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Case Report: A case of a frail 87-year-old female with intermittent obstruction secondary to a colonic fecalith. She was an unsuitable candidate for a laparotomy. Attempts at mechanical endoscopic lithotripsy were unsuccessful. A holmium YAG laser was used endoscopically to fragment the fecalith. A polypectomy snare was used to stabilize the fecalith and later extract the fragments.

Conclusion: Endoscopic intraluminal holmium laser lithotripsy provides a non-operative option for removal of an impacted fecalith.

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CASE REPORT

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Introduction: Colonic fecaliths have been fragmented with mechanical and electrohydraulic lithotripsy, however, laser lithotripsy of a fecalith has not been described. **Case Report:** A case of a frail 87-year-old female with intermittent obstruction secondary to a colonic fecalith. She was an unsuitable candidate for a laparotomy. Attempts at mechanical endoscopic lithotripsy were unsuccessful. A holmium YAG laser was used endoscopically to fragment the fecalith. A polypectomy snare was used to stabilize the fecalith and later extract the fragments. **Conclusion:** Endoscopic intraluminal holmium laser lithotripsy provides a non-operative option for removal of an impacted fecalith.

Keywords: Endoscopic, Fecalith, Holmium YAG laser, Lithotripsy

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INTRODUCTION

An impacted fecalith causing a large bowel obstruction is rare [1]. Traditional treatment includes endoscopy and retrieval. If the fecalith is too large to be retrieved, endoscopic lithotripsy is performed [2, 3]. If unsuccessful, the remaining option is laparotomy and colotomy. Previously reported methods of endoscopic lithotripsy include mechanical and electrohydraulic lithotripsy [2, 3].

The holmium YAG laser is commonly used in urology to fragment ureteric calculi [3]. It is also used in the treatment of benign prostatic hyperplasia [4, 5]. It is a pulsed laser with a wavelength of 2120 nm. The laser fragments stones through the use of a shock wave. The pulsed energy creates a cavitation bubble that collapses with tremendous force. As water is also a component of the ureteral calculi, the stone itself absorbs energy, which may contribute to its fragmentation. [3]

We present a new use of the holmium YAG laser to perform lithotripsy of an obstructing colonic fecalith.

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CASE REPORT

An 87-year-old female presented to hospital with a five-day history of obstipation and abdominal pain. The pain was in her right lower quadrant and radiated across her abdomen. She described the pain as constant, but fluctuating in severity, and crampy in quality. She had no previous episodes of similar complaints. She denied any nausea and vomiting. However, she was taking dimenhydrinate for “dizziness” and her appetite had been poor. The patient denied any hematochezia or melena; however, she did describe a history of thinner stools over the past few months, which were formed in consistency, but thin and long. The patient had taken some inulin as well as laxatives during this episode, to no effect.

Past medical history of the patient included asthma, hypothyroidism, angina, left bundle branch block, hypertension, and arthritis. Her surgical history includes open appendectomy, open cholecystectomy, open abdominal hysterectomy, a bladder lift, and bilateral cataract repair. Her medications included nitroglycerine spray, levothyroxine, irbesartan, acetaminophen with codeine, hydrochlorothiazide, zopiclone, and a budesonide inhaler. She had no known drug allergies.

The patient was a lifelong non-smoker and was functionally independent living with her husband. Her family history included a sister with breast cancer and a daughter with diabetes. She had no family history of colon cancer.

On presentation, the patient appeared well. Her abdomen was soft, not clinically distended. She had no percussion tenderness, but she was tender to palpation in the right lower quadrant. There were no inguinal hernias. No hepatosplenomegaly nor any masses were palpable. A digital rectal exam was deferred.

An abdominal X-ray was performed which showed a calcified fecalith measuring approximately 3.6 cm in the pelvis (Figure 1). There were numerous distended gas filled loops of small and large bowel seen throughout the abdomen with associated air fluid levels. The transverse colon measured at the upper limit of normal at 5.9 cm. No free intraperitoneal air was seen. A CT scan was performed, which showed a 3.1x2.1 cm calcification in the distal sigmoid colon (Figure 2). The colon distal to that point was decompressed.

Interestingly, this calcified mass was seen on previous CT scans, as far back as 2009 when it was seen in the cecum. The patient had abdominal CT scans in 2011 and 2012 for abdominal pain, which showed the mass continuing to be in the cecum.

She was admitted with a partial large bowel obstruction secondary to this large chronic fecalith which had migrated to the sigmoid colon.

On serial examination she continued to have a distended abdomen. She had a flexible sigmoidoscopy on post-admission day-one. The fecalith was visualized but could not be extracted past the rectosigmoid junction due to its size and despite several attempts no polypectomy

snare could crush the fecalith. Due to her comorbidities it was felt that she would poorly tolerate a laparotomy, which was likely to be challenging given her past surgical history and would at least require a colotomy for removal of the stone. We consulted our urology colleagues and on post-admission day-three she was then taken to the operating room where we performed endoscopic intraluminal laser lithotripsy. The fecalith was successfully fragmented and the fragments were removed with a polypectomy snare. There were signs of mild colonic mucosal injury due to trauma from the stone fragments; however, no intraoperative complications occurred.

Postoperatively, the patient did well and remained in hospital three days. She had no abdominal pain and eventually had formed stools. There was no significant change in her hemoglobin. She did not have a leukocytosis during her admission. Her stay in hospital was prolonged by electrolyte replacement for hypokalemia and hyponatremia. She was discharged home on her previous medications with the addition of an enteric-coated potassium supplement.

Technique

In lithotomy position under a general anesthetic, a dual channel colonoscope was inserted and advanced through the rectosigmoid. The fecalith was identified (Figure 3). A polypectomy snare was used to stabilize the fecalith. A holmium YAG laser with a 1000 micron laser fibre was used. The settings were initially 0.5 J and 30 Hz and were increased up to 0.6 J and 40 Hz during the procedure. The laser fibre was passed down the working channel of the colonoscope and the fecalith was lasered. A crater was formed and the fecalith was rotated to continue lasering. The smoke and heat produced during the procedure did cause the lens of the colonoscope to become blurred. Each time, the fecalith would need to be released, the colonoscope removed, the lens cleaned, the colonoscope reinserted, and the fecalith secured again with the snare. Once the stone had a sufficiently large crater, we were able to use the snare to fracture the fecalith into fragments (Figure 4). The larger fragments were individually snared and withdrawn while the smaller fragments were left to pass spontaneously. On final inspection, there was some mild bleeding and signs of mucosal colitis due to the fragments. However, there were no signs of deeper injury (Figure 5). No colonic injury occurred due to the laser. The patient was started on cefazolin and metronidazole during the procedure when it appeared that there was some mucosal trauma occurring. She continued on this postoperatively for a total of seven days.

DISCUSSION

The patient had been a prime surgical candidate, she would have had a laparotomy and colotomy to remove the fecalith, given that traditional endoscopic methods to retrieve the fecalith had failed. In this patient, however, a

laparotomy would be poorly tolerated. To our knowledge, this is the first reported case of endoscopic colonic fecalith extraction with the assistance of holmium YAG laser lithotripsy. Case reports exist of fecaliths causing large bowel obstruction and endoscopic retrieval performed by crushing the fecalith with a forceps and snare or specially designed crushing baskets [6, 7]. Lithotripsy has been used on colonic fecaliths, in the case of Morgentaler et al. who used electrohydraulic lithotripsy to fragment a 9 cm fecalith and then resected it piecemeal with an osteotome and a mallet [2]. Electrohydraulic lithotripsy was then used endoscopically by Nomura and colleagues to remove a 7-cm fecalith from a rectal remnant following loop

Figure 1: Abdominal X-ray of calcified fecalith in the sigmoid colon.

Figure 2: Abdominal computed tomography of calcified fecalith in the sigmoid colon.

Figure 3: Endoscopic picture of fecalith prior to intraluminal laser lithotripsy.

Figure 4: Endoscopic picture of fecalith during fragmentation (after intraluminal laser lithotripsy).

Figure 5: Endoscopic picture of mucosa and small fecal fragments following intraluminal laser lithotripsy and snare retrieval.

sigmoid colostomy [3]. There has not been a reported case of laser lithotripsy being used to fragment a fecalith. There are cases of laser lithotripsy being used in the colon on gallstones that have traveled through cholecystocolonic fistula [8, 9]. These cases, however, did not use the holmium YAG laser that we successfully used here. While predominately used in urology, use of the holmium YAG laser within the gastrointestinal tract has been described. There are a few cases of the holmium YAG laser being used for Bouveret's syndrome (gastric outlet obstruction from a duodenal gallstone). The gallstones were fragmented in the duodenum and stomach [9–11].

Using the holmium YAG laser is advantageous in that it is an existing technology and is locally available. Having been used extensively in urology, it has proven itself to be safe. It has a lower risk of damage to surrounding structures than electrohydraulic lithotripsy [4]. Due to its use in common urological conditions, including benign prostatic hyperplasia and ureterolithiasis, the holmium YAG laser is a common hospital technology. One of the disadvantages of using the holmium YAG laser in the colon is that it is not an aqueous environment, unlike the urinary tract. When fracturing a ureteral stone, the equipment has a continuous stream of fluid that washes away debris. During our experience in the colon, the smoke from the lithotripsy clouded the lens of the colonoscope and was resistant to the colonoscope's lens-washing mechanism. Consequently, the colonoscope would have to be removed after a period of lithotripsy and cleaned, and then reinserted and navigated back to the fecalith. Despite this shortcoming, using the holmium YAG laser allowed our frail patient to avoid a laparotomy and a longer hospital stay. In fact, she recovered from the procedure itself quite quickly. In addition, this technique made use of equipment that was already available with no special modifications required.

CONCLUSION

Our patient had a large bowel obstruction from a fecalith that we were unable to remove intact endoscopically or crush with the usual techniques. To the best of our knowledge, our case is the first documented use of the holmium YAG laser being used to fragment a large fecalith endoscopically. We would recommend this technique as a safe and effective option in patients who have not had success with traditional attempts at removal of an impacted fecalith.

Author Contributions

Aaron Daters – Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Ray Deobald – Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Kunal Jana – Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Guarantor

The corresponding author is the guarantor of submission.

Conflict of Interest

Authors declare no conflict of interest.

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