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Case Report

Bowel obstruction and perforation secondary to progressive heterotopic mesenteric ossificans[☆]

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ABSTRACT

Heterotopic mesenteric ossification (HMO) is a rare condition which usually affects male patients. Its defining feature is hyperdense ossification in the mesentery, usually following surgery or trauma. Due to potentially serious complications that can arise from HMO, it is essential to recognize it in its nascent stages. In this case study, a 65-year-old male was imaged by CT scan serially over several years for recurrent bowel obstruction as a result of worsening HMO, providing new insight into the natural progression of this condition. Mechanical injury of the bowel eventually caused perforation and abscess formation.

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Introduction

Heterotopic mesenteric ossification (HMO) is a rare condition in which ossification develops in the mesentery, most often following severe abdominal trauma or recent abdominal surgery [1]. It affects a wide range of ages (21–80 years) [2] but is predominantly seen in males [1,3]. HMO is an important entity to diagnose as it predisposes to a number of potentially serious complications, most frequently small bowel obstruction [2]. This case report details a 65-year-old man who underwent multiple CT scan investigations over several years for complications arising from HMO, providing important insight into the natural progression of the disease.

Case presentation

A 65-year-old man with a remote history of a subtotal colectomy and stoma 20 years ago secondary to treatment for ulcerative colitis presented to the Emergency Department with several days of worsening nausea, vomiting, and abdominal pain. A CT scan was performed, revealing an incarcerated, parastomal hernia (Fig. 1). The patient underwent midline laparotomy for surgical reduction of the hernia. The small bowel within the hernia was frankly ischemic and was resected successfully.

Less than 5 weeks following the initial presentation, the patient returned with symptoms of bowel obstruction, including

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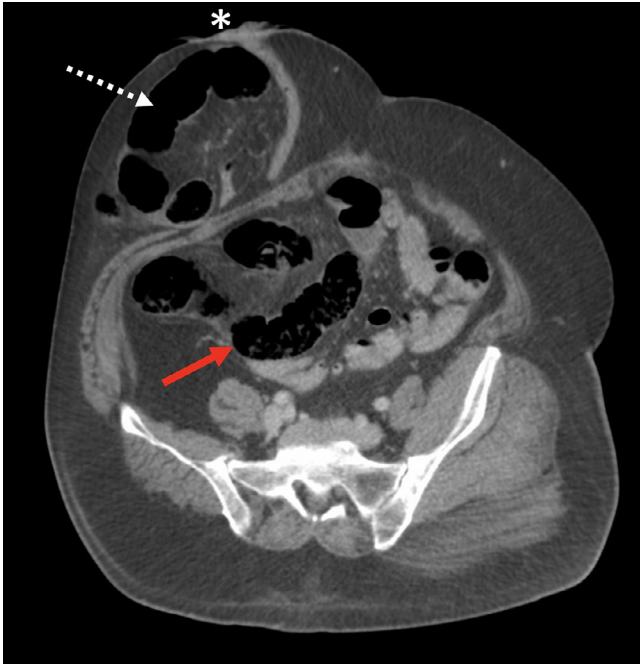


Fig. 1 – Incarcerated parastomal hernia. Transaxial CT scan demonstrates incarcerated ischemic parastomal hernial loops (dashed white arrow) adjacent to the ostomy (*). Dilated loops of small bowel (solid red arrow) are also seen in the central abdomen.

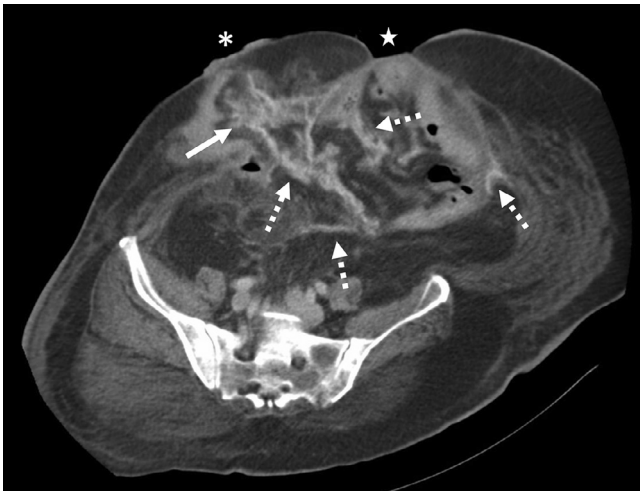


Fig. 2 – Early HMO. Transaxial CT scan taken less than 5 weeks from the initial CT scan demonstrates early ossification in the parastomal soft tissues at the site of surgical reduction (solid arrow). Interval development of multiple serpiginous densities extending toward the central abdomen along the mesenteric root (dashed arrows). The stoma site is only partially seen in this image (*). Midline incisional defect (star).

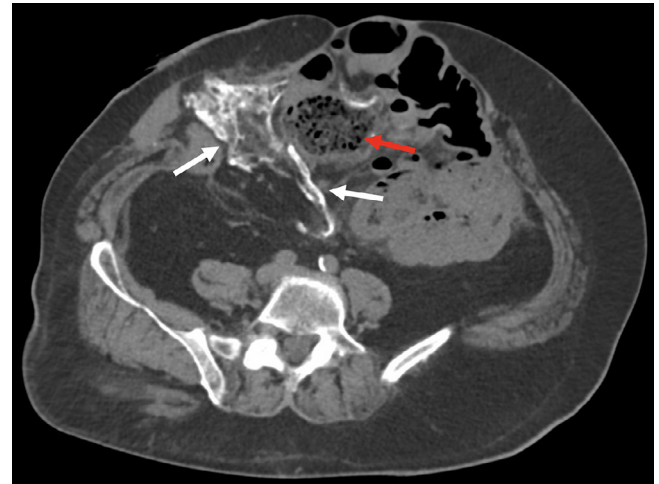


Fig. 3 – Matured HMO. Transaxial CT scan 10 months following the initial presentation demonstrates progressively mature ossification throughout the mesentery. It is peripherally hyperdense, with central low attenuation (solid white arrows). Distended loops of small bowel, including loops of bowel containing fecal-like matter and air-fluid levels, are also visible consistent with small bowel obstruction (solid red arrow). The bowel appears clustered in the central abdominopelvic region.

abdominal pain and decreased stoma output. A repeat CT scan was performed (Fig. 2). This demonstrated development of multiple, fine, curvilinear areas of mineralization throughout the mesentery. The calcifications extended toward the stoma site and the midline incisional hernia. The patient was treated conservatively and was discharged.

Nearly 10 months after the initial visit, the patient presented with similar symptomatology to the Emergency Department. Clinically, bowel obstruction secondary to incisional hernia was suspected. This third CT scan (Fig. 3) confirms the clinical diagnosis but also reveals the progressive maturation of ossification within the mesentery. The patient improved with nasogastric tube placement and conservative measures.

More than 5 years following the parastomal hernia reduction, the patient presented subsequently with abdominal pain. This time, however, symptoms were accompanied by fever and a new suprapubic mass. CT scan with volume rendered images revealed a small bowel perforation with abscess formation adjacent to one of the many sharp, serrated mesenteric ossifications (Fig. 4). Due to the complex past surgical history, the patient was managed nonoperatively. After treatment with IV antibiotics and close clinical observation for several days, the patient had recovered and was discharged.

Discussion

Heterotopic mesenteric ossification, also referred to as intra-abdominal myositis ossificans [3] or mesenteritis ossificans [4], is a rare disease in which ossification develops in the

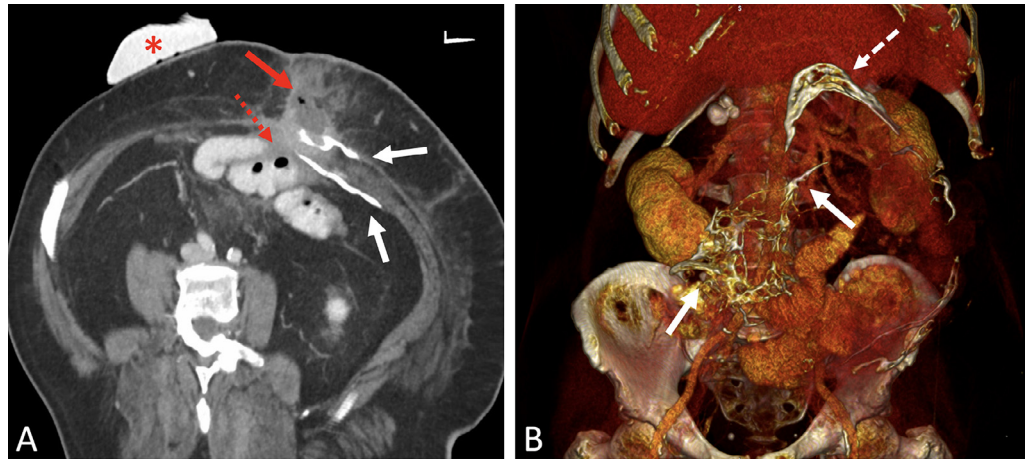


Fig. 4 – Bowel perforation and abscess. Transaxial CT scan (A) and 3-D rendering (B) acquired 5 years after the initial parastomal hernia repair. The areas of well-matured HMO are organized into arcades of jagged and lace-like structures (solid white arrows) as well as broad, semicircular sheets (dashed white arrow). Extraluminal gas and fluid related to abscess formation are seen in the anterior abdominal wall (solid red arrow) superficial to a defect of the small bowel (dashed red arrow). The bowel perforation lies immediately adjacent to two finger-like HMO projections. An ostomy bag is noted (*).

mesentery, potentially resulting in significant morbidity. The majority of HMO cases occur in men, with reported ages ranging from 21 through 80 [2]. Although the exact causes of HMO are still not completely understood, there is most commonly a history of significant surgery or abdominal trauma [3,5,6]. The resultant osteoblastic or chondroblastic differentiation from pluripotent mesenchymal cells is theorized to culminate in heterotopic bone formation [1,7–10]. No underlying endocrine or metabolic disorder has been elucidated [11].

Although there have been case reports of HMO in the past, there have been no case studies to our knowledge that have documented the evolution of HMO over the course of several years. In the case presented here, there are a few notable points. First, the ossification developed relatively early on with the earliest manifestations seen rapidly one month following the initial parastomal hernia repair. This case illustrates the importance of recognizing the incipient stages of HMO since the ossification was initially mistaken by the radiologist as surgical material. However, new advanced imaging techniques like dual energy CT can help confirm the presence of calcium/ossification with high specificity based on the unique spectral properties of calcium [12]. Second, the patient presented multiple times with recurrent bowel obstruction, each time being treated conservatively. Our case underscores the elevated risk for bowel obstruction resulting from HMO. Third, the formation of rigid, dagger-like projections is capable of physical injury and perforation of the adjacent bowel potentially resulting in abscess formation or peritonitis.

Again, although the patient was successfully treated conservatively in this case, physician should be vigilant of this complication in all cases of HMO since bowel perforation often mandates operative management. Other complications that have been reported in the literature include enterocutaneous fistula [13], duodenal stenosis [14], cholelithiasis, pancreatitis, and peritonitis [6].

The treatment of HMO is not well established and depends upon the patient's presentation and the extent of ossification.

Medical therapies including bisphosphonates, cimetidine and NSAIDs may help mitigate recurrence but further research is required to determine their effectiveness [2,3,15]. Some authors have advocated surgical resection of HMO [14] while others have cautioned that additional surgery may, in fact, induce further HMO formation [3,16].

Conclusion

Heterotopic mesenteric ossification needs to be strongly considered when mineralization of the mesentery is encountered on CT scans, especially if there has been an antecedent operation or trauma. As this case illustrates, HMO can develop within just weeks of major surgery and can evolve and enlarge to form broad or irregular sheets of ossification leading to complications such as bowel obstruction and perforation. It is important for radiologists and surgeons to not dismiss early signs of ossification as surgical or other foreign material to avoid misdiagnosis.

Patient consent statement

The patient signed a consent form, which included consent for any research, including the publication of this case report.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.radcr.2022.06.010.

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