Research Article ISSN 2689-1093

Surgical Research

Transomental Internal Hernia with Small-Bowel Volvulus in a Virgin Abdomen: A Case Report and Review of the Literature

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Received: 15 Sep 2026; **Accepted:** 22 Oct 2026; **Published:** 30 Oct 2026

Citation: Adala Soume PA, Mangione M, Lefant PY, et al. Transomental Internal Hernia with Small-Bowel Volvulus in a Virgin Abdomen: A Case Report and Review of the Literature. Surg Res. 2026; 8(5): 1-7.

ABSTRACT

Introduction: *Internal hernias account for 0.5–5.8% of small-bowel obstructions. Transomental hernia is the rarest subtype (1–4%). In a virgin abdomen, its mechanism usually remains unexplained.*

Case Presentation: *A 47-year-old woman with no surgical history presented with right upper quadrant pain. The first CT scan showed only non-specific mesenteric fluid infiltration. Pain and vomiting recurred when oral intake was resumed. A second CT scan showed small-bowel obstruction with a fat notch sign and peritoneal effusion. Laparoscopy revealed 80 cm of small bowel volvulated through a defect in the greater omentum, close to the transverse colon. Division of the omental ring allowed reduction without bowel resection. The patient was discharged on postoperative day 4.*

Discussion: *The origin of omental defects in a virgin abdomen is debated: congenital defect, senile atrophy, or unnoticed past inflammation or trauma. CT, the reference examination, is often inconclusive at an early stage. Recurrent pain on refeeding should raise suspicion of intermittent incarceration, and a closed-loop mechanism with peritoneal effusion should prompt early surgery.*

Conclusion: *In small-bowel obstruction in a virgin abdomen, internal hernia should be considered early. Early exploratory laparoscopy is both diagnostic and therapeutic.*

Keywords

Internal hernia, Transomental hernia, Small-bowel obstruction, Virgin abdomen, Laparoscopy, Volvulus.

Introduction

An internal hernia is the protrusion of a viscus, most often the small bowel, through a normal or abnormal peritoneal or mesenteric aperture, without crossing the abdominal wall [1]. Its incidence is 0.2–0.9% in autopsy series, and it causes up to 5.8% of small-bowel obstructions [2]. Prognosis depends on the delay to surgery, as strangulation is common [2,3].

Internal hernias are classically divided into constitutional forms, related to congenital peritoneal fossae or defects, and acquired forms, which are postoperative, post-traumatic or inflammatory [1]. With the rise of gastric bypass surgery, iatrogenic forms dominate the recent literature. Forms occurring in a virgin abdomen, by contrast, have been little studied.

Small-bowel obstruction in a virgin abdomen accounts for 5–16% of small-bowel obstructions [4]. In a Swedish population-based series, 12% of patients operated on for obstruction had no surgical history, and a single band was the cause in 88% of them [5]. These "primary" bands remain largely unexplained.

Transomental hernia, through a defect in the greater omentum,

is the rarest internal hernia: about 1% according to Camera et al. [6] and 1–4% according to other authors [7]. It has no hernia sac and a narrow neck, hence a high risk of strangulation; reported postoperative mortality reaches 30% [7].

We report a case of small-bowel volvulus through a transomental hernia in a patient with no surgical history, treated laparoscopically at La Rochelle Hospital. We discuss the aetiological hypotheses, diagnostic pitfalls and management in the light of the French and European literature.

Case Presentation

A 47-year-old woman with no medical or surgical history, and no previous abdominal surgery, was admitted to the emergency department of La Rochelle Hospital (Hôpital Saint-Louis) with severe right upper quadrant abdominal pain. This was the first episode.

Initial examination: Pain predominated in the epigastrium and right upper quadrant, with no guarding or rigidity reported. Laboratory tests were normal.

First abdominopelvic CT scan: It showed fluid infiltration between small-bowel loops in the mesentery, in a left retro-umbilical position, which was non-specific, with no pathological bowel distension.

Course: The patient was admitted to the gastroenterology department, where symptomatic treatment relieved her pain. When oral intake was resumed, the pain recurred with nausea and vomiting.

Second abdominopelvic CT scan (Figure 1). It showed:

- Mechanical small-bowel obstruction due to a band, with a fat notch sign in the right flank;
- Small-bowel dilatation up to 35 mm in diameter;
- No sign of bowel-wall ischaemia and no colonic distension;
- Moderate intraperitoneal effusion, predominantly in the pouch of Douglas and the paracolic gutters;
- No pneumoperitoneum.

Given the obstruction with persistent pain, exploratory laparoscopy was decided.

Surgical procedure

Under general anaesthesia with orotracheal intubation, the patient was placed supine with both arms alongside the body, the surgeon on her left and the laparoscopic column facing her right flank. After open supra-umbilical access and a 12 mmHg pneumoperitoneum, three trocars were placed: 10 mm supra-umbilical (optic), 5 mm in the left iliac fossa and 5 mm in the left upper quadrant.

Exploration found

- Serosanguinous effusion in the pouch of Douglas, both paracolic gutters and the perihepatic space (Figure 2);
- Dilated small-bowel loops, with an ecchymotic appearance in the right iliac fossa (Figure 2);
- On running the small bowel, an internal hernia through a defect in the greater omentum, located almost flush with the transverse colon, through which approximately 80 cm of small bowel had herniated and volvulated (Figure 3).

The edge of the omental defect, acting as a band, was divided, which released the entire small bowel. Complete running of the bowel found no other volvulus. The loops were judged viable and no resection was required (Figure 4). Abundant peritoneal lavage was performed, the 10 mm port site was closed with absorbable suture, and the abdominal wall was infiltrated with ropivacaine.

Postoperative course

Recovery was uneventful under multimodal analgesia and a proton-pump inhibitor. Bowel function resumed on postoperative day 2, oral intake was well tolerated and the patient was discharged on day 4.

Final diagnosis: small-bowel obstruction due to volvulus through a transomental internal hernia, in a virgin abdomen.

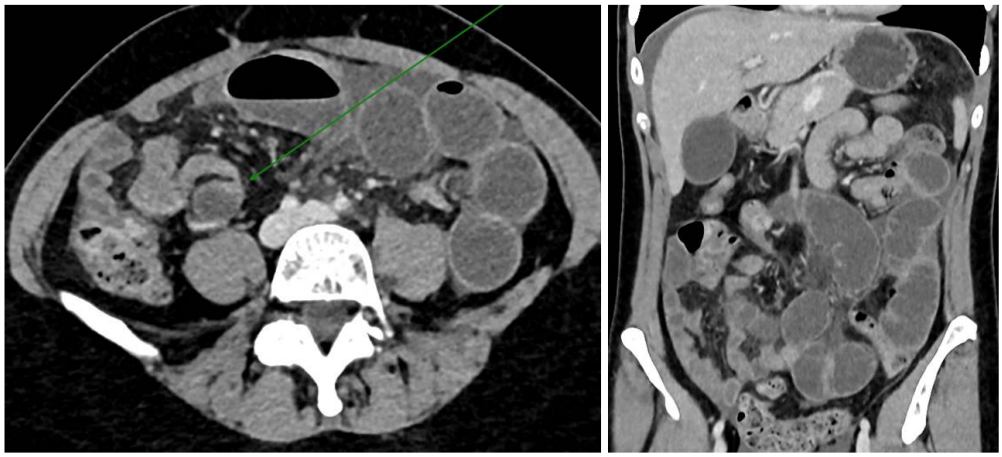


Figure 1: Second abdominopelvic CT scan. (a) Axial view: dilated small-bowel loops. (b) Coronal view: small-bowel obstruction with dilated loops and peritoneal effusion.

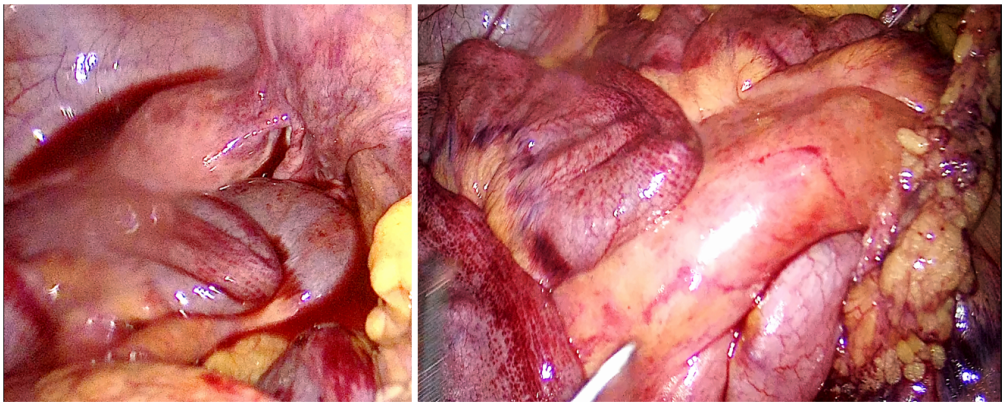


Figure 2: Laparoscopic findings. (a) Serosanguinous fluid in the pouch of Douglas. (b) Dilated, ecchymotic small-bowel loops.

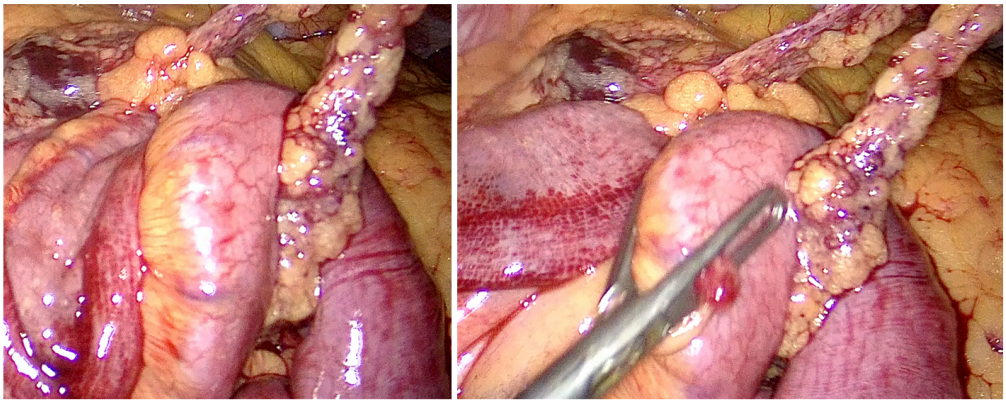


Figure 3: Small bowel herniated through a defect in the greater omentum, close to the transverse colon.

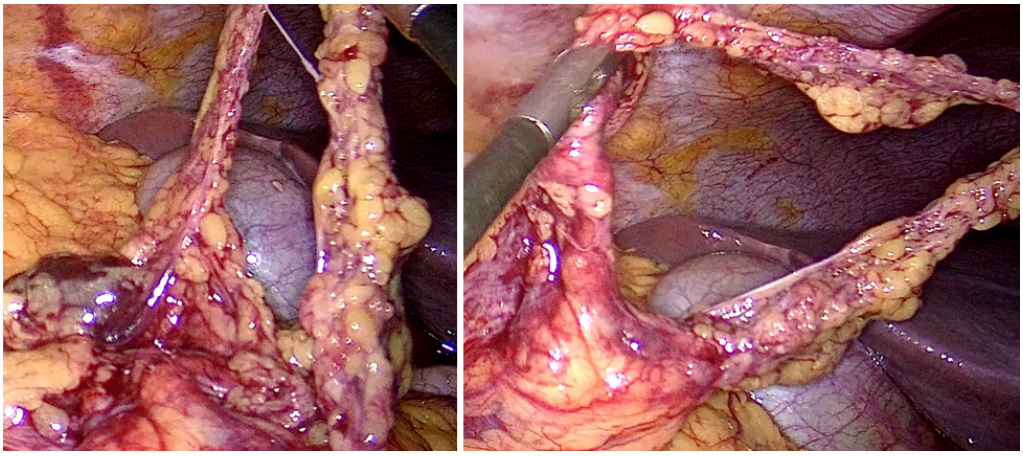


Figure 4: End of reduction and division of the omental ring.

Discussion

This case combines three rare features. A transomental hernia, an abdomen with no previous surgery, and an 80 cm small-bowel volvulus treated entirely laparoscopically without resection. It also illustrates how difficult the diagnosis is at an early stage, and how quickly an apparently benign course can turn into strangulation.

A misleading clinical presentation

The initial picture combined right upper quadrant pain, normal laboratory tests and a non-specific CT scan. Improvement with bowel rest followed by recurrence on refeeding is typical of intermittent incarceration. Mathieu and Luciani (Créteil) describe this pattern: mild abdominal discomfort alternating with episodes of intense periumbilical pain and nausea [1].

Habib and Elhadad (Aulnay-sous-Bois) reported 16 adults operated on for obstruction due to a congenital band, none with previous surgery [8]. Six had experienced similar pain in the preceding month. The preoperative diagnosis was wrong in half the cases (perforated ulcer, appendicitis, cholecystitis,

mesenteric infarction). Five patients had bowel necrosis and one died. Recurrent obstruction in a virgin abdomen should therefore immediately suggest a surgical mechanical cause.

The location of the pain was also misleading. Our patient complained of right upper quadrant pain, which first suggested a biliary or gastroduodenal origin. In retrospect, it matched the supramesocolic position of the omental defect, close to the transverse colon. Normal laboratory tests are common in internal hernia and do not exclude bowel compromise. In the Aulnay-sous-Bois series, five of 16 patients already had necrosis at surgery [8].

Differential diagnosis in a virgin abdomen

In a patient who has never had surgery, small-bowel obstruction has a wider range of causes than in the postoperative abdomen. Adhesions or bands are still the leading cause, found in about half of operated patients in the WSES review, while malignancy accounts for 4–13% of cases [4]. The other causes to consider are external hernias (inguinal, femoral, obturator, umbilical), which must be excluded clinically and on CT ; other internal hernias (paraduodenal, pericaecal, foramen of Winslow, transmesenteric), bands related to a Meckel diverticulum, intussusception (often secondary to a tumour in adult), gallstone ileus and bezoars; and inflammatory strictures, particularly in Crohn disease.

In our patient, the absence of a tumour, of an intraluminal obstacle and of an external hernia on CT pointed towards a band or an internal hernia. As in most series, the precise mechanism was only established at surgery [4,8].

Anatomical and embryological background

The greater omentum derives from the dorsal mesogastrium. It hangs from the greater curvature of the stomach, folds back and fuses with the transverse colon and its mesocolon. Its four fused layers form the lower part of the lesser sac. In adults it contains thin, poorly vascularised and sometimes fenestrated areas.

Two forms of transomental hernia are described: through the omental apron itself, or through the gastrocolic ligament into the lesser sac [6,9]. In our case, the defect lay in the apron, almost flush with the transverse colon, with no herniation into the lesser sac described.

Classification of internal hernias

Mathias et al. (Nancy) distinguish hernias through a pre-existing aperture, contained in a peritoneal sac, from hernias through an abnormal aperture, without a sac [10]. The latter, including the transomental form, mimic band obstruction on imaging [10] (Table 1). This is exactly what our patient's second CT scan showed.

Frequencies from the Meyers classification, as reported by Martin et al. [2]; transomental from [6,7]. Aperture classification from Mathias et al. [10] and Lanzetta et al. [9].

Table 1: Types of internal hernia and approximate frequency.

Type of internal hernia	Aperture	Sac	Approximate frequency
Paraduodenal (right or left)	Pre-existing fossa	Yes	53%
Pericaecal	Pre-existing fossa	Yes	13%
Foramen of Winslow	Anatomical aperture	No (lesser sac)	8%
Transmesenteric / transmesocolic	Abnormal aperture	No	8%
Intersigmoid	Pre-existing fossa	Yes	6%
Retro-anastomotic	Postoperative aperture	No	5%
Transomental	Abnormal aperture	No	1–4%

Aetiological hypotheses in a virgin abdomen

The origin of the omental defect is almost never established with certainty in an adult with no previous surgery. Several non-exclusive mechanisms have been proposed.

The first is a **congenital defect** of the greater omentum. Transomental hernia has a paediatric form, attributed to congenital defects of the omentum or gastrocolic ligament [6,7]. Congenital defects can also remain silent for decades: in the French series of congenital bands, mean age at presentation was 59 years [8]. This hypothesis is plausible in our patient, since a long-standing defect may cause no symptoms until a bowel loop becomes engaged.

The second is **senile atrophy** of the greater omentum. Thinning of the omentum with age is the explanation most often proposed for spontaneous adult cases, which mainly occur after the age of 50 [6,7]. At 47, our patient is younger than the usual age, which makes this mechanism less likely without excluding it.

The third is **past peritoneal inflammation**, a recognised acquired cause [6]. Single bands are significantly more frequent in patients with no previous surgery [11], which suggests that inflammatory episodes may go unnoticed. In a woman, an unrecognised appendicitis, pelvic inflammatory disease, endometriosis or pancreatitis could have caused a localised omental defect. These conditions should be sought in the history.

The fourth is **blunt abdominal trauma**, which is also a recognised acquired cause [6] and should be sought at interview. Finally, many cases remain **idiopathic**, with no identified factor [12,13]. This is the hypothesis retained for our patient, in the absence of any other evidence.

A "virgin" abdomen is therefore not necessarily an intact abdomen. The Swedish series by Tingstedt et al. shows that single bands are significantly more frequent in patients without previous surgery ($p < 0.001$) [11]. Sakari et al. found a band in 88% of operated patients with no surgical history [5]. The omental defect in our patient behaved like a band, hence its division.

Comparison with published transomental hernias

Spontaneous transomental hernias in adults have mostly been reported as isolated cases. Ergenç and Uprak described a 41-year-

old woman with no previous surgery, treated by laparotomy, in whom the herniated ileum was viable; the omentum was divided from the edge of the defect and she was discharged on day 2 [12]. Shafi et al. reported a similar presentation in a virgin abdomen [13]. In Italy, Camera et al. reported a spontaneous strangulated transomental hernia, whose title itself underlines the gap between prospective and retrospective CT reading [6].

The largest series comes from Japan. As summarised by Ahn et al., a review of 188 transomental hernias found that only 6.9% were diagnosed before surgery and that 38.8% required bowel resection [7]. Against this background, our case is notable for three features: a younger patient, a completely laparoscopic approach, and an 80 cm volvulus reduced without resection.

Contribution and limitations of imaging

CT is the reference examination. Signs suggestive of internal hernia are a cluster of dilated small-bowel loops in an abnormal position, displacement of adjacent structures, stretching or engorgement of mesenteric vessels, a whirl sign and a closed loop [14,15]. For the transomental form, a cluster of loops anterior to the transverse colon, in contact with the anterior abdominal wall without interposed omental fat, is suggestive [14]. These signs are often absent outside the obstructive phase.

The *fat notch sign* was described by the Besançon group [16]. It reflects the indentation of a band on the bowel loop, with interposed extraluminal fat. It is significantly associated with bands rather than matted adhesions, and these bands are more often complicated by ischaemia ($p = 0.011$) [16]. Conversely, the small-bowel feces sign is considered a criterion of non-severity [17].

Ischaemia remains the decisive issue. The Montpellier group showed that reduced bowel-wall enhancement, diffuse mesenteric haziness and a closed-loop mechanism predict strangulation (area under the curve 0.91; negative predictive value 97%) [18,19]. Among strangulated patients, mesenteric fluid was also associated with the need for resection (odds ratio 3.6) [19]. In our patient, CT showed no sign of bowel-wall ischaemia, whereas exploration found serosanguinous effusion and ecchymotic loops. The moderate effusion was the only indirect sign of this venous congestion.

Two lessons follow. A normal or non-specific first CT scan does not exclude an intermittent internal hernia. Peritoneal effusion associated with obstruction in a virgin abdomen should raise concern for underestimated bowel compromise.

Closed-loop mechanism: operate or wait?

A volvulus through an internal hernia is by definition a closed-loop obstruction. In a series of 96 closed-loop obstructions due to adhesions or internal hernia, Rondenet et al. (Paris and Montpellier) found that 35% of patients had immediate surgery [20]. Of the 62 patients managed conservatively at first, only 19 (31%) were treated successfully, and 43 (69%) required surgery [20]. A distance of at least 8 mm between the two transition zones was the only independent predictor of success [20].

A closed loop on CT is therefore not, on its own, an absolute indication for emergency surgery, but conservative treatment fails in two-thirds of cases [20]. Zins, Millet and Taourel recommend combining the closed-loop mechanism with signs of ischaemia, the type of adhesion and the clinical course to choose between surgery and observation [21]. In our patient, recurrent pain, vomiting and peritoneal effusion in a virgin abdomen left little room for prolonged observation.

Management

The WSES position paper on small-bowel obstruction in a virgin abdomen reports operative rates of 39–83% [4]. Bands or adhesions are found in 48% of operated patients, and the authors propose applying the guidelines for adhesive obstruction [4]. The Bologna guidelines allow initial non-operative management in the absence of signs of strangulation, with water-soluble contrast as a diagnostic and therapeutic tool, but require surgery in case of failure or signs of severity [22]. Water-soluble contrast was used less often in the virgin abdomen than after previous surgery (35.6% vs 52.2%) [4]. Here, recurrence on refeeding, persistent pain and effusion justified exploration.

Laparoscopy is particularly well suited to the virgin abdomen, which has no parietal adhesions. In the French multicentre study by Levard et al. (308 patients, 35 centres), laparoscopic treatment succeeded in 54.6% of patients [23]. Success was more frequent with a single band, and median hospital stay fell from 10 to 4 days [23]. The European randomised LASSO trial (Finland, Italy) confirmed a shorter stay after laparoscopic adhesiolysis (4.2 vs 5.5 days), with no increase in complications [24]. In the virgin abdomen, however, the WSES review reports more negative explorations after laparoscopy and a substantial conversion rate, which calls for a systematic and complete exploration [4].

A few technical points deserve emphasis. Open supra-umbilical access limits the risk of injury to dilated loops. The whole small bowel must be run to identify the hernia and exclude a second site of volvulus. Dividing the omental ring, rather than pulling the bowel back through a narrow neck, limits the risk of serosal tears on congested loops.

Treatment follows three steps: reduction of the loops, assessment of their viability and management of the defect. The defect may be closed, widely opened by dividing the omentum up to its free edge, or treated by partial omentectomy [12,13]. Division of the ring, as performed here, removes the hernia neck and prevents recurrence. The ecchymotic loops were judged viable after detorsion; in case of doubt, a mini-laparotomy or second-look procedure is recommended. The rest of the omentum should also be inspected for other defects.

The risk of recurrence after surgery for band obstruction is

moderate. In the French prospective multicentre study by Duron et al. (286 patients), overall recurrence was 15.9%, and 5.8% for recurrences requiring surgery [25]. Matted adhesions were the main risk factor [25], suggesting a favourable prognosis after division of a single band in a virgin abdomen. No specific follow-up imaging is required, but the patient should be informed of the warning signs of obstruction.

Strengths and limitations of this report

This report is one of the few descriptions of a spontaneous transomental hernia treated entirely laparoscopically, in a patient younger than the age usually reported. It shows that an extensive volvulus can be reduced without resection if surgery is not delayed. It also documents the progression from a non-specific first CT scan to a band-like obstruction on the second, which is useful for both surgeons and radiologists.

Its limitations are those of a single case. No histological analysis of the omentum was available. Gynaecological, infectious and traumatic history was not explored in detail, which prevents a firm conclusion between the aetiological hypotheses.

Conclusion

Transomental hernia in a virgin abdomen is exceptional and its origin usually remains unexplained. Its presentation is misleading: intermittent pain, normal laboratory tests and an inconclusive first CT scan. Recurrent pain on refeeding, a band-like appearance on CT or peritoneal effusion in a patient who has never had surgery should suggest an internal hernia. Early exploratory laparoscopy then allows diagnosis and treatment, with rapid recovery and no resection if it is not delayed.

Authors' contributions

Hélène Gibelin performed the surgical procedure and critically revised the manuscript for important intellectual content. Patrick Aimé Adala Soumé assisted during the operation and drafted the manuscript. Pierre-Yves Lefant, Matteo Mangione, Valérie Roncheau-Cezard and Alexandre Smirnoff were involved in the follow-up of the patient and reviewed the manuscript. All authors read and approved the final version of the manuscript.

References

1. Mathieu D, Luciani A. Internal abdominal herniations. AJR Am J Roentgenol. 2004; 183: 397-404.
2. Martin LC, Merkle EM, Thompson WM. Review of internal hernias: radiographic and clinical findings. AJR Am J Roentgenol. 2006; 186: 703-717.
3. Ghiassi S, Nguyen SQ, Divino CM, et al. Internal hernias: clinical findings, management, and outcomes in 49 nonbariatric cases. J Gastrointest Surg. 2007; 11: 291-295.
4. Amara Y, Leppaniemi A, Catena F, et al. Diagnosis and management of small bowel obstruction in virgin abdomen: a WSES position paper. World J Emerg Surg. 2021; 16: 36.
5. Sakari T, Christersson M, Karlbom U. Mechanisms of adhesive small bowel obstruction and outcome of surgery; a population-based study. BMC Surg. 2020; 20: 62.
6. Camera L, De Gennaro A, Longobardi M, et al. A spontaneous strangulated transomental hernia: prospective and retrospective multi-detector computed tomography findings. World J Radiol. 2014; 6: 26-30.
7. Ahn SR, Kim KY, Lee JH. Small bowel obstruction caused by spontaneous transomental hernia: a case report. Korean J Gastroenterol. 2022; 80: 186-189.
8. Habib E, Elhadad A. Occlusion de l'intestin grêle sur bride congénitale chez 16 adultes [Small bowel obstruction by a congenital band in 16 adults]. Ann Chir. 2003; 128: 94-97.
9. Lanzetta MM, Masserelli A, Addeo G, et al. Internal hernias: a difficult diagnostic challenge. Review of CT signs and clinical findings. Acta Biomed. 2019; 90: 20-37.
10. Mathias J, Phi I, Bruot O, et al. Hernies internes [Internal hernias]. EMC – Radiologie et imagerie médicale: Abdominale – Digestive. Paris: Elsevier Masson; 2008. Article 33-015-A-37.
11. Tingstedt B, Isaksson J, Andersson R. Long-term follow-up and cost analysis following surgery for small bowel obstruction caused by intra-abdominal adhesions. Br J Surg. 2007; 94: 743-748.
12. Ergenç M, Uprak T. A spontaneous transomental hernia: a rare cause of bowel obstruction. Iran J Public Health. 2023; 52: 201-204.
13. Shafi A, Karmustaji F, Younis MU, et al. Transomental hernia: rare presentation in a virgin abdomen. Cureus. 2024; 16: e76126.
14. Takeyama N, Gokan T, Ohgiya Y, et al. CT of internal hernias. Radiographics. 2005; 25: 997-1015.
15. Doishita S, Takeshita T, Uchima Y, et al. Internal hernias in the era of multidetector CT: correlation of imaging and surgical findings. Radiographics. 2016; 36: 88-106.
16. Delabrousse E, Lubrano J, Jehl J, et al. Small-bowel obstruction from adhesive bands and matted adhesions: CT differentiation. AJR Am J Roentgenol. 2009; 192: 693-697.
17. Delabrousse E, Baulard R, Sarlième P, et al. Le feces sign: valeur d'un signe TDM dans l'occlusion du grêle sur bride ou adhérences péritonéales [Value of the small bowel feces sign at CT in adhesive small bowel obstruction]. J Radiol. 2005; 86: 393-397.
18. Millet I, Taourel P, Ruyer A, et al. Value of CT findings to predict surgical ischemia in small bowel obstruction: a systematic review and meta-analysis. Eur Radiol. 2015; 25: 1823-35.
19. Millet I, Boutot D, Faget C, et al. Assessment of strangulation in adhesive small bowel obstruction on the basis of combined CT findings: implications for clinical care. Radiology. 2017; 285: 798-808.
20. Rondenet C, Millet I, Corno L, et al. CT diagnosis of closed loop bowel obstruction mechanism is not sufficient to indicate emergent surgery. Eur Radiol. 2020; 30: 1105-1112.

21. Zins M, Millet I, Taourel P. Adhesive small bowel obstruction: predictive radiology to improve patient management. Radiology. 2020; 296: 480-492.

22. Ten Broek RPG, Krielen P, Di Saverio S, et al. Bologna guidelines for diagnosis and management of adhesive small bowel obstruction (ASBO): 2017 update of the evidence-based guidelines from the World Society of Emergency Surgery ASBO working group. World J Emerg Surg. 2018; 13: 24.

23. Levard H, Boudet MJ, Msika S, et al. Laparoscopic treatment of acute small bowel obstruction: a multicentre retrospective study. ANZ J Surg. 2001; 71: 641-646.

24. Sallinen V, Di Saverio S, Haukijärvi E, et al. Laparoscopic versus open adhesiolysis for adhesive small bowel obstruction (LASSO): an international, multicentre, randomised, open-label trial. Lancet Gastroenterol Hepatol. 2019; 4: 278-286.

25. Duron JJ, Silva NJ, du Montcel ST, et al. Adhesive postoperative small bowel obstruction: incidence and risk factors of recurrence after surgical treatment: a multicenter prospective study. Ann Surg. 2006; 244: 750-757.

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