

Barium Granuloma of the Rectum:

An Uncommon Complication of Barium Enema

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Barium sulfate granuloma of the rectum may develop when this contrast material is forced through a discontinuity in the rectal mucosa. The ensuing mass may be confused with carcinoma. Preoperative biopsy and attention to plain films will prevent unnecessary inappropriate surgery.

INTUITIVELY, one would suspect that instillation of a foreign material, often under increased pressure, into a long feces lined tube, at times weakened by disease processes, would lead to frequent complications; the barium enema, in practice, however, remains a relatively safe "invasive" procedure. The most notable hazard encountered with this examination is colonic perforation with extravasation of barium sulfate or other contrast material into the peritoneal cavity or retroperitoneal space. In various reports this was seen in 2-4 cases per 10,000 examinations with an attendant mortality of approximately 50%.^{14,20} The degree of resultant damage appears to be proportional to the amount of associated fecal contamination.⁷ Other less frequent complications are inspissation of barium sulfate with resultant mechanical obstruction of the colon²⁶ sometimes resulting in barium appendicitis,⁸ venous embolization of barium,^{23,24} cardiac arrhythmias from colonic manipulation and barium granuloma of the rectum (see Table 1). This last complication is quite uncommon and less than 35 cases have been reported in the readily available literature. Four additional cases from the French and Belgian literature were mentioned in a reference article but were not reviewed for the current paper.²⁵ A further report of this complication is described below.

Case Report

A 46-year-old Negro man was well until 5 years prior to admission

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when peptic ulcer disease was diagnosed. Treatment with a bland diet and antispasmodics completely relieved his symptomatology. In February, 1970, he presented to the West Haven V.A. Hospital with a recent history of anorexia, early satiety and a 40 pound weight loss. He drank "several highballs" daily and one pint of whiskey on weekends. Pertinent physical findings on admission included hepatomegaly without other abdominal masses and a normal rectal examination. Five different stool specimens tested for occult blood were negative. An extensive x-ray work-up of the gastrointestinal tract revealed no evidence of neoplastic disease; an oral cholecystogram demonstrated cholelithiasis and a percutaneous liver biopsy was compatible with pericholangitis and cholestasis. The barium enema performed on 3/2/70 was reported as uneventful and the patient experienced no discomfort or bleeding during the procedure. A balloon catheter was used but an air contrast study was not performed. The patient was discharged on a high calorie diet with an admonition to omit alcohol.

He failed to keep follow-up appointments and again presented to this institution on 9/19/72 with the complaints of anorexia, weight loss, and hematochezia for 3 months. During this period he had up to 4 loose bowel movements per day, each interspersed with bright red blood. He denied abdominal pain, sense of incomplete evacuation, nausea, vomiting, melanotic stools, mucus, tenesmus, or bleeding between bowel movements. Pertinent physical findings included a 14 cm liver span by percussion, no abdominal masses, tenderness or other organomegaly and a firm 3-4 cm in diameter stony-hard mass with a slightly raised center on the right rectal wall at 6 cm from the anal verge. (Fig. 1) Mucus taken from this area was strongly positive for occult blood. Proctosigmoidoscopic examination revealed a 1 cm in diameter ulcerated lesion in the above location with slightly rolled up mucosa edges around its periphery. Suspecting carcinoma of the rectum, a barium enema was performed to rule out further lesions. Scout films without contrast revealed an irregular opaque density in the lower rectal wall (Fig. 2) Multiple biopsies of the lesion later revealed a granulomatous reaction around doubly refractile crystalline material in the submucous and muscular layers of the rectal wall (Fig. 3) A cholecystectomy for his cholelithiasis was performed during this admission. Follow-up stools for occult blood have been negative and the patient denies further rectal bleeding.

TABLE 1. Complete Collection of the Cases of Barium Granuloma of the Rectum in the Literature

Author	Age, Sex	Balloon Used	Air Contrast	Pain	Blood	Rectal Pathology	Findings of BE	Interval	Location Description	Ulcer	Treatment
Beddoe ²	53M	NS	yes	no	NS	hemorrhoids	normal	3 wks	1 cm tumor posterior at 6 cm.	no	excision
Swartz ²⁸	56M	NS	NS	yes	NS	NS	NS	immediate	posterior anal mass with sinus tract	yes	excision
Gordon ¹⁸	25M	NS	NS	NS	NS	NS	normal	2 dys	0.5 cm tumor anterior at 5 cm.	no	biopsy
	62M	yes	yes on 1st NS on 2nd	NS	NS	hemorrhoids	normal	8 dys	0.5 cm tumor left lateral wall at 5 cm.	no	biopsy
	52M	yes	NS	NS	NS	NS	cecal diverticulum	5 dys	nodule 3 mm diameter, location NS	yes	biopsy
Levine ¹⁹	78F	NS	NS	NS	NS	"tender masses"	ulcer of rectal mucosa	unknown	large rectal plaque	no	abdomino-perineal resection
	63F	no	yes	yes	NS	NS	diverticula mid-sigmoid	4 dys	anterior ulcer at 7.5 cm	yes	biopsy
McCurdy ²²	63F	NS	NS	NS	NS	none	normal	1 wk	anterior ulcer at 6 cm	yes	drainage
Burnikel ⁴	43M	NS	NS	yes	NS	NS	NS	immediate	left lateral wall perianal induration	no	excision
	47M	NS	NS	yes	NS	NS	NS	4 dys	perianal abscess	no	I & D
Carter ⁶	69F	yes	NS	no	NS	NS	diverticulosis	1 wk	anterior, (R) lateral & posterior-lateral	yes	biopsy
Dubarry ¹⁰	41M	no	NS	no	NS	none (past history artery aneurysm biasis)	notched appearance of sigmoid	immediate	proctitis with scattered barium flecks	no	biopsy
Rand ²⁷	69M	yes	NS	NS	NS	none	NS	19 dys	posterior right 2.5 x 8.0 cm ulcer at 8 cm	yes	biopsy
	76M	yes	NS	NS	NS	none	carcinoma of sigmoid	1 mon	anterior 1 x 2 cm ulcer at 7 cm	yes	biopsy debridement
	72F	yes	NS	NS	yes	none	NS	1 mon	rectovaginal fistula at 7.5 cm	—	biopsy

TABLE 1 (continued)

Author	Age, Sex	Balloon Used	Air Contrast	Pain	Blood	Rectal Pathology	Findings of BE	Interval	Location Description	Ulcer	Treatment
Bernier ³	73F	NS	NS	NS	NS	NS	NS	1 wk	2 x 4 cm necrotic sac-like lesion at 4 cm	yes	autopsy
Poinot ²⁵	80F	yes	NS	yes	NS	NS	NS	immediate	anterior linear tear rectal pouch	yes	biopsy
Gaston ¹⁵	60M	no	no	no	no	NS	normal	14 mon	2 cm diameter tumor (sessile)	no	biopsy
	10M	no	no	yes	no	recent rectal biopsy (history ulcerative colitis)	normal	immediate	anal verge rectrorectal abscess	no	I & D
Lull ²¹	78M	NS	NS	NS	NS	NS	NS	45 dys	anterior 2 x 3 cm lesion at 4 cm	yes	biopsy
Faivre ¹³	77F	yes	NS	NS	NS	NS	normal	4 mon	left lateral ulcer upper rectum	yes	biopsy
	80F	yes	NS	yes	NS	NS	NS	immediate	left lateral 4 x 6 cm	yes	biopsy
	60F	yes	NS	yes	yes	NS	NS	immediate	ulcer rectum ulcer above anal sphincter	yes	biopsy
Diakonov ⁹	49F	NS	NS	yes	NS	periproctitis	NS	several days	posterior perirectal abscess at 5 cm with sinus tract	NS	I & D excision tract
Altobelli ¹	73F	yes	no	yes	NS	mucosal ulcers	diverticulosis	immediate	7-10 cm "polypoid" area recto-sigmoid and rectovaginal fistula	no	transverse colostomy
Weitzner ²¹	39M	NS	NS	NS	NS	rectal mass	normal	7 dys	4 mm diameter lesion above anal verge	NS	biopsy
	75M	NS	NS	NS	NS	cancer of rectum	normal	7 dys	4 mm diameter polypoid lesion at 15 cm	NS	biopsy

TABLE 1 (continued)

Author	Age, Sex	Balloon Used	Air Contrast	Pain	Blood	Rectal Pathology	Findings of BE	Interval	Location Description	Ulcer	Treatment
	71M	yes	NS	NS	NS	NS	normal	18 dys	anterior 3 x 12 mm lesion at 8 cm	NS	biopsy
Carney ⁵	38F	NS	NS	NS	NS	old recto-vaginal fistula	ulcerative colitis	7 dys	opaque white substance in submucosa of rectum & (L) colon	NS	proctocolectomy
Lewis, et al.	46M	yes	RO	RO	RO	none	normal	2.5 yrs	(R) 4 cm in diameter mass at 6 cm	yes	biopsy

Note: NS = not stated. Balloon used, air contrast, pain, blood and findings refer to techniques and/or findings during the barium enema which caused the granuloma. Rectal pathology, when stated, refers to associated rectal findings at that time. Interval—time between barium enema and granuloma symptoms; Location/Description—author's description of the granuloma; Ulcer—whether an ulcer was present on rectal wall; Treatment—treatment to the granuloma.

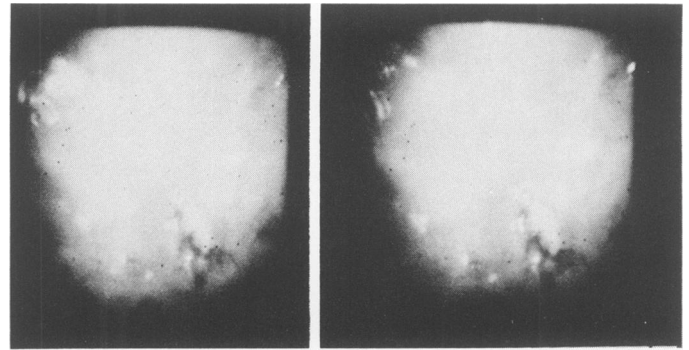


FIG. 1. Endoscopic view of barium granuloma of the rectum.

Discussion

Barium sulfate granulomata of the rectum develop when this contrast material is forced through a discontinuity in the rectal mucosa into the subjacent layers. This break in continuity may result from intrinsic disease such as amebiasis or ulcerative colitis or more commonly by injury from insertion of the enema tip, overinflation of the enema balloon, proctosigmoidoscopy, or rectal biopsy.^{18,30} Injury may not be apparent at the time of examination since only 10 of the cases reviewed in Table 1 experienced undue discomfort. In fact, one patient inserted the enema catheter himself without difficulty.¹⁰ The majority of granulomata developed between 4-8 cm from the anal verge on either the anterior or posterior wall, thus giving evidence to the assumption of enema catheter injury in its pathogenesis. The extravasated barium may remain confined to a limited portion of the submucous space without symptoms or dissect through the venous layers of the rectal wall causing necrotizing proctitis, perirectal abscesses, or draining sinus tracts. Regardless of location, the free barium incites a variable inflammatory reaction resulting in the initial outpouring of polymorphonuclear leukocytes. By the end of a week, if no complications have developed, elements of a chronic inflammatory reaction appear marked by fibroblastic proliferation resulting in various degrees of fibrosis, macrophages and multinucleated foreign body giant cells with intracytoplasmic barium sulfate crystals.¹⁷ As time passes this process can evolve into a typical granulomatous process microscopically.

The individual lesions in the reported series varied considerably, ranging in size from 2-3 mm polypoid masses to extensive necrotic ulcers up to 10 cm in diameter. In most cases no pre-existing rectal pathology was demonstrated or mentioned. Although most granulomata appeared between 4-8 cm from the anal verge, 7 were located in the perianal region and one was found at 15 cm.

Barium granuloma gains significance since it can mimic carcinoma of the rectum. Occult blood can be shed in the stool if the lesion has ulcerated and digital examination

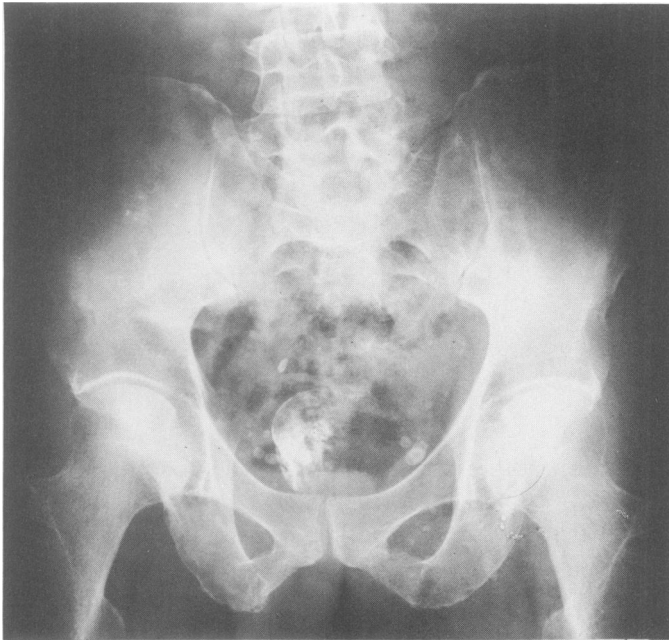


FIG. 2. Radiographic view of barium granuloma of the rectum.

may reveal a shaggy, firm intrinsic mass. Biopsy and the finding of contrast material in the tissues on plain roentgenography of the suspicious area will reveal the true nature of the lesion although two patients in the series underwent major surgical procedures because of the continued suspicion of carcinoma (a sigmoid colectomy and abdominoperineal resection respectively).

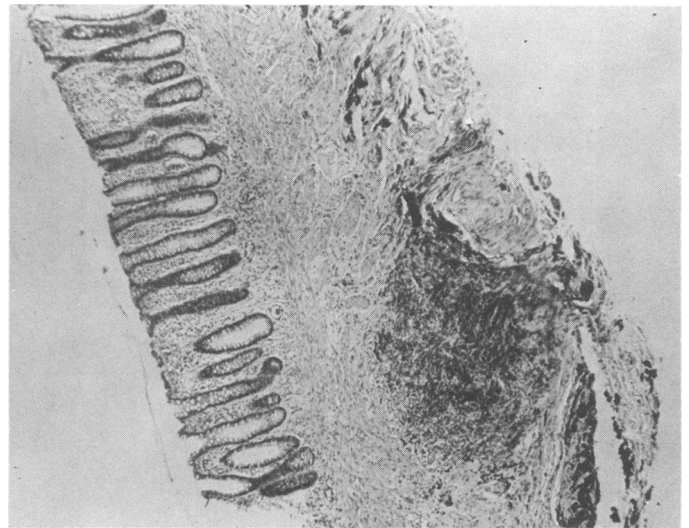


FIG. 3a. A microscopic view of barium granuloma of the rectum: low power ($\times 62$).

Treatment in the majority of cases involved excisional biopsy through the proctosigmoidoscope or establishment of drainage if suppuration were present. Experimentally, excision of overhanging mucosal edges around the barium granuloma resulted in delayed healing.²⁷ Enlargement of the site of perforation with excision of only necrotic debris resulted in the most expeditious healing. It was also demonstrated that re-epithelialization would occur despite the continued presence of barium crystals in the underlying tissue. To date there has been no

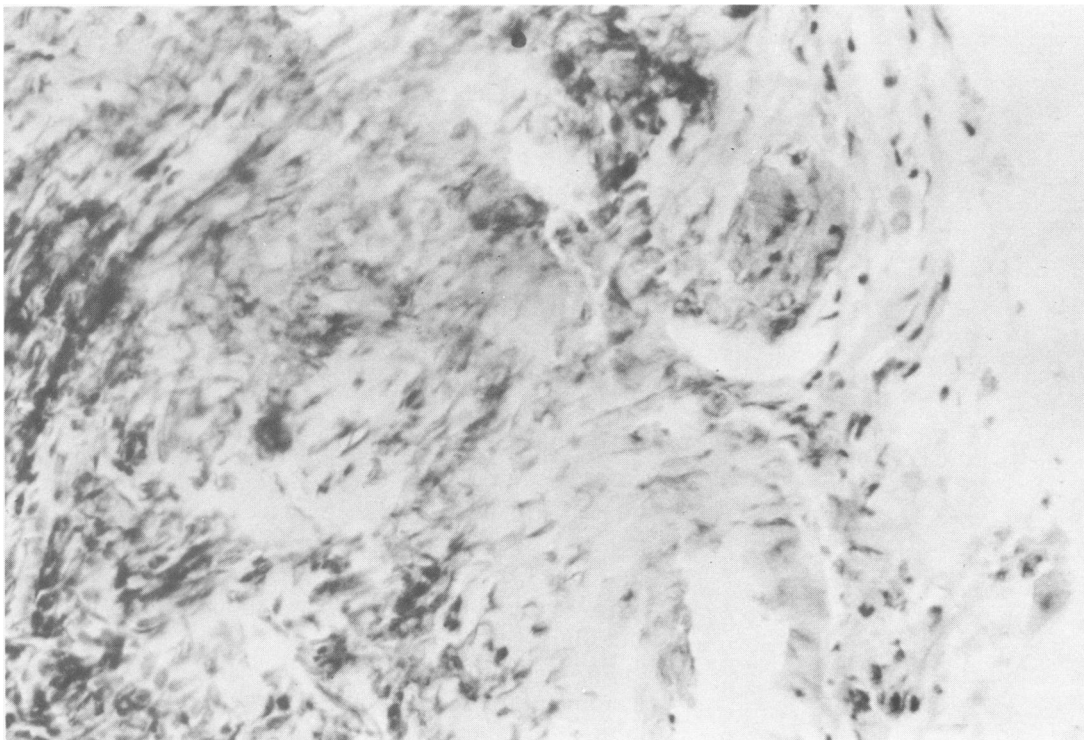


FIG. 3b. Microscopic view of barium granuloma of the rectum: high power ($\times 340$).

documentation of carcinoma arising from an old barium granuloma.

The major complications of barium extravasation seemed to occur when large volumes of contrast material were extruded into the rectal wall or adjacent tissues. A barium enema performed in a 69-year-old woman for the evaluation of a rectal polyp resulted in perforation of the rectum with extravasation of contrast material into the retroperitoneal space.³⁰ A sigmoid colostomy with drainage of the perirectal space provided interim control but 6 weeks later urinary retention progressing to anuria developed. Re-exploration revealed a dense perivesical fibrosis due to a barium granuloma and indwelling ureteral catheters were required to maintain urinary flow. From the French literature, a barium enema performed for the evaluation of diarrhea in an elderly man resulted in rectal perforation with dissection of contrast material upward into the free peritoneal space resulting in peritonitis and death.³ An unusual case of extrarectal escape of barium complicating barium enema was recently described where no perforation site was demonstrated either clinically or at autopsy.²⁸ It was postulated that although an initial submucosal injection of contrast might have occurred, dissemination was along the lymphatic system with subsequent infection of the retroperitoneal space.

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