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Case Series

Surgery Section

# Enterolithiasis Presenting as Small Bowel Obstruction: A Case Series of Three Cases

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## ABSTRACT

Enterolithiasis is a very rare condition characterised by the formation of intraluminal stones within the small bowel, often occurring in segments with stasis, strictures, or chronic inflammation. It can also further lead to small bowel obstruction, thereby posing diagnostic and therapeutic challenges. The present series reports about three cases of elderly Indian females presenting with small bowel obstruction of variable duration and severity. Presented case 1 involved a 68-year-old female having a post-tubercular ileal stricture and a 4×3×2 cm enterolith, managed by segmental ileal resection and primary anastomosis. Presented case 2 involved a 65-year-old female having adhesions, inflammatory mesentery, a submucosal lipoma, and a 4×2×2 cm enterolith, managed via adhesiolysis, resection, and lipoma excision. Presented case 3 was of a 60-year-old female, having vague abdominal pain and a radiodense shadow initially mistaken for a vesical calculus; exploratory laparotomy later revealed a mobile ileal enterolith measuring 7×5×2 cm, which was removed through enterotomy without requiring bowel resection. All of these patients had uneventful postoperative recoveries. Thus, enterolithiasis must be considered in patients having small bowel obstruction, especially in the presence of strictures, adhesions, prior inflammatory conditions or when imaging findings are misleading and suggest alternative pathologies.

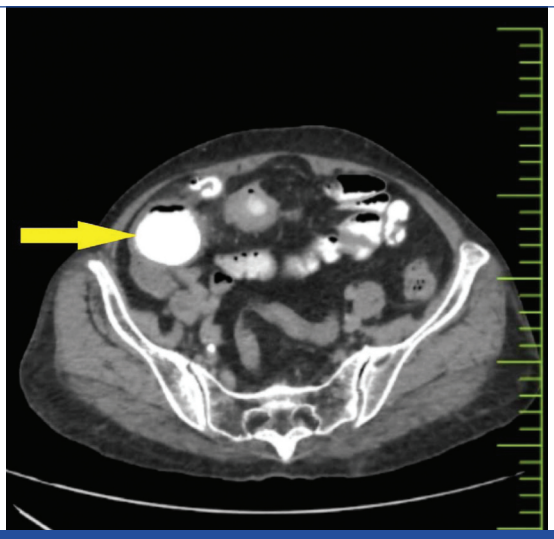
**Keywords:** Adhesiolysis, Exploratory laparotomy, Ileal stricture, Intraluminal calculus, Post-tubercular sequelae

## INTRODUCTION

Enterolithiasis is known as an uncommon condition that is characterised by the formation of mineralised concretions within the intestinal lumen, which also typically arises in segments of bowel affected by stasis, strictures, or chronic inflammation [1]. Although globally it is estimated to have a prevalence that ranges from 0.3% to 10% in a few selected surgical and imaging cohorts [1,2]. In the Indian context, literature also consistently identifies enterolithiasis as a very rare, under-reported, as well as often incidental finding, with no available population-based studies that establish the national or regional incidence [3].

### Case 1

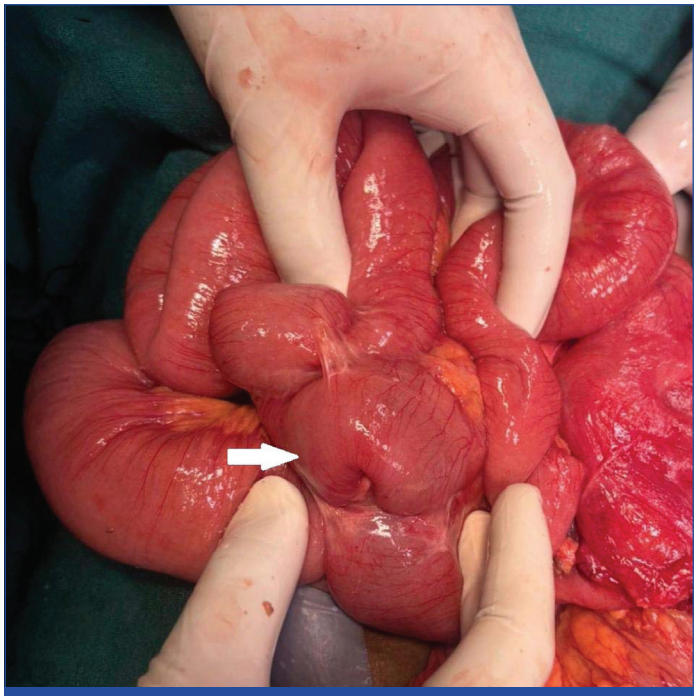
A 68-year-old female presented with a two-year history of intermittent and gradually progressive abdominal pain, which had worsened over the last 15 days before presentation and was occasionally relieved after episodes of vomiting. The patient also reported having a fever and multiple episodes of vomiting for the last three days before presentation. Her history was significant for treated pulmonary tuberculosis, treated 20 years ago, for which she had completed a full course of anti-tubercular therapy, although documentary evidence was unavailable. On clinical examination, she was haemodynamically stable, but had a soft, mildly tender abdomen and normal bowel sounds. Ultrasonography (USG) of the patient showed minimal inter-bowel free fluid and mild colonic wall oedema. Contrast-Enhanced Computed Tomography (CECT) of the abdomen also revealed long-segment thickening of the distal small bowel with mesenteric fat stranding and a large radiodense intraluminal lesion, thus suggestive of an enterolith, along with multiple mesenteric lymph nodes as shown in [Table/Fig-1]. Laboratory evaluation of patient revealed fluctuating anaemia [Table/Fig-2], which required optimisation before surgery. The patient was initially managed conservatively with Nil Per Oral (NPO) status, nasogastric tube decompression, intravenous fluids, electrolyte correction, parenteral antibiotics, analgesics and blood transfusion for anaemia correction. However, later, due to worsening abdominal pain over 10-15 days and 2-3 episodes of vomiting in the last three days, surgical intervention was planned. Intraoperative long-segment thickening of the distal small bowel with mesenteric fat stranding is shown in [Table/Fig-3].



**[Table/Fig-1]:** CECT of the abdomen revealed a large radiodense intraluminal lesion suggestive of an enterolith, as pointed with yellow arrow.

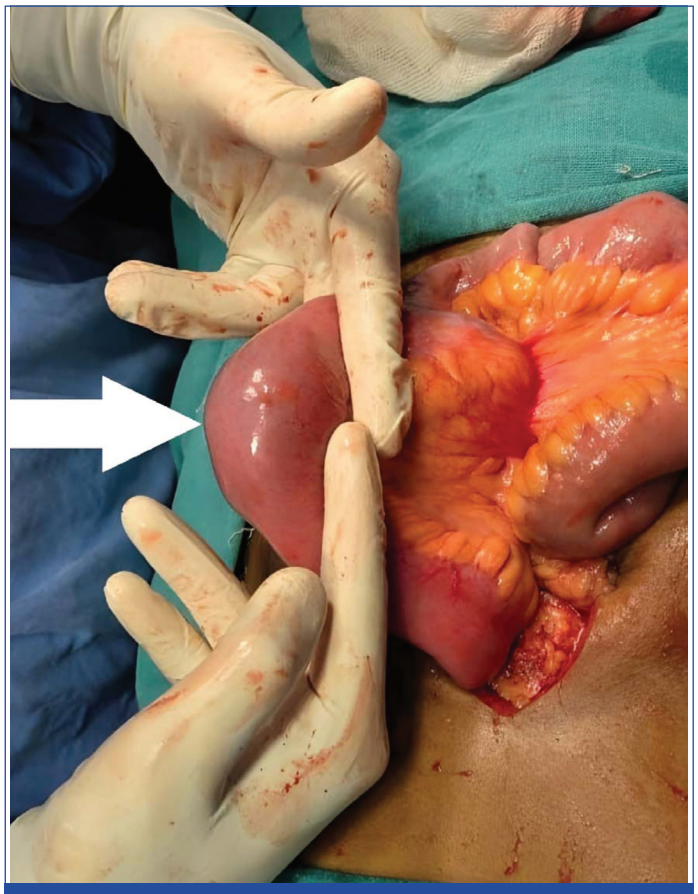
| Parameters | Lowest value | Highest value |
|---|---|---|
| Haemoglobin (Hb) (g/dL) | 7.5 | 11.6 |
| Haematocrit (HCT) (%) | 23.9 | 35.3 |
| RBC Count (×106/µL) | 4.17 | 5.39 |
| Mean Corpuscular Volume (MCV) (fL) | 57.3 | 72.0 |
| Mean Corpuscular Haemoglobin (MCH) (pg) | 18.0 | 22.6 |
| Mean Corpuscular Haemoglobin Concentration (MCHC) (g/dL) | 31.4 | 33.3 |
| Red Cell Distribution Width (RDW) (%) | 21.1 | 29.0 |

**[Table/Fig-2]:** Laboratory parameters demonstrating fluctuating anaemia.
RBC-Red blood cells



**[Table/Fig-3]:** Intraoperative long-segment thickening of the distal small bowel with mesenteric fat stranding as pointed with white arrow.

The patient then underwent exploratory laparotomy, which showed significantly dilated ileal segment that was located approximately 45 cm proximal to the Ileocaecal Junction (ICJ) as depicted in [Table/Fig-4]. Although symptoms as well as radiological images pointed towards multiple other differential diagnoses, such as inflammatory or infectious ileitis, small-bowel obstruction, and mesenteric lymphadenopathy-related pathologies suggested by the long-segment bowel thickening and mesenteric fat stranding, exploratory laparotomy thereby ultimately revealed the true pathology, an enterolith. A large enterolith was retrieved as shown in [Table/Fig-5], also multiple strictures were identified in the surrounding ileum.



**[Table/Fig-4]:** Dilated ileal segment located approximately 45 cm proximal to the ileo-caecal junction as highlighted with white arrow.

**[Table/Fig-5]:** A large enterolith of size 4×3×2 cm.

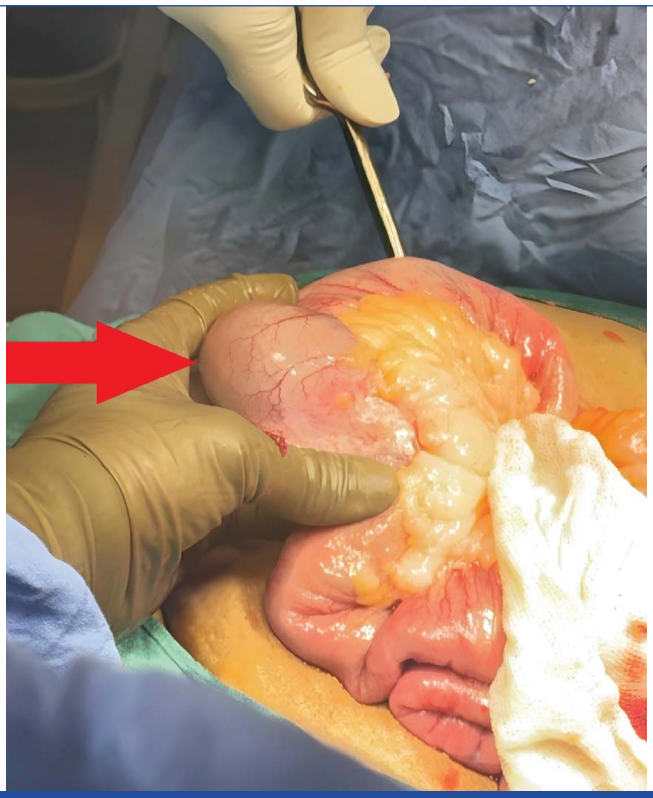
A 15 cm diseased ileal segment was resected, which was followed by performing a primary end-to-end anastomosis. The postoperative course was uneventful, and the patient thus recovered well with provision of supportive care and antibiotics. Histopathology examination of the resected specimen showed mucosal ulceration, necrosis, as well as chronic inflammatory infiltrates, with normal resection margins. The findings were consistent with presence of chronic inflammatory ileal stricture, which were likely related to previous tuberculosis, along with an enterolith. Cartridge-Based Nucleic Acid Amplification Test (CBNAAT) testing was done which did not suggest active tuberculosis. The patient improved steadily and was later discharged in stable condition on postoperative day 10 after alternate suture removal. She was followed up at seven days and 15 days after discharge, with no fresh complaints noted.

## Case 2

A 65-year-old female presented with multiple episodes of vomiting for three days. The vomiting was non projectile, non bilious, and contained food particles, and was associated with nausea and constipation. She had no abdominal pain, fever, urinary complaints, or respiratory symptoms. She also had a history of systemic hypertension for six years on tablet Telmisartan 40 mg combined with Metoprolol Succinate 25 mg (Metosartan 40/25) once daily; and hypothyroidism for seven years on tablet Thyroxine 62.5 mcg once daily. Her past surgery included an appendectomy several decades earlier. On clinical examination, she was found stable, afebrile, and her abdomen was soft, non tender, and non distended, with normal bowel sounds. Routine laboratory investigations, including haemoglobin, renal function tests, and serum electrolytes, were within normal limits and systemic evaluation was unremarkable. However, Total Leucocyte Count (TLC) was elevated at 14,000/mm$^3$, suggestive of an underlying inflammatory process.

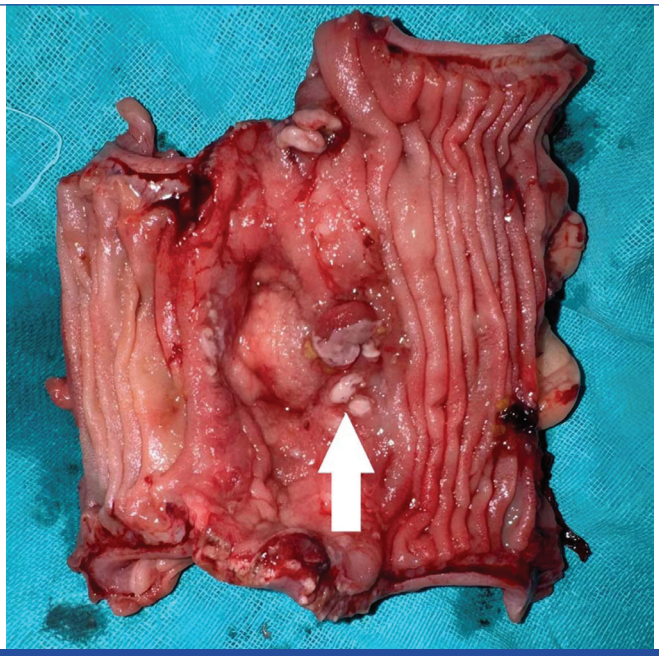
Laparoscopy was chosen initially to rule out any other intra-abdominal pathology, while also facilitating further management planning, due to the patient's stable clinical condition and absence of gross abdominal distension. Diagnostic laparoscopy revealed whitish flaky lesions on the surface of liver, a thickened mesentery with an inflammatory reaction, a small cystic lesion on the small bowel, a large enterolith located proximal to the ileocecal junction, and a submucosal lipoma in the proximal jejunum. The whitish flaky lesions were assessed intraoperatively which appeared consistent with chronic inflammatory deposits. There was no gross evidence of peritoneal carcinomatosis. Histopathological evaluation of resected specimen did not reveal granulomatous inflammation or

malignancy, thereby ruling out peritoneal tuberculosis or metastatic disease. Due to the presence of dense adhesions along with multiple lesions, the procedure was then converted to an open approach. An adhesiolysis procedure was performed; a markedly dilated ileal segment containing a large enterolith was identified as shown in [Table/Fig-6].



**[Table/Fig-6]:** Adhesiolysis procedure performed in patient, a markedly dilated ileal segment containing a large enterolith of size 4×2×2 cm was identified as highlighted by red arrow.

A segment of diseased small bowel was then resected as shown in [Table/Fig-7], thereafter a primary end-to-end anastomosis was performed. The submucosal lipoma was excised through a limited enterotomy, which was thereby closed in a single layer. The lipoma was considered as an incidental finding, which had no contributory role in the obstruction, as there was no luminal narrowing or intussusception at that site. Haemostasis was achieved, and peritoneal lavage was done before closure.

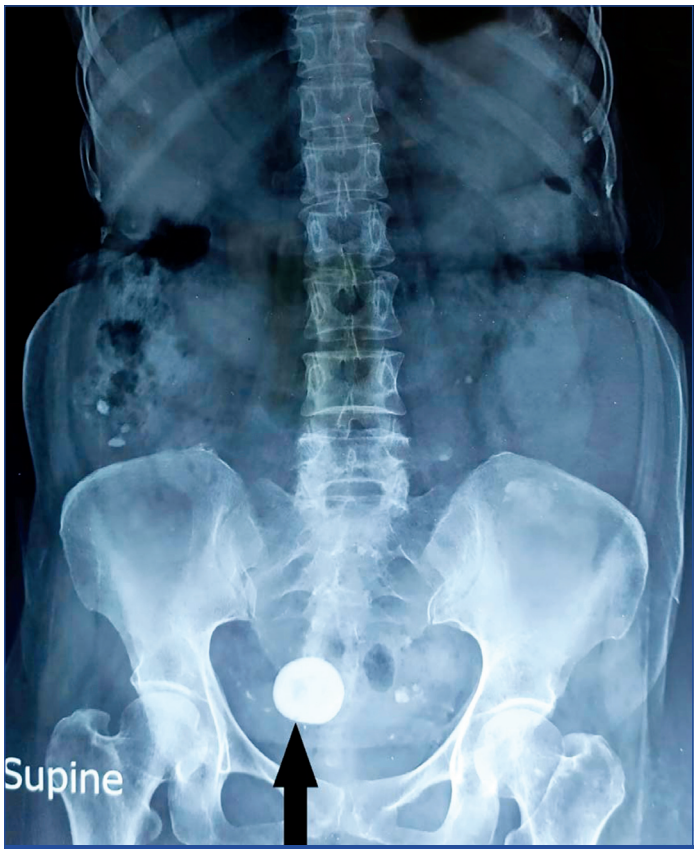


**[Table/Fig-7]:** Resected segment of diseased small bowel with a 2×1 cm white cystic lesion as pointed with white arrow.

Postoperatively, the patient was haemodynamically stable and also received intravenous antibiotics, fluids, and supportive care. The bowel functionality of the patient gradually returned, and the abdominal drain and nasogastric tube were removed on postoperative day 5 after clinical improvement. The surgical wound healed well without discharge or gaping. The patient was stable throughout hospitalisation, and later she recovered uneventfully. Histopathology examination of the resected bowel showed features that were consistent with chronic inflammatory changes associated with an obstructing enterolith, along with a benign submucosal lipoma. She was then discharged in stable condition on postoperative day 11 and was followed up after seven days and again at 15 days, during which she remained asymptomatic.

## Case 3

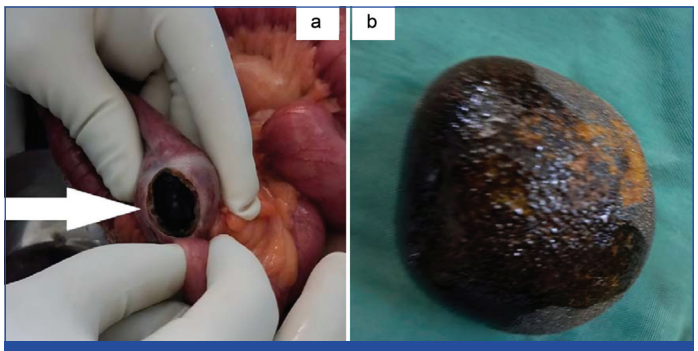
A 60-year-old female presented with complaints of lower abdominal pain on and off for 15 days, associated with urinary symptoms such as burning micturition and increased frequency of micturition for the same duration without vomiting or fever. USG of the abdomen and pelvis was suggestive of a vesical calculus, which was demonstrating a well-defined echogenic focus within the urinary bladder with posterior acoustic shadowing. An X-ray of the Kidneys, Ureters and Bladder (KUB) showed a radiodense shadow which was interpreted as a possible vesical calculus or enterolith. The X-ray of KUB is shown in [Table/Fig-8].




**[Table/Fig-8]:** The X-ray of KUB showing radiodense shadow highlighted by black arrow.

Based on such findings, and considering the patient's urinary symptoms along with concordant findings on both USG and X-ray KUB, the most probable provisional diagnosis was vesical calculus. As both imaging modalities were suggestive of vesical calculus and considering the poor financial condition of the patient, a decision was taken to proceed directly with cystoscopy as a diagnostic and therapeutic modality, without obtaining a cross-sectional imaging (CT scan). However, cystoscopy further showed a normal bladder without an intravesical calculus, thereby creating uncertainty regarding the true source behind radiodensity.

In view of persistent symptoms despite a negative cystoscopic evaluation, the patient then subsequently underwent exploratory laparotomy. Intraoperatively, a mobile intraluminal mass was also palpated in the ileum as shown in [Table/Fig-9a]. An enterotomy was then performed, and the enterolith was extracted as depicted in [Table/Fig-9b]. The bowel was thoroughly examined intraoperatively, and no significant strictures, diverticula, inflammatory changes or other pathological abnormalities were noted in the surrounding bowel. Primary closure of the enterotomy was performed. The patient was discharged in stable condition after having an uneventful postoperative recovery. At six months of follow-up, she remained symptom-free without any evidence of recurrence or postoperative complications.




**[Table/Fig-9]:** Intraoperative identification and extraction of enterolith: a) Shows the intraoperative palpation of a mobile intraluminal mass within the ileum; b) Demonstrates the extracted enterolith of size 7×5×2 cm.

## DISCUSSION

Enterolithiasis is caused by the formation of intraluminal calculi within gastrointestinal tract usually in regions where intestinal stasis or slowed transit occurs [4]. These concretions can be further classified as true primary enteroliths, which are formed from endogenous substances including bile salts or calcium salts, precipitating around a nidus, or false enteroliths formed from inspissated indigestible material, like bezoars [4]. True enteroliths develop when prolonged stasis allows bacterial overgrowth, as well as deconjugation of bile acids, along with subsequent precipitation [3]. Secondary enteroliths arise due to the formation of stones outside the intestine (such as gallstones, renal calculi), which migrate into the bowel lumen through fistulas, including cholecystoenteric tracts [3,4]. These mechanisms reflect a complex interplay of luminal chemistry, motility, and anatomic alterations, which further predispose to concretions [3,4].

Predisposing clinical factors are largely those that create intestinal stasis and structural compromise. Intestinal diverticula (such as Meckel's), strictures from chronic inflammatory diseases (such as Crohn's disease or tuberculosis), surgical anastomoses, blind pouches, radiation enteritis, eosinophilic enteritis, as well as adhesions contribute into localised hypomotility, retention of luminal contents, thereby facilitating stone formation [1,5]. In addition, intraluminal kinking, external compression and stenotic segments further impede transit while also promoting concretions [5].

Imaging poses challenges because enteroliths can be misinterpreted as other calcific densities, foreign bodies, as well as usual features on abdominal radiographs; CT scan can be subtle without having high clinical suspicion [2]. Enteroliths can appear as discrete radiodense lesions within dilated loops, but their identification is usually incidental, and it is also definitively recognised during the intraoperative period [2,5]. In some cases, CT may falsely suggest alternate pathologies, including intussusception, bladder calculi when the stone is projected over the pelvis or bowel [3,4]. Careful correlation of clinical presentation, including subacute "tumbling" pain, nausea, intermittent obstruction, along with imaging findings of a radiodense intraluminal structure at a transition point, can serve as a diagnostic clue, but definitive diagnosis usually awaits surgical exploration as well as direct visualisation [1,3,4].

The principal differential diagnosis of enterolithiasis presenting as small bowel obstruction includes gallstone ileus, which represents secondary enterolithiasis [6]. Gallstone ileus usually occurs in elderly patients with a history of cholelithiasis, which results from passage of a gallstone through a biliary-enteric fistula [6]. It can be differentiated radiologically by Rigler's triad on CT scan: pneumobilia, evidence of small bowel obstruction, and an ectopic gallstone [6]. In contrast, primary enterolithiasis usually lacks pneumobilia, biliary fistula and the stone is formed within the bowel which is often proximal to a segment of stasis such as a diverticulum or stricture [4].

Another important differential is bezoar-induced small bowel obstruction, usually phytobezoars [7]. Bezoars are known as intraluminal masses of indigestible material, which are more commonly seen in patients with prior gastric surgery, impaired motility [7]. On CT imaging, the bezoars appear as a well-defined intraluminal mass that shows a mottled gas pattern [7]. A history of high-fibre food intake, prior gastric surgery favours bezoar, while underlying small bowel diverticulosis as well as inflammatory strictures favour enterolith formation [7].

Additional differentials include adhesive small bowel obstruction, Crohn's disease-related strictures and small bowel neoplasms [8]. Adhesions generally present with obstruction without an identifiable intraluminal mass on imaging, which are strongly associated with prior abdominal surgery [8].

In cases of enterolithiasis resulting in mechanical small bowel obstruction, definitive management is usually surgical once conservative measures fail because impacted stones rarely pass spontaneously, especially when they are large, lodged at a fixed transition point [1]. Surgical options include enterolithotomy with direct extraction of the stone through an enterotomy, as well as segmental small bowel resection with primary anastomosis when there is associated diseased bowel or strictures [9,10].

In a case reported by Molla YD et al., a 60-year-old Ethiopian male, due to failure of conservative management, it required surgery, where markedly distended bowel loops, a stenotic anastomosis, and multiple hard enteroliths were also identified in the patient [11].

In a case reported by Willis MP et al., a 68-year-old American female, two large enteroliths, each approximately 5 cm in size were removed via the use of enterotomy, and the affected segment of small bowel with a mesenteric mass was resected [12].

Comparative overview of enterolith-induced intestinal obstruction, reported and current cases is described in [Table/Fig-10] [3,11-14].

## CONCLUSION(S)

The presented cases highlight variability in clinical presentation, which ranges from intermittent abdominal pain to acute vomiting,

| Parameters | Sharma O et al., [3] | Molla YD et al., [12] | Willis MP et al., [13] | Shrestha AL et al., [14] | de Silva GPUP et al., [15] | Present Case 1 | Present Case 2 | Present Case 3 |
|---|---|---|---|---|---|---|---|---|
| Demographic details (Country,Age/ Gender) | India, 72 y/Male | Ethiopia, 60 y/ Male | USA, 68 y/ Female | Nepal, 70 y/ Male | Sri Lanka, 65 y/ Female | India, 68 y/ Female | India, 65 y/ Female | India, 60 y/ Female |
| Key medical / Surgical history | No prior surgery; jejunal diverticulosis | Prior sigmoid volvulus surgery → anastomotic stenosis | Multiple prior abdominal surgeries; blind-loop anatomy | Two previous surgeries for enterolith-induced obstruction | Prior similar episode 2 months earlier | History of treated pulmonary TB 20 years ago; no prior abdominal surgery | Hypertension, hypothyroidism; remote appendectomy | No major co-morbidities; no prior abdominal surgery; initial misdiagnosis as bladder stone |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Presenting Symptoms | 1-week progressive pain, distension, vomiting, constipation, intermittent flatus | Partial LBO, vomiting, distension | Subacute pain, vomiting, diarrhea | 7 days pain, vomiting, constipation | 5 days colicky pain, nausea, constipation, bilious vomiting | 2 years intermittent abdominal pain worsening over days, vomiting, fever | 3 days vomiting (non-bilious), nausea, constipation; no abdominal pain | Vague abdominal pain; no vomiting/fever; radiodense pelvic shadow |
| Aetiology of Enterolith Formation | Stasis in small-bowel diverticulosis (primary enterolith) | Anastomotic narrowing causing stasis | Stasis in blind loop + adhesions | Recurrent primary enterolithiasis without diverticulosis | Jejunal strictures causing stasis (primary enterolith) | Chronic inflammatory ileal stricture likely post-TB + stasis → enterolith | Adhesions, inflammatory mesentery, cystic bowel lesion, and submucosal lipoma contributing to stasis | Stasis in ileum without strictures; unclear aetiology; misinterpreted radiodensity |
| Imaging Findings | X-ray: dilated loops; CECT: diverticulosis, 1.5×2.2 cm enterolith | X-ray: dilated loops, mobile radiopaque stones | CT: mucosal enhancement, tethered segments, 4.9 cm intraluminal mass | Imaging limited; no CT/ endoscopy available | X-ray: multilayered radiodense opacity; CECT: ileal enterolith | USG: free fluid; CECT: long-segment ileal thickening, fat stranding, large intraluminal enterolith, mesenteric nodes | Laparoscopy findings: cystic lesion, adhesions, enterolith; thickened mesentery; no pre-op CECT reported | USG + KUB: radiodense pelvic shadow initially suspected as vesical calculus; CT not performed pre-op |
| Stone characteristics | Single, 1.5×2.2 cm | Multiple hard enteroliths | Two large ~5 cm enteroliths | Single recurrent 5×5 cm | Single multilayered radiodense enterolith | Single large enterolith, 4×3×2 cm | Single large enterolith, 4×2×2 cm | Single large enterolith, 7×5×2 cm |
| Intraoperative findings | Managed conservatively | Dilated bowel, stenotic anastomosis, multiple stones | Adhesions, internal hernia, blind loop, obstructing masses | Dense adhesions and bands, mid-ileal obstruction | Distal ileal enterolith + jejunal strictures | Dilated ileum 45 cm proximal to ICJ; multiple ileal strictures | Dense adhesions; dilated ileum with enterolith; submucosal lipoma; cystic lesion | Mobile intraluminal ileal mass; no strictures; no additional pathology |
| Management | Conservative (IV fluids, analgesics, gradual diet) | Resection + end colostomy | Exploratory laparotomy; enterotomy + resection | Enterotomy + closure; adhesiolysis | Enterotomy + bowel resection & anastomosis | Exploratory laparotomy; enterolith extraction; 15-cm ileal resection + primary anastomosis | Diagnostic laparoscopy → open conversion; adhesiolysis; resection + anastomosis; lipoma excision | Exploratory laparotomy; enterotomy + enterolith extraction; no bowel resection |
| Histopathology | Not applicable | Not mentioned | Chronic inflammatory changes; blind-loop inflammation | Non specific; no clear aetiology | No chronic inflammation in strictures | Chronic inflammatory ileal stricture (post-TB changes) | Chronic inflammatory changes; benign submucosal lipoma | Normal bowel; no chronic stricture or inflammation |
| Outcome | Spontaneous passage of enterolith; complete recovery | Uneventful recovery; functioning stoma | Uneventful recovery | Required re-closure for burst abdomen; later stable | Uneventful; asymptomatic at 3 months | Uneventful postoperative course; stable discharge | Uneventful recovery; stable discharge | Uneventful postoperative recovery; stable discharge |

**[Table/Fig-10]:** Comparative overview of enterolith-induced intestinal obstruction, reported and current cases [3,12-15].
TB: Tuberculosis; LBO: Large bowel obstruction

and may even mimic urinary tract pathology when radiodense shadows are misinterpreted on imaging. Surgical intervention, include enterolith extraction along with or without segmental resection, is frequently needed for cases with complete obstruction and complex pathology. Awareness regarding risk factors such as prior tuberculosis, adhesions, postoperative changes is crucial for proper diagnosis and optimal operative outcomes.

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