Colonoscopic Laxative Instillation for the Fecal-loaded Colon: A Case Series*

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J Coloproctol 2023;43(1):1–6.

Abstract

Context Postoperative, critically ill, and elderly patients often have fecal loading or impaction. In a few such patients, disimpaction of fecalomas and colon cleansing are difficult. Bowel obstruction, megacolon, lower gastrointestinal bleeding, and gut perforation are complications that may ensue. Oral laxatives or enemas may only be partially effective. Surgical intervention may be needed for salvage or to treat complications.

Series and Design Fourteen hospitalized cases with defecation disorder due to fecal loading of the colon were enrolled for retrospective analysis. Colonoscopic instillation of mannitol and/or lactulose was undertaken as an intervention when the use of oral laxatives was either ineffective or unfeasible, and enema had yielded poor results.

Results Ten patients had satisfactory outcomes for fecal clearance, whereas four patients with poor or incomplete responses underwent repeat interventions or surgery. No significant complications were encountered due to this therapy.

Conclusion Colonoscopic instillation of mannitol or lactulose in fecal-loaded critically ill patients results in a safe and satisfactory fecal clearance.

Keywords
- obstipation
- impaction
- fecaloma
- megacolon
- volvulus

Introduction

Constipation and incomplete fecal evacuation often precede fecal impaction (FI).[1] Elderly or institutionalized patients have a high prevalence of FI.[2] In a patient with an empty rectum, the digital rectal examination will miss proximal FI. Thus, an abdominal X-ray is mandatory for diagnosis when there is a clinical suspicion. Gau et al.[3] have described an objective analysis of stool retention or fecal loading and a scoring system based on an abdominal X-ray. Bowel ischemia,[1] stercoral ulcers, perforation,[4] megacolon,[1] spurious diarrhea and anal sphincter incontinence,[5] + mechanical obstruction,[6] and lower gastrointestinal (LGI) bleeding[7] are sequelae of prolonged fecal loading of the colon.

Slow colon transit and anorectal dysfunction are primary causes of constipation.[8] Diabetes, endocrine disorders, neurological dysfunction, psychiatric disorders, and the use of psychotropic medication, are common secondary causes.[8] In critically ill patients, fecal loading prolongs the intensive care unit (ICU) stay, causes nutritional deprivation and protracted

* This article has been previously published as preprint on Research Square. Available at: https://assets.researchsquare.com/files/rs-1916216/v1/cbbf8cb9-d953-4ba2-8d54-685ee14f4c30.pdf?c=1666856669.

received
November 24, 2022
accepted after revision
January 23, 2023

DOI https://doi.org/10.1055/s-0043-1764192.
ISSN 2237-9363.

Thieme Revinter Publicações Ltda., Rua do Matoso 170, Rio de Janeiro, RJ, CEP 20270-135, Brazil

organ failure, and delays weaning off from mechanical ventilation.[9] Fecal-loaded patients may present with bloating, abdominal distension, pain, anorexia, vomiting, diarrhea, or subacute bowel obstruction. Enemas, manual digital evacuation, and oral laxatives have variable success. Safe and effective colon clearance could be a clinical challenge. In acutely ill patients, intestinal pseudo-obstruction may be a confounding factor. In patients with poor relief or with complications, surgical or endoscopic cecostomy, decompression colostomy, or laparotomy for bowel resection may be necessary.

Colonoscopy in stubborn FI can evaluate secondary complications and an underlying bowel abnormality that may cause obstruction. Urgent colonoscopy may be warranted to remedy LGI bleeding, megacolon, and pseudo-obstruction or impending perforation. In critically ill patients, safe bowel preparation could be a clinical issue. Restricted enteral feeding, risk of fluid overload, electrolyte imbalance, metabolic disequilibrium, lumen obstruction, and renal dysfunction are limitations to the safe use of polyethylene glycol (PEG) or electrolyte-based preparations. In such patients, rectal administration of laxatives may be partially effective to facilitate defecation. Osmotic laxatives, like sorbitol, have been used rectally for stool softening[10] and stool clearance. Sorbitol and mannitol as osmotic laxatives[11] are listed for the treatment of constipation. Lactulose, a third-line agent used to treat constipation,[12] is also an effective colon acidifier when administered rectally. Lactulose reduces blood ammonia, softens the stool, and promotes evacuation, thereby being effective in the treatment of hepatic encephalopathy.[12]

Subjects & Methods

We selected medical records of 14 inpatients (7 males and 7 females) with disordered defecation, for retrospective analysis after formal approval by the local ethics committee. These patients were referred between June 2019 to September 2021. The median age of patients at presentation was 55.5 years, with the youngest being 41 and the oldest being 93 years old. These patients had fecal loading of the colon and had presented either with obstipation, abdominal pain, vomiting, spurious diarrhea, volvulus, pseudo-obstruction, or subacute intestinal obstruction (SAIO). Abdominal X-rays (*see* ►***Fig. 1***) revealed air-fluid levels, or bowel dilation, and fecal loading of the colon, in varying combinations. Oral or rectal laxatives were either ineffective or unfeasible and enemas too had failed to yield decisive results.

Intervention: These patients underwent colonoscopic therapy for fecal loading of the colon. While using carbon dioxide insufflation, the colonoscope was negotiated carefully up to the farthest reachable point in the proximal colon. One hundred milliliters (ml) of 20 % mannitol in 11 patients and 100 ml of lactulose in 1 patient were instilled, respectively, as sole agents for predominant proximal impaction. One hundred ml of mannitol in the proximal colon combined with lactulose— variably 50 to 100 ml, depending on the endoscopic assessment of severity and feasibility, as judged by the colon diameter on X-ray— in the distal colon were used for 2 patients whose entire colon was loaded. Fifty ml of water was flushed into the endoscope channel after each laxative instillation.

The clinical profiles (*see* ►***Table 1***) of these 14 patients are listed. Two patients were being treated in the ICU, a 42-year-old male patient with polytrauma, operated on for fixing multiple fractures, and a female (71 years of age) patient on inotropes with assisted ventilation for septic shock. The youngest male who was previously treated for ileo-cecal tuberculosis had presented as SAIO, and his computerized tomography (CT) scan revealed ileal obstruction. The 46-year-old male with chronic kidney disease (CKD), diabetes mellitus (DM), and hypertension with incomplete sigmoid volvulus underwent colonoscopic reduction and decompression. A 48-year-old male patient with recent hematemesis while on antiplatelet drugs, post iliac stenting, and past stroke presented with SAIO. Another 48-year-old female patient with CKD and sepsis, while on four-drug therapy for active pulmonary tuberculosis, presented with Ogilvie syndrome. An 85-year-old female with rheumatoid arthritis (RA), in post covid recovery, had severe hypogastric pain and bloating. Sigmoid volvulus was suspected based on X-ray of the abdomen. Computed tomography scan of the abdomen ruled out volvulus and revealed dilated left colon with fecal loading. The 81-year-old female patient with DM/CKD presented with obstipation, nausea, and vomiting. A 54-year-old female with fecal loading of the colon had a history of cesarean section, hysterectomy, incisional hernia repair, and presented with SAIO. Five other patients did not have any associated comorbid illness. Among them, one patient had abdominal distension with spurious diarrhea and another had impending megacolon. Two other patients presented with SAIO, whereas the last patient had abdominal pain, vomiting, and obstipation.

Laboratory profiles (*see* ►***Table 2***): The workup of these patients detected anemia, leukocytosis, hypokalemia, and hypoalbuminemia in a few. Patients with CKD had elevated serum creatinine.

Endoscopy findings: Stercoral ulcers, diverticuli, and sessile polyps were seen as synchronous endoscopic abnormalities with FI in three patients. Cecal intubation failed in three patients due to obstructing fecalomas (*see* ►***Fig. 2***). The 81-year-old female with DM/CKD and vomiting had gastric polyps—fundic gland polyps on histopathology—in addition to FI. A gastroscopy performed on a patient for recent hematemesis revealed a chronic duodenal ulcer with a clean base.

Outcomes (*see* ►*Table 1*)

Patients were considered to have satisfactory outcomes if they opened their bowels, had symptomatic relief, and had colon clearance. A follow-up abdominal X-ray confirmed improvement. Ten patients had satisfactory outcomes after therapy, including the 41-year-old male treated for ileocecal tuberculosis. The latter had no

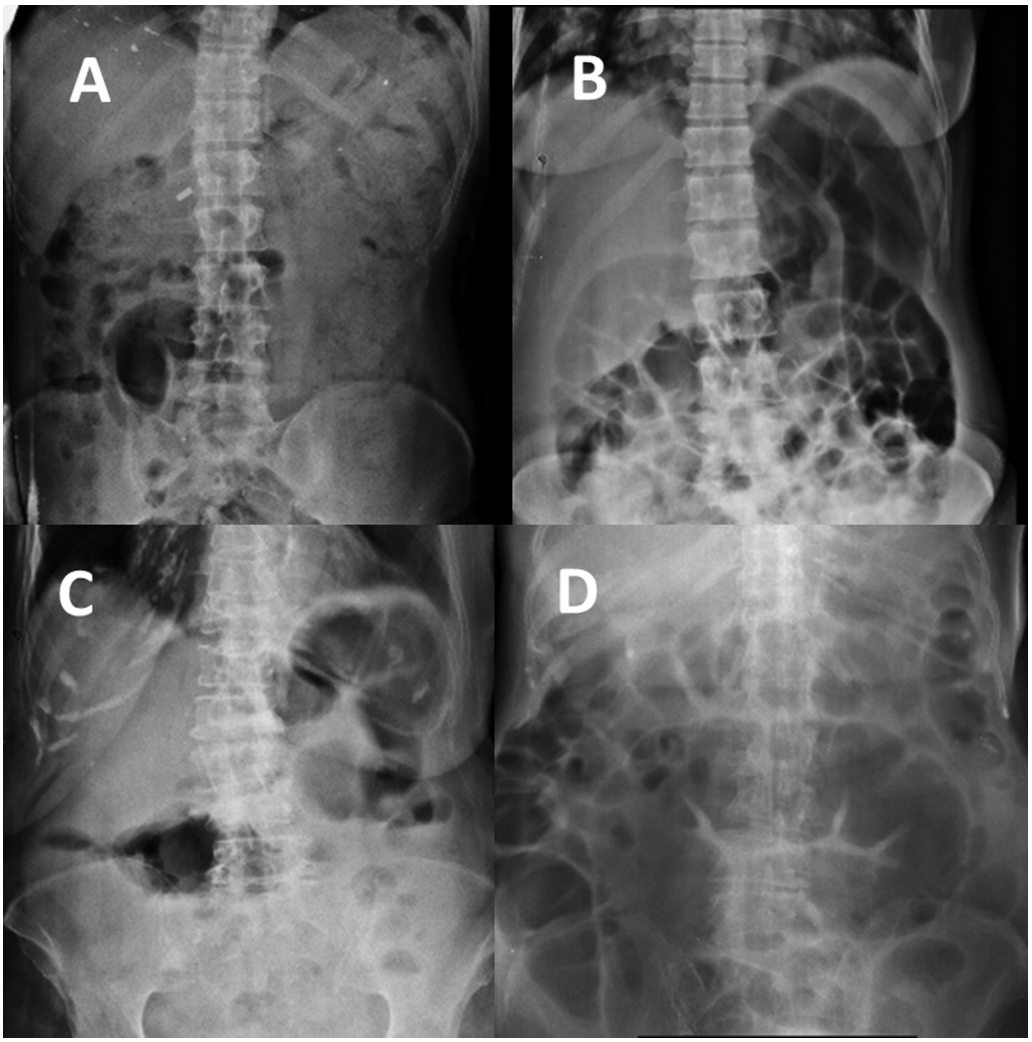

Fig. 1 Abdomen X-rays. (**A**) Fecal loading of colon with dilated ileal loop (**B & C**) Fecal loading with proximal colon dilation (**D**) Colon dilation with impending sigmoid volvulus.

endoscopic abnormality in the distal terminal ileum. Among the remaining four patients, the male with sigmoid volvulus showed recurrence on a follow-up X-ray. A colon decompression tube was inserted during the second attempt, and its proximal end was positioned near the hepatic flexure. Fifty ml of mannitol was re-instilled through this tube, twice over the next 4 days and it was effective. The female patient with CKD and pulmonary tuberculosis had a poor response and was advised of cecostomy. She experienced postprocedure tachypnoea and hypoxemia that settled with high-flow nasal oxygen supplementation. The patient with RA and post covid status experienced recurrent distensions after endoscopic decompression. She was conservatively managed with oral laxatives. Flatus tube passages were undertaken repeatedly over the next 10 days, as she did not consent to colon tube placement. The female patient with a history of past multiple surgeries underwent laparoscopic adhesiolysis for persistent pain and bloating, despite colon clearance after laxative instillation. No patient had other serious complications after therapy.

Discussion

Fecal impaction is common in the elderly as reflected by the mean age in our case series. In young patients, FI is infrequent, yet it may occur during ICU admissions, due to pseudo-obstruction, or following surgery. In ill patients unfit for standard bowel preparation or those with complications of FI, a colonoscopy may have to be undertaken with a calculated risk. Patients may develop frank intestinal obstruction after oral bowel preparation is administered.[13] Informed consent should be taken after proper counseling, and a surgical backup should be arranged before attempting colonoscopy in patients with FI.

The European Society of Gastrointestinal Endoscopy (ESGE) guidelines[14] recommend administration through the colonoscope of phosphate enema plus bisacodyl enema, or one liter PEG solution in fecal-loaded cases that have a poor response to standard bowel preparation. Colonoscopic instillation of Coca-Cola[15,16] is used for dislodging obstructing fecalomas. This is an unconventional method that warrants more study.

Table 1 Clinical profiles and outcome

	Sex/age	Indication	Other findings	Comorbidity	Sol 1	Sol 2	Outcome	Complication/ issues
1	M/42	SAIO in polytrauma		Surgery	M		Improved	No
2	M/71	Obstipation, fecal loading/colon dilation	Diverticuli	Septic shock	M		Improved	No
3	M/41	SAIO and dilated ileum on CT scan		Past GI TB	M		Improved	No
4	M/46	SAIO & incomplete sigmoid volvulus		DM CKD	M		Recurred	Decomp tube
5	M/48	SAIO and past iliac artery stenting		CVA	M		Improved	No
5	F/48	Ogilvie syndrome, PR bleed, pulmonary Kochs		CKD/ sepsis	M		Poor relief	Cecostomy
7	F/85	Abdomen pain & suspected sigmoid volvulus	Diverticuli	Post covid	M		Recurred	Flatus tube
8	F/81	Obstipation, vomiting & fecal loading		DM CKD	M	L	Improved	No
9	F/54	RIF pain, vomiting & jejunal entrapment		Hernia repair	M		Improved	Adhesiolysis
10	F/93	Diarrhea, fecal loading on AXR				L	Improved	No
11	M/93	Obstipation and impending megacolon	Polyp		M		Improved	No
12	M/57	Abdomen bloating & IC obstruction on AXR			M		Improved	No
13	F/42	RIF tenderness, vomiting with SAIO			M	L	Improved	No
14	F/71	Obstipation, pain, vomiting, & fecal loading on AXR			M		Improved	No

Abbreviations: Sol 1, solution 1; Sol 2, solution 2; M, mannitol; L, lactulose; SAIO, subacute intestinal obstruction; GI TB, gastrointestinal tuberculosis; DM, diabetes mellitus; CVA, cerebrovascular accident; PR, per rectal, CKD, chronic kidney disease; CT: computerized tomography; Decomp, decompression; RIF, right iliac fossa; AXR, abdomen X-ray; IC; ileo-cecal.

Here, we describe the colonoscopic instillation of mannitol and lactulose solution, either alone or in combination. Both these agents can clear the loaded left colon when administered as an enema but that may be ineffective for inspissated proximal fecal residue or fecalomas. There are clinical concerns with the use of these agents. Spontaneous bowel perforation was reported with the use of oral mannitol.[17] Electrosurgical interventions following bowel preparation using oral mannitol have been considered an explosion hazard.[18] Lactulose generates intraluminal air that may cause megacolon,[19] and the risk is high if the colon is already dilated. In patients with FI, carbon dioxide is safer for endoscopic insufflation, and the use of air should be avoided.

If the fecal loading is extensive, we recommend colonoscopic instillation of mannitol in the proximal colon and additional lactulose in the left colon. Thus, the intraluminal volume of both agents is minimized for safety. Lactulose is better avoided if the colon is already dilated. A prospective controlled trial in the future would corroborate this treatment modality, objectively assess complications, and document the efficacy or equivalence of both agents.

Conclusion

In patients with fecal loading or impaction, colon clearance may be difficult or unsafe. Oral bowel preparation may be unfeasible in critically-ill patients, or those with associated comorbid conditions, due to the risk of clinical deterioration. Colonoscopic instillation of mannitol or lactulose, either alone or in combination results in a satisfactory outcome and should be utilized carefully with a surgical backup. Prospective controlled studies will be helpful to establish this treatment modality as a standard of care.

What is Already Known?

- Fecal impaction causes nutritional disarray and prolongs hospital stay. It delays recovery of ICU patients, postoperative cases and elderly inpatients.

Table 2 Laboratory values

	Sex/ Age	Hb	WBC	Platelets	INR	Na+	K^+	Creat	Alb	T.Bil	AST	ALT	TSH
		g%	x 10^3/cmm	x 10^3/cmm		mEq/L	mEq/L	mg%	g%	mg%	IU/ml	IU/ml	mCu/ml
1	M/42	10.3	12.5	329	1.32	138	5.0	1.64	2.82	0.45	234	161	
2	M/71	8.5	12.3	213	1.16	131	2.7	1.17	1.83	2.96	26	24	
3	M/41	14.9	10.4	261	1.25	135	3.8	1.07	4.7	1.2	35	40	
4	M/46	10.1	6.15	220	1.1	140	4.9	4.02	2.99	0.29	11	18	3.37
5	M/48	7.1	11.8	390	1.03	134	5.3	1.76	4.0	1.3	34	27	
6	F/48	7.3	43.2	126	1.32	134	4.0	4.64	2.43	0.38	16	11	
7	F/85	11.4	4.9	149	1.1	143	4.0	0.8	3.02	29	43	24	
8	F/81	9.6	7.24	196	0.9	132	5.8	9.69	3.7	0.3	13	10	0.6
9	F/54	11.0	6.53	295	1.3	139	4.0	0.65	3.8	0.37	13	18	2.0
10	F/93	12.1	4.6	208	1.2	138	3.3	1.2	3.7	0.3	27	18	
11	M/93	9.9	6.8	209	1.17	133	4.5	1.7	3.02	0.29	20	19	
12	M/57	16.3	7.5	319	1.1	137	4.6	0.95	4.68	1.35	14	18	1.2
13	F/42	12.0	9.72	286	1.1	134	3.5	0.58	4.2	0.34	13	10	
14	F/71	8.8	5.2	323	0.93	123	3.9	1.24	3.7	0.2	42	25	

Abbreviations: Hb, hemoglobin; WBC, white blood cells; INR, international normalized ratio; Na, sodium; K: potassium; Alb, albumin; T. Bil, total bilirubin; AST, aspartate aminotransferase; ALT, alanine aminotransferase; TSH, thyroid-stimulating hormone.

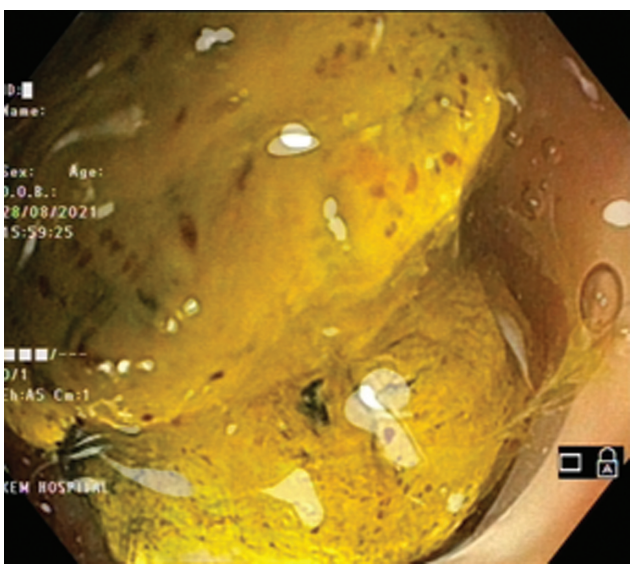

Fig. 2 Lumen blocking fecalomas.

- Laxatives (oral or rectal) may fail or are unfeasible.
- Surgery may be indicated in severe cases or for complications.

What is New in this Study?

- In morbidly ill patients, fecal clearance may be a challenge.
- Colonoscopic delivery of laxatives is a viable alternative for salvage.
- Colonoscopic delivery of laxatives prevents complications and may avoid surgery.

What Are the Future Clinical and Research Implications of the Study Findings?

- This modality may evolve as a solution to a vexing clinical issue
- In affected patients, it will promote nutritional recovery and reduce hospitalization costs.
- A prospective controlled trial will enable this to evolve as the standard of care.

Ethical Statement

We undertook this retrospective study after formal approval by the KEM Hospital Research Centre Ethics Committee. All information provided herein is original, and there is no reproduction of data, figures, tables, or text from other authors. The 14 patients/close relatives gave informed verbal consent to publish their data. The privacy of patients is preserved, and their name or identity has not been revealed.

Author Contributions

S. D. W.: Endoscopy procedures, data retrieval, data study, literature review and references, and manuscript drafting and finalization.

A. S. W.: X-ray evaluations and reviews, data retrieval, data study, literature review and references, and manuscript finalization.

Source of Funding

None.

Conflict of Interests
The authors have no conflict of interests to declare.

Acknowledgments
We acknowledge with thanks the constructive inputs given by Dr. Ashish Bavdekar (Consultant Pediatric Gastroenterologist & Hepatologist, KEM Hospital Pune) and thank Dr. Dayanand Shetty (Director Academics and Radiodiagnosis & Imaging) for giving us access to the archives for the study. Dr. Neha Chauhan and Dr. Sai Harer, clinical at the endoscopy unit, helped collect data and its tabulation, whereas our staff of the endoscopy unit assisted with the procedures and patient care.

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