Section: General Surgery

Case Report

SUCCESSFUL MANAGEMENT OF DISTAL ILEAL ENTEROLITH PRESENTING WITH SUBACUTE INTESTINAL OBSTRUCTION USING COLA DISSOLUTION THERAPY

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ABSTRACT

Background: Enterolithiasis is a rare condition in which stones form within the intestine, most commonly due to intestinal stasis. Patients may either remain asymptomatic or present with features of intestinal obstruction. Although surgery is often considered for symptomatic enteroliths, reports on successful conservative treatment are limited.

Case Presentation: A 55-year-old woman with a previous history of pelvic radiotherapy presented with recurrent colicky abdominal pain, abdominal distension, vomiting, and loss of appetite suggestive of subacute intestinal obstruction. X-ray erect abdomen showed no evidence of intestinal obstruction. Contrast-Enhanced Computed Tomography (CECT) Abdomen revealed an enterolith in the distal ileum with associated bowel wall thickening. The patient was initially managed conservatively with bowel rest, intravenous fluids, correction of anemia, and close clinical monitoring. As serial imaging showed no spontaneous migration of the enterolith, and considering the patient's stable condition, a trial of enterolith dissolution therapy was undertaken after informed consent. Coca-Cola solution (500 mL twice daily) was administered through a Nasojejunal tube for six days. The patient tolerated the treatment well, with one episode of mild abdominal pain. Follow-up CT imaging demonstrated reduction in the size of the enterolith along with its migration across the ileocecal junction into the cecum. The patient improved clinically and was discharged in stable condition.

Conclusion: This case demonstrates that Coca-Cola dissolution therapy can be an effective, minimally invasive treatment option for enterolithiasis in carefully selected stable patients. It also highlights the importance of considering conservative management before surgical intervention, particularly in poorly nourished patients.

Keywords: Enterolithiasis, Intestinal Obstruction, Cola dissolution therapy, Conservative management, Acid-Base reaction.

INTRODUCTION

The term Enterolithiasis, is derived from the suffixes -entero, meaning related to the intestine and –lithiasis, meaning process of stone formation. Prevalence of enteroliths ranges from 0.3-10% of the world population.[1] The formation of enteroliths is majorly initiated by the presence of intestinal stasis, which could be attributable to various factors like paralytic ileus, diverticulae, strictures – secondary to inflammatory bowel disease, tuberculosis, radiation induced or following surgical intervention on bowel - like bowel anastomosis, longitudinal closure of perforation etc.[2] It is a relatively rare condition. Clinically, patients with enteroliths might be asymptomatic or present with features of intestinal obstruction.[2,3] Treatment depends on the clinical presentation and the size of enterolith, and ranges

from non-operative management to surgical management.

In this article, we report a case of a middle aged female, who presented with subacute intestinal obstruction secondary to an enterolith in the distal ileum and was successfully managed conservatively, using cola dissolution therapy.

Case Report: A 55-year-old female with no known comorbidities presented with episodes of colicky abdominal pain in the periumbilical region three days prior to presentation to hospital, which was insidious in onset, with no radiation and each episode lasting three to four hours. The pain increased in severity the evening before arrival to hospital, which was relieved by medication. The patient has been pain-free since then.

The patient had a history of abdominal distension three days ago for two days. She complained of one episode of non-bilious vomiting three days ago, after the onset of pain.

There is a history of loss of appetite for one year, aggravated for the last three days. The patient shares that she has no history of constipation and is passing flatus and stools normally.

There was no history of similar episodes of pain in the past. The patient had two vaginal deliveries, following which she underwent a tubectomy 35 years ago. She underwent a procedure for reversal of tubectomy 33 years ago. She gives a history of hysterectomy 20 years ago, following which she had 20 cycles of external beam radiotherapy. Substantial evidence regarding the indication of hysterectomy and radiotherapy was not available.

Patient was thin built and poorly nourished. Physical examination revealed the presence of pallor and angular stomatitis.

Abdominal examination: Previous surgical scars were noted, soft, tenderness in periumbilical region present, liver span of 15 cms- mild hepatomegaly, no free fluid and normal bowel sounds were present. The rest of the systemic examination was normal.

Laboratory investigations revealed the presence of microcytic hypochromic anaemia with a haemoglobin level of 6.5 gm%, PCV of 26%, MCV of 65.3 fL and MCHC of 18.4%. The rest of the investigations were within normal limits.

Figure 1: Chest Xray at admission showing normal lung fields & no signs of hollow viscus perforation

Figure 2: Xray Erect Abdomen showing both psoas shadows, and no signs of intestinal obstruction

Patient was kept nil by mouth and **managed conservatively** with IV fluids for **48 hours**. Vital parameters like Heart Rate, Blood Pressure, Temperature and Abdominal girth measurement was done hourly. Patient had no signs of deterioration.

Serial CT Abdomen and Pelvis was performed :

- On the day of admission – CECT Abdomen and pelvis (Figure 3,4)
- 48 hours after admission (Figure 5)
- After 6 days of dissolution therapy (Figure 6)

CECT Abdomen findings on the day of admission were as follows:

- Mild wall thickening m/s upto 5 mm in distal ileal loops and ileocecal junction.
- Caliber of terminal ileum lumen just proximal to ileocecal junction measured 8 mm, at the time of imaging.
- Well defined hyperdense focus m/s **16x17x8 mm (CCxTRxAP)** noted in proximal ileal loops, with maximal luminal diameter of approximately 19 mm. - **? Foreign body/ Faecolith/ Enterolith.**
- Oral contrast seen in bowel loops distal to hyperdense focus - **No evidence of obstruction noted.**

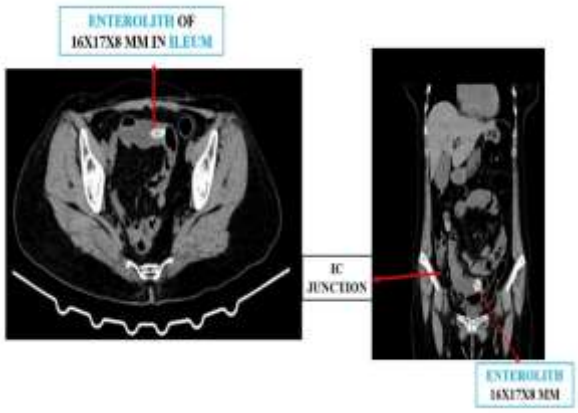

Figure 3: Contrast Enhanced CT Abdomen on the day of admission -Axial and Coronal views-showing the presence of an Enterolith m/s 16x17x8 mm in ileum

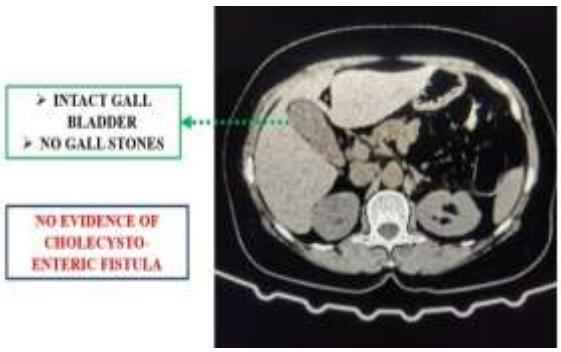

Figure 4: Contrast Enhanced CT Abdomen on the day of admission -Axial section showing an intact gall bladder wall, with no gall stones and no evidence of Cholecysto-enteric fistula

Patient was continued on conservative management, with IV fluids, antacid and regular monitoring of Heart Rate, Blood pressure, Temperature and Abdominal girth. Serum electrolytes were repeated – S.Sodium - 136 meq/L and S.Potassium – 5 meq/L. Iron deficiency anaemia corrected with parenteral Iron. Simultaneously patient was prepared for laparotomy with one unit blood transfusion. Patient was comfortable, with no pain episodes. Trial of clear oral liquids was given and patient tolerated.

Review CT Abdomen was done **after 48 hours of conservative management**. **No distal migration of enterolith and no change in size** (Figure 5).

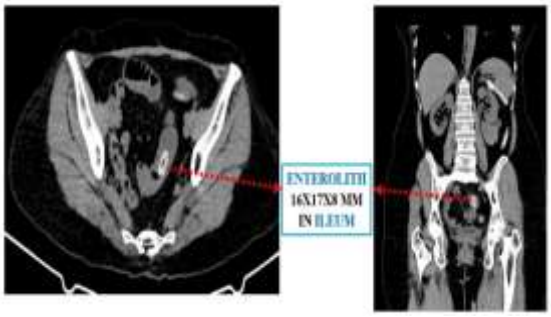

Figure 5: CT Abdomen after 48 hours of conservative management - Axial and Coronal views showing the presence of Enterolith in ileum, with no change in size or position

Present condition of the patient and the possibility of recurrent intestinal obstruction explained to the patient. Treatment options of elective surgical management and Enterolith dissolution therapy were discussed. Patient opted for trial of Enterolith dissolution therapy.

Second unit blood transfusion given for optimisation of haemoglobin levels. Upper GI Endoscopy revealed no stasis in stomach and Naso jejunal tube placement done.

Investigations were repeated – Haemoglobin of 11.1gm%, Total counts – 9600/mm^3, Platelet counts -3.51 Lakhs/mm^3 S.Sodium- 138 meq/L and S.Potassium – 3.9 meq/L – All were within normal limits.

Enterolith dissolution therapy was started**. 500ml of Coca-Cola solution was given through Naso jejunal tube twice daily**. Patient was started on soft diet. Close monitoring of Heart Rate, Blood Pressure, Temperature and Abdominal girth was performed. No abdominal pain, vomiting and abdominal distension noted throughout.

Patient had an episode of abdominal pain on Day 4 of dissolution therapy, colicky type, lasting for half an hour, relieved without any medication.

Cola dissolution therapy was given for a total of six days. Repeat CT Abdomen after completion of dissolution therapy showed **reduction in size of Enterolith m/s 10x16x10 mm. Enterolith has crossed the ileocecal junction and reached caecum, at a distance of 2cm from ileocecal junction.** [Figure 6]

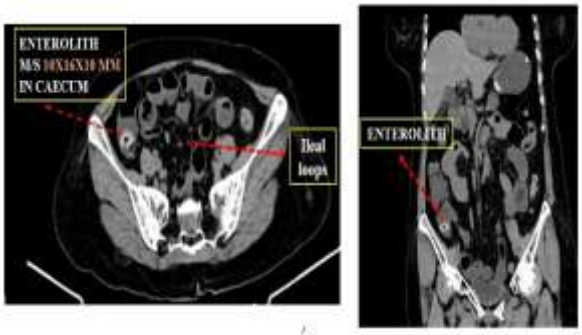

Figure 6: CT Abdomen after 6 days of Dissolution therapy - Axial and Coronal views - showing reduction in size of enterolith to 10x16x10 mm and migration to caecum.

As patient was hemodynamically stable and improved clinically, Naso jejunal tube was removed and patient was discharged. At 2 week follow up, patient had no complaints. Patient was advised to undergo colonoscopy with terminal ileal biopsy, to look for presence of any narrowing.

DISCUSSION

The pH of gastrointestinal tract varies widely along its entire course. This variation in pH is responsible for it's functions like digestion, activation of enzymes and absorption of various nutrients and minerals.[4]

Table 1 - pH of various regions of Gastrointestinal tract

REGION OF GIT	Ph
STOMACH	**1.5 in fasting state** **2.5 in fed state**
DUODENUM	**2.7 - 4**
JEJUNUM	**4 - 7**

ILEUM	**7 - 8**
LARGE INTESTINE	**7.9 - 8.5**

The formation of enteroliths is primarily favoured by the presence of **intestinal stasis**. It can occur in the presence of strictures and intestinal diverticulae.[1] Strictures can be secondary to Crohn's disease,[5] post-surgical, related to chronic Non-Steroidal Anti-Inflammatory Drug(NSAID) use, radiation- induced, related to abdominal tuberculosis etc. Stasis in diverticulae is due to presence of broad sac and narrow neck. **Terminal part of ileum and ileocecal junction is the commonest site where enteroliths can be seen and this is due to their narrow luminal diameters and relatively less active peristalsis**.[6] Luminal diameter of ileocecal junction is 1.85-1.95 cm and that of terminal ileum is <2cm.[7]

Bile, released in duodenum contains bile salts, plays an important role in fat digestion, by micelle formation. These bile salts are reabsorbed in distal small bowel and cycled back to liver (Enterohepatic circulation).[8] **Calcium absorption** requires an **acidic environment**. Due to presence of **stasis**, in the presence of **alkaline environment**, Calcium salts precipitate to form a nidus, which further leads to the formation of an **enterolith**.[1]

In **Secondary Enterolithiasis**, stone formation may occur elsewhere and then migrate into the intestine. A large gall stone of 2-5 cm migrating from gallbladder, eroding the duodenum and entering it, causing gall stone ileus is a major example of this condition. There is a formation of **cholecysto-enteric fistula** and the migration usually ends at the level of terminal ileum, due to narrow diameter.[9] Other locations include stomach and duodenum- where it causes **gastric outlet obstruction** – called **Bouveret syndrome**.[10]

Diagnosis of enteroliths is by a strong clinical suspicion, which is confirmed by radiological investigations. In case of radio-opaque enteroliths, X-ray abdomen may show the presence of stones, and features of intestinal obstruction can be observed. **CT Abdomen is the gold standard** investigation to diagnose presence of enterolith and to know the presence of any fistulae leading to the migration of stones. **Gall stone ileus** shows a characteristic triad, known as **Rigler's triad**, [3] – 1.Presence of Pneumobilia 2.Signs of complete/partial intestinal obstruction 3.Presence of ectopic gall stone and change in its position on serial imaging studies (**Tumbling sign**).

Patient presentation may vary from being asymptomatic to emergent conditions like intestinal obstruction. It depends on the size of the enterolith. Smaller ones, which do not occlude the lumen can be asymptomatic. Patients may complain of recurrent episodes of colicky abdominal pain, nausea, vomiting – usually subacute to total intestinal obstruction. Hence, in cases of **recurrent subacute intestinal obstruction** – a suspicion of enteroliths must be borne in the mind.

Management varies from case - to- case basis **and depends on** clinical presentation, size and location of enterolith and overall condition of the patient. Management can be surgical or conservative.

In this case of a middle aged female, with history of subacute intestinal obstruction and prior history of radiation exposure, with stable vitals and general condition , we have undertaken a trial of conservative management **of Enterolith dissolution therapy using Coca-Cola via Naso jejunal tube**. Patient recovered with the conservative management.

The main principle of Enterolith dissolution therapy is based on the occurrence of **an acid-base reaction**.[1] The commercially available Coca-Cola, which we consume has a **pH of 1.9** - with **Carbonic acid and Phosphoric acid** being responsible for its acidic nature.[11] For an enterolith which is in distal ileum, with ileal pH of 7-8, strongly acidic solution is needed to trigger a reaction. The use **of Naso jejunal tube is to bypass the stimulatory secretion of bicarbonate** from Pancreas due to release of Secretin, which is triggered by acid entering the first part of Duodenum and thus maintaining the acidic nature of Cola. This coupled with the **carbonation** helps in **slowly disintegrating the enterolith and makes it fragile**, causing a gradual decline in its size, which favours its forward propulsion from the narrow regions of alimentary tract.

In our study, we have administered Coca-Cola 500ml twice daily for a period of 6 days, with close monitoring of clinical status of the patient. Serial imaging of the patient at admission, after 48 hours of conservative management and after 6 days of dissolution therapy – showed promising results- reduction in size of enterolith and migration of enterolith.

Coca-Cola has been used by various medical professionals around the world for the treatment of **gastric bezoars.**[12] However, there is limited studies on successful use of Coca-Cola for the treatment of enteroliths in the modern medical world. Komaki et al. (2019) used Cola dissolution therapy via ileus tube, for a case of small bowel obstruction caused due to enterolith in an elderly female.[13] Nomura et al. (2023) used a combination of Cola dissolution therapy with the use of Double balloon endoscopy in an elderly female with small bowel obstruction secondary to enterolith.[14]

CONCLUSION

This is a case of middle aged female, with no known comorbidities and presented with features of subacute intestinal obstruction, secondary to an enterolith at distal ileum. After a trial of conservative management and informed consent from the patient, she was started on Cola dissolution therapy for a period of 6 days. Following the dissolution therapy, patient showed symptomatic improvement and there

is radiological evidence of reduction in size and migration of enterolith distal to Ileo-Caecal junction. This signifies the importance of conservative and non-invasive management of Enterolithiasis in malnourished patients.

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