Case Report
Volume 11:1, 2021

Clinical Case Reports

ISSN: 2165-7920 Open Access

A Case Study of Intestinal Obstruction Associated with True Primary Enteroliths in an Elderly Patient

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Abstract

Enteroliths are generally classified as 'true' or 'false' enteroliths and most cases involve the latter, with 'true' enteroliths being rare. In addition, Enteroliths are often asymptomatic and unlikely to cause intestinal obstruction or perforations. The following is a very rare case of intestinal obstruction accompanied by true enteroliths suffered by a very elderly patient. We report the case of 96-year-old female with loss of appetite and abdominal pain. A Computed Tomography (CT) confirmed enteroliths and Press through Packages (PTP) near the terminal ileum. Moreover, the intestinal tract closest to the mouth was enlarged. A diagnosis was made of an intestinal obstruction caused by the enteroliths and so emergency surgery was carried out. We found the existence of stenosis with incarcerated enteroliths found in the intestinal tract adjacent to the mouth. A piece of the small intestine was therefore removed. Upon analysis of the sample, four intestinal stones plus PTP were found. The main component of the enteroliths was determined to be deoxycholic acid upon analysis of their makeup and we thought the sample stones as true enteroliths. The post-operative course went well and the patient was able to return home on the 37th day of hospitalization. Cases of intestinal obstruction due to true enteroliths have a low likelihood of the stones being passed naturally. Thus, it is advisable that surgery be performed as soon as the corresponding diagnosis is made.

Keywords: Enteroliths • Intestinal obstruction • Very elderly people

Introduction

Enteroliths (intestinal stones) are generally classified as 'true' enteroliths formed in stasis in the intestines or 'false' enteroliths such as migrating gallstones and gastroliths. Most cases involve the latter, with 'true' enteroliths being rare. Moreover, enteroliths are often asymptomatic and unlikely to cause intestinal obstruction or perforations. The following is a very rare case of intestinal obstruction accompanied by enteroliths suffered by a very elderly patient of ours. We would accordingly like to review the relevant literature.

Case Report

A 96-year-old female was referred to us with complaints of pain in her lower right abdomen and loss of appetite. Her medical history indicated a track record of uterine cancer, hemorrhagic cystitis, and cholecystitis. She had also undergone a complete hysterectomy 30 years prior and received radiotherapy after operation. She had recently been hospitalized multiple times for a Urinary Tract Infection (UTI). An abdominal CT taken during hospitalization for UTI confirmed enteroliths near the terminal ileum (Figure 1). Considering that the stones were asymptomatic, the advanced age of the patient and the fact that she also had an Abdominal Aortic Aneurysm (AAA) with a diameter of 55 mm, follow-up observation was initially prescribed with priority given to the treatment of UTI. The patient's ability to withstand surgery was also taken into account when deciding her treatment options. The patient was subsequently re-hospitalized 3 months later due to UTI. It was during this time that she began complaining of the loss of appetite and abdominal pain. While her abdomen was flat and soft, she experienced sharp pain upon pressure. There was no apparent rebound tenderness. An abdominal CT revealed enteroliths and PTP near the terminal ileum same as before (Figure 2) and the intestinal tract adjacent to the mouth was slightly enlarged. Edematous changes were found in the small intestine surrounding enteroliths and her fat tissue concentration had increased. A biochemical examination of a blood sample gave results of BUN 25.2 mg/dl, CRE 1.14 mg/dl (indicating reduced renal function) and CRP 6.0 mg/dl, WBC 4800/μl (Neut 79.2%), Hb 7.9 g/dl. An increase in inflammatory response and anemia was observed, but beyond that, there was nothing else of note. The subsequent diagnosis was intestinal obstruction caused by enterolithiasis. Although the patient was advanced age, emergency surgery was performed. We did however take into account the ability of the patient to undergo said procedure and other possible post observational treatments before proceeding.

Laparoscopic surgery was initially attempted, but we encountered difficulties due to strong adhesion across a wide area. Therefore, a 7 cm right side pararectal incision was made to enable abdominal surgery. We detected stenosis roughly 30 cm from the terminal ileum and incarcerated enteroliths. Because of the effect of the previous operation and the inflammation caused thereby, the whole surface experienced strong adhesion around the surrounding organs. We loosed adhesion as much care as possible. Subsequently, a piece of the small intestine was removed, from which a sample was taken in order to prepare for removal of the blocked section. Upon analysis of the sample, four enteroliths having a diameter of 2 to 5 cm plus PTP were found (Figure 3). Upon analysis of their makeup, the main component of the enteroliths was determined to be more than 98% deoxycholic acid and was thus determined to be 'true' enteroliths. Via histopathological examination, we found that the greatest changes caused by stenosis were the complete loss of mucous membrane and muscle layers in the small intestine. As a result, all muscular layers had begun to become necrotic. Inflammatory cells had begun to infiltrate the serous membrane and started spreading over a wider area, suggesting that there had been micro perforations in part of the small intestine. Additionally, fibrosis occurred over the passing of time in the serosal membrane, which was considered a possible cause of the stenosis in the small intestine (Figure 4). She suffered from UTI again post operation, but this eventually cleared up and indicated a high likelihood for recovery. After this development, the patient was discharged on the 37th day of hospitalization.

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Received 28 November 2020; **Accepted** 25 December 2020; **Published** 01 January 2021

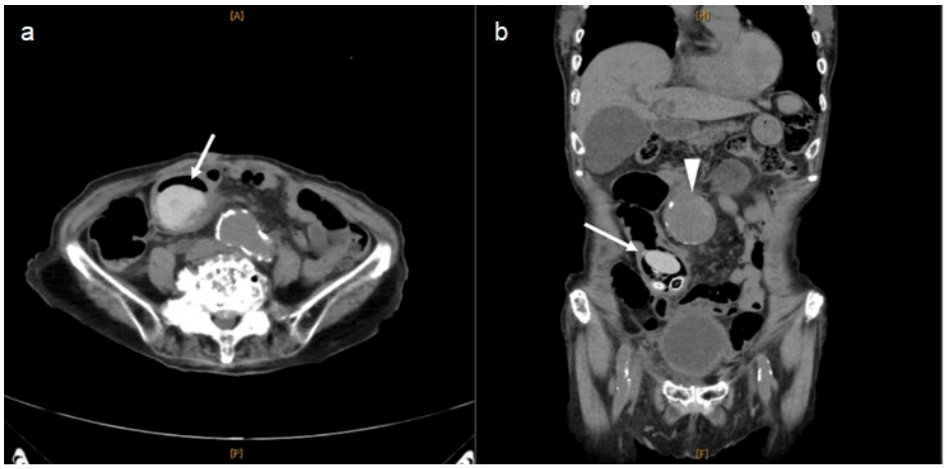

Figure 1. (a) Abdominal CT three months prior to the operation: At least 3 enteroliths are observed near the terminal ileum (arrows). **(b)** Abdominal aortic aneurysm with a maximum breadth of 55 mm (arrow head).

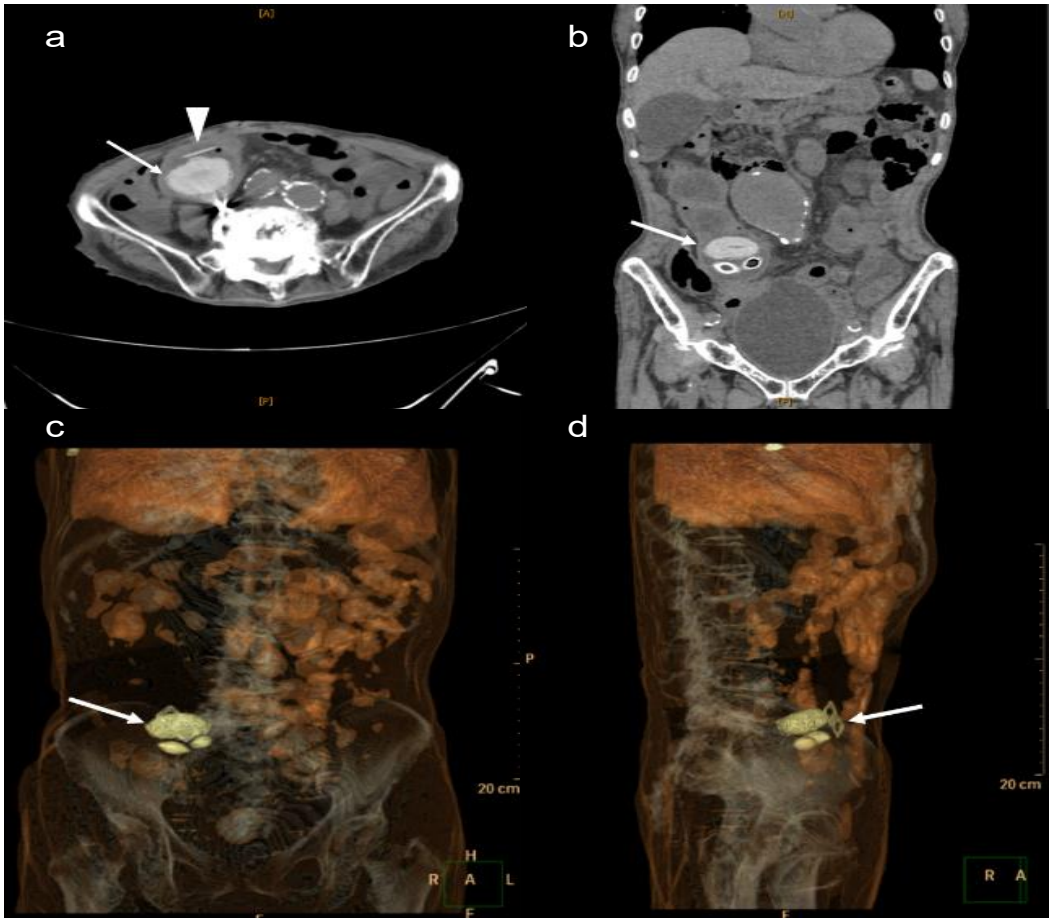

Figure 2. Pre-operative CT: **(a, b):** 3 enteroliths were confirmed near the ileac end section in a similar position to the last time a CT scan was taken (arrows). Moreover, in this vicinity there is a flat structure that seems to be PTP (arrow head). There is an edematous change in the small intestine surrounding the intestinal stone, thus slightly increasing the fat tissue concentration. **(c, d)** 3 bowel stones and PTP are indicated here (arrows).

Discussion

Enteroliths are generally classified as either 'false' enteroliths or 'true' enteroliths, most of which are of the former classification. 'Fake' enteroliths are defined as insoluble clumps found in the intestinal fluids or are defined as matter found in the contents of the intestines or mere sediment. They can include hairballs, stones caused by dietary fiber, ingested lipids, gastroliths, gallstones, foreign bodies found in the intestines, etc. 'True' primary enteroliths are deemed as being produced in the intestine via the precipitation and retention of the intestinal contents [1,2]. Depending on their makeup, 'true' enteroliths are classified as either 1) bile acid, 2) calcium oxalate stones, or 3) calcium phosphate types among others, but most are bile acid or calcium oxalate types [3]. Bile acid enteroliths tend to be deposited more under acidic conditions and are found more in the jejunum, whereas their calcium oxalate equivalents are more likely to be deposited under more alkaline conditions in the ileum. True Enteroliths are considered to be caused by chemical factors such as the concomitant existence of matter which can be used to create the actual stone paired with the solubility, of the ph, of the intestinal contents. Mechancial factors such as stenosis/diverticula/blind pocket formation are also thought to contribute as well [4]. In reported cases of actual 'true' primary enteroliths, there have been numerous cases of said stenosis/diverticula/blind

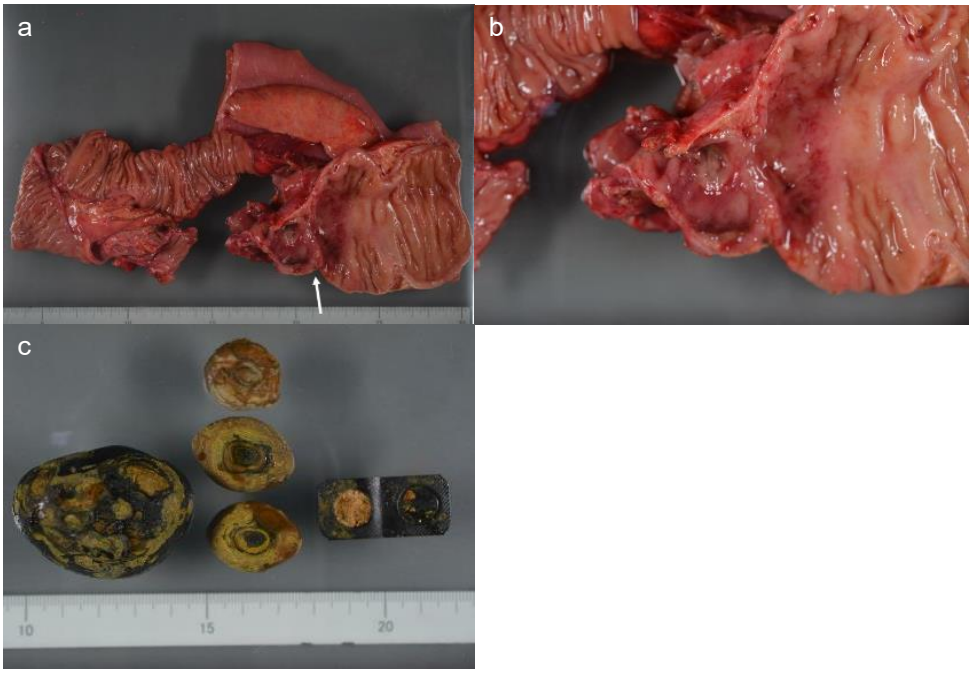

Figure 3. An extracted specimen: **(a, b)** The intestine indicated that it had high level adhesions and radiation induced contractions. **(c)** 4 intestinal stones with a size of 2 to 5 cm and PTP were detected in the intestines.

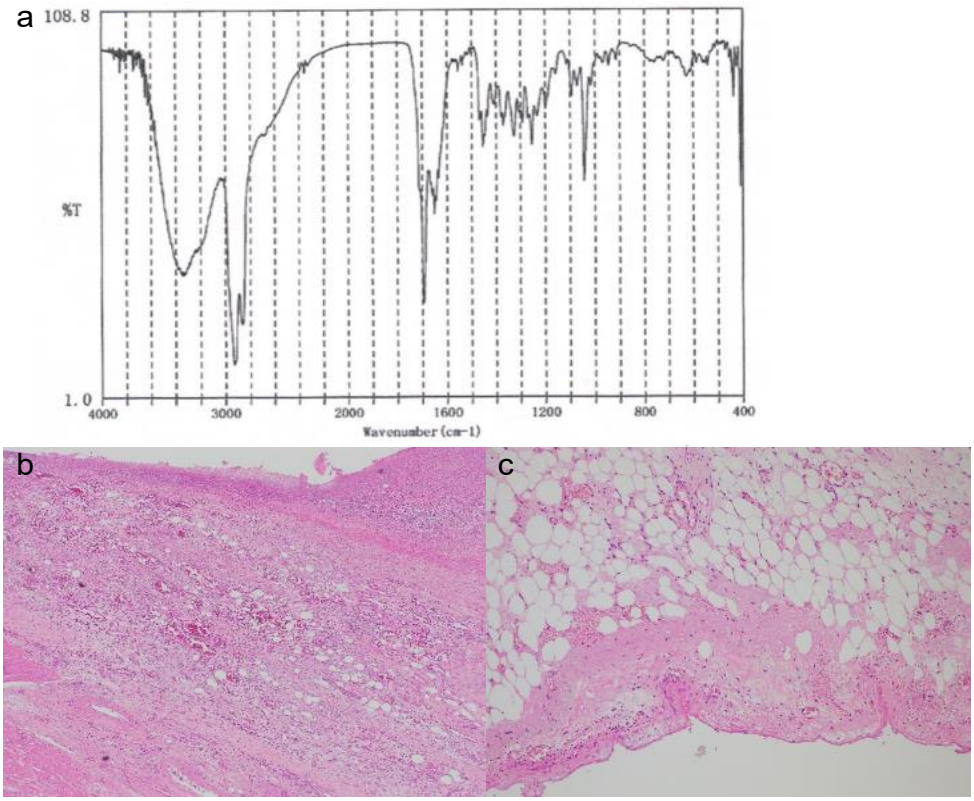

Figure 4. **(a)** A stone composition analysis: An IR (infrared spectroscopy) consistent with deoxycholic acid was confirmed, suggesting that these were bile acid enteroliths. **(b).** There was a complete loss of mucous membrane and muscle layers in the small intestine. Additionally, all muscular layers had begun to become necrotic. Inflammatory cells had begun to infiltrate the serous membrane and spread over a wider area. **(c)** Fibrosis was observed over time in the serosa.

pocket formation accompanied by congestion of the contents of the stomach [5]. In our case, we were able to diagnose these as 'true' primary enteroliths, as opposed to 'fake' ones, thanks to the size of enteroliths, absence of gastroliths (stones caused by dietary fiber or lipid intake) and the fact that more than 98% of the stone's components were made up of deoxycholic acid (which is a type of bile acid). The intestinal contents also had stagnated thanks to the existence of intestinal stricture caused by previous surgical adhesion and postoperative radiotherapy in the ileum located across an area 30 cm adjacent to the mouth side to the end of the ileum where the intestinal stone existed.

This factor was considered mechanical as such. While enteroliths are often asymptomatic, they can sometimes lead to serious complications such as bowel obstruction and perforation. In asymptomatic cases, non-surgical treatments such as crushing/extraction, and follow-up treatment are often prescribed [6,7]. In symptomatic cases, surgical treatment is often

chosen and surgical incisions are made near the enterolith to remove it. If this is difficult to do, partial intestinal resection is then carried out [8-10]. In recent years, laparoscopic surgery has increasingly become the more often performed way of tackling this malady. In the case listed above, we initially decided on a course of follow-up observations as the patient didn't display any visible symptoms. Furthermore, we took into account the risk of administering a general anesthetic and performing surgery on a very elderly patient who suffered from AAA. However, due to 1) the appearance of symptoms indicating intestinal obstruction, 2) the existence of enteroliths that had not moved to anal side, 3) edematous changes that had been observed in the small intestine, increased fat tissue concentration in the surrounding areas, and the fact that minor perforations caused by inflammation could not be ruled out, and 4) the likelihood of said perforations eventually occurring, it was decided that immediate invasive procedures be undertaken. Since there was a high degree of adhesion and stenosis in the ileum near said enterolith, it was thought that we could not expect improvement in the bowel obstruction even if an intestinal incision was performed and the enterolith removed. We discussed the possibility of placing an ileostomy during surgery, but we had no choice to placing an ileostomy due to the difficulty in stoma care and the fact that we would not be able to proceed unless we removed the adhesion first. In the end, we chose to remove sections of the small intestine, including the area of the bowel where the stones were incarcerated. Said surgery was performed as soon as possible. Coming to this conclusion was incredibly difficult taking the age and recuperative abilities of the patient into consideration. Numerous reports exist indicating that emergency surgery performed on the very elderly is blighted by poor prognosis or follow-up complications [11-13]. However, since deciding not to operate can also be linked directly to numerous cases of mortality, there is a tendency to push for surgery despite the pitfalls surrounding it [14]. Indeed, we often come up against cases like the one above in which there is no option but to operate. In this case, it was thought that post operation management and the choice of a technique that was as non-invasive as possible and allowed the patient to return to their family and community as quickly as possible was crucial.

Conclusion

We encountered a rare case of intestinal obstruction due to enterolithiasis in a very elderly person. The chances of recovery of this kind of obstruction were low if we followed a path of preservationary treatment. Furthermore, there was a danger that the intestine would be perforated if we did not act. Once we were able to determine that the patient could bear the surgery, we followed a path that was as quick and non-invasive as possible.

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How to cite this article: Hiroyuki Inoue, Mahito Miyamae, Takuma Arai, and Yozo Kokawa, et al. "A Case Study of Intestinal Obstruction Associated with True Primary Enteroliths in an Elderly Patient." *Clin Case Rep* 11 (2021): 1404.