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Case Report

Laparoscopic Treatment of Enterolith Bowel Obstruction: Case Report

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Abstract

Introduction: Small bowel obstruction can be caused by an entherolith formed within a jejunal diverticulum.

Case Report: We report two patients with obstructive acute abdomen caused by jejunal entherolith, demonstrated by CT-Scan, and treated by local jejunal resection and respective mechanical anastomosis by laparoscopic surgery. During surgery biliary fistula between the gallbladder and the small bowel was excluded. In both cases post-operative follow-up was uneventful. Analysis of the stones revealed the presence of calcium oxalate and bile pigments.

Discussion: Consensus management of enterolith ileus advices to remove stones through an enterotomy which could be performed in a less oedematous segment of the jejunum or by a small bowel segmentary resection done by laparoscopy.

Conclusions: It is well accepted that diverticuli provide an acidic environment necessary for choleic acid precipitation and stone formation. However calcification cannot occur without alkaline pH shift, which normally occurs in the ileum. Our cases confirm calcification occurring in the proximal small bowel.

Keywords: *Entherolith; Bowel Obstruction; Jejunal Diverticulum; Laparoscopy*

Introduction

Small bowel ileus is a frequent occurring surgical situation that needs urgent measures. Common causes are hernia, adhesions or neoplasias. Small bowel obstruction caused by an entherolith formed within a jejunal diverticulum can be complicated by haemorrhage or perforation due to this rare entity, causing a local ischemic and infectious reaction described as a cause of threatening acute abdomen. We present two cases and discuss the management options.

Case Report

Two men (68 and 73 years old) were admitted in our Unit of Specialized Surgery in december 2005 and september 2017, with a history of three and four days existing small bowel obstruction. They had no personnel or familiar history of diverticular disease, no previous abdominal surgeries or comorbidities. Both were dehydrated and febrile (38.1°C and 38.5°C respectively). Abdominal examination showed a moderate distension. Bowel peristaltic sounds were diminished but not absent. White blood cells counts were 17.9 G/l and 18.3 G/l both with neutrophilia. C-Reactive Protein was 281 and 331 mg/l respectively. Plain abdominal X-Rays where demonstrative for ileus and abdominal CT-Scans showed a small bowel obstruction caused by a stoned structure in a jejunal diverticum in both cases, as showed in figure 1.

Figure 1: *CT-Scan showing small bowel obstruction due to entherolith.*

In both cases, laparoscopy showed an isolated jejunal diverticulum, associated to inflammatory reaction in the first case, and an initial abscess in the second patient.

Once the surgical evaluation was finished, we proceeded with a local jejunal resection. This manoeuver showed a calcified entherolith inside a jejunal diverticulum, as shown in figure 2.

Figure 2: *Entherolith within a jeunal diverticulum locally resected.*

Classic mechanical anastomosis were made. The gallbladders were removed with no evidence of fistula to the small bowel. In both cases post-operative follow-up was uneventful. Analysis of the stones revealed the presence of calcium oxalate and bile pigments.

Results

It is well accepted that diverticuli provide an acidic environment necessary for choleic acid precipitation and stone formation [1]. Nevertheless, the calcification phenomena appears due to the shift of the alkaline pH, that is usually common in the ileum and not in the jejunum [2].

This case shows that calcification can occur in the proximal small bowel as an exceptional situation that confirms the rule.

Discussion

Enteroliths are abnormal concretions formed in the intestine and are usually composed of mineral salts, described the first time by Chomelin J, a french surgeon early in XVIII century, as a case of stone formation in a duodenal diverticulum at autopsy [5]. Sjoqvist gave the chemical composition of an enterolith early in the XXth century [6], more recently Pfahler., et al. published a report on the radiological features of enterolithiasis [11] and it was not until 1959 that Atwell., et al. introduced the definition of enteroliths as "endogenous foreign bodies in the gastrointestinal tract" [8,12]. Its prevalence ranges from 0.3% to 10% in selected populations [13,15]. Any proximal primary enterolith is composed of salts of choleic acid, by the other hand, any distal enterolith, is composed more out of calcium salts [9,16]. The incidence of enterolithiasis is not exactly because, as a common denominator of the disease, the majority of patients are asymptomatics or as often, the correct diagnosis is not evoked [8]. Less than 50 similar cases have been reported worldwide [7].

There are two types of classification of enteroliths, the first one classifies enterolithiasis in: Primary enteroliths (originated in the intestinal lumen) or Secondary enteroliths (lithiasis formed outside the intestine, that has eroded the bowel wall and has migrated into the lumen) [16]. The most frequent entity is when gallstones causes gallbladder erosion through the adjacent intestine, and it will passes as a secondary migrating enterolith [3,9].

A second type of classification determines the entherolith's chemical composition, and they are classified as: True enteroliths, composed by frequent substances found in the bowel (Calcium, choleic acid, hydroxy-fatty acid and ammonium-magnesium phosphate stones), and False enteroliths, composed by rare substances or foreign structures that will be found in the bowel (Insoluble varnish stones bezoars, concretions of chalk, lime or barium sulfate pebbles and inspissated faecal stones) [12,16-18].

It has been mentioned that a disturbed bowel motility may be the cause involved in the development of an enterolith within the jejunum as a result of a diminished peristaltic movements [9]. Stasis occurs frequently where intestinal diverticuli are placed, sites of intestinal anastomoses, sites of intestinal adhesions, hernias and at sites of intestinal strictures or Meckel's diverticulum [3]. The endoluminal pH specific to each segment of the proximal bowel, varying it's properties, can result in crystals deposits of choleic acid, that predisposes aggregates and forms enteroliths at acidic pH whereas calcium enteroliths are formed at alkaline pH [10,11]. Therefore, it is possible to find enteroliths of choleic acid in the jejunum and enteroliths containing calcium carbonate in the distal ileum or right colon [16].

Weak specific clinical manifestations make the intestinal obstruction eased by a mildly symptomatic enterolith [7]. The endoluminal migration of an enterolith can make the clinical setting fluctuating and frequently presents unexplained remission [12]. They may also present real surgical emergencies such as acute intestinal obstruction followed by bleeding or perforation of the intestine [13]. In our descriptions, both patients presented in an infectious setting associated with acute intestinal obstruction due to an enterolith, which required urgent intervention [16].

In case of small bowel obstruction, plain abdominal X-rays will show a visible enterolith as a radiopaque stone with a peripheral irregular calcifications surrounded by a radiolucent center in just 30% of the cases. Some apparent mobility of the enterolith during radiography may be suggestive of a mobile endoluminal stone [11]. For this reason, abdominal computed tomography (CT-Scan) performed using oral contrast, is specific for the diagnostic yield of enterolith. CT-Scan may also identify radiolucent enteroliths, their exact location, the total number of stones, and the presence of underlying intestinal pathology. Unfortunately, in most of the cases, diagnosis of intestinal obstruction caused by an enterolith can only be made during surgery [1,17].

The surgical approach remains the only option for small bowel obstruction caused by large enteroliths, when complementary examination such CT-Scan is not available and/or when the conservative treatment has failed [2,4].

During surgery, manual fragmentation of the stone, followed by distal milking of smaller pieces to the colon, is limited to a success of around 50% [13]. Large, hard enteroliths that cannot be fragmented manually or mechanically, can be recovered through a proximal enterotomy followed by manual removal of the enterolith.

Small intestine segmental resections followed by primary anastomosis will be required when endoluminal enteroliths are associated with other intestinal pathology such as exudative diverticulitis, strictures, abscess or intestinal ischemic injuries [4,7,14,15].

Conclusion

Steenvoorde P proposes that management of enterolith ileus at surgery is to remove the stone through an enterotomy which is made in a less oedematous segment of the jejunum or by a small bowel segmentary resection [14]. The rarity of diverticulosis complicated with a small bowel obstruction due to an enterolith is well described [7].

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