



Laparoscopic removal of intragastric trichobezoar in a child: A case report

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ABSTRACT

Introduction: A trichobezoar is a mass of indigestible hair in the gastrointestinal tract caused by hair ingestion, usually associated with trichotillomania and trichophagia. Although sometimes asymptomatic, it can become a rare cause of intestinal obstruction and require an emergent surgical intervention. The operative approach of choice, laparotomy versus laparoscopy, is still controversial.

Case presentation: A 11-year-old girl was admitted to our institution with abdominal pain, vomiting and anorexia for 3 days. On abdominal examination, she had diffused abdominal pain with tenderness in the mesogastrium, with no palpable mass. Abdominal computed tomography (CT) scan and barium meal study shown a large gastric mass. Upper gastrointestinal (GI) endoscopy identified an enormous trichobezoar, which was later removed laparoscopically. An anterior gastrotomy was performed and the bezoar was then transferred *en bloc* into the endo-bag. The neck of the endobag was then exteriorized through the umbilical incision and removed by gradual fragmentation. The volume and size of the phytobezoars were 1875 cm³ and 25 × 15 × 5 cm. The patient was discharged on the 5th postoperative day without any complications.

Conclusion: Successful laparoscopic management of pediatric trichobezoar may be accomplished by a 4-ports approach. It allows a lower intraoperative risk of contaminations, a rapid recovery and good cosmetic results in children.

1. Introduction

Bezoars are retained concretions of indigestible foreign material that accumulate and conglomerate in the gastrointestinal tract, commonly in the stomach. Bezoars can be divided into four types based on their representative substances: trichobezoars, phytobezoars, lactobezoars and pharmacobezoars [1].

Trichobezoar is defined as 'hair bezoar' and is a rare presentation, usually associated with psychiatric disorders such as trichotillomania and trichophagia, respectively, the urge to pull out one's own hair and the urge to eat it [2]. A trichobezoar is usually located in the stomach but may extend through the pylorus into the duodenum and small bowel (Rapunzel's syndrome) [3]. They are a relatively rare disease entity that occur predominantly (up to 90%) in females under the age of 20 and often in children. The exact incidence rate of this disease is unknown but, based on the case series, 5–30% of the patients with trichotillomania develop trichophagia, while

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1–35% of them will present with a trichobezoar [4–6]. There is no consensus in the literature regarding a correlation between prevalence and race [7].

Patients who have a trichobezoar may be asymptomatic or present with vague symptoms; 80% of them refer a feeling of epigastric discomfort [8]. Other symptoms include abdominal bloating, nausea and vomiting, early satiety, post-prandial fullness, halitosis, anorexia, dysphagia and weight loss [9,10]. Considerable weight loss may be due to early satiety and recurrent vomiting. Gastric bezoars may result in mucosal ulcerations from pressure necrosis and subsequent gastrointestinal bleeding, as well as gastric outlet obstruction [2]. Patches of alopecia may be recognized due to trichotillomania [11].

Surgical therapy is the gold standard approach for gastric and intestinal bezoars. The preferred option is gastrotomy and removal of the mass by laparotomic or laparoscopic technique.

We describe the case of a giant trichobezoar in a young girl that needed emergent surgical intervention and psychiatric follow-up. We highlight the fundamental tricks to successfully remove it laparoscopically without extending the port-site incision, and we review the existing literature.

This manuscript was prepared following the CARE guidelines (<https://www.care-statement.org>).

2. Case report

An 11-year-old girl presented to our Emergency Department for recent episodes of vomiting, decreased bowel movements, anorexia and abdominal pain that had acutely worsened over the past 3 days. She denied weight loss, nausea, and early satiety.

The child had no previous history of gastric or intra-abdominal surgery.

The anamnesis revealed that the patient was diagnosed with mild developmental delay without an identifiable cause and was managed by a neuropsychiatrist. No history of observed trichotillomania and trichophagia could be documented.

At the time of admission, physical examination revealed she was in the 75th percentile for height and weight. She had diffused abdominal pain with tenderness in the mesogastrium, with no palpable mass. Laboratory values were normal (hemoglobin 13.7 g/dl, hematocrit 40%, white blood cells $11980 \times 10^6/L$ and C-reactive protein 8.78 mg/L).

Abdominal x-ray revealed multiple air-fluid levels consistent with intestinal obstruction and there was a suspicion of free peritoneal air (Fig. 1).

For further diagnostic investigation, she underwent an abdominal computed tomography (CT) scan, which demonstrated a gastric mass (Fig. 2). A barium meal study also showed a large intra-gastric filling defect (Fig. 3). Based on the above, a gastric trichobezoar was suspected.

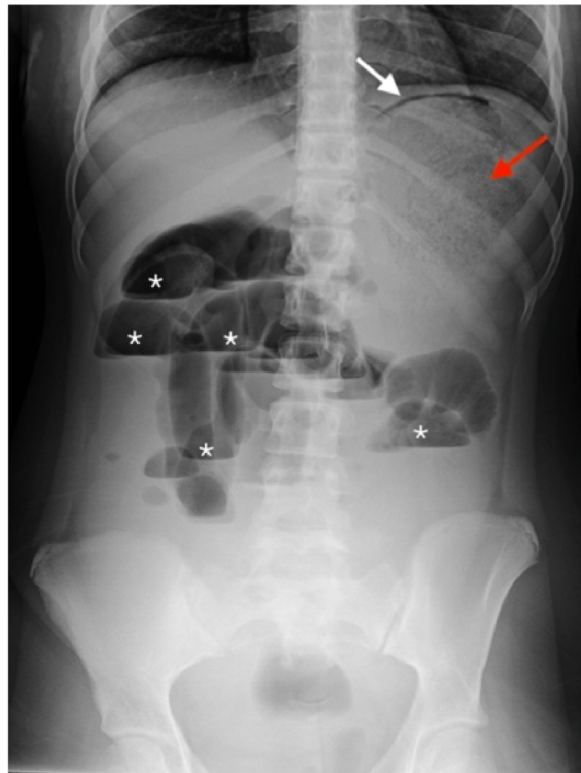


Fig. 1. Plain abdominal X-ray demonstrating multiple air-fluid levels (asterisks), stomach filled with ingested material (red arrow), doubt of free air layer (white arrow).



Fig. 2. CT scan: transverse view demonstrating overdistended stomach (asterisks), with thickened and multiple wall defects compatible with gastric ulcers (white arrow).

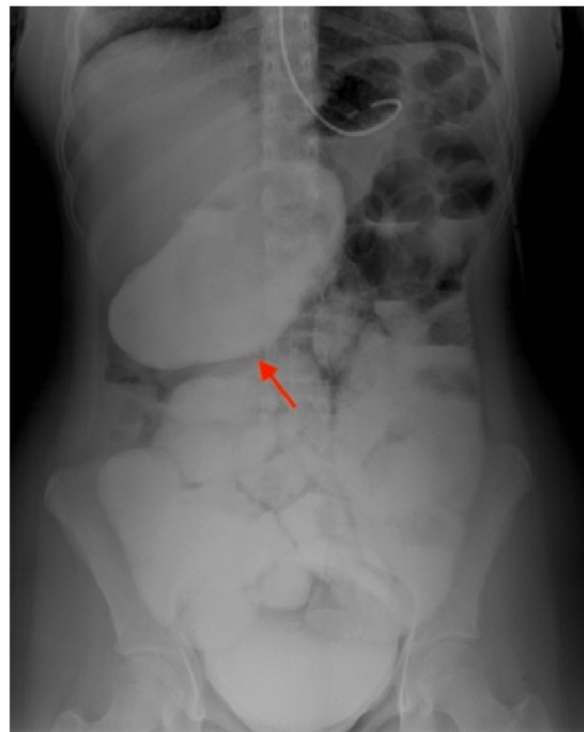


Fig. 3. Gastrointestinal contrast swallow study revealing a large gastric filling defect (red arrow).

An upper digestive endoscopy was requested and revealed a mass formed by hair, food and mucus, oval-shaped and occupying the gastric cavity (Fig. 4). The gastric mucosa was normal. The size of this mass did not allow us to remove it endoscopically, and therefore, the patient was referred for laparoscopic removal.

Under general anesthesia, a 10-mm infraumbilical camera port was placed, and pneumoperitoneum was created using 10 mmHg pressure. A 30-degree laparoscope was introduced and a laparoscopic guided TAP block with 20 ml of ropivacaine 0.2% was performed.

Two 5-mm trocars were placed in the right and left mid abdomen. During operation, an additional 15-mm access was placed in the left iliac fossa, through which a 15 mm laparoscopic bag was inserted (Fig. 5).

The surgeon and assistant were standing on the right side of the patient and a 2nd assistant on the left side. The screen was placed on the left side of the patient.

Under direct vision of the abdominal cavity, we did not find any macroscopic abnormality, except the evidence of gastric dilatation. We placed an open wet gauze under the great curvature to protect the abdominal cavity from spillage of material.



Fig. 4. Endoscopic photo shows a hairball in the stomach (red arrow).

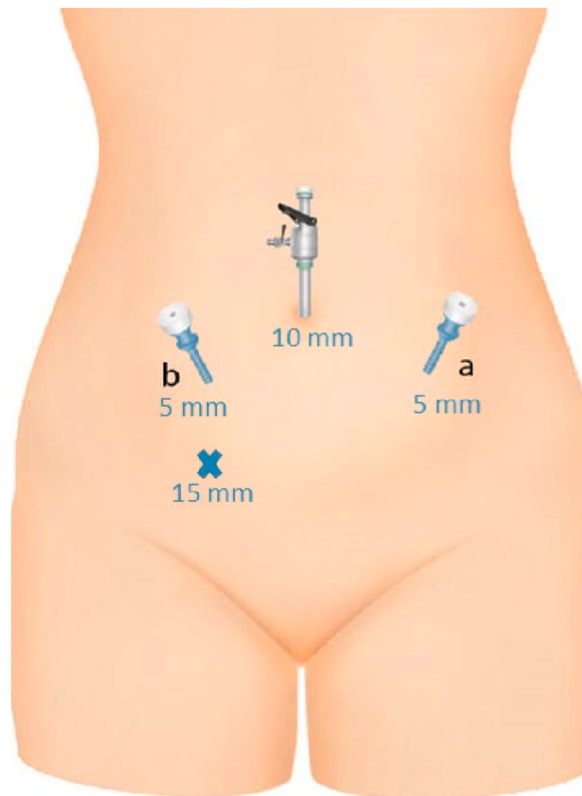


Fig. 5. Diagram of port siting: camera port placed in the umbilicus; operating ports (a, b) placed in right and left mid abdomen; assisting access in suprapubic right area.

An anterior L-shaped incision of about 7 cm extending from the body of the stomach to the antrum was made with a Harmonic scalpel (Ultracision Harmonic Scalpel®; Ethicon Endo-Surgery, Cincinnati, OH). To keep the gastrotomy open and help the bezoar retrieval, a stay stitch was placed through the stomach wall. The «window» opening allows to have a greater removal surface with less stretching on the stomach wall, reducing the risk of spillage. The bezoar was immediately visualized, appearing hard and compact. Gentle traction was applied to separate the mass from the gastric mucosa. The laparoscopic bag (USSC 15-mm Endo Catch II; U.S. Surgical Corp) was opened in front of the stomach. Using 2 graspers, the bezoar was then transferred *en bloc* into the endo-bag, that was then closed and placed in the pelvis. The gauze was removed by a 10-mm endobag (USSC 10-mm Endo Catch®; U.S. Surgical Corp).

The gastrotomy was closed with a single layer suture with a 2-0 V-lock suture (2/0 PDS) and covered with a small layer of omentum. The integrity of the suture was tested by insufflation of air into the stomach via the nasogastric tube. Exploration of surgical field did not show any spillage of gastric material.

The neck of the endobag was then exteriorized through the umbilical incision. Using Kocher's forceps, the trichobezoar was removed by gradual fragmentation and extracted piecemeal. The giant trichobezoar volume was 1875 cm³, measuring 25 × 15 × 5 cm (Fig. 6).

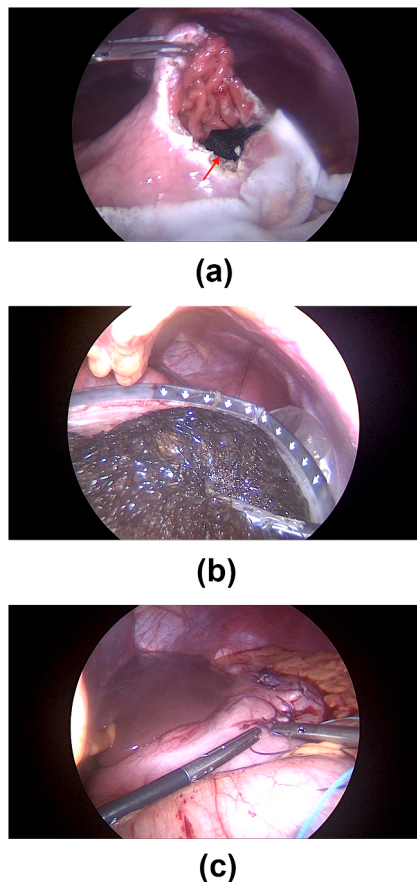


Fig. 6. Intraoperative pictures: (a) the bezoar seen through the gastric incision (red arrow) (b) bezoar guided into endobag (white arrow) and (c) gastrotomy closure.

The procedure took about 3 hours. The naso-gastric tube was removed on postoperative day 2. The child had an uneventful recovery, feedings were started on 3rd postoperative day and the patient was discharged on 5th after psychiatric consultation. At 4-month follow-up, she has no wound complications and is tolerating a diet. Once she fully recovered after the surgical intervention, she was referred to the local pediatric Neuropsychiatry service.

3. Discussion

The diagnosis of trichobezoar is challenging. Clinical and X-ray evaluations are not precise enough to provide the diagnosis; plain films often show the presence of a non-specific mass or indirect sign of intestinal obstruction [12]. Abdominal ultrasound may reveal a posterior acoustic shadowing in the gastric region due to echogenicity of hair. An upper gastrointestinal series and an abdominal computed tomography (CT) scan may demonstrate the presence of a heterogeneous intraluminal mass (interspersed with gas) causing a filling defect in the stomach. CT scan shows high sensitivity (up to 90%) and specificity (up to 60%) [13]. However, for most patients, the final diagnosis can be achieved only by upper gastrointestinal endoscopy. Furthermore, endoscopy permits to detect the real dimension and localization of trichobezoar and the presence of complications (gastric mucosa erosion, ulceration and perforation). In case of small trichobezoar, endoscopic removal (in-block or fragmented) can be chosen [14].

Various treatments have been proposed for the removal of gastric trichobezoar, however the ideal approach is still not defined. The current treatment of trichobezoars depends on their size/volume and their location. Multiple therapeutic approach such as chemical dissolution, endoscopic removal, laparotomy and laparoscopic surgery have been described. Chemical dissolution is not much effective on trichobezoar, and the results are poor even after prolonged treatment [15–17]. Endoscopic removal of trichobezoar, in a recent study by Gorter et al., is reported as successful in 5% of selected patients [18]. The result is influenced by the dimension and the composition of bezoars, and a disadvantage of the method is that it is time-consuming and laborious. However no major complications are reported [19]. Endoscopy is proposed for little trichobezoars removal, otherwise laparotomy is considered the technique of choice. However, the advent of minimally invasive surgical techniques has allowed the removal of large trichobezoars avoiding laparotomy. The main criticalities in laparoscopic removal of a gastric trichobezoar are the risk of peritoneal spillage and the associated risk of wound and peritoneal contamination as well as longer operative times.

Only few pediatric cases have been published in the literature about the use of laparoscopy in gastric trichobezoar removal, the first by Nirwasa et al., in 1998 [20].

In our study, PubMed database was searched from its beginning until November 30th, 2022. The search terms included ‘Trichobezoar’ and ‘laparoscopy’ or ‘laparoscopic’. Titles and abstracts of the 82 results were evaluated and only the publications about pediatric and adolescent cases were read in full. This resulted in the inclusion of 10 articles (15 cases) on successful laparoscopic removal of pediatric trichobezoar (Table 1).

A total of 16 cases are described and it is possible to recognize 2 different laparoscopic approaches: (1) totally laparoscopic removal without mini-laparotomy [21–25] (2) laparoscopic-assisted mini-laparotomy [20,29]/gastrostomy [26]/gastrocutaneopexy [27,28].

In totally laparoscopic techniques, all the surgeons performed the same surgical steps with the difference, in some cases, of using an assistant port (4th port access) to insert an endobag. The common surgical steps are: (1) ports positioning; (2) gastrotomy; (3) insertion of the trichobezoar in an endobag and (4) exteriorization of the endobag through an abdominal or umbilical port. According to our experience, the 4-ports approach can help the surgeon to avoid peritoneal contamination through the direct placement of the trichobezoar inside the endobag, thus reducing the risk of complications.

Dorn et al. [24] described a technical variation using an intragastric port and positioning three trocars inside the lumen of the stomach. Carbon dioxide distended the stomach to allow the intragastric fragmentation and piecemeal removal of the trichobezoar. Even if this procedure reduces the risk of intra-peritoneal complications, it is burdened by the risk of iatrogenic gastric injuries due to the overdistention of the stomach and the prolonged operative time (more than 6 hours).

The median operative time in laparoscopic removal is 3 hours (varying from 2.10 to 6 hours) and it is strongly related to trichobezoar size, since timing is deeply affected by the fragmentation and extraction time, as it was in our case (1 hour out of 3).

In laparoscopic-assisted techniques [20,29], trichobezoar is removed by mini-laparotomy through extended port or Pfannenstiel or suprapubic incision. These procedures are characterized by low operative time, higher risk of wound infections and poor cosmetic outcome (mini-laparotomy and port incision scars).

Pimpalwar, Javed and Jan [26–28] proposed three different techniques in which a gastrostomy (through the abdominal wall) or a gastrocutaneopexy (into the umbilical or epigastric area) were made. Gastrostomy sutures to the perimeter of the incision avoided any contamination of the peritoneal cavity and wound. Although these techniques incorporate the benefit of minimally invasive approach, they left a midline scar on the abdomen and cosmetic results should be further evaluated. Regarding the operative time, it may be equal or slightly lower than the other reported mini-invasive techniques. Adults’ reviews on laparoscopic vs laparotomic approaches confirm the better outcomes of laparoscopic approach in term of less postoperative pain and blood loss, better cosmesis, and most importantly less risk of wound infection and shorter lengths of hospital stay. These define a clear superiority of laparoscopy over laparotomy.

Current experience on laparoscopic or laparo-assisted removal of trichobezoar is limited to only 16 cases (including the one reported here) and does not allow clear conclusions regarding the best techniques to adopt in children.

According to our experience based on only this case, the 4-ports approach can help the surgeon to avoid peritoneal contamination by placing the bezoar directly inside the bag, thus avoiding any contact of it with the peritoneal surface. To contain the spillage, we recommend to place a gauze in the proximity of the gastric incision. A large «window» gastrotomy allows to insert an endobag with proper dimensions and stiff handle; it reduces both the risk of intraoperative complications and the operative time. The exteriorization of the neck of the bag through the umbilical incision avoids other incisions and scars and offer a good cosmetic result.

Laparoscopy also carries the benefits of highlighting any spillage and allowing irrigation of the peritoneal cavity to prevent possible intra-abdominal complications.

Laparoscopic procedures in pediatrics can be hindered by limited abdominal space, especially in a young child. The placement of a trichobezoar inside the endobag without any spillage requires the skills of an experienced laparoscopic surgeon, otherwise a significant peritoneal contamination could occur.

Table 1
Laparoscopic removal of trichobezoars in children. Reports from the literature.

References	Age(y)/Gender	Port access (n trocar)	Mini-laparotomy	Operative time (hours)	Complications	Trichobezoar volume (cm)	Feeding PO-day
Nirasawa 1998 [20]	7/female	4	Yes/Suprapubic	5	No	11 × 9 × 6	/
Hernandez-Peredo 2009 [21]	12/female	3	No	3.5	No	/	5th
	7/female	3	No	3	No	/	5th
Fraser 2009 [22]	10/female	3	No	/	No	13 × 7 × 6	1st
Cintolo 2009 [23]	4/female	4	No	3	No	15 × 15 × 7	2nd
Dorn 2010 [24]	17/female	4 (1 intragastric port)	No	6	No	15 × 10	4th
Vepakomma 2014 [25]	4/male	4	No	2.10	No	/	4th
Pimpalwar 2014 [26]	9/male	3	Gastrostomy	/	No	/	/
Javed 2016 [27]	9/female	1	Transverse epigastric skin incision	0.30	No	/	3rd
	14/female			0.45	No	/	3rd
	15/female			1	No	/	3rd
Jan 2019 [28]	10/female	2	Umbilical incision	/	No	12 × 10	2nd
	5/female			/	No	15 × 12	2nd
Zmudzinski 2020 [29]	5/female	3	Yes/Pfannenstiel incision	/	No	11 × 11 × 5	/

4. Conclusion

Laparoscopic intragastric removal of a trichobezoar in young children seems to be safe and feasible and offers immediate recovery and a good cosmetic result.

Informed consent was obtained from the patient mother or guardian, for the publication of any potentially identifiable images or data included in this article.

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

All authors attest that they meet the current ICMJE criteria for Authorship.

Author contributions

Conceptualization, AP; methodology GP; Investigation, AC; Original draft preparation, GL; writing-review and editing GL, SC.; Supervision, GP. All authors have read and agreed to the published version of the manuscript.

Institutional review board statement

Data were retrospectively evaluated according to the principles of the Declaration of Helsinki as revised in 2008. The reservedness of the collected information was ensured according to Regulation (EU)/2016/679 GDPR (Regulation (EU) 2016/679), Legislative Decree n.101/18.

Informed consent statement

Informed consent was obtained from all subjects involved in the study.

Data availability statement

Data supporting reported results are archived in the first Author's personal datasets.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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