

## Radiohistology and histochemistry of barium granuloma of the colon and rectum

M. Mayorga, F. Castro, F. Fernández, F. Val-Bernal and V. Arribas

Department of Pathology and Radiology, National Hospital «Marqués de Valdecilla»,  
School of Medicine, Cantabria University, Santander, Spain

**Summary.** Barium granuloma of the colon and rectum is a rare complication of X-ray examination of the digestive tract using barium. The authors report 5 new cases occurring in the last 3 years. Histological examination revealed a granulomatous reaction with greyish finely granular refractile PAS-negative material located in the cytoplasm of histiocytes and in the interstitial space. The radiographic study of the paraffin blocks confirmed the nature of this material, which was X-ray opaque, and this was corroborated histochemically with the rhodizonate technique.

**Key words:** Barium granuloma, Radiohistology, Histochemistry

### Introduction

The complications or side-effects resulting from X-ray examination of the gastrointestinal tract using a contrast medium containing barium sulphate are rare (Swartz, 1955; Gordon and Clyman, 1957; Carter, 1963; De Mascarel et al., 1988; Subramanyam et al., 1988).

One of these side-effects in the colon or rectum is what is termed a «barium granuloma», first described by Beddoe in 1954 (Beddoe et al., 1954).

The importance of recognising this entity lies in the fact that, endoscopically, it can mimic other lesions including a neoplastic process (Gordon and Clyman, 1957; Hariri et al., 1983; De Mascarel et al., 1988). Moreover, histological findings observed with routine techniques, though they may be characteristic, often go unnoticed (De Mascarel et al., 1988).

The aim of this paper is to report 5 new cases of barium granuloma occurring in the last 3 years and to confirm their nature, and therefore their diagnosis, through radiohistological and histochemical techniques, from paraffin blocks.

*Offprint requests to:* Dr. D. Fernando Val-Bernal, M.D., Ph.D.,  
Departamento de Patología, Hospital Nacional «Marqués de Valdecilla», 39008 Santander, Spain

### Materials and methods

#### *Patients*

The five cases correspond to patients of both sexes, two males and three females, whose ages ranged from 58 to 76 (average age 64). At endoscopy, three of them showed yellowish macular lesions with a smooth, regular surface or scab-like lesions in the colon or rectum. The fourth and fifth cases were a chance finding in two surgical specimens from colectomy (Table 1).

#### *Sample processing*

The samples obtained were fixed in 10% neutral-buffered formalin for 24 hours, routinely processed and then embedded in paraffin. Tissue sections 5 µm thick were stained with haematoxylin and eosin and Periodic Acid Schiff.

#### *Radiohistological technique*

X-rays were taken of the paraffin blocks with a Senographe 500 T, Senix H-F (F 0.1 mm). Barium sulphate and normal intestinal mucosa, both embedded in paraffin, were used as positive and negative controls respectively.

#### *Histochemical technique*

Further histological sections were stained with the rhodizonate technique at a temperature of 60° C for 2 hours (Culling et al., 1985).

### Results

The five patients had had x-ray examination with a barium contrast medium (opaque enema) at least 1 year prior to the discovery of the lesion (Table 1).

Histologically, particularly at the level of the mucosa and/or submucosa of the colon or rectum, an organised mass of mononucleate cells, identified as histiocytes or



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macrophages, with large cytoplasm containing greyish finely particulate refractile PAS-negative material (Fig. 1) was seen. This material was also found free in the interstitial space. Other inflammatory cells, mainly lymphocytes and plasma cells, were observed but to a lesser extent.

X-rays of the paraffin blocks showed an opaque zone, which corresponded to the previously described granulomatous lesion, with a density similar to that of the positive control (barium sulphate) (Fig. 2).

With the sodium rhodizonate technique the barium sulphate, which is a particulate material and refractile with haematoxylin and eosin, was stained an intense

black (Fig. 3).

## Discussion

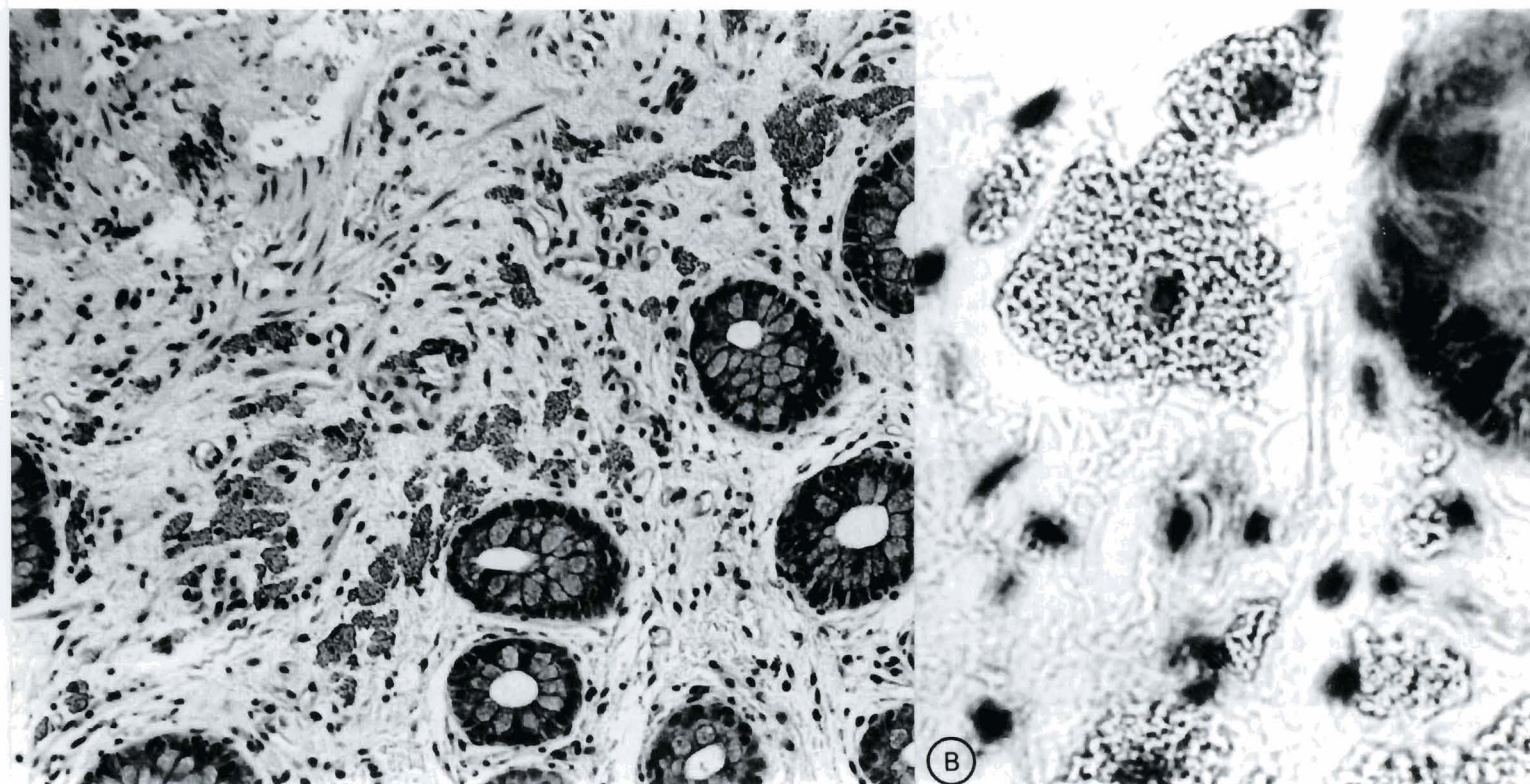
Barium granuloma, a side-effect of X-ray examination of the colon and rectum, is an uncommon lesion but should be borne in mind in all patients undergoing X-ray studies after administration of barium enema. Although it may occasionally be a chance finding in intestinal exeresis due to an inflammatory or tumoral process, it may also be the cause of non-specific symptoms requiring an endoscopic examination so that the situation which originally led to the opaque enema being performed can be assessed (incomplete removal of an adenoma or the occurrence of new polyps, sudden worsening of an inflammatory process, etc.).

The endoscopic appearance is variable ranging from macules or yellowish plaques to nodules (Gordon and Clyman, 1957; Carter, 1963) or even ulcers (De Mascarel et al., 1988) of the mucosa. These can at times mimic polypectomy scabs and sometimes the mucosa is apparently normal (Subramanyam et al., 1988).

Histologically, various forms of barium sulphate in tissue sections have been reported (Levison et al., 1984). However, the usual appearance of barium granuloma in the colon and rectum is characteristic and is recognized as small granular particles, weakly anisotropic in polarised light. When very little barium sulphate is

**Table 1.** Clinical features of five patients with barium granuloma.

Case	Age	Sex	Site	Reason for prior enema
1	76	Male	Rectum	Diverticulitis
2	65	Female	Rectum	Unknown
3	59	Female	Rectum	Dyspepsia following polypectomia
4	62	Male	Colon	Neoplasm of the sigma
5	58	Female	Rectum	Polyposis



**Fig. 1.** A Barium granuloma in the rectal mucosa and submucosa. H&E. x 125. B. Refractile and particulate material within the histiocytes. H&E. x 600

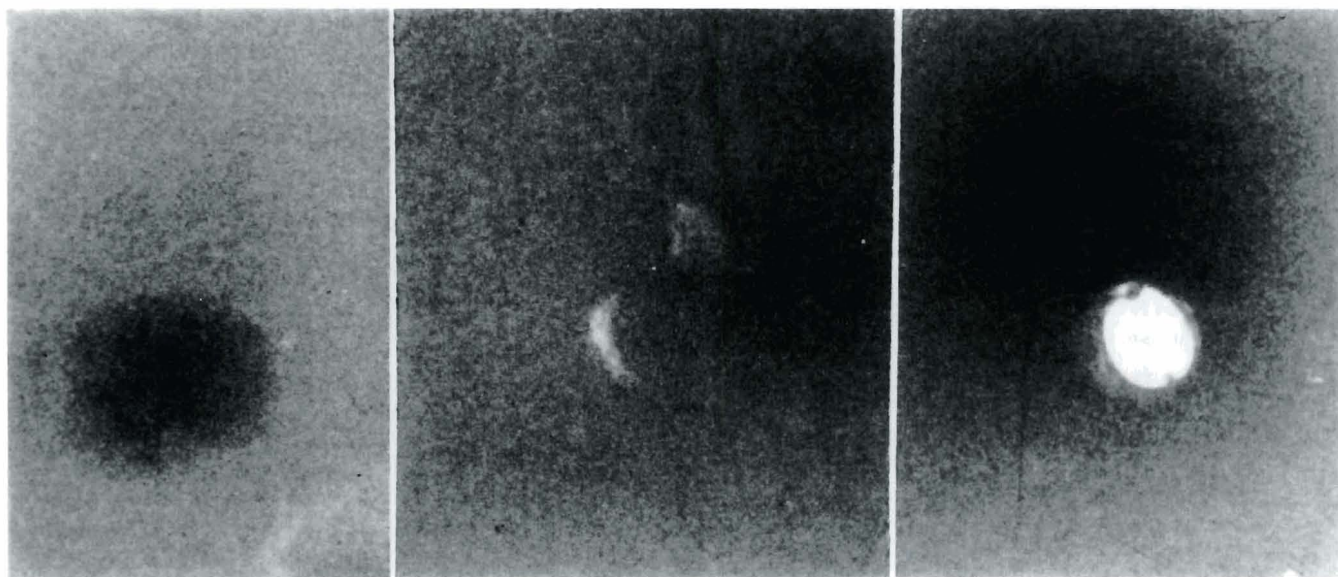


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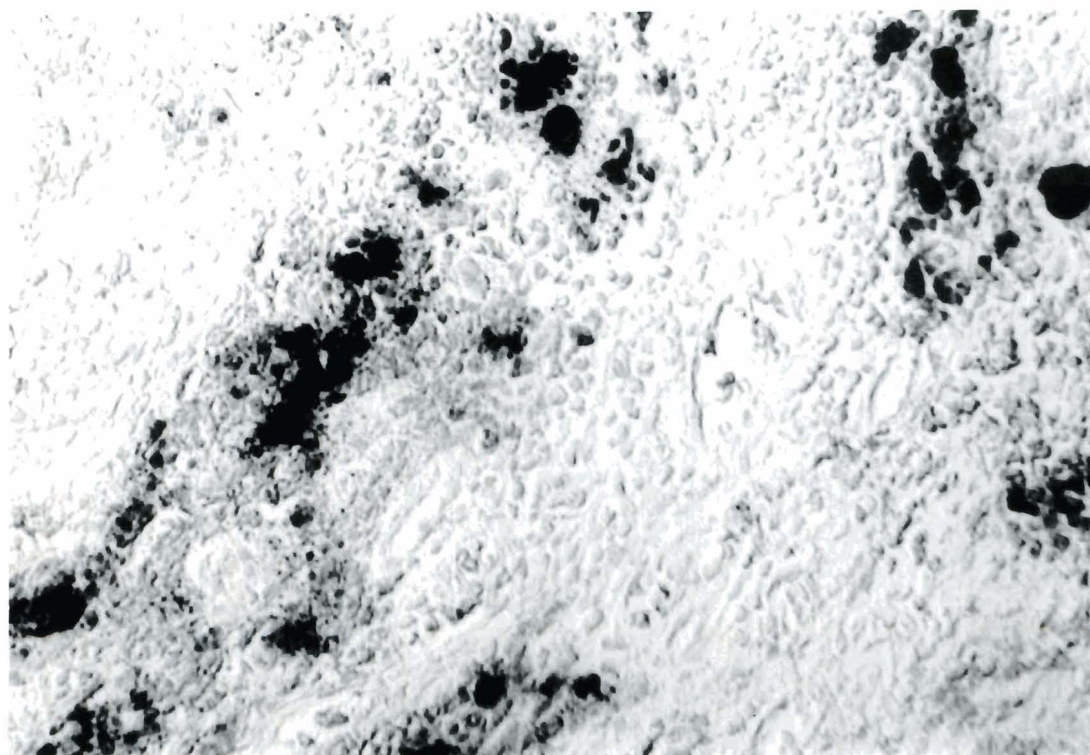
deposited in the intestinal wall, it often goes unnoticed. It is in such circumstances that radiohistological techniques (Hariri et al., 1983; De Mascarel et al., 1988) may be of great help in making a diagnosis. If doubt exists, histological sections stained using the rhodizonate technique confirm or bring out the nature of the

granuloma. Barium sulphate may also be identified by energy dispersive X-ray analysis (Levison et al., 1984).

The pathogenesis of barium granuloma lends itself to several hypotheses. Intestinal mucosa weakened either by an underlying inflammatory or infectious process or by trauma (catheter, polypectomy scabs,



**Fig. 2.** X-ray of paraffin block with a biopsy of a rectal barium granuloma (centre). Right, positive control. Left, negative control.



**Fig. 3.** Histological section of a barium granuloma stained with the rhodizonate technique (in black, barium sulphate).  
x 125

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etc.) and/or excessive pressure exerted during the introduction of the contrast medium could all account for the deposition of the barium sulphate in the intestinal wall and the macrophage reaction which is the immediate cause (Gordon and Clyman, 1957; Carter, 1963; Seaman and Wells, 1965; Subramanyam et al., 1988).

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