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Paneth Cell Hyperplasia Mimicking Colonic Metaplasia in a Patient with Ulcerative Colitis

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SUMMARY

A case of colonic metaplasia in a patient with ulcerative colitis of 41 year old male is described. The resected specimen of loop colostomy after total abdominal colectomy was grossly normal but showed colonic metaplasia of the small intestinal mucosa characterized by disappearance of villi, prominence of crypts, reactive epithelial changes, crypt abscess, microscopically.

There was Paneth cell hyperplasia, represented by increased numbers of Paneth cells within the small intestinal crypts and localization along the epithelium towards luminal surface away from their usual site in the crypt base. The above changes in ileostomy was probably not the manifestation of ulcerative colitis but the result of bacterial proliferation and mechanical stimulation.

Key Words: ulcerative colitis, colonic metaplasia, Paneth cell hyperplasia, bacterial proliferation

INTRODUCTION

Paneth cells are pyramidal cells containing large secretary granules found primarily at the base of the crypts of Lieberquin in the small intestine[11]. But one of the pathognomonic microscopic finding of ulcerative colitis is the relative amount of Paneth cells in colon[12].

Sometimes the lesion of ulcerative colitis involves the ileum including entire colon. The standard surgical treatment of ulcerative colitis is total removal of entire colon and they make often ileostomy for the prevention of leakage.

But the diverting ileostomy occasionally shows some pathologic change grossly and microscopically. We experienced a patient in whom Paneth cell hyperplasia and colonic metaplasia in ileostomy were accompanied by ulcerative colitis in colon.

We concluded that the paneth cell hyperplasia in ileostomy was not manifestation of ulcerative colitis but the result of bacterial proliferation and mechanical stimulation[13]. In the present paper, we describe this cases of the Paneth cell hyperplasia mimicking

colonic metaplasia in a ileum with ulcerative colitis.

CASE REPORT

A 41 year old white male with loop ileostomy was admitted to Roswell Park Memorial Institute on October 1987. He was first diagnosed suffering from ulcerative colitis in 1970 when he had a severe bout of diarrhea and hematochezia requiring hospitalization. But he had gone about twelve years with relatively quiscent disease. Over the past two years he had severe disease having watery bowel movements. He took azulfidine, one gram, four times per day and cortiform enemas everyday. The barium enema showed a pipe change of his left colon and fairly normal appearing right colon.

He had no family history of colon cancer or ulcerative colitis. Colonoscopy showed chronic burned out disease in his left colon, fairly normal right colon, too. On March 26, 1987, the patient underwent exploratory laparatomy, total abdominal colectomy, rectal mucosectmy, ileal "J" pouch construction with ileoanal pull through and loop ileostomy. The colonic lumen was essentially empty except for some thin film of fibrinous and mucoid material which coats rectosigmoid. There was numerous superficiallinear irregular serpingineous ulcers in the distal 15 cm, but most prevalent in the distal 7 cm. Microspically the sections through the rectum and colon showed active chronic ulcerative colitis involving entire colon, which consisted of varying amounts of mucopurulent exudate coating the mucosal surface (Photo 1).

There was atrophy of the mucosa with disease in the number of crypts and distortion of remaining crypts. Most of cypts showed neutrophilic exudate (crypt abscess). The epithelium of crypts showed deletion or abscence of goblet cells. Inflammatory infiltrates with lymphocytes, plasma cells and neutrophilic leucocytes extended to muscularis mucosa but not to submucosa and mucularis propria. The included segment of ileum showed lymphoid hyperplasia (Peyer's patch hyperplasia). He was discharged without complication.

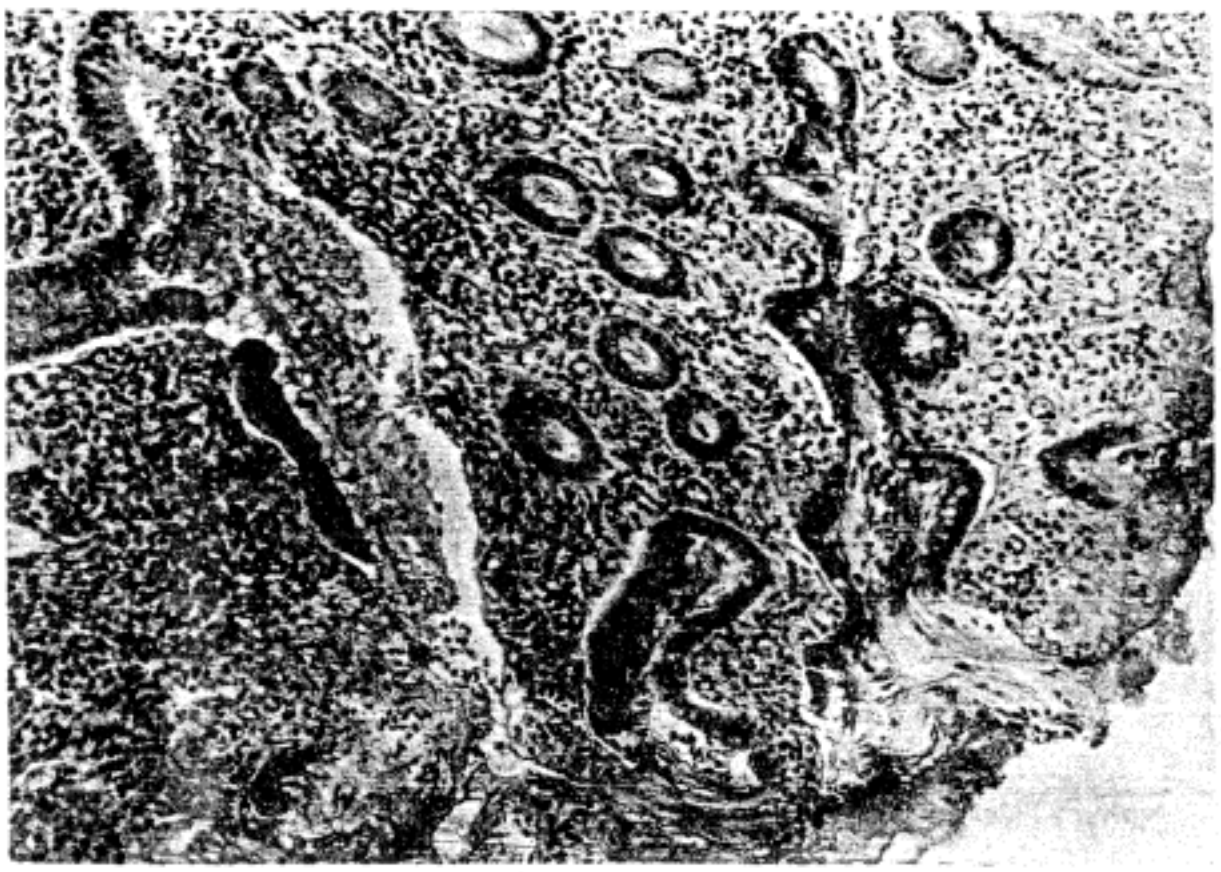

Fig. 1. Photomicrography showing active chronic ulcerative colitis. (H&E, x100).

On this admission, he was well nourished, abdomen was soft and ileostomy function was good. CBC revealed WBC 78000/cubic mm, Hct 44.1%, Hb 14.8 g/100 ml, platlet count 545,000/cubic mm. He underwent closure of ileostomy of right lower quadrant without any event. The resected ileal loop was grossly normal.

But the multiple sections taken throught the ileos-

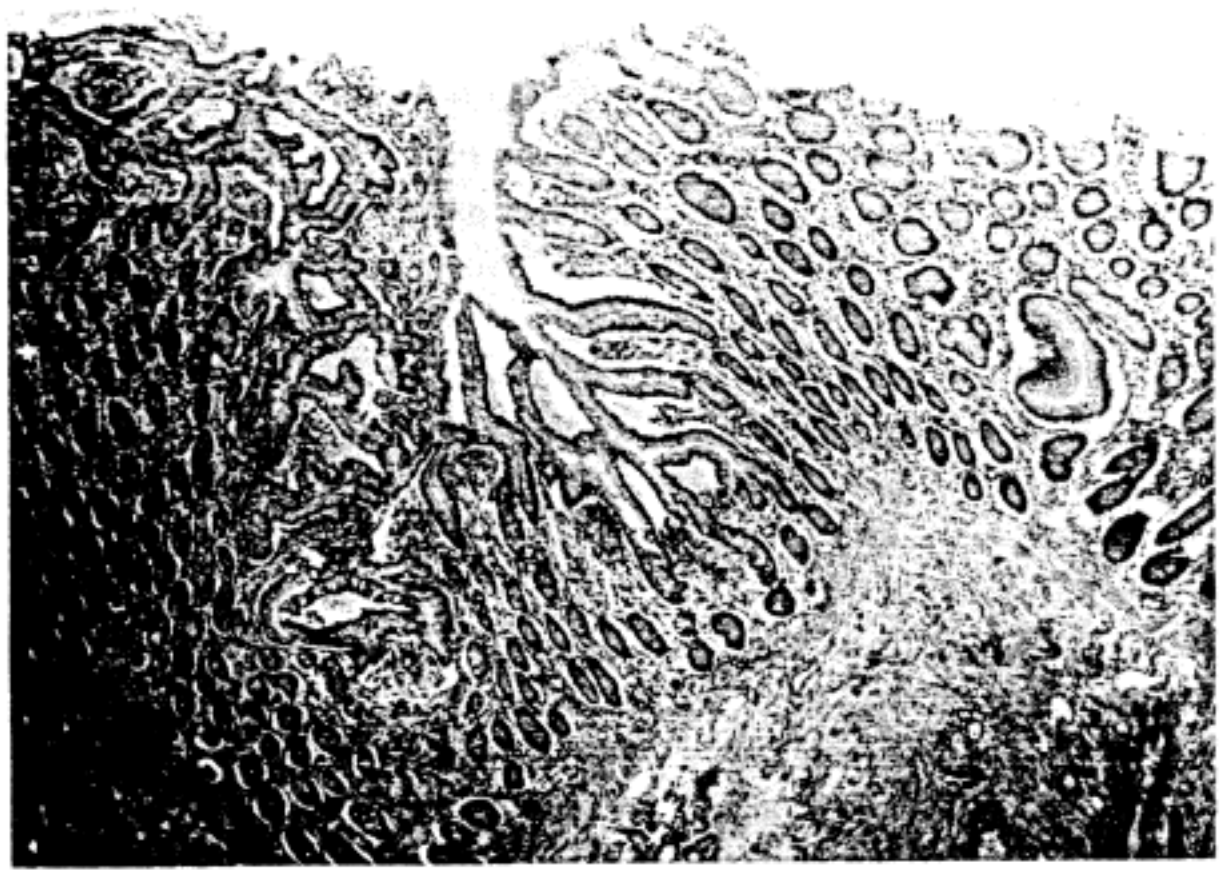

Fig. 2. Photomicrography of colonic metaplasia in the sections through the ileostomy. (H&E, x40)

Fig. 3. Paneth cell hyperplasia within the small intestinal crypts. (H&E, x400)

tomy and near the ileostomy show colonic metaplasia of the small intestinal mucosa characterized by disappearance of the villi, prominence of crypts, reactive epithelial changes (Photo 2). There was increased inflammatory infiltration of lamina propria with lymphocytes and plasma cells along with neutrophilic leucocytes. Aggregates of neutrophils were present inside lamina of crypts producing crypt abscess.

Of some interest, there was Paneth cell hyperplasia, represented by increased numbers of Paneth cells within the small intestinal crypts and localization along the epithelium towards luminal surface away from their usual site in the crypt base (Photo 3). He was discharged on October 28, 1987 in good condition having eight bowel movement daily with nucturnal continence.

DISCUSSION

Untill now a few reports have described changes in the mucosa of loop ileostomy. There is some fragmentary evidence to suggest the implanted ileal mucosa may undergo colonic metaplasia in response to its new environment[18]. Nakahara et al[14] reported the cases that ileal adenomas occuring after colectomy for familial polyposis coli and the mucosa of the ileostomy showed colonic metaplasia. Especially one can confuse the changes of the ileostomy with involvement of ileum in ulcereative colitis, because a histologic finding mimicked ulcerative colitis occasionally found[17].

Most patients with fulminant ulcerative colitis require colectomy[7]. The standard surgical procedure was proctocolectomy with conventional ileostomy[10]. But the understanding of the pathogenesis of ulcerative colitis as yet incomplete. In ulcerative colitis, the most effective variables in the predicition of activity were histiocytic and neutrophilic infiltration, height of crypt epithelium, and cryptal distance and plasma cell infiltration[12].

O'Connel et al[14] reported that all of the biopsy specimens in ileal pouch anal anastomosis for ulcerative colitis showed microscopically nonspecific, chronic inflammation with increased number of lymphocytes and plasma cells in the lamina propria. Crypt abscess and other signs of acute inflammation were not seen. Colonic metaplasia defined as a change from paillary mucosal structure typical of small bowel to the glandular morphology typical of colon, the change being accompanied by an increase in mucus producing epithelial cells, was present in 45 percent. Knobler et al[16] reported a patient in whom pouchitis in continent ileostomy was accompanied by extrainetestinal manifestations that responded to local steroid treatment.

In that case, the histologic findings revealed flattening of villi with many small ulcerations and inflammatory infiltrate in the lamina propria comprising neutrophils, lymphocytes and plasma cells. A few glands showed crypt abscess, with accumulation of neutrophilis in the destroyed crypts. The gland showed goblet cell depletion with dysplasia of epithelial cells. Those histologic findings resembled the changes seen in ulcerative colitis[10].

The multiple sections taken through the ileostomy and near the ileostomy of the present case showed colonic metaplasia of the small intestinal mucosa characterized by disappearance of the villi, prominence of crypts and reactive epithelial changes. Of interest, there was Paneth cell hyperplasia, represented by increased numbers of Paneth cells within the small intestinal crypts and localization along the epithelium towards the luminal surface away from their usual site in crypt base (Photo 2,3).

An increase in the Paneth cell population may occur in response to changes in the intestinal environment[3]. Paneth cell hyperplasia is also found in human colon in inflammatory bowel disease[11]. Paneth cells are derived from the common small intestinal epithelial stem cell, and dipersed throughout the crypt base. Paneth cells mature, their gran-

ules enlarge, and that within 2~3 weeks of formation, Paneth cells die in situ. There is gradient of Paneth cell age in crypt base, whith the oldest Paneth cells at the buttom, and the youngest at the top[22].

Paneth cells originate from the base of crypts and migrate towards the base during maturation. Paneth cell secretions may have a trophic action on mucosa[12]. The maturation of Paneth cell is accompanied by increase in the content of lysozyme in the secretory granules and with senescene lysozyme diffuse into cytoplasm. The fully mature Paneth cells at the base of crypts had basal nuclei, the cytoplasm mainly occupied by uniformly electron dense secretory granules, the Golgi scattered at the periphery of the cells and irregular lysozomal bodies containing membrane fragments and myelin like structure at the base.

Peters et al[16] demonstrated that mucosal fluorescence against lysozyme was confined to the base of the crypts of Lieberkuhn, when Paneth cells are located and that lysozyme is derived from the Paneth cell. An antiserum prepared against lysozyme isolated from mucosal strapings of the mouse small intestine was also used to stain sections of mouse small intestine with indirect fluorescent antibody techique[15].

Atrophy of villi, with increase in crypt depth and Paneth cell number and size, occurs in chronically isolted (Thiry-Vella) ileal loops in rabbit[9]. The antibiotic solution achieved a reduction in bacterial growth as to compared to the loops flushed with saline. Recently intestinal phospholipase A2 and trypsin like reactivities were idetified in rat and human Paneth cells, respectively.

Separately, the demostrations of phagocytosis of luminal organisms by rat Paneth cells and the known antibacterial actions of lysozyme, supported an antimicrobial role. The hyperplasia of Paneth cell may have represented a protective response since Paneth cells may produce lysozyme and serve phagocytic function. The presence of mitoses in Paneth cells indicates enhanced replication, especially since Paneth cells are normally produced by nongranulated precursors. Ileal mucosa may contain potentially pathogenic microorganisms which may persist despite the use of antibiotics[4].

In patients with conventional ileostomies, the ileal flora is qualitatively and quantiatively a transition between those of intact ileum and stools[17]. Ileostomy effluent has a greater total concentration of organisms and a more anaerobic flora than does ileal chyme in health. In affected segments of mucosa with a frankly pathogenic flora, there are obvious degenerative changes in many cells of the surface epithelium and goblet cells appear emptied of ther contents[1].

The cellularity of lamina propria is increased, and above all, the architecture of mucosa is altered such that the villi was shortened and blunted and the crypts elongated. Paneth cell populations in small intestine are affected by alterations in the intestinal luminal environment due to previous surgery or neoplastic or inflammatory disease[5]. For example, the surgery to reduce gastric acidity which may result in intestinal stasis and bacterial overgrowth causes Paneth cell proliferation which maintains a normal mucosa sterile[6].

In the survey of the literature, including the present case, the paneth cell hyperplasia and colonic metaplasia in ileostomy was not a manifestation of ulcerative colitis but the result of bacterial proliferation and mechanical stimulation.

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