Laparoscopic Enterolysis of Congenital Band Precipitating Pathogenic Heterotopic Mesenteric Ossification Requiring Hemicolecction: A Case Report

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Patient: Male, 52-year-old
Final Diagnosis: Heterotopic ossification
Symptoms: Abdominal pain • bloating • obistipation
Medication: —
Clinical Procedure: —
Specialty: Surgery

Objective: Unusual clinical course
Background: Small bowel obstruction is a relatively uncommon cause of abdominal pain in the emergency department setting. However, patients with this pathology are almost uniformly admitted to the hospital, demonstrating its clinical importance in terms of diagnostic delays and risk of clinical demise.

Case Report: This case report describes a patient who presented with a small bowel obstruction and no abdominal surgical or trauma history. The patient failed conservative management and proceeded to the operating room for diagnostic laparoscopy, which demonstrated a congenital band, a rare cause of bowel obstruction in the adult population. Surgical intervention was initially curative; however, the patient returned to the hospital 2 weeks later with concern for recurrent bowel obstruction. Despite computed tomography without any pathological lesion or lead point, the patient was taken back to surgery owing to high clinical concern, where an obstructing mass was found, and partial colectomy was performed. Pathological evaluation at the level of the obstruction demonstrated heterotopic mesenteric ossification, an exceedingly rare condition. This patient was managed at a community hospital general surgery program and, following 2 surgical interventions, had complete resolution of his symptoms.

Conclusions: This case is unique in that it presents the surgical management of 2 uncommon conditions that occurred in a single patient. It further demonstrates the importance of clinical suspicion in the management of bowel obstruction. Further study of pathogenic congenital bands and heterotopic mesenteric ossification are required to truly understand etiology, workup, and appropriate treatment.

Keywords: Case Reports • Ossification, Heterotopic • Pathology, Surgical • Tissue Adhesions
Abbreviations: POD – postoperative day; BMP – bone morphogenic protein

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Background

Small bowel obstruction is a relatively uncommon cause of abdominal pain in the emergency department (ED) setting. However, patients with this pathology are almost uniformly admitted to the hospital, demonstrating its clinical importance in terms of diagnostic delays and risk of clinical demise [1]. Patients with small bowel obstruction are generally split into 2 groups, those with and those without a prior history of trauma or surgery. In patients presenting with a small bowel obstruction without prior abdominal surgery, the rate of surgical intervention is cited in the literature as to be between 39% and 83% [2]. Known causes of small bowel obstruction in this population include hernias, malignant or benign tumors, inflammation, and other rare disorders. Congenital bands account for a very small subset of adult bowel obstructions. In review of congenital bands requiring surgery in the adult population, the authors found less than 60 cases in the available literature [3,4]. In patients presenting with bowel obstruction with a history of prior surgery or trauma, adhesions represent the leading cause of small bowel obstruction and include 60% to 75% of cases [5,6]. Heterotopic mesenteric ossificans is a rare condition presenting in the post-traumatic or postoperative patient, that has only been reported as a causative lead point for bowel obstruction in a few case reports [7].

This paper presents the case of a 52-year-old man with acute-on-chronic small bowel obstruction in the community hospital general surgery program, following 2 surgical interventions, had complete resolution of his symptoms. Congenital bands requiring surgery in the adult population, the authors found less than 60 cases in the available literature [3,4]. In patients presenting with bowel obstruction with a history of prior surgery or trauma, adhesions represent the leading cause of small bowel obstruction and include 60% to 75% of cases [5,6]. Heterotopic mesenteric ossificans is a rare condition presenting in the post-traumatic or postoperative patient, that has only been reported as a causative lead point for bowel obstruction in a few case reports [7].

Case Report

A 52-year-old man presented to the ED after 2 days of abdominal pain, nausea, and vomiting. He endorsed regular bowel movements and denied hematochezia, melena, or hematemeses. The patient denied any prior medical, surgical, or social history, as well as any family or personal history of gastrointestinal cancer, Crohn disease, ulcerative colitis, or prior colonoscopies. The patient described 1 prior hospitalization for small bowel obstruction 6 years prior to this admission and recurrent episodes of abdominal distention, nausea, pain, and constipation throughout his adult life that would eventually resolve without intervention. The patient had never sought out treatment for these episodes, describing them as infrequent in nature and attributing them to large meal consumption. The initial presentation revealed a hemodynamically stable patient with a severely distended abdomen, which was positive to diffuse percussive tenderness.

Computed tomography (CT) with intravenous (i.v.) contrast demonstrated a high-grade small bowel obstruction with a possible transition point near the terminal ileum, as demonstrated in Figure 1. Of note, there were no defined masses nor mass effect from surrounding structures. The laboratory analysis was within normal limits. A 2-day course of conservative management was attempted, but without clinical or radiologic improvement, was eventually deemed unsuccessful. The patient was then taken to the operative suite for diagnostic laparoscopy, where a congenital band obstructing the terminal ileum was seen (Figure 2). The bowel dilation seen proximal to this area resolved after the band was taken down via sharp dissection, confirming the suspicion that this was the source of obstruction. The rest of the bowel was examined, and there was no evidence of injury or bleeding. No other gross pathology was identified. The patient experienced a brief postoperative ileus, but the obstruction seemed to have resolved, as the patient was discharged on postoperative day 3, was tolerating normal diet, and having bowel movements.

The patient returned to the ED 16 days after surgery reporting worsening abdominal pain and new-onset nausea and emesis. The patient's examination demonstrated marked percussive tenderness.
tenderness and severe distention. CT with i.v. contrast demonstrated a high-grade transition point in the right lower quadrant as well as worsening bowel distention, with loops measuring up to 5.1 cm, as demonstrated in Figure 3.

A 24-h period of medical optimization via nasogastric tube decompression and correction of electrolyte abnormalities was initially preformed. The patient’s CT was discussed with the Radiology Department team, who suspected a cecal mass as the source of obstruction. Following shared decision-making with the patient in the setting of significantly dilated bowel and severe obstruction, an exploratory laparotomy with bowel resection and possible ostomy was planned. Upon entry into the peritoneal cavity substantial, nonspecific fluid was encountered and evacuated. A large phlegmonous fluid collection was present in the right lower quadrant surrounding a hard mass at the junction of the terminal ileum and the cecum with inflammatory stricturing extending onto the cecum. The decision was made to perform a right hemicolectomy with primary anastomosis owing to the obstructing nature and concern for a malignant origin of the mass. Following the procedure, the patient had an uncomplicated recovery with return of bowel function on postoperative day 3 and was discharged on postoperative day 5 in stable condition. Please see Figure 4 for a complete timeline of the patient’s course. The patient was seen

Figure 2. Diagnostic laparoscopy demonstrating band in the right lower quadrant across the terminal ileum.

Figure 3. Computed tomography demonstrating progression and worsening of high-grade small bowel obstruction with transition in the right lower quadrant.

Figure 4. Timeline of patient’s pathological course. POD – postoperative day.
in the clinic 1 week and 1 month after hospital discharge. He reported no recurrence of any obstructive symptoms, such as abdominal pain, constipation, or distention. Owing to the extensive abdominal surgery performed to relieve the obstructive, the patient can be at risk for further heterotopic ossification formation and has been instructed to reach out to our team if any symptoms return. He has remained asymptomatic for approximately 4 months.

Pathological examination of the mass demonstrated idiopathic heterotopic mesenteric ossification with superimposed fibrous adhesion, causing severe constriction and obstruction of the nearby looped segment of terminal ileum. On histological analysis, the mass was described as having multifocal ossifications that were otherwise distributed in a linear fashion. There was a slight zonal change of the ossification showing more osteoblastic rimming around the bony trabeculae of the peripheral and a more advanced portion of bone with a more osteoid matrix. Furthermore, most of the sample demonstrated osteoblastic trabeculae and very limited areas of osteoclasts or cortical bone, consistent with early stages of ossification. Please see Figures 5-8 for complete pathological evaluation imaging.

Discussion

Admission to the hospital for small bowel obstruction occurs at a rate of 350,000 cases per year in the United States. The reported mortality related to small bowel obstruction is
approximately 10%, and the surgical intervention rate is approximately 20% [8,9]. The standard of care in hemodynamically stable patients without signs of bowel ischemia is conservative management. This consists of nasogastric decompression, fluid resuscitation, correction of electrolyte abnormalities, and serial abdominal examinations [10,11]. Adhesions from previous surgeries represent the overwhelming cause of small bowel obstruction in the United States. Other causes include malignant or benign tumors or masses, hernias, and other pathology [2].

Congenital bands are defined as abnormal maladaptive peritoneal folds that are formed during embryogenesis [3]. Many go unnoticed and remain asymptomatic but can theoretically cause obstruction, intussusception, internal hernias, and incarcerated or strangulated hernias. Owing to the low incidence of congenital bands causing obstruction in adults, most clinicians fail to include it in the differential diagnosis for small bowel obstruction. This may increase the likelihood of intestinal necrosis or fatal outcomes, as attempts at conservative management are prolonged when an obvious obstructive source is absent [3,12]. A review of the available literature showed only 58 cases of small bowel obstruction caused by congenital bands in adults [4]. It is safe to assume the prevalence of congenital bands is far higher in the adult population; however, only a portion become pathogenic. Adult onset of pathogenic obstruction from congenital bands is almost clinically indistinguishable from other pathology. Vague distinguishing features include the presence of recurrent obstructive symptoms in a young patient without previous surgery or trauma. Less obvious symptoms include recurrent episodes of abdominal pain, bloating, and nausea not related to any certain food group, seemingly random periods of constipation, and signs such as a high pain tolerance to severe distention and massive functional bowel dilation. Congenital bands are most often found at the ileum, and thus patients with unprovoked lead points at this location should prompt inclusion of bands in a differential diagnosis [3,4]. It is important to complete a thorough history in patients with bowel obstruction of unknown cause to pick up on subtle hints of a chronic partially obstructive state. The presented patient followed the classic presentation of adult congenital bands, with recurrent obstructive symptoms without inciting events or pertinent history and with imaging demonstrating a potential lead point near the terminal ileum. After successful management of this condition, the patient then developed a new pathological process.

Heterotopic ossification is the process of bone formation in tissues that do not normally undergo skeletal ossification. It most commonly occurs in the hip area following orthopedic surgical procedures, specifically, total hip arthroplasty [13]. Heterotopic mesenteric ossification, also known as ossificant myositis or intra-abdominal myositis ossificans, refers to the development of an ossifying pseudotumor in the mesentery or colonic tissue. This disease process was initially believed to be exclusively associated with invasive abdominal surgery or major trauma [7]. However, in reality, the exact pathogenesis of this phenomenon remains speculative. The most widely accepted hypothesis suggests that an initial incident, such as trauma, sepsis, burns, or major abdominal surgery, activates an inflammatory cascade into surrounding undifferentiated mesenchymal cells that in turn undergo differentiation into osteoblasts or chondroblasts [14,15]. This has been demonstrated in mouse models in which hypoxia and TGF-beta release activated bone morphogenic protein, thus stimulating multipotent mesenchymal cells to undergo osteoblastic metaplasia [7,16]. They further demonstrated that the osteoblasts subsequently proliferated in a uniform manner, leading to bony trabeculae resembling mature cortical bone, as seen in the pathology described above. Prior to admission, the presented patient had no prior trauma, surgery, chronic inflammatory diseases, or malignancy. This supports the conclusion that the inciting event in this case was the diagnostic laparoscopy.

A recent review of heterotopic mesenteric ossification determined that since 1983 there is a total of only 73 cases cited in the literature. It was determined that 90% of those cases were reported in men, with a median age of 48.28±18.27 years. In that study, only 4 patients presented without a history of previous life-threatening trauma or major abdominal surgery. One of these patients experienced a large bowel obstruction at the level of the sigmoid colon. This patient had radiological evidence of a solid mass originating at the sigmoid colon with multiple loops of bowel adhered to it, requiring extensive surgery [17]. The remaining 69 patients had previous laparotomies. This reiterates the unique nature of the presented case report because the patient developed such a strong reaction following minimally invasive surgery [18].

The pathological presentation of heterotopic mesenteric ossification has been reported as early as 3 weeks after the inciting event up until years following [18]. Imaging can be a useful adjunct in the diagnosis of heterotopic mesenteric ossificans. CT evidence of a solid, hypertenatuating mass indicates the presence of mature cortical bone located at the periphery. However, it is important to note that this is not present during the early phase of bone formation. Early heterotopic ossifications can go undetected on imaging because the early phase soft tissue mass has yet to undergo mineralization followed by maturation to peripheral cortical bone [19-21]. This reflects the experience of the presented case that had a negative CT for any hypertenatuating bone lesions, histological analysis that is consistent with early heterotopic ossificans (mostly osteoblastic trabeculae, minimal areas osteoclasts/cortical bone), and timing consistent with an early postoperative period. Although it is possible that the heterotopic ossification
could have been present before the patient’s first surgery, the immature features found in the histologic examination suggest early bone formation. In addition, evidence of a mature lesion would be visible on imaging.

Conclusions

This case report presents the surgical management of 2 rare conditions occurring in a single patient. Initially, the patient presented with acute-on-chronic obstruction secondary to a congenital band that was managed laparoscopically. This differential diagnosis is rarely pathogenic but should be considered in the obstructed virgin abdomen of a young or middle-aged adult with ileal proximity and chronic intermittent obstruction. Following successful intervention, the patient experienced an obstruction and underwent reoperation secondary to a new obstructing mass that was consistent with heterotopic mesenteric ossification on final pathology. The review of the available literature confirms this as the earliest pathological case of heterotopic mesenteric ossificans and highlights its consideration in the laparoscopic postoperative patient, which has not been previously reported. It is further unique as CT was negative owing to the pathological stage of bone growth in the early presentation. This report serves to highlight that no patient is immune to rare pathologies. Furthermore, in the setting of unique causes of bowel obstruction, it demonstrates the importance of proper clinical judgment and appropriate surgical management in providing successful patient outcomes. This patient was managed at a community hospital general surgery program and, following 2 surgical interventions, had complete resolution of his symptoms.

Declaration of Figures’ Authenticity

All figures submitted have been created by the authors who confirm that the images are original with no duplication and have not been previously published in whole or in part.

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