Open Access Original Research Article

MedPeer Publisher
Abbreviated Key Title: MedPeer
ISSN : 3066-2737
homepage: https://www.medpeerpublishers.com

SMALL BOWEL OBSTRUCTION CAUSED BY A TRICHOBEZOAR IN AN 8-YEAR-OLD GIRL: IMAGING FINDINGS AND THE RAPUNZEL SYNDROME

DOI: 10.70780/medpeer.000QGRA

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ABSTRACT

Trichobezoars are concretions of ingested hair that accumulate within the gastrointestinal tract, most commonly in the stomach. They are predominantly observed in young females with trichophagia, often in the context of underlying psychiatric disorders. Small bowel obstruction caused by a trichobezoar is a rare but potentially serious complication. The Rapunzel syndrome, characterized by a gastric trichobezoar with a tail extending through the pylorus into the small intestine, is an even rarer variant. We report the case of an 8-year-old girl who presented with acute abdominal pain and signs of intestinal obstruction. Ultrasound demonstrated an arciform hyperechoic line with complete posterior acoustic shadowing in the left iliac fossa, suggestive of a bezoar. Contrast-enhanced CT confirmed the diagnosis by revealing small bowel distension and a well-defined, heterogeneous, intraluminal mass in the distal ileum with entrapped air, characteristic of a trichobezoar causing mechanical obstruction. Surgical exploration confirmed a large trichobezoar with a gastric body and an ileal tail consistent with Rapunzel syndrome. This case illustrates the key imaging features of trichobezoar-related intestinal obstruction and emphasizes the role of CT in establishing the diagnosis and guiding surgical management.

KEYWORDS

Trichobezoar; Rapunzel syndrome; Small bowel obstruction; Pediatric; Computed tomography; Ultrasound; Trichophagia

MAIN ARTICLE

INTRODUCTION

Bezoars represent aggregates of non-digestible substances that progressively collect within the alimentary canal. Their nomenclature reflects their composition: trichobezoars consist of hair, phytobezoars of plant fiber, lactobezoars of coagulated milk, and pharmacobezoars of medication residues. Trichobezoars are the most common type in the pediatric population and result from trichophagia, the compulsive ingestion of hair, which is frequently associated with trichotillomania and other psychiatric comorbidities.

Trichobezoars predominantly affect young females, with approximately 90% of cases occurring in girls, and a peak incidence during adolescence. They typically form in the stomach, where hair becomes trapped in the gastric folds and, being resistant to digestion, progressively accumulates into a compact mass. While most trichobezoars remain confined to the stomach, in rare cases, the mass extends through the pylorus into the duodenum and small intestine, a condition known as the Rapunzel syndrome, first described by Vaughan et al. in 1968.

Small bowel obstruction caused by a trichobezoar is a rare complication, with the terminal ileum being the most common site of obstruction. We present the case of an 8-year-old girl with acute intestinal obstruction secondary to a trichobezoar, diagnosed by ultrasound and CT, with surgical confirmation of the Rapunzel syndrome.

CASE REPORT

An 8-year-old girl was admitted to the pediatric emergency department with acute-onset abdominal pain, nausea, bilious vomiting, and failure to pass flatus for 48 hours. The parents reported a history of intermittent abdominal pain and constipation over the preceding months but no prior surgical history. On direct questioning, the mother acknowledged a long-standing habit of hair pulling and chewing by the child. Physical examination revealed a distended, diffusely tender abdomen with high-pitched bowel sounds. A firm, non-mobile mass was palpated in the left iliac fossa. Laboratory investigations were unremarkable except for a mild leukocytosis.

Abdominal ultrasound identified a curvilinear hyperechoic structure with complete posterior acoustic shadowing in the left iliac fossa, within the lumen of a distended bowel loop, highly suggestive of a bezoar (Figure 1).

CT performed with intravenous contrast confirmed small bowel obstruction with significant proximal bowel distension and a clear transition zone in the distal ileum. At the site of obstruction, a well-defined, ovoid, heterogeneous intraluminal mass was identified, displaying a characteristic mixed-density pattern with entrapped air pockets within a predominantly hypodense matrix, surrounded by oral contrast medium and without any parietal attachment (Figures 2–3). No pneumoperitoneum or signs of bowel ischemia were observed.

The patient underwent emergent exploratory laparotomy. A large, dark-colored trichobezoar was found occupying the gastric lumen with a long tail extending through the pylorus and duodenum into the distal ileum, where it caused complete obstruction, consistent with the Rapunzel syndrome. The bezoar was extracted via a combined gastrotomy and enterotomy. The specimen measured 25 cm in total length and was composed entirely of compacted human hair. The child had an unremarkable postoperative recovery. The patient was referred to pediatric psychiatry for management of trichophagia and trichotillomania, and was discharged on postoperative day 7.

DISCUSSION

Epidemiology and pathogenesis

Trichobezoars are predominantly found in young females (over 90% of cases), with a mean age of 10–12 years and a peak incidence during adolescence [10]. They result from trichophagia, which is frequently associated with underlying psychiatric disorders including trichotillomania, anxiety, depression, obsessive-compulsive disorder, or intellectual disability. Because hair resists both acid hydrolysis and peristaltic clearance, individual strands become lodged within the mucosal rugae and steadily coalesce into a dense concretion that gradually conforms to the gastric cavity. Small bowel obstruction caused by bezoars is rare, with the terminal ileum being the most common site of obstruction due to its relatively narrow caliber and reduced peristaltic activity at the ileocecal valve.

Clinical presentation

The clinical presentation of trichobezoars is often insidious, and patients may remain asymptomatic for prolonged periods. Common symptoms include epigastric fullness, nausea, postprandial vomiting, and progressive weight loss. Acute presentations include intestinal obstruction (complete or partial), with colicky abdominal pain, bilious vomiting, obstipation, and abdominal distension. Less common complications include gastrointestinal bleeding, perforation, peritonitis, pancreatitis, and obstructive jaundice. The Rapunzel syndrome,

characterized by a gastric trichobezoar with an extending tail causing distal obstruction, represents the most dramatic presentation.

Imaging findings

Ultrasound (Figure 1): Ultrasound may suggest the diagnosis by demonstrating a characteristic curvilinear hyperechoic line (arciform image) with complete posterior acoustic shadowing within the gastric or intestinal lumen. This appearance reflects the dense, compacted nature of the hair mass, which strongly attenuates the ultrasound beam. Associated findings may include distended fluid-filled bowel loops proximal to the site of obstruction and intraperitoneal free fluid in cases of perforation.

Computed tomography (Figures 2–3): Among available imaging techniques, CT offers the highest combined sensitivity and specificity for confirming a bezoar as the cause of mechanical bowel obstruction. CT demonstrates the bezoar as a well-defined, intraluminal mass of heterogeneous, predominantly low density, with a characteristic "mottled" appearance created by entrapped air and food particles within the hair matrix. The mass is surrounded by oral contrast or intestinal fluid and has no parietal attachment, a key feature distinguishing it from an intraluminal neoplasm. CT accurately identifies the level and cause of the obstruction, assesses for signs of bowel ischemia (wall thickening, decreased enhancement, pneumatosis), and evaluates for the extension of the bezoar through the pylorus into the small bowel (Rapunzel syndrome). The presence of air entrapped within the mass is a highly suggestive finding that strongly supports the diagnosis of bezoar. Kyin et al. (2023) demonstrated the utility of 3D CT rendering in preoperative planning for Rapunzel syndrome, providing precise delineation of bezoar extent through the pylorus and into the small bowel [9]. Koh et al. (2022) reported a case where a trichobezoar masqueraded as massive splenomegaly on initial imaging, highlighting the importance of careful CT analysis to avoid diagnostic pitfalls [14].

Differential diagnosis

The differential diagnosis of an intraluminal mass causing small bowel obstruction in a child includes intussusception (with or without a lead point), foreign body, intraluminal neoplasm (Burkitt lymphoma, gastrointestinal stromal tumor, carcinoid), fecaloma, and gallstone ileus. The characteristic CT findings of a bezoar, particularly the mottled air pattern and absence of parietal attachment, usually allow confident differentiation from these entities.

Management

The management of trichobezoars causing intestinal obstruction is primarily surgical. Laparotomy with gastrotomy and/or enterotomy for bezoar extraction remains the standard of care, particularly for large bezoars and those with distal extension (Rapunzel syndrome). Laparoscopic approaches have been described for smaller, uncomplicated gastric bezoars. Endoscopic fragmentation and removal may be attempted for small gastric bezoars but is generally ineffective for large or compacted masses. HanBin et al. (2022) and Haggui et al. (2022) confirmed that laparotomy with gastrotomy remains the standard of care, as endoscopic retrieval is rarely feasible due to the large size and firm consistency of trichobezoars [12,13]. Crucially, psychiatric evaluation and long-term behavioral therapy are essential components of management to address the underlying trichophagia and prevent recurrence. While recurrence has been reported in up to 20% of cases without psychiatric follow-up [2], Mirza et al. (2020) reported no recurrence in 17 surgically managed pediatric cases when adequate psychiatric care was provided [11].

CONCLUSION

Trichobezoar-related small bowel obstruction is a rare but important diagnosis to consider in young girls presenting with acute intestinal obstruction. Ultrasound can suggest the diagnosis, while CT is the modality of choice for confirming the bezoar, localizing the obstruction, and assessing for complications including the Rapunzel syndrome. Long-term management requires both surgical extraction and sustained psychiatric follow-up to address the underlying trichophagia and reduce the risk of recurrence.

FIGURES

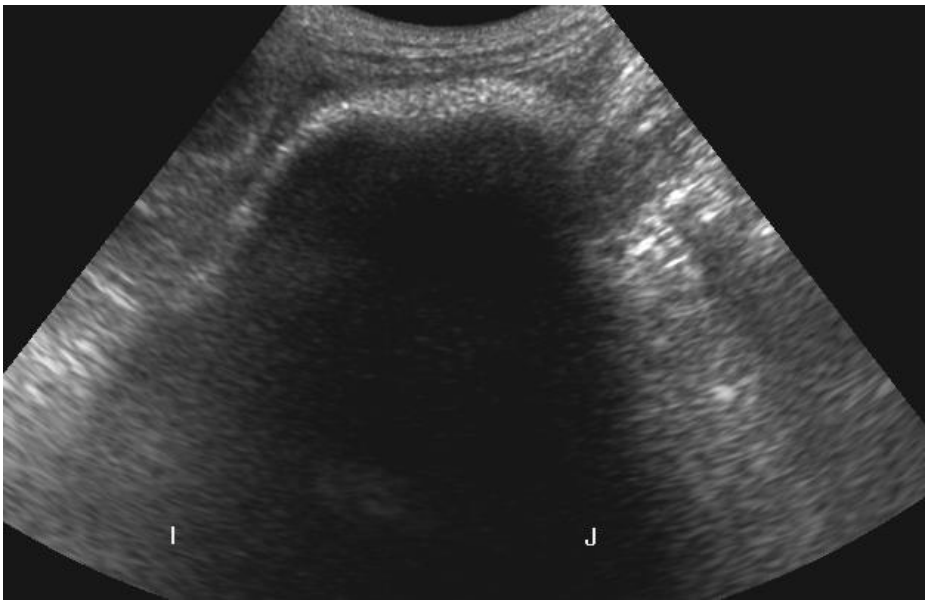

Figure 1. *Abdominal ultrasound demonstrating a curvilinear hyperechoic structure (arciform line) with complete posterior acoustic shadowing within a distended bowel loop in the left iliac fossa, characteristic of an intraluminal bezoar.*

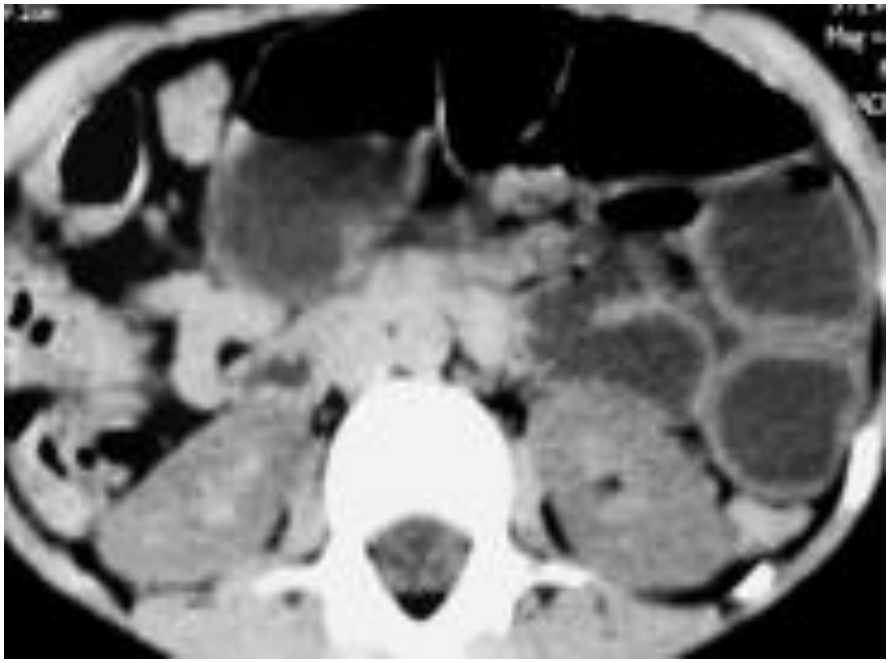

Figure 2. *Axial contrast-enhanced CT demonstrating significant small bowel distension with multiple air-fluid levels proximal to the obstruction site. A well-defined, heterogeneous intraluminal mass is seen in the left iliac fossa, consistent with a trichobezoar causing mechanical obstruction.*

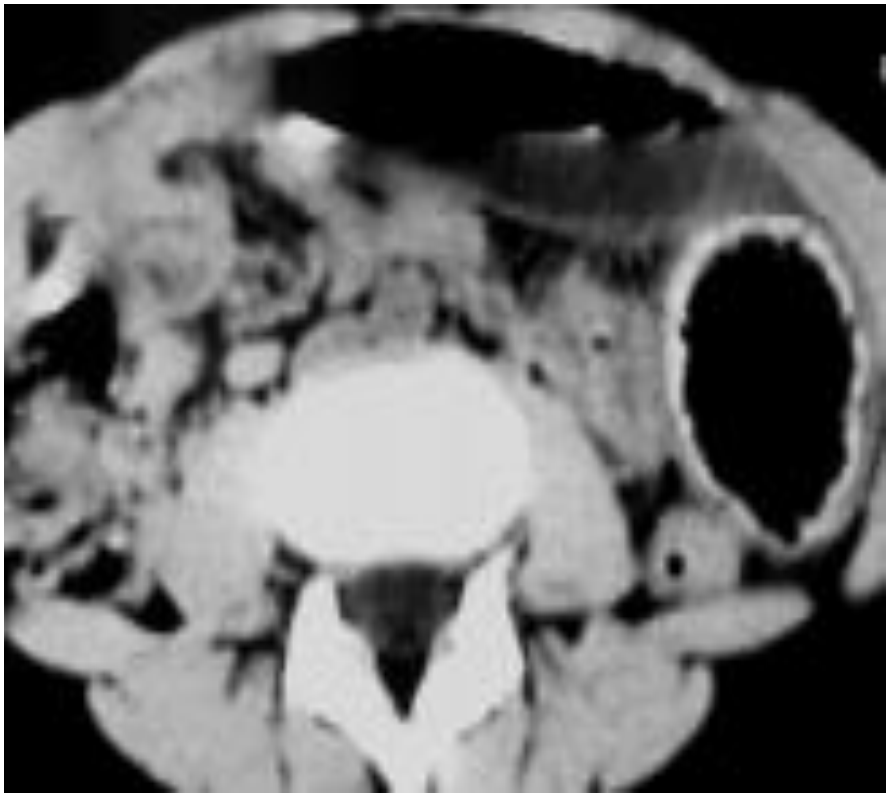

Figure 3. *Axial contrast-enhanced CT at the level of the obstruction showing the intraluminal trichobezoar as an ovoid, heterogeneous mass of mixed density with entrapped air pockets within a hypodense matrix. The mass has no parietal attachment, and is surrounded by intraluminal fluid.*

ACKNOWLEDGEMENTS

Ethics approval and consent to participate: The legal guardian of the patient granted written permission for the publication of this case, including all clinical and imaging findings.
Funding: No specific financial support was allocated for this publication.
Conflict of interest: The authors have nothing to disclose.
Acknowledgments: None.

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