratory for patients with Crohn's disease (14,15).

RESULTS

Characteristics of Crohn's disease: Of the 877 patients, 492 were female (56.1%) and 385 (43.9%) were male. Of these patients, 740 (84.4%) had a diagnosis of Crohn's disease first established before age 40 years. The other 137 patients (15.6%) had a diagnosis of Crohn's disease first established at age 40 years or older. Additional details on this patient population have been previously reported (8). There were 222 patients (25.3%) with disease in the terminal ileum alone, 238 patients (27.2%) with disease in the colon alone, and 304 patients (34.6%) with disease in the ileum and colon. Of the 113 patients with disease in the upper gastrointestinal tract, including the esophagus, stomach, duodenum and jejunoileum, 23 also had disease in the terminal ileum, 12 in the colon and 71 in the ileum and colon. For the course of the patient's disease, disease behaviour was classified as nonstricturing and nonpenetrating in 256 patients (29.2%), stricturing in 294 patients (33.6%) and penetrating in 327 patients (37.2%). As previously noted in a different study on Crohn's disease (16), 311 patients (35.5%) had at least one distal small bowel resection during this 20-year period. This result is comparable with that from a previous study on Meckel's diverticulum from St Mark's Hospital in London, United Kingdom, where 294 consecutive patients with Crohn's disease had at least one distal small intestinal resection (ie, right hemicolectomy), but data were collected over a longer period of 45 years from 1947 to 1992 (4). For all patients, serum samples were negative for antinuclear cytoplasmic antibody (ANCA) seromarkers, including atypical perinuclear ANCA and cytoplasmic ANCA (14,15,17).

Characteristics of Meckel's diverticulum: Ten of 877 patients with Crohn's disease had a Meckel's diverticulum (less than 2%). For eight of 10 patients, this diagnosis was confirmed at the time of the surgical resection. Although the population with Crohn's disease was predominantly female, Meckel's diverticula were detected in six of 385 men (less than 2%) and four of 492 females (less than 1%) (Table 1). Most patients with Meckel's diverticula were under age 40 years and had ileal involvement with or without colonic disease. Of these 10 patients, five had penetrating or perforating type Crohn's disease and five had granuloma-positive Crohn's disease.

TABLE 1
Crohn's disease with Meckel's diverticulum

Case	Age*/sex	Disease location†	Disease behaviour†	Surgery	Granuloma
1	22/F	Ileum and colon	NP/NS	Ileal resection and total procto-colectomy	Positive
2	43/M	Ileal only	P	Ileal and cecal resection	Negative
3	24/M	Ileum and colon/UGI	S	Ileal and cecal resection	Positive
4	16/F	Colon only	P	No surgery	Positive
5	26/F	Colon only	NP/NS	No surgery	Negative
6	17/M	Ileocolonic	P	Ileum-cecal resection	Positive
7	36/M	Ileum and colon	P	2 Ileum-colon resections	Negative
8	26/M	Ileum and colon	P	3 Ileum-colon resections	Negative
9	48/M	Ileum only	S	Ileal resection	Negative
10	16/F	Ileum only	S	2 Ileum-colon resections	Positive

**Age at diagnosis of Crohn's disease; †Defined by Vienna classification (reference 8). F Female; M Male; NP/NS Nonpenetrating and nonstricturing; P Penetrating; S Stricturing; UGI Upper gastrointestinal tract*

In the resected surgical specimens, histological examination revealed no heterotopic mucosa in any of the Meckel's diverticula from these patients; only intestinal mucosa was present. In addition, the Meckel's diverticula were not involved with Crohn's disease in the specimens from patients who underwent resection. Moreover, no granulomas were detected in the Meckel's diverticula.

DISCUSSION

In this series of 877 patients, a Meckel's diverticulum was detected in less than 2% of patients, similar to the reported frequency in the normal population (1). These results contrast with earlier anecdotal accounts suggesting that there might be an increased prevalence of Meckel's diverticula in Crohn's disease (2-4). While it is possible that some cases might be missed because of the failure of surgeons and pathologists to report their findings, it is unlikely in this series of patients that this would have accounted for a sufficient additional number to demonstrate a significantly increased frequency in Crohn's disease. Indeed, estimates of the frequency of Meckel's diverticulum in this particular clinical setting of Crohn's disease are more likely to approximate closely the true frequency of this small intestinal diverticulum compared with other disorders due to the frequent, often repeated, performance of small intestinal radiological studies as well as surgical resections of the distal small intestine in these patients.

In the present study, no single characteristic of the patient's Crohn's disease would have predicted the presence of a coexistent Meckel's diverticulum. However, some features of the Meckel's diverticulum should be noted. First, no patient had involvement with Crohn's disease in the Meckel's diverticulum. As a result, clinical management did not appear to be influenced by this finding, although in some patients, the site of the proximal resection margin may have been determined by the Meckel's diverticulum rather than by the Crohn's disease. Indeed, in each patient reported here, detection of the Meckel's diverticulum at the time of the initial surgery resulted in a more proximal resection margin than was needed for Crohn's disease. Second, in the general population, approximately 50% of Meckel's diverticula contain heterotopic mucosa, and as many as 65% of these contain gastric mucosa (18-20). Indeed, in some of these reports, it has been suggested that resultant acid secretion from a Meckel's diverticulum may be a rare cause of terminal ileal inflammation. A striking finding in the present report was the rather surprising absence of heterotopic mucosa. This suggests that imaging with technetium in patients with Crohn's disease rarely yields a positive result for heterotopic gastric mucosa.

CONCLUSIONS

The present study indicates that the frequency of Meckel's diverticula in patients with Crohn's disease approximates that reported in normal populations. Moreover, the diverticulum in this clinical setting has no apparent role in the inflammatory process associated with Crohn's disease. Only intestinal type mucosa, rather than heterotopic gastric mucosa, was present, lending no support to the hypothesis that increased acid secretion might cause coexistent ileal inflammation. Except for removal of additional small bowel to include the diverticulum, its presence in Crohn's disease did not appear to alter clinical management, and, in at least three patients here, additional small bowel resections were required after the initial resection that included the Meckel's diverticulum.

REFERENCES

1. Soltero MJ, Bill AH. The natural history of Meckel's diverticulum and its relation to incidental removal: a study of 202 cases of diseased Meckel's diverticula found in King Country, Washington over a fifteen year period. Am J Surg 1976;132:168-73.
2. Bondeson L, Bondeson-Starck AG. Crohn's disease in heterotopic gastric mucosa in a Meckel's diverticulum. Acta Pathol Microbiol Scand [A] 1974;82:427-30.
3. Ekman CN. Regional enteritis associated with Meckel's diverticulum: a report of five cases. Gastroenterology 1958;76:130-4.
4. Andreyev HJN, Owen RA, Thompson I, Forbes A. Association between Meckel's diverticulum and Crohn's disease: a retrospective review. Gut 1994;35:788-90.
5. Rau P, O'Brien M, Ezpeleta M, Williams L, Kramer P, Burakoff R. Bleeding Meckel's diverticulum in a patient with inflammatory bowel disease. J Clin Gastroenterol 1982;4:455-9.
6. Traube M, Iswara K, Reddy RS. Meckel's diverticulum: an unusual case with ileal stricture. Am J Gastroenterol 1981;76:291-6.

7. Lennard-Jones JE. Classification of inflammatory bowel disease. Scand J Gastroenterol Suppl 1989;170:2-6.
8. Freeman HJ. Application of the Vienna Classification for Crohn's disease to a single clinician database of 877 patients. Can J Gastroenterol 2001;15:89-93.
9. Barrington-Ward L, Norrish RE. Crohn's disease or regional ileitis. Br J Surg 1938;25:530-7.
10. Cabot case 28081. N Engl J Med 1942;226:307-9.
11. Horn RC Jr, Rhoads E. Regional enteritis involving Meckel's diverticulum. Perforation of the diverticulum and fistula formation. Ann Surg 1944;110:274-8.
12. Won KH. Endometriosis, mucocele and regional enteritis of Meckel's diverticulum. An unusual case report and experiences in 111 cases. Arch Surg 1969;98:209-12.
13. Solomons D, Halford MEH. Crohn's disease of a Meckel's diverticulum occurring in a case of jejunal diverticulitis. Br J Surg 1964;51:910-3.
14. Freeman H, Roeck B, Devine D, Carter C. Prospective evaluation of neutrophil autoantibodies in 500 consecutive patients with inflammatory bowel disease. Can J Gastroenterol 1997;11:203-7.
15. Freeman HJ. Atypical perinuclear antineutrophil cytoplasmic antibodies in patients with Crohn's disease. Can J Gastroenterol 1997;11:689-93.
16. Freeman HJ, Freeman KJ. Prevalence rates and an evaluation of reported risk factors for osteonecrosis (avascular necrosis) in Crohn's disease. Can J Gastroenterol 2000;14:138-43.
17. Freeman HJ. Inflammatory bowel disease with cytoplasmic-staining antineutrophil cytoplasmic antibody and extensive colitis. Can J Gastroenterol 1998;12:279-82.
18. Baker AL, Marshall SF. Meckel's diverticulum: a report on ninety three cases. Am Surg 1955;21:1173-81.
19. Aubrey DA. Meckel's diverticulum: a review of the sixty-six emergency Meckel's diverticulectomies. Arch Surg 1970;100:144-6.
20. Yamaguchi M, Takeuchi S, Awazu S. Meckel's diverticulum: investigation of 600 patients in the Japanese literature. Am J Surg 1978;136:247-9.