Pathology of the defunctioned rectum in ulcerative colitis

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Abstract
Faecal stream diversion may induce inflammatory changes in the defunctioned segment of the large intestine. These changes are predominantly mucosal, although confusing histological features including granulomas may be present. The pathology of 15 defunctioned rectal stumps has been studied. All patients had previously undergone urgent total colectomy for ulcerative colitis and rectal stumps had been left in situ while they awaited pelvic ileal reservoir construction. All rectal stumps showed predominantly mucosal disease but there were additional features such as florid lymphoid follicular hyperplasia (12 cases), transmural inflammation (nine cases), granulomas (four cases), fissures (eight cases), and changes akin to ischaemia or to pseudo-membranous colitis (four cases). These changes may result from a combination of defunctioning and of active ulcerative proctitis. Some induce a histological appearance that may mimic Crohn's disease. Nevertheless review of all 15 colectomy specimens showed unequivocal ulcerative colitis and none of the patients has subsequently shown any clinical, radiological, or pathological evidence to support a diagnosis of Crohn's disease. Histology of the rectal stump in ulcerative colitis may lead to an erroneous diagnosis of Crohn's disease and the patient may subsequently be denied the advantage of a pelvic ileal reservoir.

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Faecal stream diversion may cause a variety of pathological changes in the colon and rectum. These changes are predominantly mucosal but the pathological features may mimic inflammatory bowel disease, both macroscopically and histologically.1 4 Chronic inflammation with activity in the form of intraepithelial polymorphs together with crypt abscesses are a common feature while crypt architectural changes are more unusual but when present may mimic ulcerative colitis.2 7 These pathological changes are seen in the large intestine when faecal stream diversion has been performed for colonic cancer, diverticular disease, or functional bowel disease.6 Occasionally, granulomatous inflammation and even well formed granulomas are seen in diversion colitis1 4 and lymphoid follicular hyperplasia is also a characteristic feature.1 6

Patients with acute severe ulcerative colitis frequently undergo total colectomy with ileostomy and preservation of a defunctioned rectal stump. This operation is performed in the hope that the profound inflammatory changes in the rectum will improve with time allowing a definitive operative procedure to be performed at a later date. Excision of the rectal stump and construction of a pelvic ileal reservoir is probably the operation of choice among colorectal surgeons and patients alike in this situation.8 At this time a defunctioning ileostomy is maintained in order to allow reservoir suture lines to heal. The ileostomy is subsequently taken down and the pelvic ileal reservoir is connected to the faecal stream. We describe a pathological study of the changes in the defunctioned rectum in 15 patients with ulcerative colitis who had undergone such pelvic ileal reservoir surgery.

Methods
Fifteen patients who had undergone total colectomy with preservation of a rectal stump were included in this study. In each case the macroscopic and microscopic features of the original colectomy specimens were reviewed. All resected rectal stumps were received fresh and pinned to a cork board. Specimens were then fixed in formalin for 24 hours, unpinned, and float fixed for a further 24 hours. Two longitudinal strips were cut from the rectal stumps, blocked sequentially, and processed routinely through paraffin wax to 2 μ sections. Subsequent to rectal stump excision, each patient underwent quadruple loop (W) pelvic ileal reservoir construction9 with a covering temporary ileostomy. After 6 weeks, the ileostomy was taken down and the reservoir was connected to the faecal stream. Each patient has been followed up for between 13 and 28 months (mean 22.5) subsequent to pelvic ileal reservoir construction.

Results
CLINICAL
The patients' age range was 19–61 (mean 30) years and there were nine men and six women. The duration of ulcerative colitis to the time of total colectomy ranged from 12 months to 18 years, with a mean disease duration of 7-5 years. The rectal stumps had been defunctioned for between 2 and 28 months before fashioning of the pelvic ileal reservoir. Follow up of patients subsequent to fashioning of the pelvic ileal reservoir and reversal of ileostomy has shown two with clinical, endoscopic, and histological features of pouchitis.10 Both patients responded well to metronidazole.11 One developed anterior strip pouchitis12 which required surgical treatment. No other surgery has been necessary. In no case was there any clinical, radiological, or pathological evidence of Crohn's disease.
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Figure 1: Rectal stump showing lymphoid follicular hyperplasia and transmural inflammation in the form of lymphoid aggregates throughout the wall.

Figure 2: Rectal stump showing mucosal granulomas adjacent to a ruptured crypt.

**PATHOLOGY**

Macroscopic assessment of the colectomy specimens showed the typical features of active chronic ulcerative colitis. There was continuous disease that was worse distally, with extensive linear ulceration and inflammatory polyps. In all cases the bowel wall was of normal thickness and there was no fat wrapping.

Histology showed extensive active mucosal inflammation with crypt abscesses and inflammatory polyps. The disease was restricted to the mucosa except in areas of severe ulceration where inflammation extended into the submucosa. Features typical of Crohn's disease such as sarcoid like granulomas and transmural inflammation were not present.

Macroscopic examination of the resected rectal stumps showed diffuse disease with ulceration in all cases and a strikingly granular mucosa. The rectal wall was of normal thickness and the mesorectal fat looked normal in all patients. Histology showed that all rectal stumps had the characteristic features of active chronic ulcerative colitis including diffuse chronic inflammation, gross crypt distortion with mucin depletion, and activity in the form of crypt abscesses. In addition, there was pronounced and widespread mucosal and submucosal lymphoid hyperplasia (Fig 1). This occurred in 12 of 15 cases. Granulomas were found in four of 15 patients, both in the mucosa in response to ruptured crypts, where foreign body giant cells and neutrophils were also found (Fig 2), and deep in the bowel wall at the proximal end of the stump in association with suture material (Fig 3). Transmural inflammation was a feature of nine rectal stumps; lymphoid aggregates extended into mesorectal fat as is seen in Crohn's disease (Fig 1). In none of these patients, however, was there any linear arrangement of lymphoid aggregates on the outer border of the muscularis propria, a highly characteristic feature of Crohn's disease - the so-called Crohn's rosary. Vertical fissures were observed in eight stumps. In no cases were there the connective tissue changes that characterise Crohn's disease such as neuronal hyperplasia and muscularisation of a fibrotic submucosa. Changes possibly related to ischaemia and resembling the spray like exudate of mucus and polymorphs seen in pseudomembranous colitis (Fig 4) were present in four stumps.

**Discussion**

This study shows that histological changes within the defunctioned rectal stump in ulcerative colitis patients include the pathological appearances of ulcerative colitis but with additional features that may resemble Crohn's disease. Defunctioning of the previously normal (non-colitic) rectal stump produces a variety of histological changes, some of which may be confused with inflammatory bowel disease.

These changes are seen after defunctioning the bowel in diverticular disease or carcinoma, and include lymphoid follicular hyperplasia (as seen in the defunctioned colitic rectum in this study), erosions, surface exudate, granulomas, and acute and chronic inflammation.

The changes of defunctioning are thought to be a consequence of a lack of faecal butyrate and other fatty acids that are required for cell proliferation and maturation. The precise mechanism of the histological changes seen remains speculative. The granulomas are explained by an inflam-
matery and giant cell reaction to ruptured crypts or retained suture material. Both fissures and pseudomembranous colitis like lesions may be seen in ischaemic colitis. 11 The changes described in this study are a likely consequence of pre-existing ulcerative proctitis with superimposed defunctioned proctitis, possibly with mild mucosal ischaemia as an additional pathogenetic mechanism.

Misinterpretation of these histological features, whether on examination of biopsy tissue or of a frozen section at the time of reservoir surgery or resected rectal stump in ulcerative colitis, may have disastrous consequences for the patient. An erroneous change in diagnosis from ulcerative colitis to Crohn’s disease will result in personal difficulties with health insurance and employment and will deny the patient the chance of a pelvic ileal reservoir. Ileal reservoir surgery is contraindicated in Crohn’s disease and the early consequences after reservoir surgery can be disastrous. 20 These patients will be consigned to an ileorectal anastomosis with persistent ulcerative proctitis and the need for endoscopic surveillance. 21 Just as a diagnosis of Crohn’s disease cannot be made on pathological examination of the pelvic ileal reservoir alone, a diagnosis of Crohn’s disease should not be made solely on the basis of histological changes within the defunctioned rectum. The pathological diagnosis should be made on the macroscopic and histological changes in the original colectomy specimen in conjunction with the clinical and radiological data. The combined features of ulcerative colitis and defunctioned proctitis should not be considered a contraindication to pelvic ileal reservoir surgery.

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